

Vantra™ Series

Intermittent Motion Cartoner

Serial Number: M217012

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Standard Documentation Package

- OEM (Original Equipment Manufacturer) Documentation
- Operator Manual (2 Copies)
 - Safety
 - Operator Controls
 - Startup/Shutdown
- Service Manual (2 Copies)
 - Safety
 - Operator Controls
 - Startup/Shutdown
 - Changeover
 - Components
 - Maintenance
 - Recipe Screens
 - Troubleshooting
- Job Aids (2 Copies)
 - Changeover Adjustment Number Settings Chart
 - Changeover Quick Reference Guide
 - Troubleshooting Quick Reference Guide

Documentation USB Flash Drive

- Electrical Programs & Drawings (dwg or dxf, and pdf)
- Operator Manual (pdf)
- Service Manual (pdf)
- Quick Reference Guide Job Aids (pdf)
- Changeover Adjustment Number Settings Chart (Excel)
- Bill of Materials (Excel)
- Assembly Drawings (pdf)
- Reassembly Photos (pdf)

Douglas

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Section 1

Safety

General Safety
Safety Precautions
Safety Map
Locking Out the Machine
Safety Circuits
Light Column



General Safety

Guidelines

- The basic safety rules serve as a guide for proper operation of Douglas packaging equipment. Some of the safety concerns in this section apply to specific machine components that may not be present on your machine. All personnel who work with this machine should learn this information.
- The buyer must follow all procedures and precautions. If personnel must deviate or change
 from the original specifications, he/she should establish appropriate procedures for the
 continued safe operation of the machine.
- We design and manufacture packaging equipment with due consideration and care for generally accepted safety standards. Proper and safe operation of this equipment depends on using sound and prudent operating, maintenance, and servicing procedures under properly trained supervision.
- Always use proper lifting techniques while operating, loading, maintaining, or troubleshooting the machine.
- Be aware of overhead objects while working in or around the machine to prevent head bumps.
- Be aware of dwell conditions; the machine will start automatically when the condition is satisfied.



Safety Symbols



This unsafe practice will result in severe injury or death.

The use of the word Danger always signifies an immediate hazard with a high likelihood of severe personal injury or death if all personnel do not follow instructions and safety precautions.



This unsafe practice could result in severe injury or death.

The use of the word Warning signifies the presence of hazards or unsafe practices that could result in severe personal injury or death if all personnel do not follow instructions and safety precautions.



This unsafe practice could result in minor injury or property damage.

The use of the word Caution signifies possible hazards or unsafe practices that could result in minor injury or damage to property or product if all personnel do not follow instructions and safety precautions.

Operating Zone

Personnel should establish an operating zone around all machines with a painted guard rail or warning stripe.

- Only the operator(s) and other authorized personnel should work within the operating zone during machine operation.
- Do not keep tools or other equipment within the operating zone.
- Do not be inside the machine while the machine is in operation or attempt to operate the machine while anyone is inside the machine. Always use proper lockout/tagout procedures when personnel enter the machine to prevent startup.



Installation

Only trained and authorized personnel should install electric and pneumatic power sources. Installations must comply with all applicable codes and standards, including those established by OSHA (Occupational Safety and Health Administration, 200 Constitution Ave. NW, Washington DC 20210).

Safety Inspection

Before Starting the Machine

- Install and operate all guards and safety devices.
- Clear all personnel away from the machine.
- Remove any materials, tools, or foreign objects away from the machine.
- Ensure the machine is in operating condition.
- Verify that all indicator lights, horns, pressure gauges, and other safety devices and indicators function correctly.
- Verify that the incoming voltages are correct, as specified in the wiring diagrams.

After Shutdown

• Turn off all pneumatic and electrical power.



General Operating Safety

Before Starting the Machine

- Do not operate this machine until you read and understand the operating instructions. You should thoroughly familiarize yourself with the machine and its controls.
- Never operate a machine with a safety device or guard removed, damaged, or disconnected.
- Always wear safety glasses, hats, shoes, ear protection, or any other required safety equipment.
- Do not start the machine until warning all personnel in the area. We recommend that other personnel move outside the operating zone.
- Never remove warnings displayed on the machine. Replace any torn or old labels.
- Do not wear loose clothing, neckties, or necklaces near an operating machine. Restrain long hair. Do not wear gloves, watches, rings, bracelets, or other jewelry near an operating machine.
- Remove any foreign objects or tools from the operating zone before starting.
- Keep the operating zone free of obstacles that could cause you to fall against the machine.
- Ensure a clean work surface, including proper guarding of platform areas and ladders.
- Keep hands clear of all pinch points.



General Operating Safety (continued)

While the Machine is in Operation

- Never sit or stand on anything that could cause you to fall against the machine.
- Horseplay around a machine at any time is dangerous and prohibited.
- Never operate the machine above specified speeds, pressures, or temperatures.
- Never manually operate any sensors with the power on.
- Keep alert and observe indicator lights and warnings that appear on the machine.
- Never leave the machine unattended while in operation.
- Avoid placing fingers, hands, or any part of your body into the machine or near moving parts when control circuits are energized.
- Do not enter a confined space without first checking for toxic fumes and providing standby personnel on the site. Follow your facility's confined space procedures.
- Do not reach around any guards.
- Be aware of rotating parts on the machine. Do not operate the machine with the protective covers removed.

Stopping the Machine

- Never use a guard door as a means of locking out a machine. Follow appropriate lockout/ tagout procedures.
- Energy sources are not always removed from the machine actuators when an emergency stop button is pressed. Never use an emergency stop button as a means of locking out a machine. Follow appropriate lockout/tagout procedures.
- Always wait for the machine to come to a complete stop before opening a guard door.
- Turn pneumatic and electrical power off when the machine is not in use. Lock out the power source for maximum protection.
- Know the emergency stop procedure and locations of the machine's E-Stop buttons.



Repeated use of the emergency stop could result in damage to the machine. E-Stop buttons are not intended for routine cycle stops or maintenance. They should only be used for emergencies: life, limb, or major machine damage.

Do not use emergency stops, guard doors, or safety switches to routinely stop the machine as machine and product damage may result. Use the Cycle Stop buttons to bring the machine to a controlled stop.



General Operating Safety (continued)

General Maintenance Safety

- Do not operate faulty or damaged equipment. Always perform proper service and maintenance procedures.
- Do not service a machine without thorough qualifications. Ensure familiarity with the necessary service tasks.
- Never operate any controls while other people perform maintenance on the machine.
 Whenever personnel enter the machine's guard package to perform maintenance, a complete machine lockout and tagout must be performed.
- When personnel are performing routine operational tasks, such as clearing jams or making
 minor adjustments, and a guard door could be closed behind them, personnel must use the
 lockable Machine Entry switch located on the HMI control panels to prevent machine motion
 from being reactivated while they are still inside the machine.
- Do not bypass a safety circuit.
- Always use the proper tool for the necessary service.
- Never open covers that house electrical components when the power is on.
- Only perform maintenance on a machine in motion when properly trained and required to do so.
- Relieve all pneumatic pressure before performing maintenance or loosening connections on any pressurized system.
- Turn off all pneumatic and electrical power unless required for specific servicing. Lock out the power source for maximum protection.
- Turn off and lock out the power when replacing fuses.
- A malfunctioning gearbox or motor may become hot, causing severe burns. Always allow time to cool before performing maintenance on a gearbox or motor.



Electrical Safety

Before Starting the Machine

- Clear all personnel away from the machine before applying power to any equipment.
- Never operate a machine with a safety device or guard removed, damaged, or disconnected.
- Close all covers on the junction panels.
- Ground and overload protect all electrical equipment.
- Confine all electrical connections within a sealed junction box.

Operating the Machine

- Do not bypass a safety device.
- Never open covers that house electrical components when the power is on.
- Always assume that the power is on; treat all conditions as live. This practice assures a
 cautious approach that may prevent an accident or injury.
- To remove the load from the circuit or equipment, open the disconnect or breaker and lock in the open position. Lock out the power source for maximum protection.

Stopping the Machine

• Turn electrical power off when the machine is not in use. Lock out the power source for maximum protection.



Electrical Safety (continued)

Electrical Maintenance

- Only trained and authorized electricians should perform electrical/electronic maintenance and service.
- Turn off all electrical power unless required for specific servicing. Lock out the power source for maximum protection.
- Turn off and lock out the power when replacing fuses.
- Use the proper test equipment to ensure an open circuit. Check the test equipment at regular intervals.
- Allow several minutes for power to dissipate from any disconnected energy sources before handling associated wires.
- Give the capacitors time to discharge.
- You may need to troubleshoot on live equipment. Under special circumstances, take the following precautions:
 - Clear all tools and personnel away from the area.
 - Take extra safety measures in damp areas.
 - Be alert and avoid any outside distractions.
- Open control panel doors only when checking out the electrical equipment or wiring. After closing the panel door, ensure the disconnect handle mechanism functions properly.



Pneumatic Safety

Operating the Machine

- Never operate a pneumatic system unless covers, safety devices, and indicators are operating and in place.
- Never operate a pneumatic system above the specified pressure.
- Never loosen any pneumatic connection when the system is under pressure.
- A pneumatic system retains the pressure to complete its intended motion even after the power is off. Take care to avoid injury.

Pneumatic Maintenance

- Relieve all pneumatic pressure before performing maintenance or loosening connections on any pressurized system.
- Turn off all pneumatic and electrical power unless required for specific servicing. Lock out the power source for maximum protection.



Cleaning Safety



Frame and component finishes shall not be warranted if the equipment is installed in a wet environment or exposed to harsh cleaners or high-pressure wash downs.

- Do not use toxic or flammable solvents to clean a machine.
- Always clean up spills around the machine as soon as possible.
- Always clean up lubricant that has leaked onto the floor as soon as possible to prevent slipping.
- Keep the operating zone free of obstacles that could cause you to fall against the machine.
- Never clean a machine in operation.
- On equipment that includes wireways, close and latch all covers before starting the cleaning cycle.
- Never wash down or subject equipment to conditions causing moisture condensation on nonwashdown components. Serious equipment damage could result. Under no circumstances should water, or any other liquid, be directed at any part of the machine.

Electrical Hazards

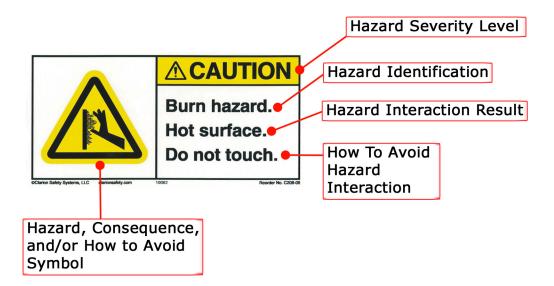
- Lock out pneumatic and electrical devices prior to cleaning a machine.
- For a cleaning cycle controlled from a remote or automated control center, establish fail-safe procedures to avoid automatic startup while servicing equipment.
- Keep electrical panel covers closed and powered off when cleaning a machine. Lock out the power source for maximum protection.



Safety Precautions

Safety Labeling

Color-coded labels are present on the machine to warn the operator of different levels of machine hazards. The diagram below illustrates industry standard safety labeling. Always pay attention to all safety labeling used on the machine. The following pages address the safety stickers that may or may not be present on your machine. Contact your replacement parts representative for replacement stickers.

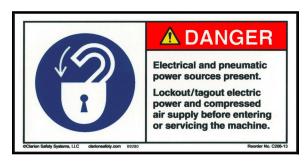




Danger Safety Precautions



Red means **Danger** and indicates immediate hazards that will result in severe personal injury or death.



The **Danger - Electrical and Pneumatic Power Sources Present** sticker may be found on electrical cabinets that contain a main disconnect handle.



The **Danger - Hazardous Voltage** sticker is used for multiple and/or remote sources of power and may be found on electrical cabinets that do not contain a main disconnect handle.



The **Danger - Machine Starts Automatically Keep Away** sticker may be found on any guard door that can be opened without a tool.



The **Danger - Moving Parts Can Cause Serious Personal Injury** sticker may be found on any guard door where personnel can enter the machine and have the guard door close completely behind them. This sticker may not be present on machines that do not have the Machine Entry No/Allowed selector switch on an HMI control panel.

Warning Safety Precautions



Orange means **Warning** and indicates hazards that could result in severe personal injury or death.



The **Warning - Crush Hazard** sticker may be found near openings between the guarding and product entry and exit points.



The **Warning - Pinch Point** sticker may be found at entry and exit points.



The Warning - Read and Understand the Operator's Manual sticker may be found on the HMI control panels.

Caution Safety Precautions



Yellow means **Caution** and indicates hazards that could result in minor personal injury, product, or property damage.



Electrical Safety Precautions



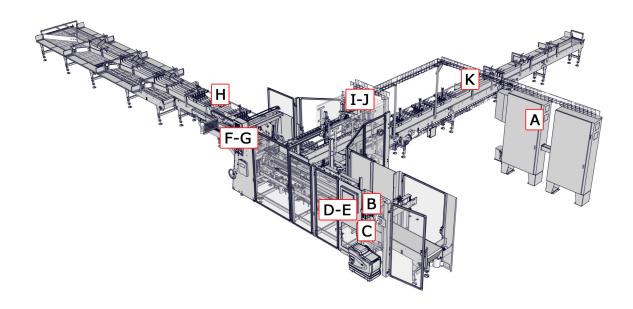
The **Lightning Bolt** sticker indicates an enclosure that contains electrical parts. High voltage may also be present.



The **Lightning Bolt with Danger** sticker means **Danger** and indicates an arc flash and shock hazard and may be found on all electrical cabinets.



Safety Map



Location	Description	Location	Description
Α	Main Disconnect	G	E-Stop Button
В	Air Disconnect	Н	E-Stop Button
С	Glue Disconnect	I	Machine Entry Selector Switch
D	Machine Entry Selector Switch	J	E-Stop Button
Е	E-Stop Button	K	E-Stop Button
F	Machine Entry Selector Switch		

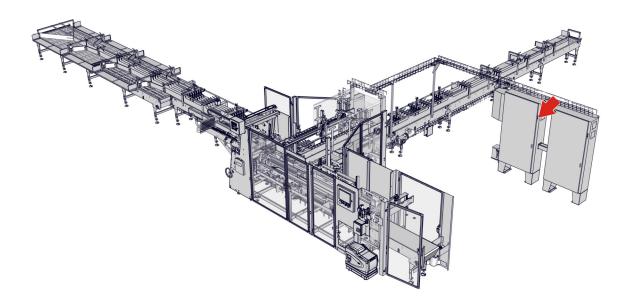


Locking Out the Machine

NOTICE

Please refer to your facility's safety literature for specific lockout/tagout procedures.

Main Disconnect



The main disconnect lockout device contains a switch designed to lock out electrical energy going to the machine, except for the glue system, when the switch is turned off. To lock out electrical energy to the machine, pull the handle down to the off position.

A locking device can be placed on the main disconnect handle when machine lockout is necessary. This prevents the machine from accidentally powering up.





Main Disconnect (continued)

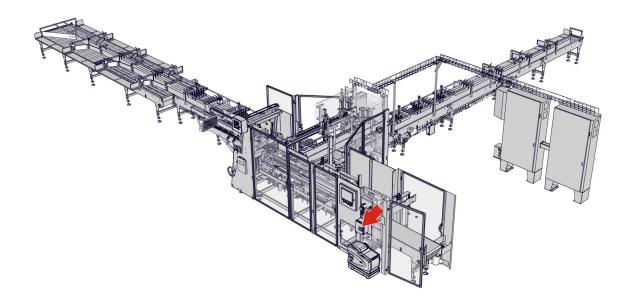


Serious injury or death can occur when the main disconnect is turned off because power at the top of the main disconnect is live (hot). It will remain live until the main power source is turned off.

Always perform the lockout/tagout procedure required by your facility before entering the guard package or performing any maintenance.



Glue Disconnect

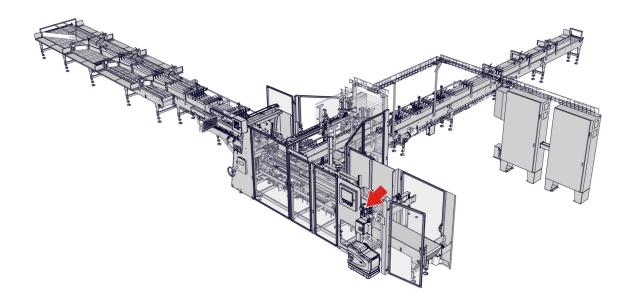


The glue disconnect controls electrical energy going to the glue system and is located near the glue tank. To lock out electrical energy, rotate the disconnect switch to the off position. The handle may be secured with a locking device.





Air Disconnect



The machine has an air pressure sensor which displays the current psi reading. Machine operation will automatically shut down if the air pressure drops below the minimum psi and a low air pressure message will appear on applicable HMI screens.

To resume production, press the Reset button after the air pressure has reached the operating pressure.

Turn the black and blue valve to disrupt and dump the air

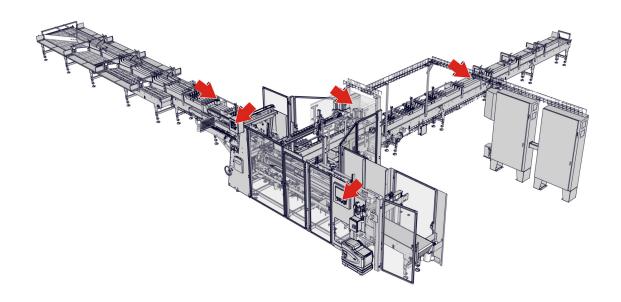


supply to the machine. To allow pneumatic pressure to return to the machine, turn the valve back to the shut position.



Safety Circuits

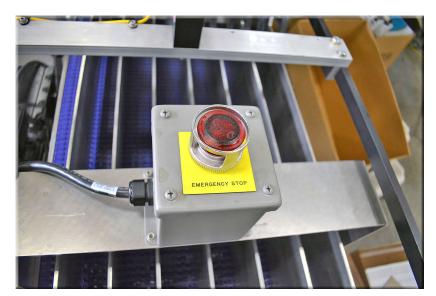
Emergency Stop Buttons



The E-Stop buttons are one of the main safety features of this machine. The buttons are part of a dual-redundant circuit.

E-Stop buttons are located on the control panel and other strategic points around the machine.

The E-Stop is an input to the safety control system that is responsible for disabling hazardous output devices. These devices include: servo drives, motor starters or contactors, VFDs, and air



pressure relief valves. The air pressure relief valve dumps a portion of the machine's air supply to components plumbed with a blue airline. This is known as the controlled air system.



Emergency Stop Buttons (continued)



Repeated use of the emergency stop could result in damage to the machine. E-Stop buttons are not intended for routine cycle stops or maintenance. They should only be used for emergencies: life, limb, or major machine damage.

Do not use emergency stops, guard doors, or safety switches to routinely stop the machine as machine and product damage may result. Use the Cycle Stop buttons to bring the machine to a controlled stop.



Guard Door Interlock Switches



A magnetically coded guard door interlock switch is mounted on guard doors that may be opened without the use of a tool.

The guard door switches are connected in series with dual-redundant circuits. These circuits are monitored by the safety control system and will stop the machine immediately if either circuit opens. This protects the operator from the moving parts of the machine and reduces the probability of injury.

The switch sensor is mounted to the machine frame. The actuator is mounted to the corresponding guard door. If the indicator light is green, the switch senses the actuator. If the indicator light is flashing green, the actuator is present on the switch but another guard door may be open. A red light indicates the actuator is not present.

These switches are designed to prevent the machine from accidental startup, not for stopping the machine. Always use the Cycle Stop button to stop the machine before opening a perimeter guard door. If a guard door or E-Stop is activated, the machine will stop immediately.

To close the safety circuit, close the guard door.



Personnel entering the guard package, without first locking out the power, risk accidental restart and potential serious injury or death. Do not enter the machine without first performing the lockout/tagout procedure required by your facility.



Magazine Safety Switch



A magnetic magazine safety switch is mounted on the magazine, which controls two parallel contacts. The switch is connected in series to provide the machine with redundant circuits. The machine cannot run without blanks in the magazine.

The safety switch is monitored by a safety control system. If either set of contacts open, the safety circuit opens and immediately stops the machine. This protects the operator from the moving parts of the machine and reduces the probability of injury.

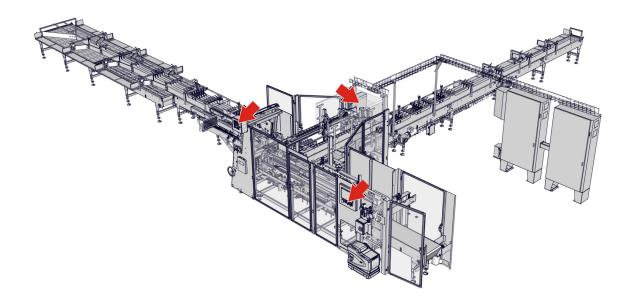
The magazine safety switch is designed to prevent the magazine from running without blanks, not for stopping the machine. Always use the Cycle Stop button to routinely stop the machine.



Personnel entering the guard package, without first locking out the power, risk accidental restart and potential serious injury or death. Do not enter the machine without first performing the lockout/tagout procedure required by your facility.



Machine Entry No/Allowed Selector Switches



The Machine Entry No/ Allowed selector switches are a safety feature used to protect the operator from moving parts when entry into the machine is necessary.

- In the No mode, entry into the machine is not allowed and production can occur.
- In the Allowed mode, entry into the machine is allowed. The switch will open the guard door safety circuit, preventing accidental startup. A locking device can be



placed on the selector switch when lockout is desired. Set the selector switch back to No and then reset the machine to allow for restart.



Personnel entering the guard package, without first locking out the power, risk accidental restart and potential serious injury or death. Do not enter the machine without first performing the lockout/tagout procedure required by your facility.



Light Column



The stackable light column contains three lights and a horn to signal the operator of a machine condition.

Lights

- The Red light remains solid when the machine has a shutdown fault condition and the machine is not ready.
- The Amber light flashes when the machine has low materials.
- The Green light remains solid when the machine is running and flashes when the machine is dwelling.



When the green light is flashing, the machine can start automatically with no warning. Be sure that personnel are away from the machine.

Horn

This machine is equipped with startup delay. The Machine Start button must be pressed for a predetermined number of seconds before the machine will begin running. During this time, the horn will sound off to warn personnel of impending machine startup.





Section 2

Operator Controls

HMI Control Panels
Auxiliary Controls
HMI Screen Banner
HMI Screens



HMI Control Panels





The two HMI control panels contain the same buttons and screens.

The **HMI** touchscreen allows for human/machine interface.

The **Jog Wheel** corresponds with the Jog Wheel selector switch on the Machine Control - Manual Screen and the Maintenance Screens.

- On the Machine Control Manual Screen, the jog wheel manually jogs the corresponding line shaft when the selector switch is set to On.
- On the Maintenance Screens, the jog wheel manually jogs the selected servo axis when the selector switch is set to On.

The **Cycle Stop** button brings the machine to a controlled stop in a predetermined position.



HMI Control Panels (continued)

The **Machine Entry No/Allowed** selector switch is a safety feature used to protect the operator from moving parts when entry into the machine is necessary.

- In the No mode, entry into the machine is not allowed and production can occur.
- In the Allowed mode, entry into the machine is allowed. The switch will open the guard door safety circuit, preventing accidental startup. A locking device can be placed on the selector switch when lockout is desired. Set the selector switch back to No and then reset the machine to allow for restart.



Personnel entering the guard package, without first locking out the power, risk accidental restart and potential serious injury or death. Do not enter the machine without first performing the lockout/tagout procedure required by your facility.

The **Emergency Stop** button provides safety for personnel.

- Press the E-Stop button to stop the machine. The button illuminates while in the Stop position. The Emergency Stop message appears on the message display bar after pushing the button. The E-Stop system immediately disables the drive motors. The vacuum system is independent of the E-Stop system. A case blank sitting on the vacuum cups should not fall off when the machine stops.
- Pull the E-Stop button out and press the Reset button to clear the message and allow for machine restart.



Repeated use of the emergency stop could result in damage to the machine. E-Stop buttons are not intended for routine cycle stops or maintenance. They should only be used for emergencies: life, limb, or major machine damage.

Do not use emergency stops, guard doors, or safety switches to routinely stop the machine as machine and product damage may result. Use the Cycle Stop buttons to bring the machine to a controlled stop.



Auxiliary Controls

Auxiliary Control Panel



The **Panel Enable** button enables the auxiliary control panel. The operator cannot start the machine from this control panel unless the Panel Enable button is pressed and illuminated.

The **Machine Start** button initiates machine recovery and, after a time delay, starts the machine.

The **Cycle Stop** button brings the machine to a controlled stop in a predetermined position.

The **Machine Entry No/Allowed** selector switch is a safety feature used to protect the operator from moving parts when entry into the machine is necessary.

- In the No mode, entry into the machine is not allowed and production can occur.
- In the Allowed mode, entry into the machine is allowed. The switch will open the guard door safety circuit, preventing accidental startup. A locking device can be placed on the selector switch when lockout is desired. Set the selector switch back to No and then reset the machine to allow for restart.



Auxiliary Control Panel (continued)

The **Emergency Stop** button provides safety for personnel.

- Press the E-Stop button to stop the machine. The button illuminates while in the Stop position. The Emergency Stop message appears on the message display bar after pushing the button. The E-Stop system immediately disables the drive motors. The vacuum system is independent of the E-Stop system. A case blank sitting on the vacuum cups should not fall off when the machine stops.
- Pull the E-Stop button out and press the Reset button to clear the message and allow for machine restart.



Repeated use of the emergency stop could result in damage to the machine. E-Stop buttons are not intended for routine cycle stops or maintenance. They should only be used for emergencies: life, limb, or major machine damage.

Do not use emergency stops, guard doors, or safety switches to routinely stop the machine as machine and product damage may result. Use the Cycle Stop buttons to bring the machine to a controlled stop.

The **Machine Reset** button resets the machine for operation following a fault.



Remote Enclosure Light Selector Switches



The **Enclosure Light Off/On** selector switches turn the corresponding electrical enclosure's light off and on. The selector switch is illuminated while in the on position.



Remote E-Stop Buttons



The **Emergency Stop** buttons provide safety for personnel.

- Press the E-Stop button to stop the machine. The button illuminates while in the Stop position. The Emergency Stop message appears on the message display bar after pushing the button. The E-Stop system immediately disables the drive motors. The vacuum system is independent of the E-Stop system. A case blank sitting on the vacuum cups should not fall off when the machine stops.
- Pull the E-stop button out and press the Reset button to clear the message and allow for machine restart.



Repeated use of the emergency stop could result in damage to the machine. E-Stop buttons are not intended for routine cycle stops or maintenance. They should only be used for emergencies: life, limb, or major machine damage.

Do not use emergency stops, guard doors, or safety switches to routinely stop the machine as machine and product damage may result. Use the Cycle Stop buttons to bring the machine to a controlled stop.



HMI Screen Banner





This screen banner appears on most HMI screens. The banner's button functions are described on this page to prevent redundancy.

The **Screen Name** banner at the top of the screen advances the current screen to the Machine Controls - Auto Screen or the Machine Controls - Manual Screen, whichever is selected by the Control Mode Manual/Auto selector switch.

The **Message Display Bar** indicates current fault and status messages. Pressing the message display bar advances the current screen to the Active Alarms Screen.

The **Recipe Display Bar** indicates the active recipe.

The **Menu** button returns the current screen to the previous Menu Screen.

The **Reset** button resets the machine for operation following a fault. The existing fault condition appears on the message display bar. After correcting the fault, pressing the Reset button clears the fault message and allows for machine restart.



HMI Screens



Depending on the application of this machine, one or more of the display items may or may not be visible.

Logo Screen



The PLC Local IP Address display indicates the local PLC ethernet card's IP address.

The **HMI Config** button shuts down the current machine application and advances the current screen to the Allen-Bradley Configuration Screen. Refer to the Allen-Bradley manual provided for further information.

The **Menu** button advances the current screen to the Menu 1 Screen.



Menu 1 Screen



The Menu Screen allows the operator to navigate between screens. Press the desired screen button to advance to the corresponding screen.

The **Yellow Arrow** button advances the current screen to the Menu 2 Screen.

The following buttons advance the current screen to the corresponding screen:

- Data Collection
- Logo
- Date and Time



Menu 2 Screen



The Menu Screen allows the operator to navigate between screens. Press the desired screen button to advance to the corresponding screen.

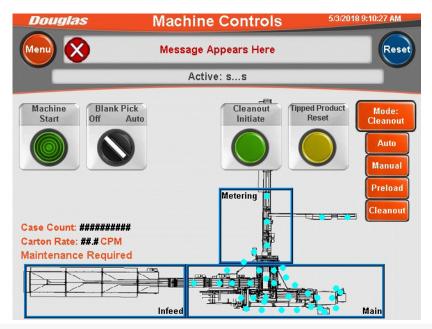
The **Yellow Arrow** button advances the current screen to the Menu 1 Screen.

The following buttons advance the current screen to the corresponding screen:

- Data Collection
- Logo
- Date and Time



Machine Controls Auto - Screen





An image of the machine's floor plan is displayed on buttons that are used to access the modules' Control Screens. The floor plan is populated with indicators corresponding with various fault and status messages that flash the message's color (yellow or red) while the message is active.

The **Machine Start** button initiates machine recovery and, after a time delay, starts the machine.

The **Blank Pick Off/Auto** selector switch disables or enables the blank pick vacuum.

While in the cleanout mode, the **Cleanout Initiate** button causes the loader to load whatever products are in the load area by overriding the need for a full load.

The **Tipped Product Reset** button resets the machine after correcting tipped product. Pressing this button is the only way of resetting a tipped product fault.

The **Machine Mode** display indicates the current machine mode. Press the display to cycle through the following machine modes:

- Auto
- Manual
- Preload
- Cleanout



Machine Controls Auto - Screen (continued)

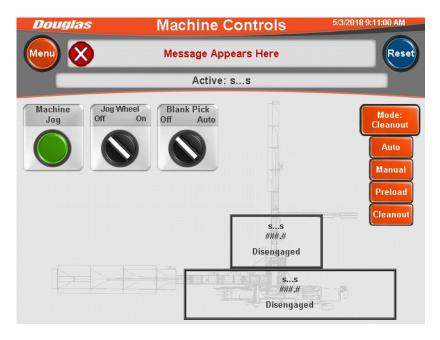
The **Case Count** display indicates the number of cases produced since the Case Count Reset button on the Maintenance Screen was last pressed.

The **Carton Rate** display indicates the current machine speed in cycles per minute (CPM).

The **Maintenance Required** display appears when a meter on the Maintenance Screen reaches its preset value. After the required maintenance is performed, press and hold the meter's reset button to reset the meter and clear the Maintenance Required display.



Machine Controls Manual - Screen



The **Manual Mode** buttons are displayed on an image of the machine's floor plan. Each module's button displays its line shaft's actual position and jog status (Disengaged, Will Engage, Engaged, or Will Disengage). Press one or more Manual Mode buttons to select or deselect the line shafts for jogging.

The **Machine Jog** button initiates machine recovery and, after a time delay, jogs the selected modules' line shafts forward while the button remains pressed.



Machine or product damage may occur. Use caution when jogging machine components to prevent them from colliding with product, blanks, or other machine components.

The **Jog Wheel Off/On** selector switch disables or enables the jog wheel, which jogs the machine forward and backward. Set this switch to Off to run production and to On to enable the jog wheel.



Machine or product damage may occur. Use caution when jogging machine components to prevent them from colliding with product, blanks, or other machine components.

The **Blank Pick Off/Auto** selector switch disables or enables the blank pick vacuum.



Machine Controls Manual - Screen (continued)

The **Machine Mode** display indicates the current machine mode. Press the display to cycle through the following machine modes:

- Auto
- Manual
- Preload
- Cleanout



Machine Maintenance Screen



The **Recover Machine** button initiates machine recovery, which recovers the machine's servos to their proper positions.

The **Lube Frequency** meters indicate the machine run time since the meters' reset buttons were last pressed. When a meter reaches the recommended time for lubing, the meter flashes and a Maintenance Required display appears on the Machine Controls Screen. After lubing, press the flashing meter to reveal the meter's reset button. Press and hold the button to reset the meter and clear the Maintenance Required display.

The **Lights Off/On** selector switch turns the machine lights off and on.

The **Machine Hour Meter** indicates the machine run time since the meter's reset button was last pressed. Press the meter to reveal the meter's reset button. Press and hold the button to reset the meter.

The **Dry Cycle Off/On** selector switch, which is visible while the Control Mode Local/Prod selector switch is set to Local, disables or enables the dry cycle feature. In the On mode, the machine is allowed to cycle without product or blanks. Press the Machine Start button to start the dry cycle process. While the machine is running in the dry cycle mode, the machine speed increases by five cycles per minute (up to the maximum machine speed) each time the Machine Start button is pressed.



The Dry Cycle On feature is only intended for experienced maintenance personnel. This feature overrides machine controls, which could result in machine or product damage. Do not dry cycle with product in the machine.



Machine Maintenance Screen (continued)

The **Control Mode Local/Prod** selector switch determines the machine interface control mode (local or production). Set the switch to Prod to operate the machine with active line controls or to Local to override upstream and downstream line controls.



The Control Mode Local feature is only intended for experienced maintenance personnel. This feature overrides line controls, which could result in machine or product damage.

The **Case Count** display indicates the number of packages produced since the meter's reset button was last pressed. Press the meter to reveal the meter's reset button. Press and hold the button to reset the meter.

The **Panelview Backlight** setting specifies the percentage of Panelview backlight intensity.

The **Recipe Edit** button advances the current screen to the Machine Recipe Screen.



Machine Recipe Screen





This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

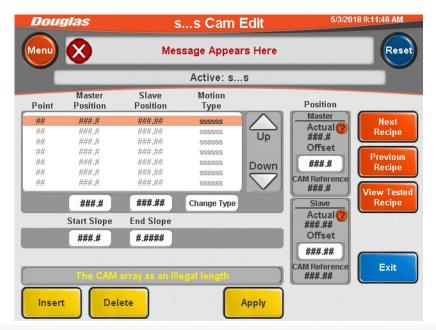
The **Next Recipe** and **Previous Recipe** buttons allow personnel to view or edit settings, found on this screen, for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested cam settings can not be edited. Offsets can be edited.

The **Machine Maint** button returns the current screen to the Machine Maintenance Screen.



Global Cam Edit Screen



NOTICE

The screen, as shown above, will appear when viewing untested recipes (the recipes designated as *Not Tested*). After a recipe is saved as tested within the program (no special recipe designation), changing the cam profile is limited to the offset setting for the Master and Slave Positions. Other editing buttons will not appear on the screen.

A fault message will appear when attempting to make edits to this screen while the machine is running.

This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

The **Master Position**, **Slave Position**, and **Motion Type** settings for the displayed points can be viewed or edited. The **Up** and **Down** arrow buttons allow scrolling up or down through the selected points.

The **Change Type** button opens a window from which the desired motion type for the highlighted point may be selected.



Global Cam Edit Screen (continued)

The **Actual** and **Cam Reference** settings are displayed for the Master Position and Slave Position. The **Master Offset** and **Slave Offset** settings can be viewed or edited.

The **Start Slope** and **End Slope** settings can be viewed or edited.

The **Insert** button inserts a new cam point to the current display at the highlighted position.

The **Delete** button removes the highlighted cam point from the current display.

The **Apply** button accepts all changes made to this screen when the machine is at the cycle stop position.



Unless changes are applied, they will not take effect and the original settings will replace the edits when the screen is exited.

The **Next Recipe** and **Previous Recipe** buttons allow personnel to view or edit settings, found on this screen, for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested cam settings can not be edited. Offsets can be edited.

The **Exit** button returns the current screen to the previous screen.



Security Screen



The Security Screen provides a keypad to allow authorized personnel to perform protected edits and recipe variable functions.

When the Security Screen appears, enter the security code and press the enter (arrow) button. If the code is entered incorrectly, a Password is Incorrect window will pop up. Press the **Retry** button to reenter the code or the **Exit** button to exit the screen.



Secured screens may be viewed by any personnel, but the security code is required to implement changes.

Once the correct security code is provided, all protected settings and recipe variable functions on all screens within the same security level will be accessible. They will remain unlocked until a non-secured screen (a screen that is not normally protected) is accessed for a preset time.

The **Exit** button returns the screen to the previous screen.



Take Control Screen



This screen allows personnel to take control of machine operation controlled from another location.

Press the **Yes** button to confirm the control. Press the **No** button to cancel.



Date Time Set Screen



To set the date and time:

- 1. Press the desired button.
- 2. A keypad will appear.
- 3. Enter the setting.
- 4. Press the Enter button on the keypad.
- 5. Repeat the above steps until all values are correct.
- 6. Press the **Set Date/Time** button.



Recipe Control Screen





The **Recipe Manager** button disappears when pressed, allowing the Copy Recipe, Delete Recipe, Rename Recipe, Move Recipe Up, and Move Recipe Down buttons to display.

Fault and status messages may appear toward the bottom of the screen when the Copy Recipe, Delete Recipe, or Select Recipe buttons are pressed.

A list of the available recipes appears in the center display. Use the **Up** or **Down** arrow buttons to scroll through the recipes.

The **Changeover Position** button moves certain machine components/assemblies to a position conducive to changeover. This button must be pressed before selecting a new recipe. If a module is running while the Changeover Position button is pressed, the Stop Machine & Try Again message prompts the machine operator to stop the machine before pressing the Changeover Position button.

The **Stop Machine & Try Again** message prompts the machine operator to stop the machine before pressing the Copy Recipe, Delete Recipe, Rename Recipe, or Select Recipe buttons.

The **Copy Recipe** button copies the highlighted recipe's information to use for a new recipe. Contact Douglas Machine Technical Support for assistance in creating new recipes.

The **Delete Recipe** button advances the current screen to the Recipe Delete Warning Screen.

The **Rename Recipe** button allows the operator to rename the highlighted recipe.



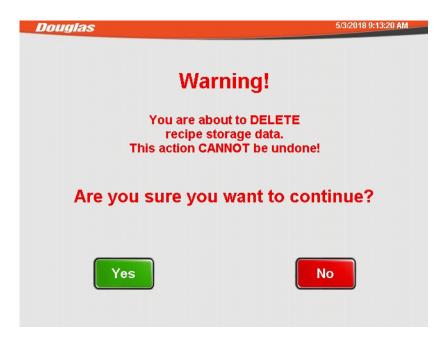
Recipe Control Screen (continued)

The **Move Recipe Up** and **Move Recipe Down** buttons reposition the highlighted recipe within the list.

The **Select Recipe** button changes the highlighted recipe to the active recipe.



Recipe Delete Warning Screen



This screen will appear after the Delete Recipe button on the Recipe Control Screen is pressed.

The **Yes** button deletes the recipe and returns the current screen to the Recipe Control Screen.

The No button cancels the action and returns the current screen to the Recipe Control Screen.



Inactive Recipe Warning Screen

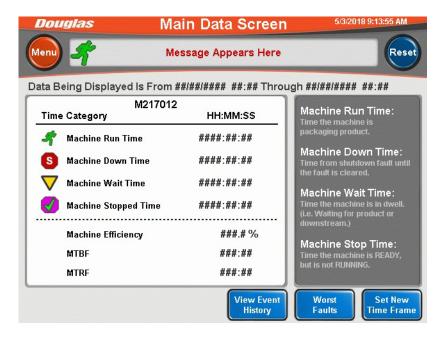


This screen will appear after attempting to edit inactive recipes.

The OK button advances the current screen to the previous screen.



Main Data Screen



The **Data Being Displayed Is From # Through #** display indicates the time frame of the displayed data. The percentages for selected data will appear when the Set Data Time Frame button on the Time Frame Setup Screen is pressed.

This screen displays the following information:

- Machine Run Time
- Machine Down Time
- · Machine Wait Time
- Machine Stopped Time

- Machine Efficiency (percent)
- MTBF (Mean Time Between Faults)
- MTRF (Mean Time to Reset Faults)

The Machine Run Time, Machine Down Time, Machine Wait Time, and Machine Stop Time functions are explained on the side of the screen.

The following buttons advance the current screen to the corresponding screen:

- View Event History (Event History Screen)
- Worst Faults
- **Set New Time Frame** (Time Frame Setup Screen)

Active Alarms Screen



This screen displays currently active faults and alarms. It can be accessed by pressing the message display bar on any applicable screen.

The **Exit** button returns the current screen to the previous screen.



Event History Screen



The **Data Being Displayed is From # Through #** display indicates the time frame of the displayed data. The percentages for selected data will appear when the Set Data Time Frame button on the Time Frame Setup Screen is pressed.

A list of previous events, the date and time the event occurred, and the duration of the event are displayed on this screen. A color-coded key indicates each event type. Events included in the selected time frame are shown in color. Use the **Up** and **Down** arrow buttons to scroll through the events.

The **Capture Time Stamp** button causes the Capture As Start Time and Capture As End Time buttons to appear.

The **Capture As Start Time** button copies the time from the top entry in the events list for use on the Time Frame Setup Screen. Press the Paste Start Time button on the Time Frame Setup Screen to change the start time. This button only appears when the Capture Time Stamp button is pressed.

The **Capture As End Time** button copies the time from the top entry in the events list for use on the Time Frame Setup Screen. Press the Paste End Time button on the Time Frame Setup Screen to change the end time. This button only appears when the Capture Time Stamp button is pressed.

The **Up/Down x1/Page/x100/x1000** button causes the Up and Down arrow buttons to move the events list up or down by one entry, one page (13 entries), 100 entries, or 1000 entries, respectively.



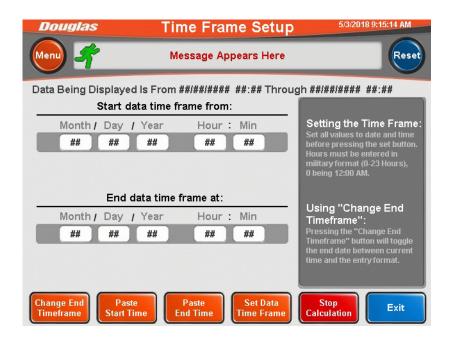
Event History Screen (continued)

The following buttons advance the current screen to the corresponding screen:

- **Set New Time Frame** (Time Frame Setup Screen)
- Exit (Previous Screen)



Time Frame Setup Screen



This screen is used to set up a time frame (range of time) to calculate data. The data can be evaluated in as large or small of a range as needed as long as there is time stamped data in the event history for that range of time. Setting the time frame (calculating the data) indicates that the data displayed on the Main Data Screen and the Worst Faults Screen is updated according to the selected time frame.

The **Data Being Displayed Is From # Through #** display indicates the time frame of the displayed data. The percentages for selected data will appear when the Set Data Time Frame button on the Time Frame Setup Screen is pressed.

The time settings for the **Start Data Time Frame From** display appear for viewing or editing.

The time settings for the **End Data Time Frame At** display appear for viewing or editing.

The **Change End Timeframe** button changes the specified end data time to the current time. When this button is pressed, the end data time settings disappear and the **Time Frame End is Current Time** display and the **Paste End Time** buttons appear. Press the Set Data Time Frame button to return to the time settings display.

The **Paste Start Time** button changes the start time to the time copied from the Event History Screen.

The **Paste End Time** button changes the end time to the time copied from the Event History Screen.



Time Frame Setup Screen (continued)

The **Set Data Time Frame** button processes the machine data for the specified start and end data time frames. When this button is pressed, it will read Data Calculating and the percentage of calculated data will appear on the blue banner at the top of the screen. The **Stop Calculation** button will also appear. If an error was made on one of the entries, press the Stop Calculation button to prematurely stop the calculations from processing. After the Stop Calculation button is pressed, it will disappear and the Data Calculating message will revert to Set Data Time Frame.

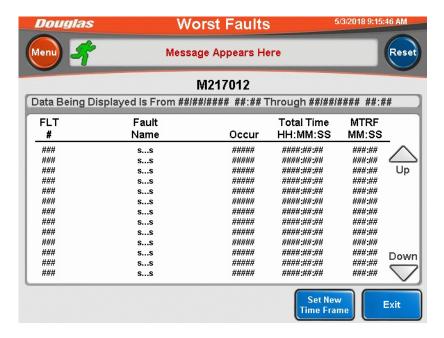


Enter all values for the date and time functions before pressing the Set Data Time Frame button.

The **Exit** button returns the current screen to the previous screen.



Worst Faults Screen



The **Data Being Displayed Is From # Through #** display indicates the time frame of the displayed data. The percentages for selected data will appear when the Set Data Time Frame button on the Time Frame Setup Screen is pressed.

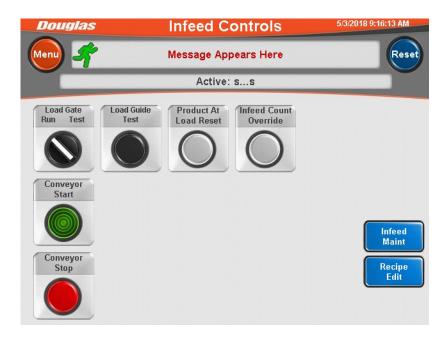
The center display lists all faults for the selected time frame. The faults are sorted in order by number of occurrences. Use the **Up** or **Down** arrow buttons to scroll through the faults.

The following buttons advance the current screen to the corresponding screen:

- **Set New Time Frame** (Time Frame Setup Screen)
- Exit (Main Data Screen)



Infeed Controls Screen



The **Load Gate Run/Test** selector switch, when set to Test, makes the **Load Guide Test** button appear.

The **Conveyor Start** and **Conveyor Stop** buttons start and stop the conveyor.

The **Load Guide Test** button moves the load gate up and down when pressed.

The **Product At Load Reset** button sends the surge release back to the product stop position and resets the loader enable from infeed. This allows new product into the load area. When using this button, clear all product from the load area before restarting the machine.

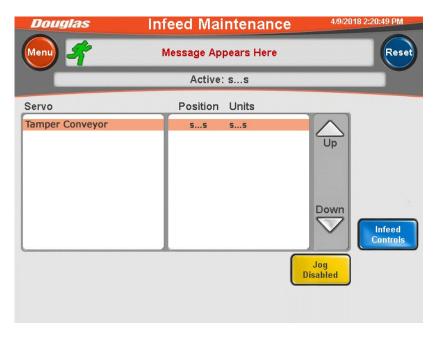
The **Infeed Count Override** button allows the operator to replace product in the load area. When pressed, the loader is enabled.

The following buttons advance the current screen to the corresponding screen:

- Infeed Maint (Infeed Maintenance Screen)
- **Recipe Edit** (Infeed Recipe 1 Screen)



Infeed Maintenance Screen



The current **Position** and **Units** are displayed for each **Servo** on this module. Press the **Up** or **Down** arrow buttons to scroll through the listed servos.

The **Jog Disabled/Enabled** button disables or enables the **Jog Negative** and **Jog Positive** buttons for jogging the selected servo(s) backward and forward.



Machine or product damage may occur. Use caution when jogging machine components to prevent them from colliding with product, blanks, or other machine components.

The **Jog Disabled/Jog Enabled** button disables or enables the jog wheel dial for jogging the selected servo(s) forward or backward.



Machine or product damage may occur. Use caution when jogging machine components to prevent them from colliding with product, blanks, or other machine components.

The **Infeed Controls** button advances the current screen to the Infeed Controls Screen.



Infeed Recipe 1 Screen



The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.



This screen's settings may be viewed or edited. Refer to the Recipe Screens Section of the service manual for more information.

The **Tamper Conv Speed** and **Infeed Conv Speed** displays each indicate the current corresponding conveyor speed in feet per minute (FPM).

The ? buttons display a help message for the corresponding recipe variable. The help message disappears when pressed.

The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings, found on this screen, for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings can not be edited.

The **Infeed Controls** button returns the current screen to the Infeed Controls Screen.



Infeed Recipe 2 Screen



The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.



This screen's settings may be viewed or edited. Refer to the Recipe Screens Section of the service manual for more information.

The **Tamper Conv Speed** and **Infeed Conv Speed** displays each indicate the current corresponding conveyor speed in feet per minute (FPM).

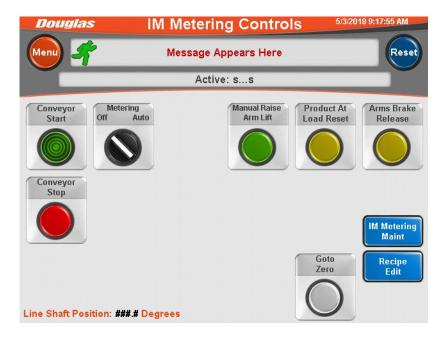
The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings, found on this screen, for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings can not be edited.

The **Infeed Controls** button returns the current screen to the Infeed Controls Screen.



IM Metering Controls Screen



The **Conveyor Start** and **Conveyor Stop** buttons start and stop this module's conveyor(s).

The **Metering Off/Auto** selector switch deactivates or activates the metering system. When the selector switch is set to Auto, automatic metering will occur when certain machine conditions are met.

The **Manual Raise Arm Lift** button moves the arm up to a preset position.

The **Product At Load Reset** button sends the surge release back to the product stop position and resets the loader enable from infeed. This allows new product into the load area. When using this button, clear all product from the load area before restarting the machine.

The **Goto Zero** button is visible while the Control Mode Manual/Auto selector switch is set to Manual. This button homes this module's line shaft and then recovers the associated servos to the line shaft.

The **Arms Brake Release** button immediately releases the arms' servo brakes, allowing the arms to move freely.

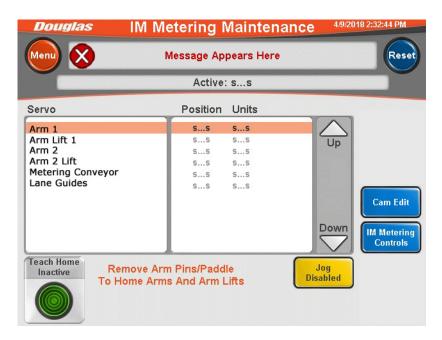
The **Line Shaft Position** display indicates the actual position of this module's virtual line shaft.

The following buttons advances the current screen to the corresponding screen:

- **IM Metering Maint** (IM Metering Maintenance Screen)
- Recipe Edit (IM Metering Recipe Edit Screen)



IM Metering Maintenance Screen



The current **Position** and **Units** are displayed for each **Servo** on this module. Press the **Up** or **Down** arrow buttons to scroll through the listed servos.

The homing button's text reads **Teach Home Inactive** while homing is disabled.

If the selected servo is homed by the manual homing process, the homing button's text reads **Teach Home** when homing is enabled. Pressing this button establishes the selected servo's current physical position as its home position by setting the servo's absolute position to zero.



The Homing feature is only intended for experienced maintenance personnel. Failure to place the selected servo at its yellow home position before pressing the Teach Home button will home the servo at the wrong position. This may result in machine components colliding with product, blanks, or other machine components.

The **Jog Disabled/Jog Enabled** button disables or enables the jog wheel for jogging the selected servo(s) forward or backward.



Machine or product damage may occur. Use caution when jogging machine components to prevent them from colliding with product, blanks, or other machine components.



IM Metering Maintenance Screen (continued)

The following buttons advance the current screen to the corresponding screen:

- Cam Edit (Global Cam Edit Screen)
- IM Metering Controls



IM Metering Recipe Edit 1 Screen





This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

The **Arm Lift 1 Torque** and **Arm Lift 2 Torque** displays indicate the torque value of the corresponding arm lift.

The **Line Shaft Position** display indicates the actual position of this module's virtual line shaft.

The **IM Metering Config** button advances the current screen to the IM Metering Config Initialize Screen.

The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings found on this screen for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings cannot be edited.

The **IM Metering Controls** button advances the current screen to the IM Metering Controls Screen.



IM Metering Recipe Edit 2 Screen





This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

The ? button displays a help message for the corresponding recipe variable. The help message disappears when pressed.

The **Line Shaft Position** display indicates the actual position of this module's virtual line shaft.

The **IM Metering Config** button advances the current screen to the IM Metering Config Initialize Screen.

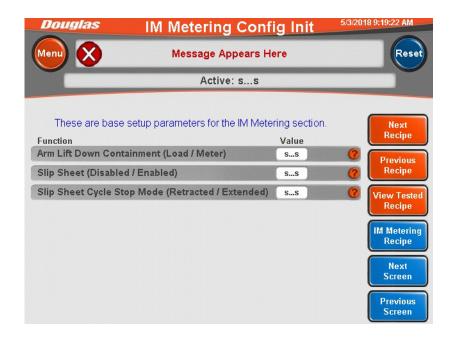
The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings found on this screen for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings cannot be edited.

The **Metering Controls** button advances the current screen to the IM Metering Controls Screen.



IM Metering Config Initialize Screen





This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

The ? button displays a help message for the corresponding recipe variable. The help message disappears when pressed.

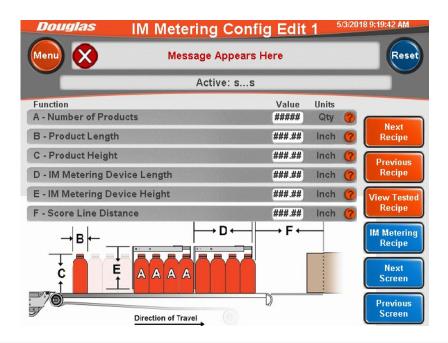
The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings found on this screen for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings cannot be edited.

The **IM Metering Recipe** button advances the current screen to the IM Metering Recipe Edit 1 Screen.



IM Metering Config Edit 1 Screen





This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

The ? button displays a help message for the corresponding recipe variable. The help message disappears when pressed.

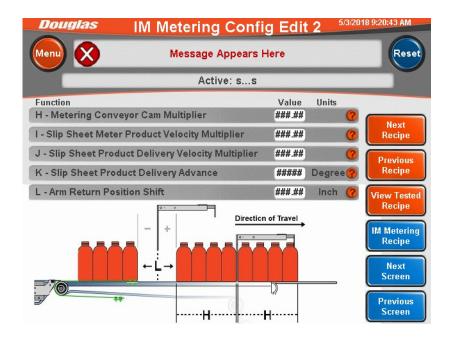
The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings found on this screen for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings cannot be edited.

The **IM Metering Recipe** button advances the current screen to the IM Metering Recipe Edit 1 Screen.



IM Metering Config Edit 2 Screen





This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

The ? button displays a help message for the corresponding recipe variable. The help message disappears when pressed.

The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings found on this screen for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings cannot be edited.

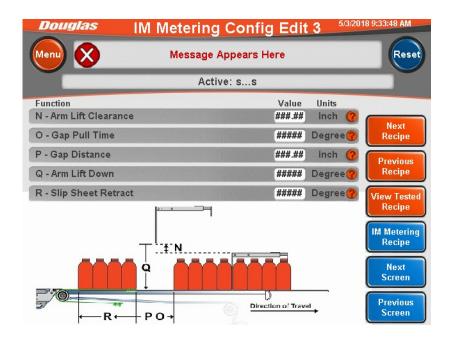
The **IM Metering Recipe** button advances the current screen to the IM Metering Recipe Edit 1 Screen.

The **Next Screen** and **Previous Screen** buttons advance through this module's screens.



2.46

IM Metering Config Edit 3 Screen





This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

The ? button displays a help message for the corresponding recipe variable. The help message disappears when pressed.

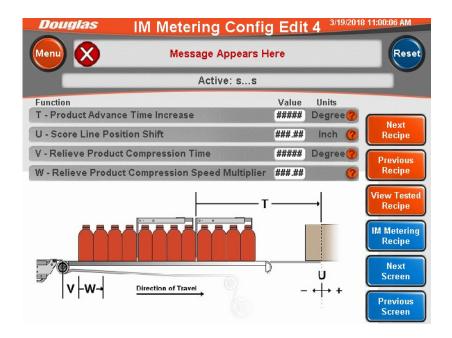
The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings found on this screen for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings cannot be edited.

The **IM Metering Recipe** button advances the current screen to the IM Metering Recipe Edit 1 Screen.



IM Metering Config Edit 4 Screen





This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

The ? button displays a help message for the corresponding recipe variable. The help message disappears when pressed.

The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings found on this screen for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings cannot be edited.

The **IM Metering Recipe** button advances the current screen to the IM Metering Recipe Edit 1 Screen.



IM Metering Config Edit 5 Screen





This screen's settings may be viewed or edited. Refer to the Recipe Screens section of the service manual for more information.

The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.

The ? button displays a help message for the corresponding recipe variable. The help message disappears when pressed.

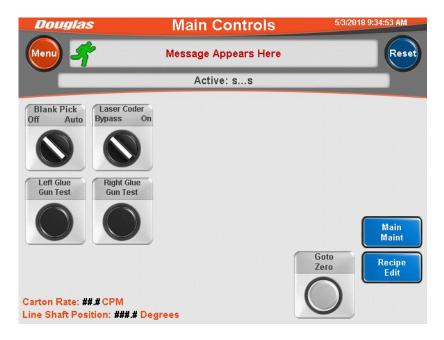
The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings found on this screen for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings cannot be edited.

The **IM Metering Recipe** button advances the current screen to the IM Metering Recipe Edit 1 Screen.



Main Controls Screen



The Blank Pick Off/Auto selector switch disables or enables the blank pick vacuum.

The **Left Glue Gun Test** and **Right Glue Gun Test** buttons test-fire the designated glue gun(s). Test-firing the glue guns ensures the nozzles are clear of glue buildup. Position a piece of waste material in front of the nozzles to intercept the glue before test-firing.

The **Laser Coder Bypass/On** selector switch determines the operating mode of the laser coder. In Bypass mode, the machine will ignore the coder interlock signal.

The **Carton Rate** display indicates the current machine speed in cycles per minute (CPM).

The **Line Shaft Position** display indicates the actual position of this module's virtual line shaft.

The **Goto Zero** button is visible while the Control Mode Manual/Auto selector switch is set to Manual. This button homes this module's line shaft and then recovers the associated servos to the line shaft.

The following buttons advance the current screen to the corresponding screen:

- Main Maint (Main Maintenance 1 Screen)
- **Recipe Edit** (Main Recipe 1 Screen)



Main Maintenance 1 Screen



The current **Position** and **Units** are displayed for each **Servo** on this module. Press the **Up** or **Down** arrow buttons to scroll through the listed servos.

The homing button's text reads **Teach Home Inactive** while homing is disabled.

If the selected servo is homed by the manual homing process, the homing button's text reads **Teach Home** when homing is enabled. Pressing this button establishes the selected servo's current physical position as its home position by setting the servo's absolute position to zero.



The Manual Homing feature is only intended for experienced maintenance personnel. Failure to place the selected servo at its yellow home position before pressing the Teach Home button will home the servo at the wrong position. This may result in machine components colliding with product, blanks, or other machine components.

The **Jog Disabled/Jog Enabled** button disables or enables the jog wheel for jogging the selected servo(s) forward or backward.



Machine or product damage may occur. Use caution when jogging machine components to prevent them from colliding with product, blanks, or other machine components.



Main Maintenance 1 Screen (continued)

The following buttons advance the current screen to the corresponding screen:

- Cam Edit (Global Cam Edit Screen)
- Main Controls



Main Recipe 1 Screen



The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.



This screen's settings may be viewed or edited. Refer to the Recipe Screens Section of the service manual for more information.

The ? buttons display a help message for the corresponding recipe variable. The help message disappears when pressed.

The **Line Shaft Position** display indicates the actual position of this module's virtual line shaft.

The **Carton Rate** display indicates the current machine speed in cycles per minute (CPM).

The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings, found on this screen, for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings can not be edited.

The **Main Controls** button returns the current screen to the Main Controls Screen.



Main Recipe 2 Screen



The **Recipe Display Bar** indicates the recipe to which the screen settings apply. An active or inactive display bar indicates the recipe status. The active recipe is the recipe the machine is currently running.



This screen's settings may be viewed or edited. Refer to the Recipe Screens Section of the service manual for more information.

The **Carton Rate** display indicates the current machine speed in cycles per minute (CPM).

The **Line Shaft Position** display indicates the actual position of this module's virtual line shaft.

The **Next Recipe** and **Previous Recipe** buttons allow personnel to view settings, found on this screen, for recipes other than the currently selected recipe.

The **View Tested Recipe** button allows the operator to view the most recently saved tested recipe settings for the current recipe. Pressing the button will not change the current settings and the tested recipe settings can not be edited.

The **Main Controls** button returns the current screen to the Main Controls Screen.





Section 3

Startup/Shutdown

Machine Operation
Machine Loading
Startup/Shutdown
Machine Cleanout



Machine Operation

Before operating the machine:

- All personnel must read and familiarize themselves with the safety precautions (see the Safety section). Failure to observe these precautions may result in damage to the machine or serious personal injury.
- Examine the machine. Ensure that guard doors are closed, the machine has power, no obstructions are present, and E-stops are not activated.

General Production

- The machine will load and seal cases as long as machine conditions are met for the active recipe.
- Some faults will disable operation of the machine until the fault is corrected.
- For routine stops, always cycle stop the machine. Ensure the machine has come to a complete stop before opening a guard door.
- The machine will cease to operate if a guard door is opened. Close the door and press the Reset button on the control panel to allow for restart.

General Fault Recovery Procedure

- 1. Check the HMI for fault messages.
- 2. Refer to the Troubleshooting section in the service manual for specific recovery information on each fault message.
- 3. Check the position of the machine before restarting. Clear any cases or products that obstruct a moving part.
- 4. Reset the machine.
- 5. Press the Machine Start button to resume automatic operation.



Machine Loading

Magazine

1. If the magazine is empty, load it by sliding the bottom of the blanks up to the clips. Let the top of the blanks fall into place.



2. Adjust the magazine clips if necessary. Continue to load blanks until the magazine is full.

During production, continue to load blanks as needed. It is easier to load the magazine if it does not completely run out of blanks. The back pressure from a loaded magazine is also beneficial because it allows the setup to pick blanks more easily.

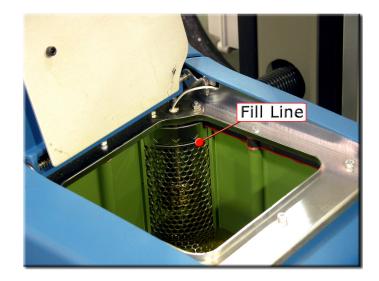




Machine Loading (continued)

Glue System

- 1. Ensure the machine and glue system have power.
- 2. If required, pour glue pellets into the glue tank reservoir up to the fill line.



3. Turn on the glue tank to begin heating the pellets. The hot melt glue will require about 35-40 minutes to reach the operating temperature. The machine will not start if the glue is not at operating temperature.

Refer to all service manuals supplied by the hot melt and glue system manufacturers for recommended operating procedures and safety precautions.





- The tank, hoses, or guns of the glue system can cause severe burns. Hot melt glue systems use glue at high temperatures and air pressures. When filling the glue tank, wear safety goggles, gloves, and other protective clothing to prevent injury from splashed glue.
- Store glue in a closed container to prevent contamination which can cause blockages in the hoses and nozzles.



Machine Loading (continued)

Preload - Right Angle Infeed

- 1. Access the Machine Controls Auto Screen.
- 2. Select the Mode: Preload.
- 3. Load the lanes so product is even across all lanes.
- 4. Press the Machine Start button.
- 5. Run product until it gets to the back of the arm.
- 6. Once sufficient surge has been met, the machine will automatically switch to Auto Mode.
- 7. Set the Blank Pick Off/Auto selector switch to Auto.



Preload - Inline Infeed

- 1. Access the Machine Controls Auto Screen.
- 2. Select the Mode: Preload.
- 3. Load the lanes so product is even across all lanes.
 - Watch for tipping cans as they enter the load area.
- 4. Press the Machine Start button.
- 5. Once sufficient surge has been met, the machine will automatically switch to Auto Mode.
- 6. Set the Blank Pick Off/Auto selector switch to Auto.





Startup/Shutdown

Machine Startup

- 1. Connect the power source to the machine to begin heating the glue system. The hot melt glue will require about 35-40 minutes to reach the operating temperature.
- 2. Complete the changeover adjustments as outlined in the Changeover section of the service manual. Ensure the machine adjustments correspond to the product and case sizes.
- 3. Advance to the Recipe Control Screen.
- 4. Press the Up or Down buttons to highlight the desired recipe and press the Select Recipe button.
- 5. Advance to the Machine Controls Auto Screen.
- 6. Set the Mode to Preload.
- 7. Press the Machine Start button.
- 8. Set the Blank Pick Off/Auto selector switch to Auto.

Machine Shutdown

- 1. On the HMI control panel, press the Cycle Stop button.
- 2. Advance to the Machine Controls Auto Screen.
- 3. Set the Blank Pick Off/Auto selector switch to Off.
- 4. Disconnect the power to the machine and the glue system.



Personnel entering the guard package, without first locking out the power, risk accidental restart and potential serious injury or death. Do not enter the machine without first performing the lockout/tagout procedure required by your facility.



Machine Cleanout

- 1. Run the machine until the machine is low on surge and the HMI displays the *Infeed Low Surge* message.
- 2. Manually balance the lanes.
- 3. Insert the cleanout blocks.
- 4. On the HMI control panel, advance to the Machine Controls Auto Screen.
- 5. Set the Mode to Cleanout.
- 6. Once the machine stops auto picking blanks, press the Cleanout Initiate button to load product until there is not enough for a full case.
- 7. Remove the remaining product by hand.
- 8. Remove the cleanout blocks.







Section 4

Changeover

Changeover Overview Changeover Procedure Adjustments



Changeover Overview



Failure to observe safety precautions may result in damage to the machine or serious personal injury. All personnel must read and familiarize themselves with the safety precautions before attempting to adjust the machine.



Change parts may be heavy. Use caution to avoid injuries. Additional help may be required to avoid drops or pinch points.

- The machine runs a range of products and blank sizes. Based on specific product, blank, and pack-pattern dimensions, the machine is programmed with a corresponding recipe. When activated via the HMI, the recipe electronically configures the machine. This section of the manual describes how to perform each manual adjustment required to change from one recipe to another and includes the manufacturer-tested changeover settings for each recipe. Failure to perform the adjustments correctly may cause the machine to fault and damage products, blanks, or machine components.
- Adjustment numbers are attached to the machine at or near the adjustment location. Refer to the individual changeover adjustment instructions in this section to locate each adjustment. Depending on which recipe you are changing to or from, the adjustments may have to be done out of numerical sequence. The correct sequence is annotated on the changeover adjustment settings chart and the individual changeover adjustment instructions.
- To ensure correct adjustments and proper machine operation, manual cycle/jog the machine several times before fine-tuning any changeover adjustment or operating the machine automatically.

Fine-Tuning Changeover Adjustments

- 1. If the machine faults or otherwise fails to operate properly, check the changeover adjustment settings to ensure they correspond with the active recipe. Make any necessary adjustments and then run the machine through several cycles.
- 2. If the problem persists, fine-tune related changeover adjustments—one adjustment at a time and in no more than 1/8" increments. Over-adjusting may compound the problem and result in additional down time. Allow for sufficient testing before adjusting further.
- 3. To recover from an over-adjustment, return to the tested changeover adjustment setting before beginning the fine-tuning process.



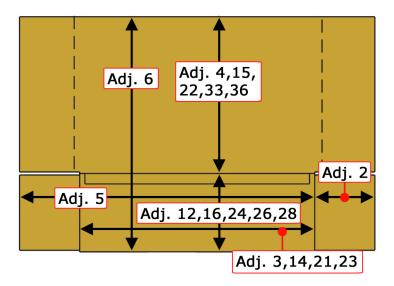
Due to variations in blanks or product, fine adjustments that differ slightly from the original settings may be necessary to ensure optimal machine performance.



4.2

Carton Case Blank Drawing with Adjustments

The adjustments shown on the following blank correspond to the annotated blank measurements. If the blank is warped, it may affect the machine's performance.





Changeover Procedure

Prepare the Machine for Changeover

The machine should be empty of product for changeover.

- 1. Clean out the machine as per the instructions in the Startup/Shutdown section.
- 2. Advance to the Recipe Control Screen on the HMI and press the Changeover Position button to automatically move machine assemblies to the changeover position.
- 3. Remove the blanks from the upstream end of the magazine against the direction of travel.
- 4. Perform the Lockout/Tagout procedure or any other safety measure required by your facility when performing a changeover.
- 5. Perform the changeover adjustments as described on the following pages. Be sure to follow the proper sequence.

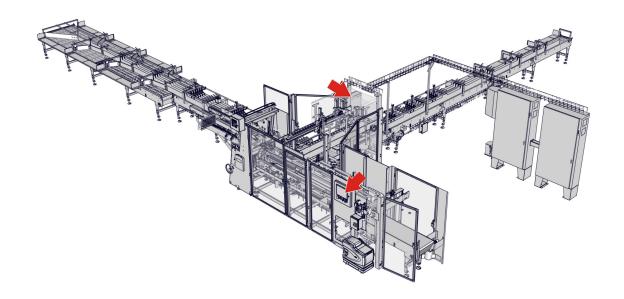
Changeover Adjustment Number Settings

The changeover adjustment chart, found on the documentation USB jump drive, reflects the machine's original factory settings and can be easily updated to reflect the most current settings. If assistance is needed, please contact our Technical Service Department at 320.763.5507 or email service@douglas-machine.com.



Adjustments

Adjustment 1: Select Recipe-Changeover Position



When changing over, advance to the Recipe Control Screen and press the Changeover Position button.

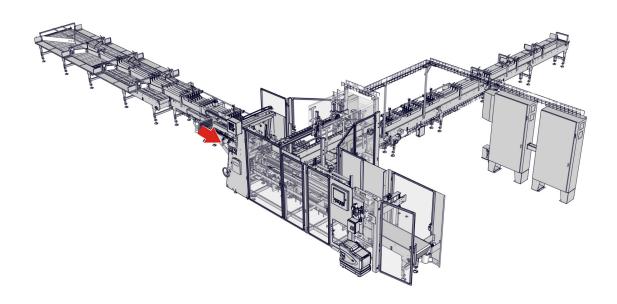
- 1. On the HMI, advance to the Recipe Control screen.
- 2. Press the Changeover Position button.
- 3. Press the Up or Down arrow buttons to select the desired recipe.
- 4. Press the Select Recipe button.

The machine is now electronically configured to run this recipe.





Adjustment 2: Magazine Fixed Side Backstop

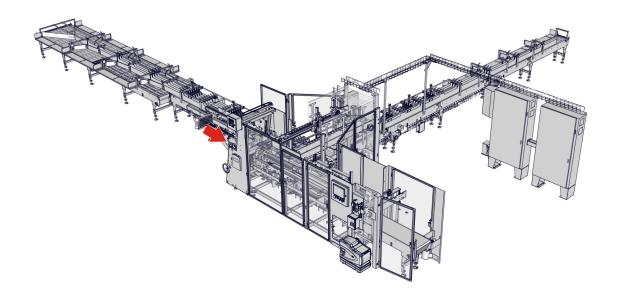


1. Turn the handratchet to the correct position indicator setting.





Adjustment 3: Magazine Adj Side Drive Chain Width



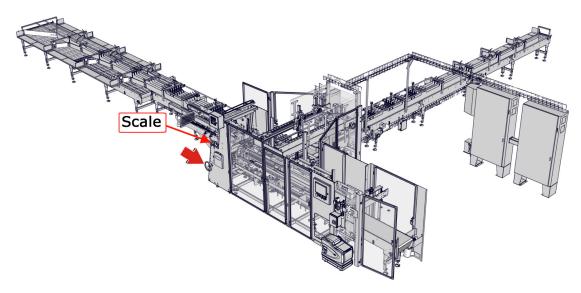
When changing over to a larger size, perform Adj. 5 before Adj. 3.

1. Turn the handratchet to the correct position indicator setting.





Adjustment 4: Magazine Bed Height

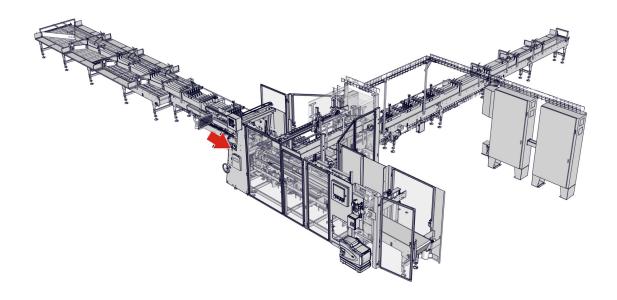


1. Turn the handwheel to the correct scale setting.



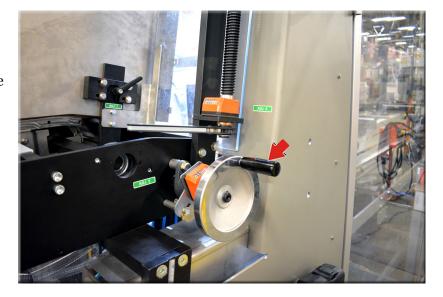


Adjustment 5: Magazine Adj Side Guide Width



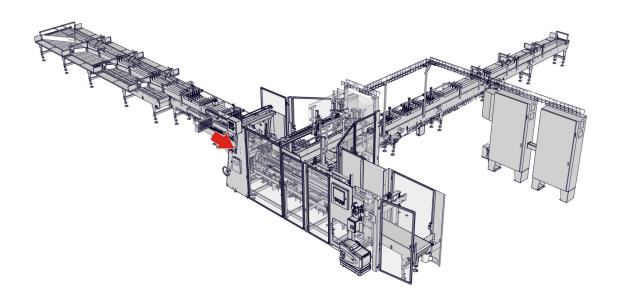
When changing over to a larger size, perform Adj. 5 before Adj. 3.

1. Turn the handwheel to the correct position indicator setting.





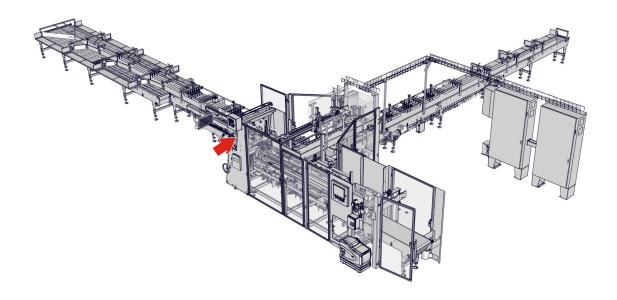
Adjustment 6: Magazine Height



1. Turn the handratchet to the correct position indicator setting.



Adjustment 7: Magazine Adj Side Guide

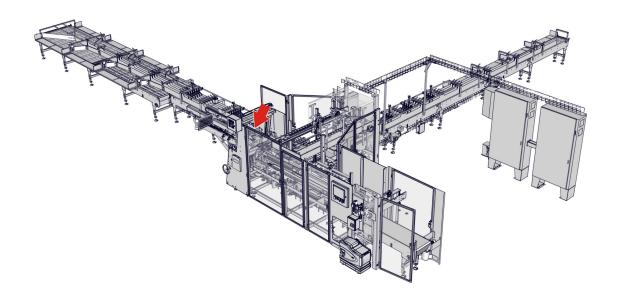


- 1. Loosen the handlever.
- 2. Remove the magazine adj side guide change part and replace it with the correct change part.
- 3. Tighten the handlever to secure.





Adjustment 8: Magazine Fixed Side Guide

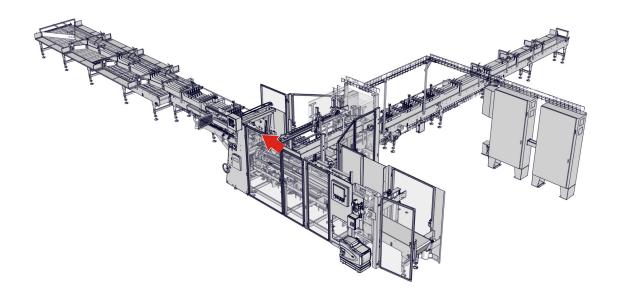


- 1. Loosen the handlever.
- 2. Remove the magazine fixed side guide change part and replace it with the correct change part.
- 3. Tighten the handlever to secure.



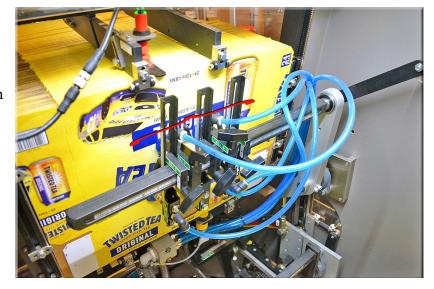


Adjustment 9: Upper Vacuum Cup Width



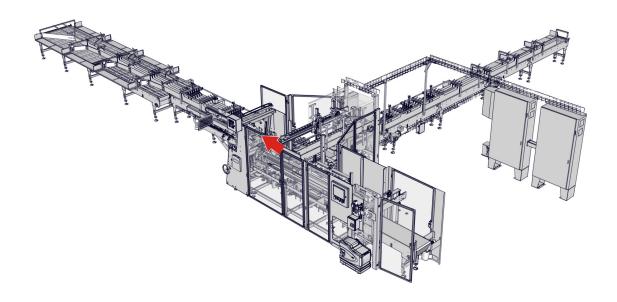
At each adjustment location (five total):

- 1. Loosen the handknob.
- 2. Position the upper vacuum cup width to the correct scale setting.
- 3. Tighten the handknob to secure.





Adjustment 10: Upper Cups Height Adj



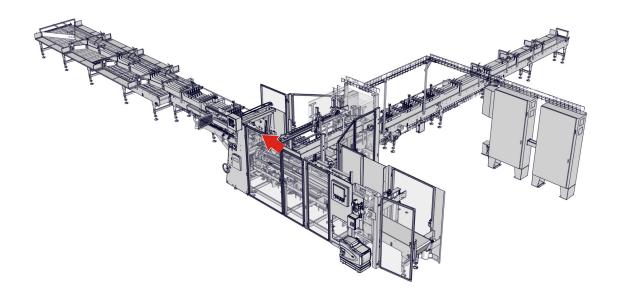
At each adjustment location (three total):

- 1. Loosen the handknob.
- 2. Position the upper cups height adj to the correct scale setting.
- 3. Tighten the handknob to secure.





Adjustment 11: Lower Vacuum Cup Width



When changing over to a larger size, perform Adj. 21 before Adj. 11.

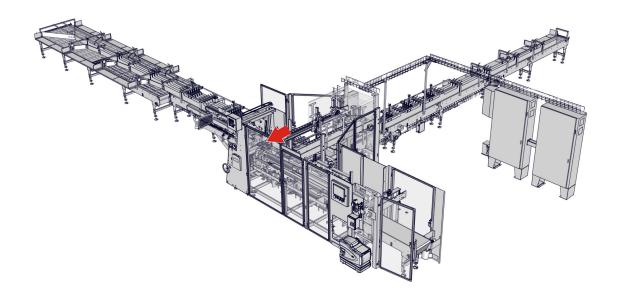
At each adjustment location (three total):

- 1. Loosen the handknob.
- 2. Position the lower vacuum cup width to the correct scale setting.
- 3. Tighten the handknob to secure.





Adjustment 12: Hold Down Height

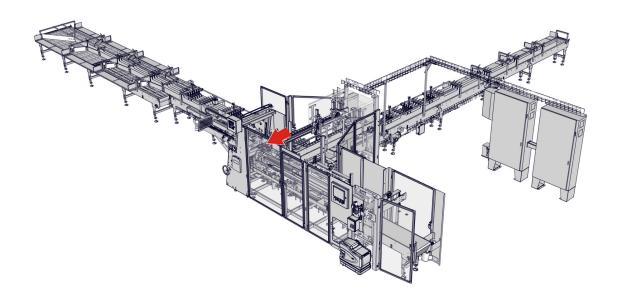


- 1. Loosen the handknob.
- 2. Position the hold down height to the correct scale setting.
- 3. Tighten the handknob to secure.





Adjustment 13: Hold Down Width

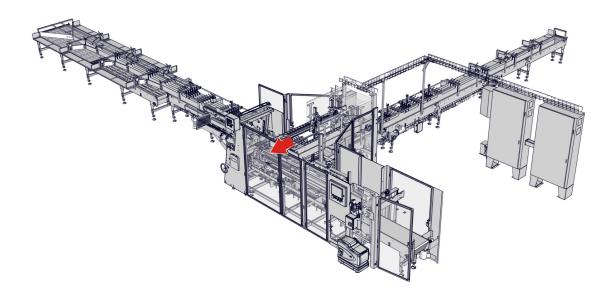


- 1. Loosen the handlever.
- 2. Position the hold down width to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 14: Breaker Bar Width

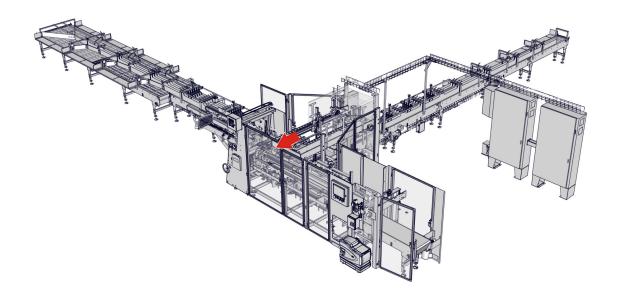


- 1. Loosen the handknob.
- 2. Position the breaker bar width to the correct scale setting.
- 3. Tighten the handknob to secure.

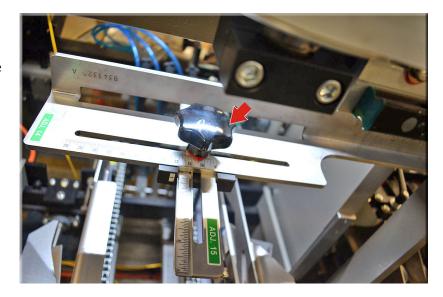




Adjustment 15: Breaker Bar Length

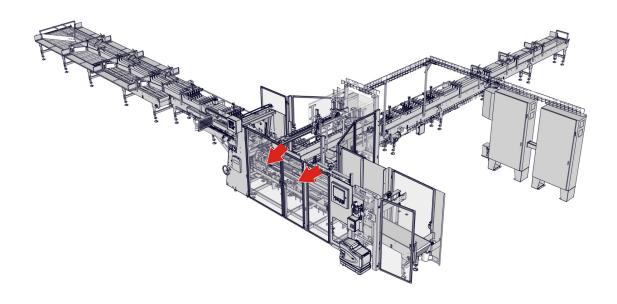


- 1. Loosen the handknob.
- 2. Position the breaker bar length to the correct scale setting.
- 3. Tighten the handknob to secure.





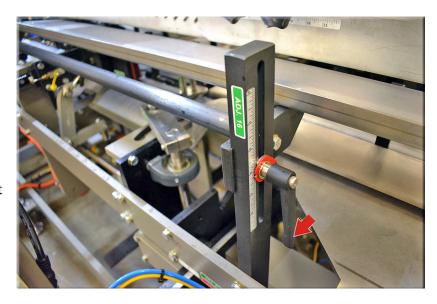
Adjustment 16: Upper Flap Guide Height



When changing over to a smaller size, perform Adj. 17 and Adj. 19 before Adj. 16.

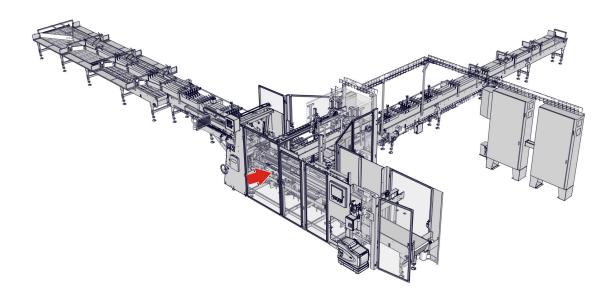
At each adjustment location (two total):

- 1. Loosen the handlever.
- 2. Position the upper flap guide height to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 17: Load Backstop Plate



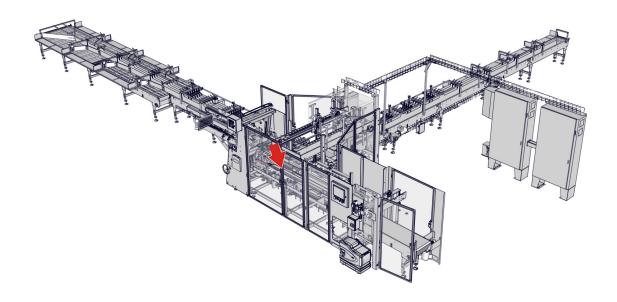
When changing over to a smaller size, perform Adj. 17 and Adj. 19 before Adj. 16.

- 1. Loosen the handlever.
- 2. Remove the load backstop plate change part and replace it with the correct change part.
- 3. Tighten the handlever to secure.

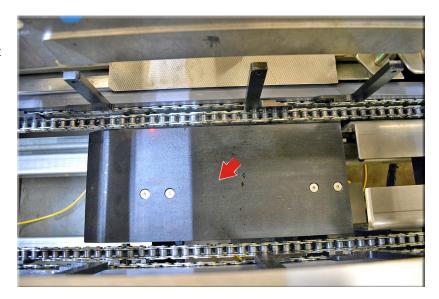




Adjustment 18: Load Station Support Plate

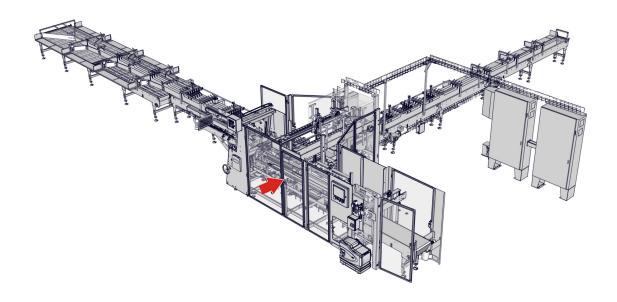


1. Lift to remove the load station support plate change part and replace it with the correct change part.





Adjustment 19: Adj Side Tucker Head



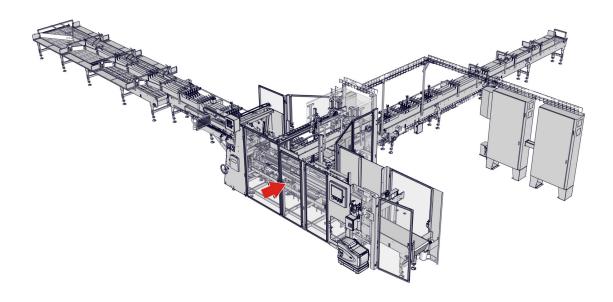
When changing over to a smaller size, perform Adj. 17 and Adj. 19 before Adj. 16.

- 1. Loosen the handknob.
- 2. Remove the adj side tucker head change part and replace it with the correct change part.
- 3. Tighten the handknob to secure.





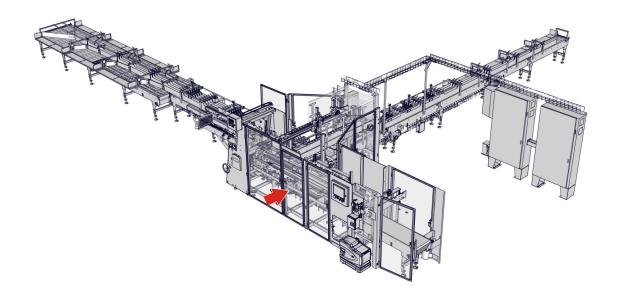
Adjustment 20: Adj Side Tucker Rail Length



- 1. Loosen the handlever.
- 2. Position the adj side tucker rail length to the correct scale setting.
- 3. Tighten the handlever to secure.



Adjustment 21: Toolbar Width



When changing over to a larger size, perform Adj. 21 before Adj. 11.

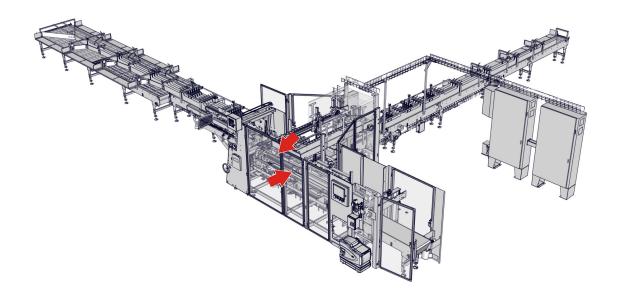
When changing over, move Adj. 24 to 7.00 before performing Adj. 21 and Adj. 23.

- 1. Loosen the handlever.
- 2. Turn the handratchet to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 22: Overhead Length



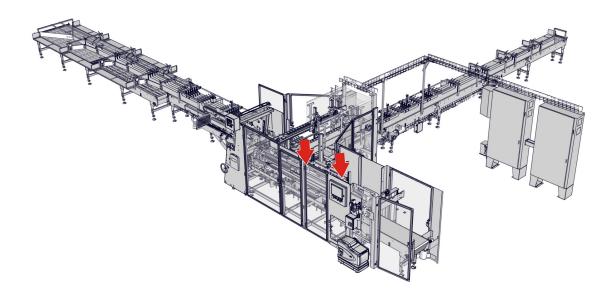
At each adjustment location (two total):

- 1. Loosen two handknobs.
- 2. Position the overhead length to the correct scale setting.
- 3. Tighten the handknobs to secure.





Adjustment 23: Overhead Width



When changing over, move Adj. 24 to 7.00 before performing Adj. 21 and Adj. 23.

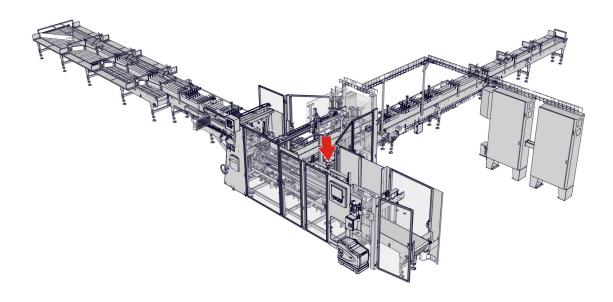
At each adjustment location (two total):

- 1. Loosen the handlever.
- 2. Position the overhead width to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 24: Overhead Height



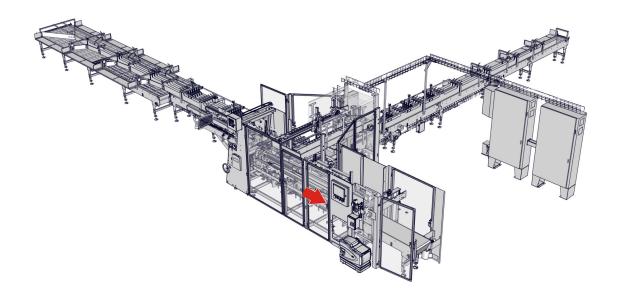
When changing over, move Adj. 24 to 7.00 before performing Adj. 21 and Adj. 23.

- 1. Loosen the handlever.
- 2. Turn the handwheel to the correct position indicator setting.
- 3. Tighten the handlever to secure.





Adjustment 25: Adj Side Glue Gun Height

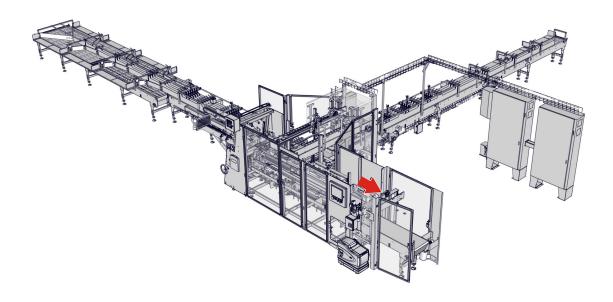


- 1. Loosen the handlever.
- 2. Position the adj side glue gun height to the correct scale setting.
- 3. Tighten the handlever to secure.





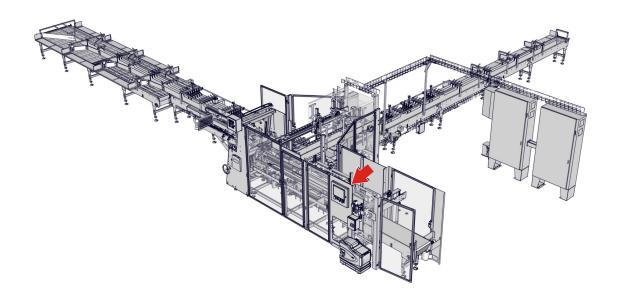
Adjustment 26: Laser Height



1. Turn the handratchet to the correct position indicator setting.



Adjustment 27: Fixed Glue Gun Height

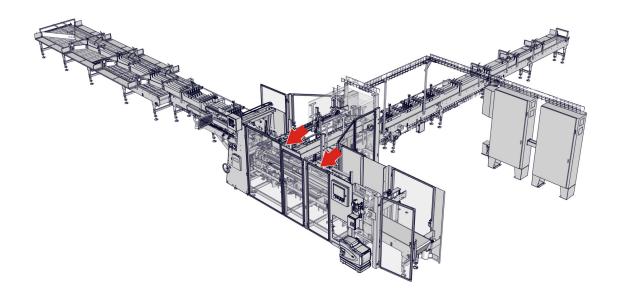


- 1. Loosen the handlever.
- 2. Position the fixed glue gun height to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 28: Fixed Flap Guide Height

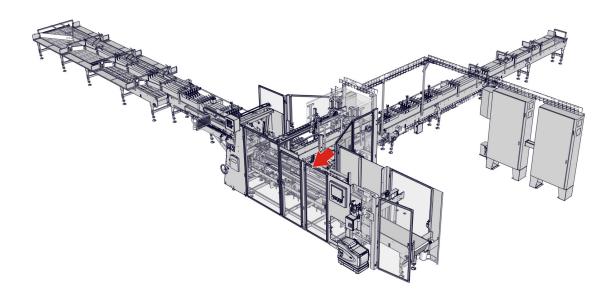


At each adjustment location (two total):

- 1. Loosen the handlever.
- 2. Position the fixed flap guide height to the correct scale setting.
- 3. Tighten the handlever to secure.



Adjustment 29: Tucker Rail Length

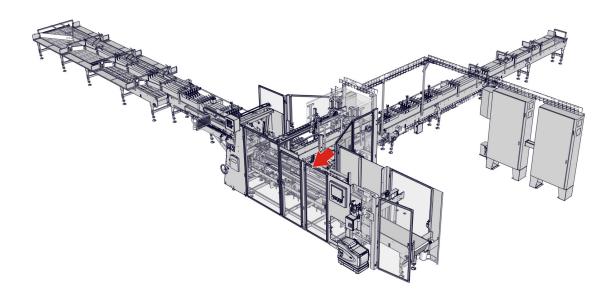


- 1. Loosen the handlever.
- 2. Position the tucker rail length to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 30: Tucker Head

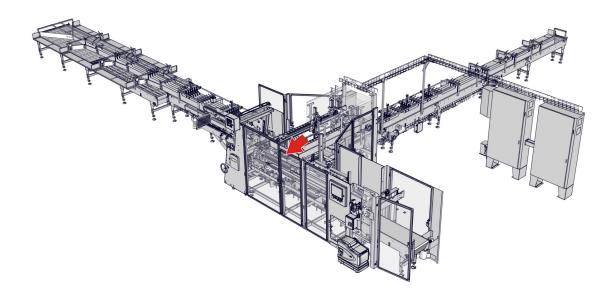


- 1. Loosen the handknob.
- 2. Remove the tucker head change part and replace it with the correct change part.
- 3. Tighten the handknob to secure.





Adjustments 31-32: Adj and Fixed Funnels



At each adjustment location:

To remove:

1. Lift the corresponding funnel to remove.

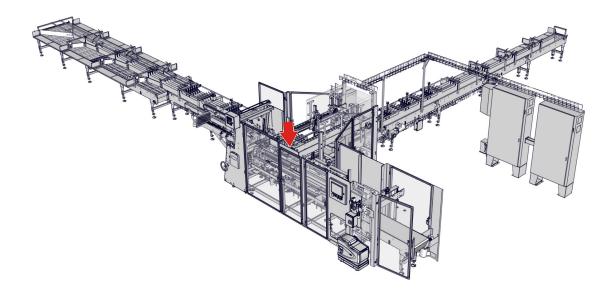
To install:

1. Place the corresponding funnel onto the shaft to install.

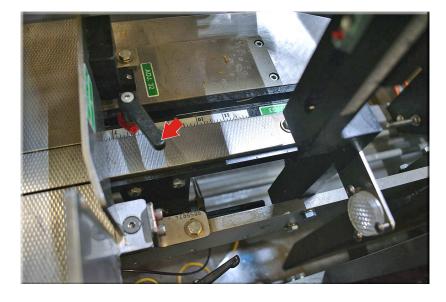




Adjustment 33: Adj Funnel Width

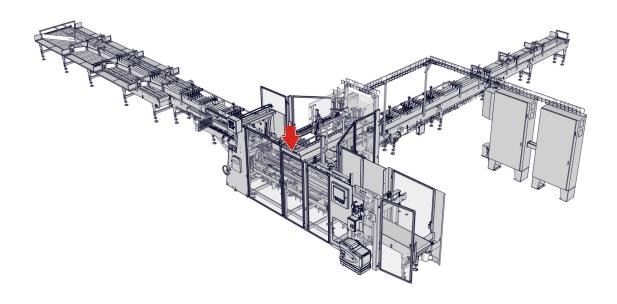


- 1. Loosen the handlever.
- 2. Position the adj funnel width to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 34: Inline Load Guide

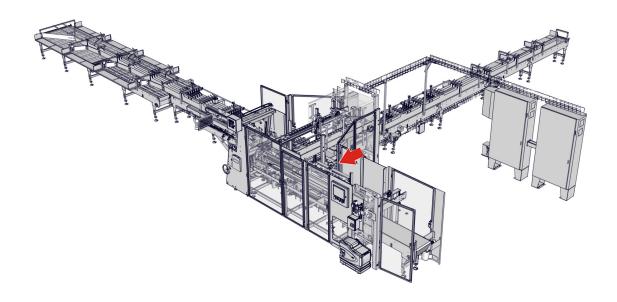


- 1. Loosen the handlever.
- 2. Position the inline load guide to the correct scale setting.
- 3. Tighten the handlever to secure.





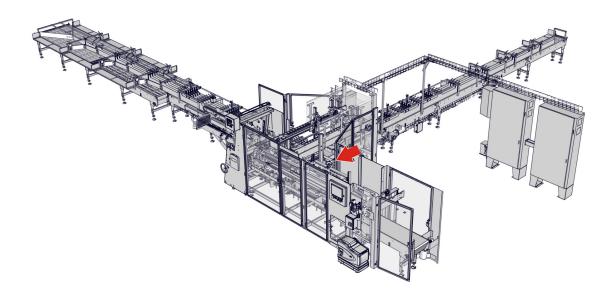
Adjustment 35: Surge Release Width



- 1. Loosen the handlever.
- 2. Turn the handwheel to the correct position indicator setting.
- 3. Tighten the handlever to secure.



Adjustment 36: Surge Release Funnel



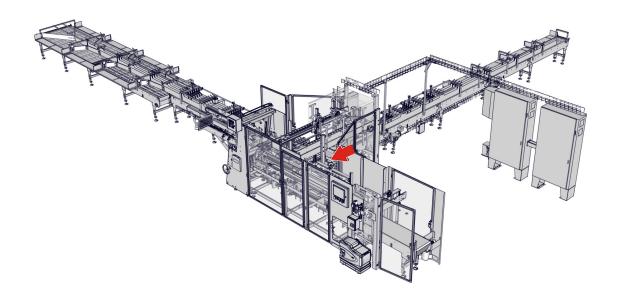
- 1. Loosen the handlever.
- 2. Position the surge release funnel to the correct scale setting.
- 3. Tighten the handlever to secure.

When the recipe does not call for the change part, remove the surge release funnel change part.





Adjustment 37: Surge Release Flags Width



At each adjustment location (six total):

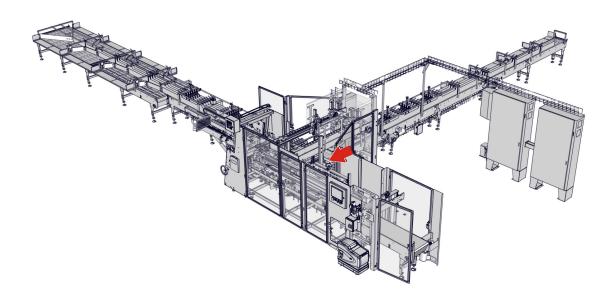
- 1. Loosen the handlever.
- 2. Position the surge release flags width to the correct scale setting.
- 3. Tighten the handlever to secure.





4.40

Adjustment 38: Surge Release Head

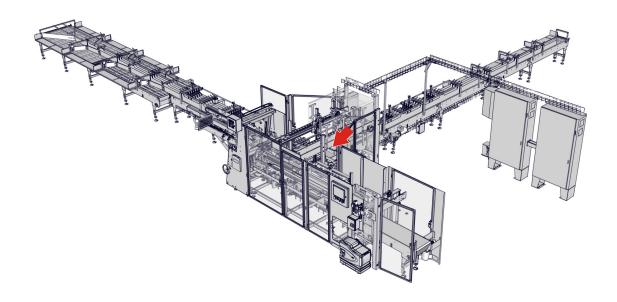


1. Lift to remove the surge release head change part and replace it with the correct change part.



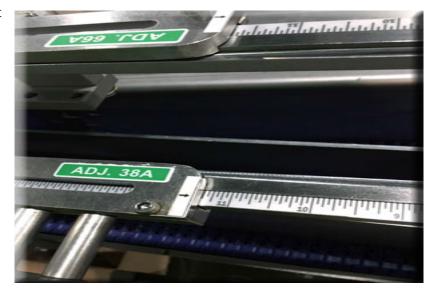


Adjustment 38A: Side Guide Length

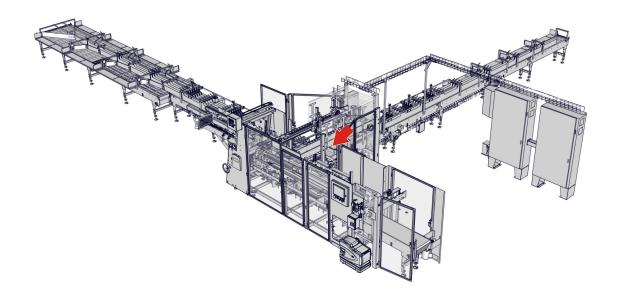


- 1. Loosen the handlever (not shown in photo).
- 2. Position the side guide length to the correct scale setting.
- 3. Tighten the handlever to secure.

When the recipe does not call for the change part, remove the side guide length change part.



Adjustment 39: Loader Arm 2

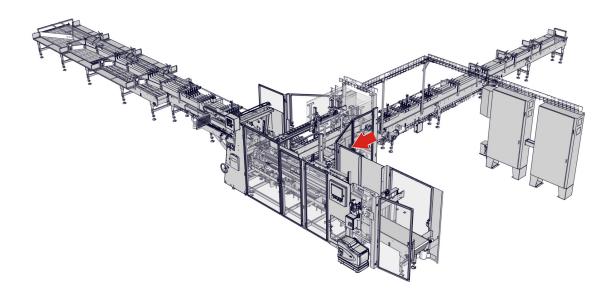


- 1. Loosen the bolt using a 9/16" wrench.
- 2. Remove the loader arm 2 change part and replace it with the correct change part.
- 3. Tighten the bolt to secure.





Adjustment 40: Lane Length

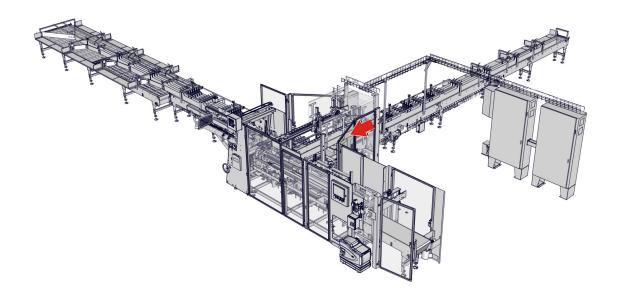


- 1. Loosen the handlever.
- 2. Position the lane length to the correct scale setting.
- 3. Tighten the handlever to secure.

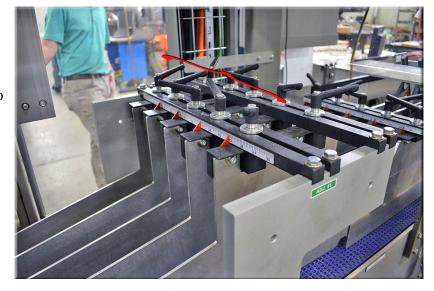




Adjustment 41: Infeed Lanes

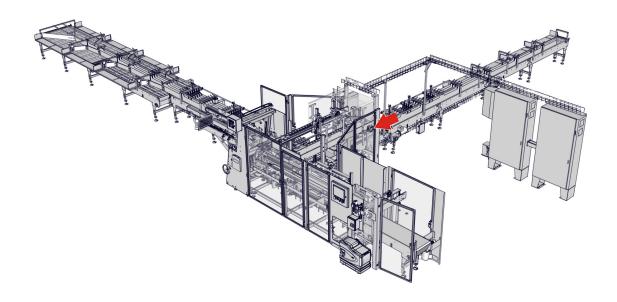


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 42: Arm 2 Width

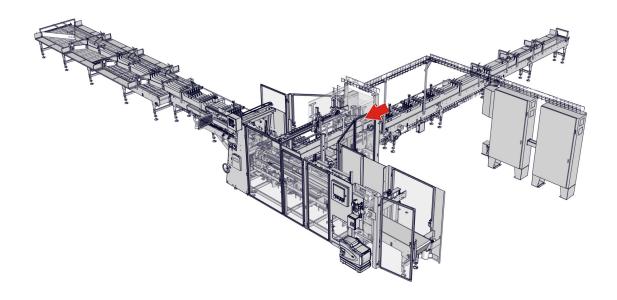


- 1. Loosen the handlever.
- 2. Turn the handwheel to the correct position indicator setting.
- 3. Tighten the handlever to secure.





Adjustment 43: Infeed Lanes

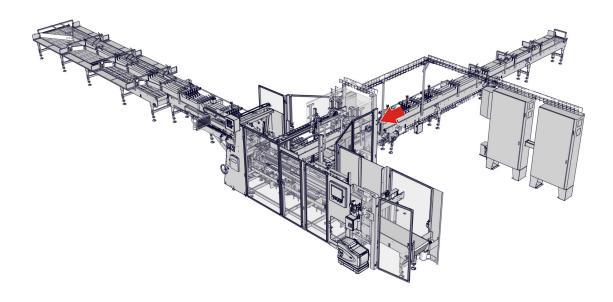


- 1. Loosen the handlever.
- 2. Position infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 44: Flags Width

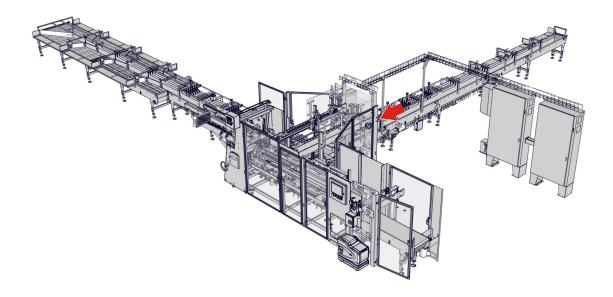


- 1. Loosen the handlever.
- 2. Center the flags width above the product in the lane.
- 3. Tighten the handlever to secure.





Adjustment 45: Lane 4 Flag Position

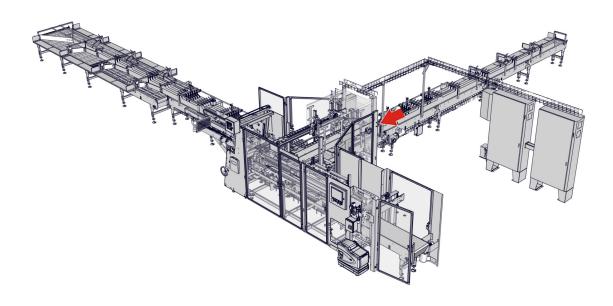


- 1. When the lane 4 flag position is not used, lift and hook the back of the flag onto the bracket.
- 2. When the lane 4 flag position is used, unhook the flag from the bracket and lower the flag.





Adjustment 46: Flags Height

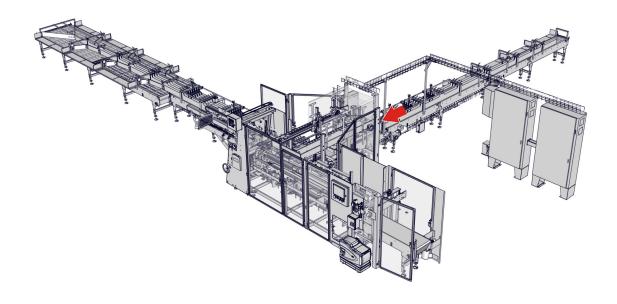


- 1. Loosen the handlever.
- 2. Turn the handcrank to position the flags height to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 47: Infeed Lanes

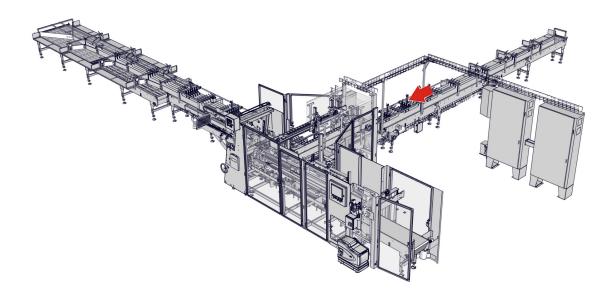


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





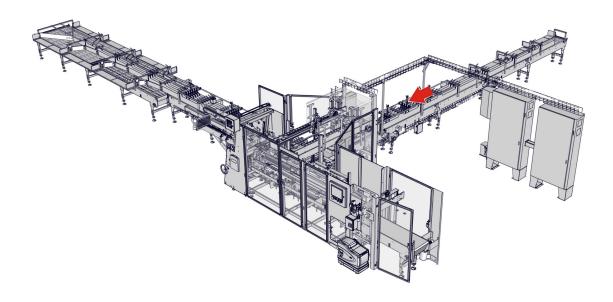
Adjustment 48: Flags Width



- 1. Loosen the handlever.
- 2. Center the flags width above the product in the lane.
- 3. Tighten the handlever to secure.



Adjustment 49: Lane 4 Flag Position

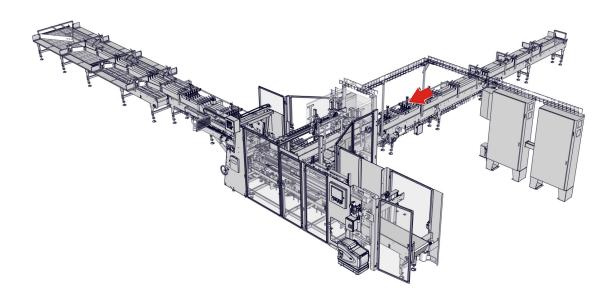


- 1. When the lane 4 flag position is not used, lift and hook the back of the flag onto the bracket.
- 2. When the lane 4 flag position is used, unhook the flag from the bracket and lower the flag.





Adjustment 50: Flags Height

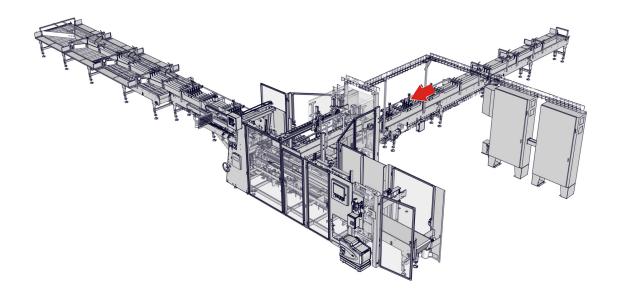


- 1. Loosen the handlever.
- 2. Turn the handcrank to position the flags height to the correct scale setting.
- 3. Tighten the handlever to secure.

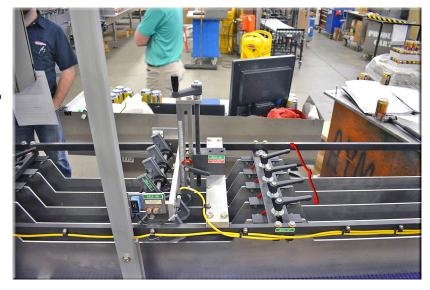




Adjustment 51: Infeed Lanes

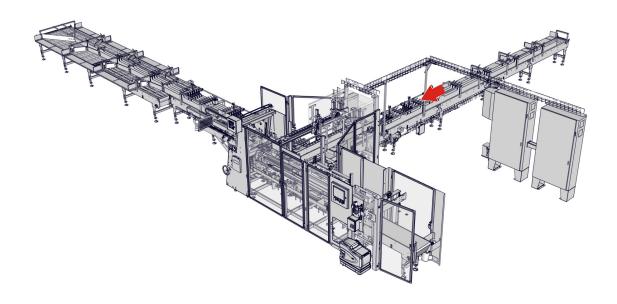


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





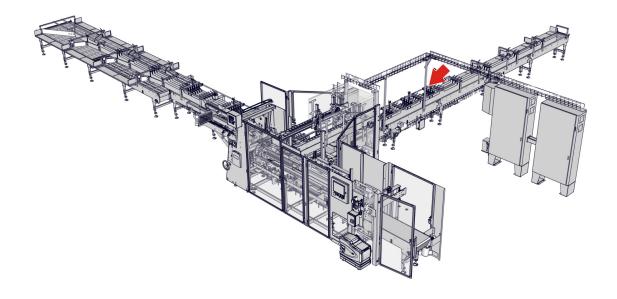
Adjustment 52: Infeed Lanes



- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.



Adjustment 53: Flags Width

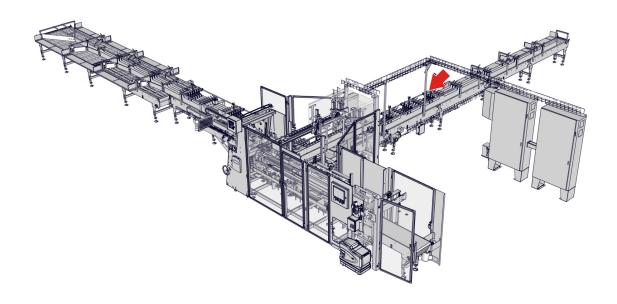


- 1. Loosen the handlever.
- 2. Center the flags width above the product in the lane.
- 3. Tighten the handlever to secure.





Adjustment 54: Lane 4 Flag Position

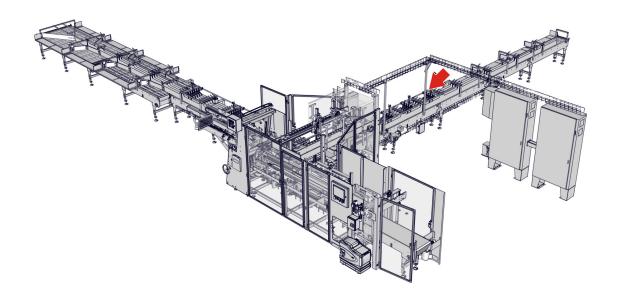


- 1. When the lane 4 flag position is not used, lift and hook the back of the flag onto the bracket.
- 2. When the lane 4 flag position is used, unhook the flag from the bracket and lower the flag.





Adjustment 55: Flags Height

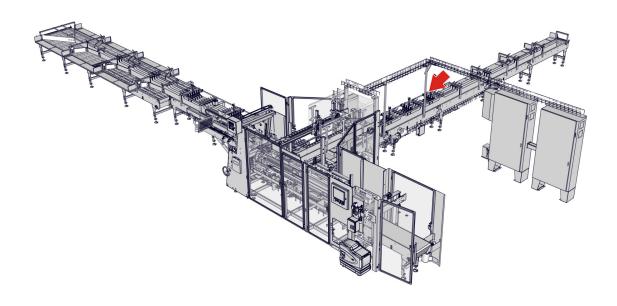


- 1. Loosen the handlever.
- 2. Turn the handcrank to position the flags height to the correct scale setting.
- 3. Tighten the handlever to secure.

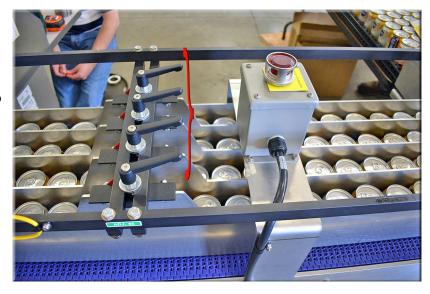




Adjustment 56: Infeed Lanes

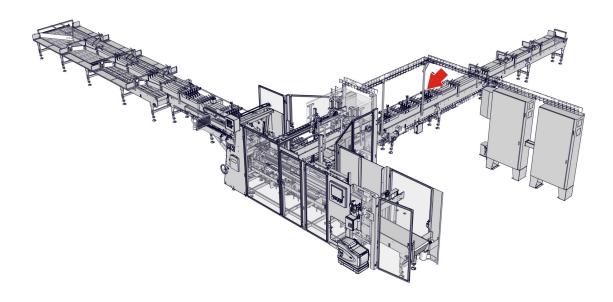


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 57: Infeed Lanes

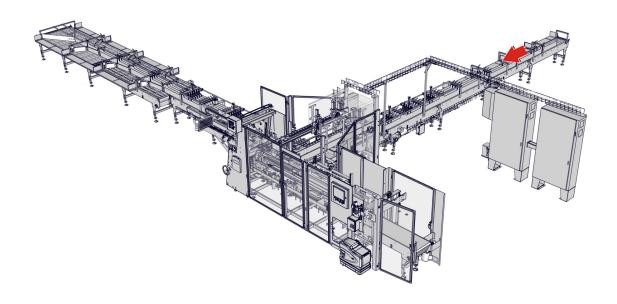


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





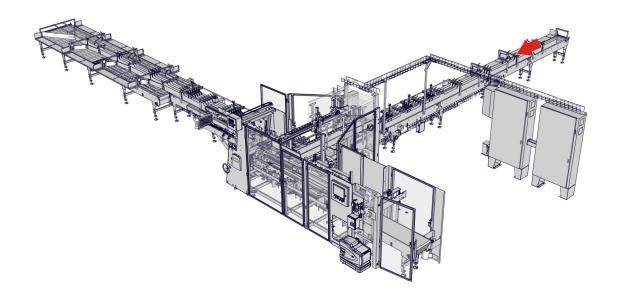
Adjustment 58: Infeed Lanes



- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.



Adjustment 59: Infeed Lanes

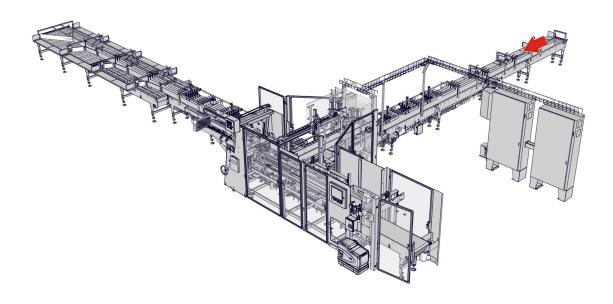


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 60: Infeed Lanes

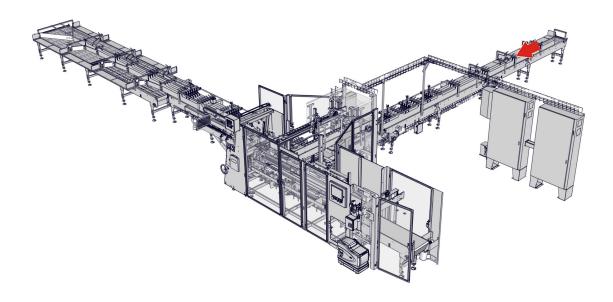


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 61: Infeed Lanes

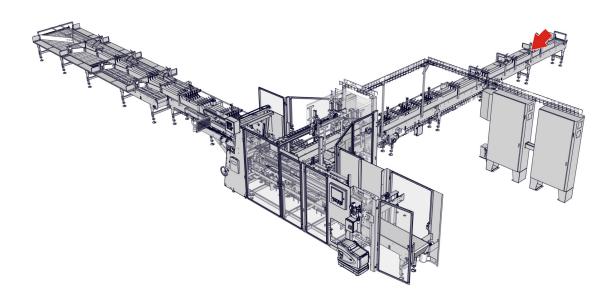


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





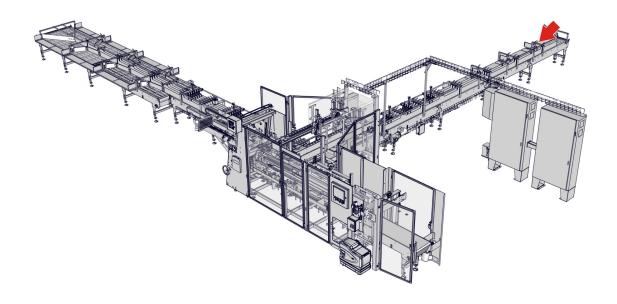
Adjustment 62: Infeed Lanes



- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.



Adjustment 63: Infeed Lanes

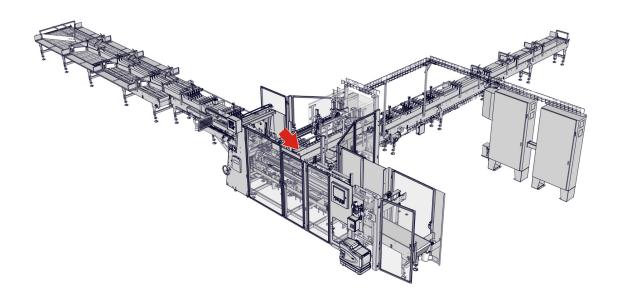


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 64: Arm 1 Loader Head

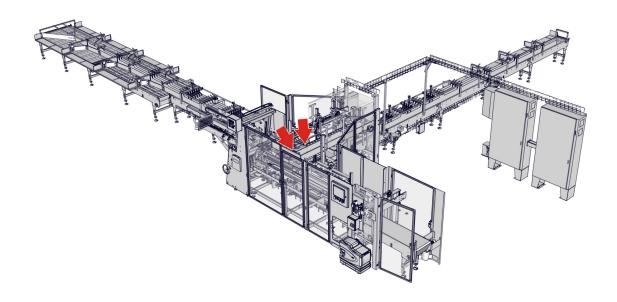


- 1. Loosen the bolt using a 9/16" wrench.
- 2. Remove the arm 1 loader head change part and replace it with the correct change part.
- 3. Tighten the bolt to secure.





Adjustment 65: Load Deck

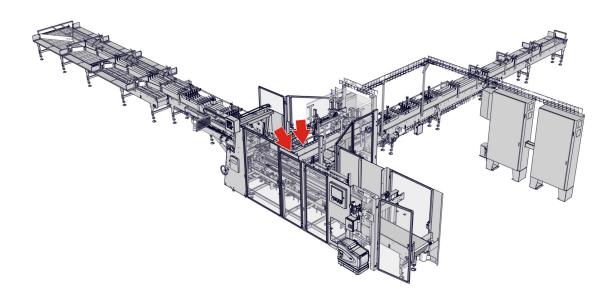


- 1. Loosen the handknobs.
- 2. Remove the load deck change part and replace it with the correct change part.
- 3. Tighten the handknobs to secure.





Adjustment 66: Pop Up Gate

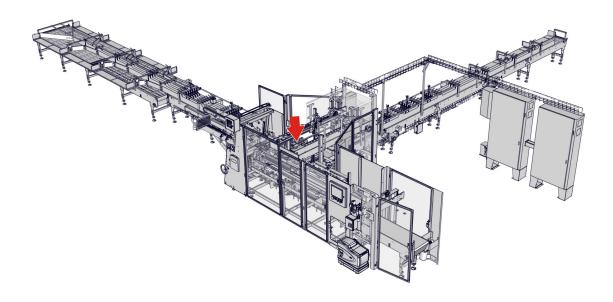


1. Remove the pop up gate change part and replace it with the correct change part.





Adjustment 66A: Guide Length



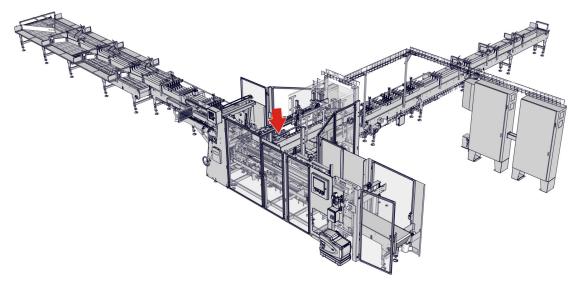
- 1. Loosen the handlever (not shown in photo).
- 2. Position the guide length to the correct scale setting.
- 3. Tighten the handlever to secure.

When the recipe does not call for adjustment 66's lane guide, this adjustment is not used.





Adjustments 67-68: Shuttling Lanes



At each adjustment location (seven total):

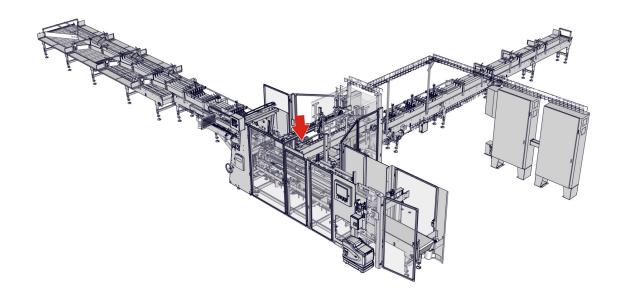
- 1. Using the die provided, loosen the handlevers.
- 2. Position the shuttling lanes to the correct scale setting.
- 3. Tighten the handlever to secure.







Adjustments 69-70: Shuttling Lanes 5 and 6

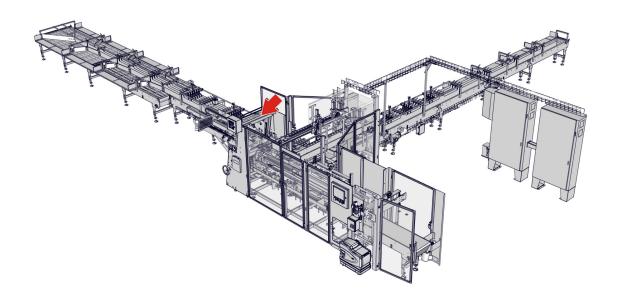


- 1. When called for by the recipe, insert the corresponding shuttling lane change part.
- 2. Loosen the handlever.
- 3. Position the corresponding shuttling lane to the correct scale setting.
- 4. Tighten the handlever to secure.

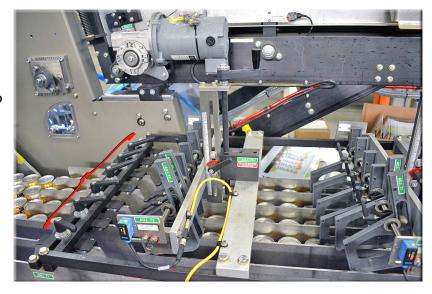




Adjustment 71: Infeed Lanes

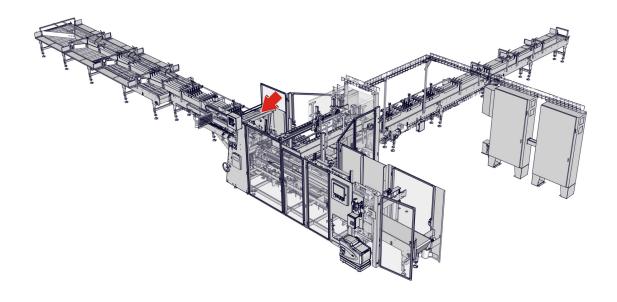


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 72: Flags Width

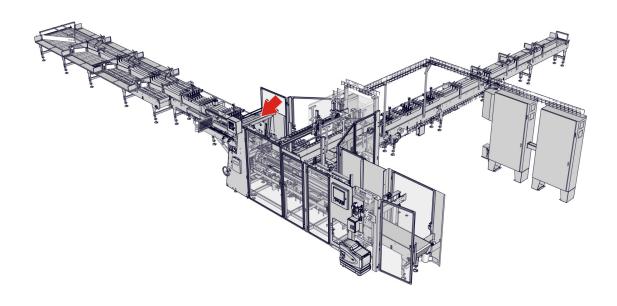


- 1. Loosen the handlever.
- 2. Center the flags width above the product in the lane.
- 3. Tighten the handlever to secure.

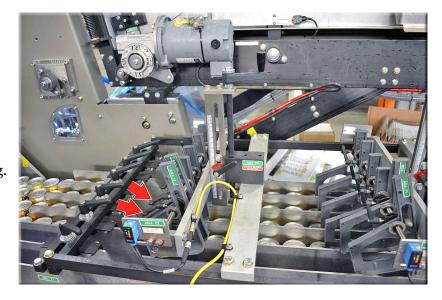




Adjustments 73-74: Lane 6 and Lane 5 Flag Position

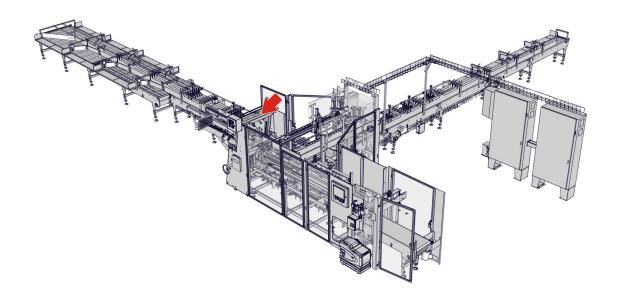


- 1. When the corresponding lane flag position is not used, lift and hook the back of the flag onto the bracket.
- 2. When the corresponding lane flag position is used, unhook the flag from the bracket and lower the flag.

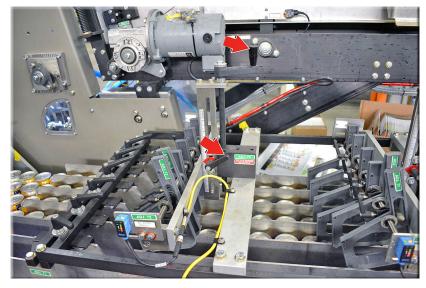




Adjustment 75: Flags Height

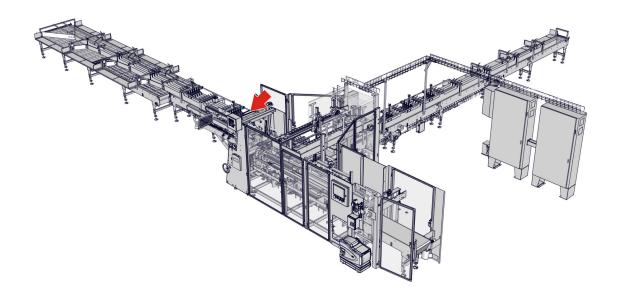


- 1. Loosen the handlever.
- 2. Turn the handcrank to position the flags height to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 76: Flags Width

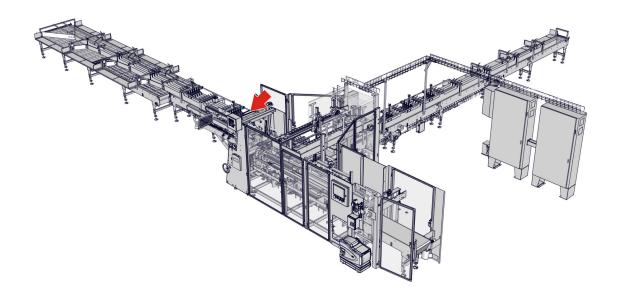


- 1. Loosen the handlever.
- 2. Center the flags width above the product in the lane.
- 3. Tighten the handlever to secure.





Adjustments 77-78: Lane 6 and Lane 5 Flag Position

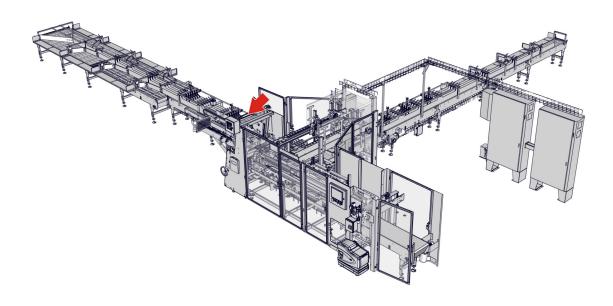


- 1. When the corresponding lane flag position is not used, lift and hook the back of the flag onto the bracket.
- 2. When the corresponding lane flag position is used, unhook the flag from the bracket and lower the flag.





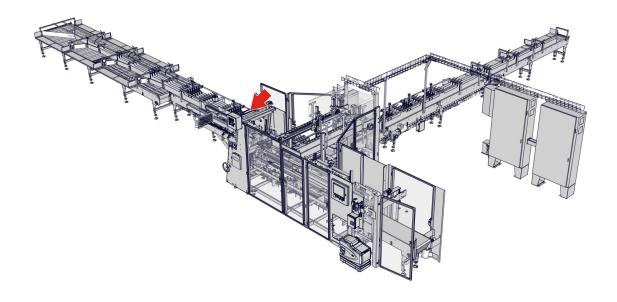
Adjustment 79: Flags Height



- 1. Loosen the handlever.
- 2. Turn the handcrank to position the flags height to the correct scale setting.
- 3. Tighten the handlever to secure.



Adjustment 80: Infeed Lanes

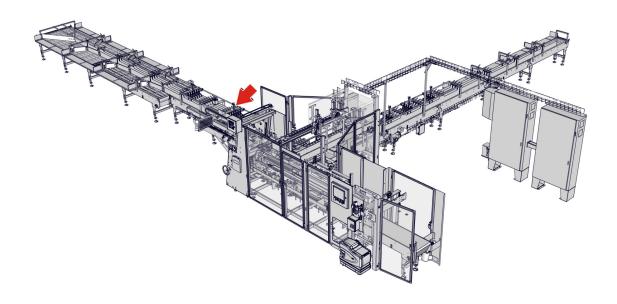


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.

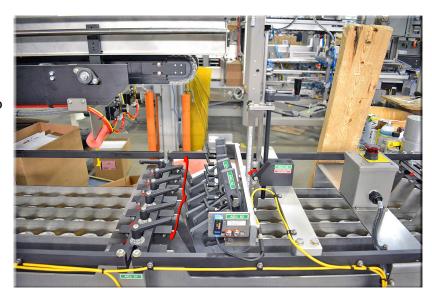




Adjustment 81: Infeed Lanes

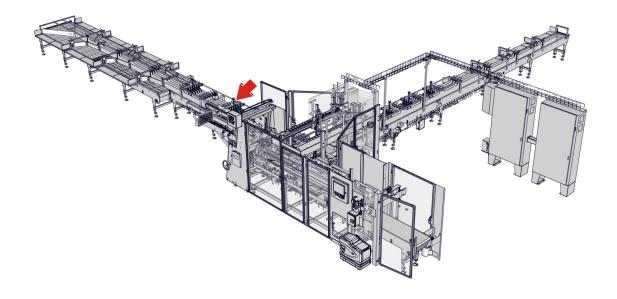


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustment 82: Flags Width

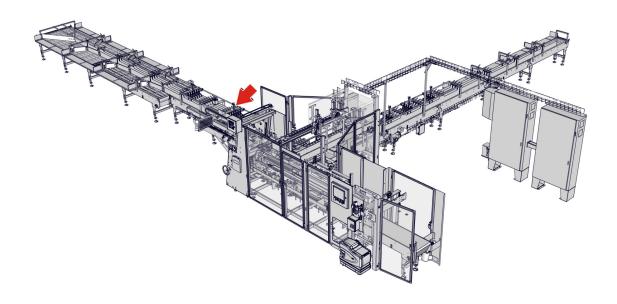


- 1. Loosen the handlever.
- 2. Center the flags width above the product in the lane.
- 3. Tighten the handlever to secure.

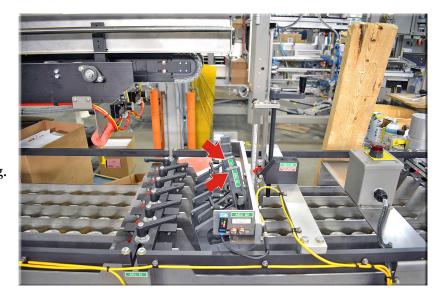




Adjustments 83-84: Lane 6 and Lane 5 Flag Position

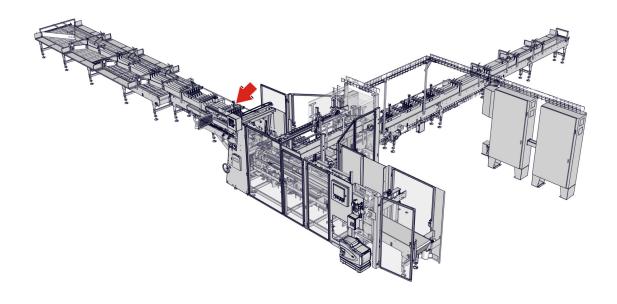


- 1. When the corresponding lane flag position is not used, lift and hook the back of the flag onto the bracket.
- 2. When the corresponding lane flag position is used, unhook the flag from the bracket and lower the flag.

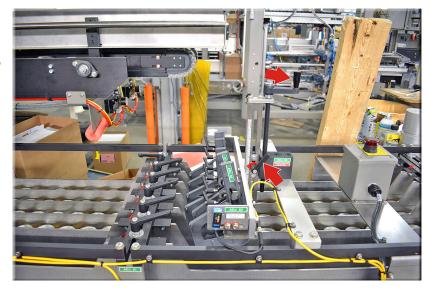




Adjustment 85: Flags Height

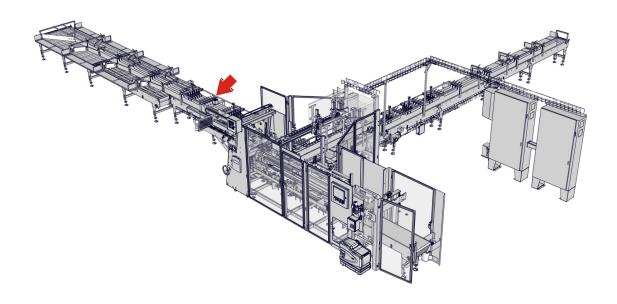


- 1. Loosen the handlever.
- 2. Turn the handcrank to position the flags height to the correct scale setting.
- 3. Tighten the handlever to secure.





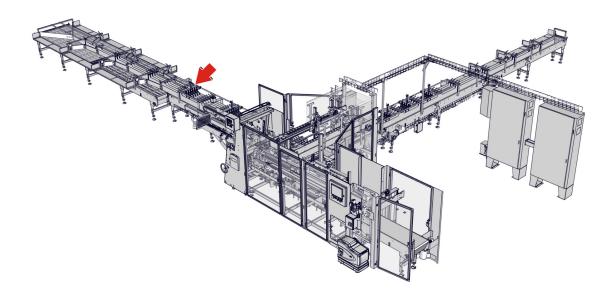
Adjustment 86: Infeed Lanes



- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.



Adjustment 87: Infeed Lanes

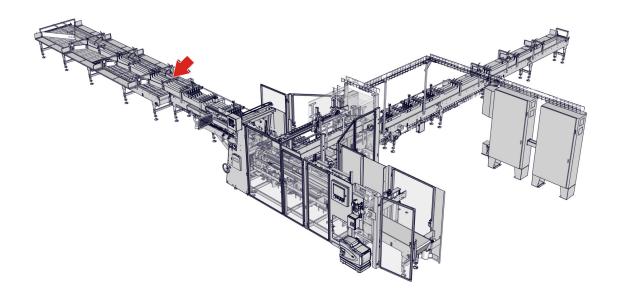


- 1. Loosen the handlever.
- 2. Position the infeed lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





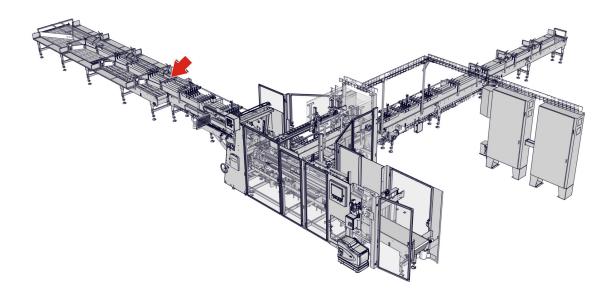
Adjustment 88: Flags Width



- 1. Loosen the handlever.
- 2. Center the flags width above the product in the lane.
- 3. Tighten the handlever to secure.



Adjustment 89: Flags Height

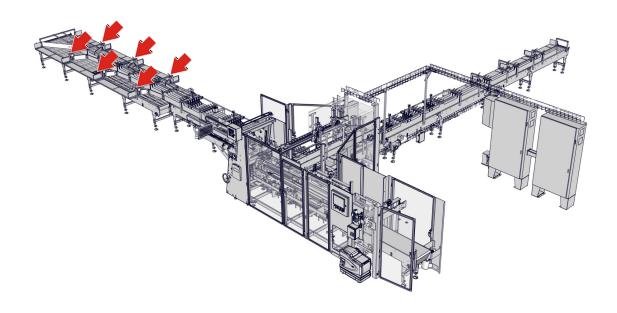


- 1. Loosen the handlever.
- 2. Turn the handcrank to position the flags height to the correct scale setting.
- 3. Tighten the handlever to secure.





Adjustments 90-95: Funneling Lanes



- 1. Loosen the handlever.
- 2. Position the funneling lanes to the correct scale setting.
- 3. Tighten the handlever to secure.





Section 5

Components

General Components
Primary Components



General Components

PLC



The PLC (Programmable Logic Controller) is a digital computer that controls machine operation.

The PLC is designed for multiple inputs and output arrangements, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact.

The PLC continually receives information from input devices and depending on their state, systematically commands the output devices.

Input devices include, but are not limited to, sensors (photo eyes, limit switches, proximity sensors, etc.), HMIs, control buttons/switches, and servomotors. Output device examples include the light column, solenoid valves, and motors. Servomotors serve as both an input and output device.

A customized program controls the PLC and is stored in an Energy Storage Module (ESM). Save the PLC program to an external location before replacing the ESM.



Arc welding on or near the machine could cause electrical interference and possible PLC failure. Always perform the lockout/tagout procedure required by your facility before arc welding on or near the machine.



5.2

Glue System



This machine uses a hot melt applicator. The melter liquefies solid-form hot melt and maintains the hot melt at the desired temperature. When the guns activate, the melter pumps the liquefied hot melt through the hoses and out the gun nozzles, where it is applied to the surface of the blank.

Refer to the OEM product literature supplied with the machine for additional information.



- The tank, hoses, or guns of the glue system can cause severe burns. Hot melt glue systems use high glue temperatures and air pressures. When servicing the glue system, wear safety goggles, gloves, and other protective clothing to prevent injury from splashed glue.
- Store glue in a closed container to prevent contaminants from reaching the hoses and nozzles; contaminants can cause blockages.



AC Motors



AC (alternating current) motors are single speed if not controlled by a VFD (variable frequency drive).

Most AC motors are controlled by VFD, which controls the rotational speed of a motor by increasing or decreasing the frequency (hertz) of electrical power supplied to the motor. Through the drive, the PLC commands the AC motor to start, stop, and vary its speed and direction in accordance with the PLC program.

Most AC motors are equipped with a gearbox. The gearbox performs a torque-speed conversion, reducing the speed provided by the motor into a lower RPM while increasing the torque.

The VFD drives are located in an electrical cabinet. Each drive is equipped with status LED indicators. Refer to the OEM documentation to interpret the LED indicator states and determine fault code resolution.

Refer to the OEM documentation and electrical drawings for additional motor and drive information.



Servomotors



A servomotor is used in a closed-loop system that is capable of being precisely controlled. A resolver or encoder provides constant and highly accurate feedback of the motor's exact position, speed, and torque to the motor's servo drive (also called a controller). Through the drive, the PLC commands the servomotor to start, stop, and vary its speed and direction in accordance with the PLC program.

Most servomotors are equipped with a gearbox. The gearbox performs a torque-speed conversion, reducing the speed provided by the motor into a lower RPM while increasing the torque.

The servo drives are located in an electrical cabinet. Each drive is equipped with status LED indicators. Refer to the OEM documentation to interpret the LED indicator states and determine fault code resolution.

Refer to the OEM documentation and electrical drawings for additional motor and drive information.



Solenoid Valves



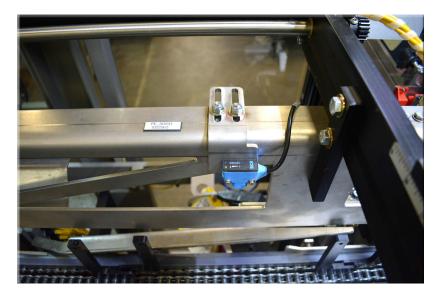
Solenoid valves are electromechanical valves controlled by electrical current through a solenoid coil(s).

Three-way valves have three ports (pipe connections) and two orifices. When one orifice is open, the other is closed, and vice versa. These valves are commonly used for glue guns and vacuum cups, and to alternately apply pressure to and exhaust pressure from single-acting cylinders or actuators.

Four-way valves have four or five ports: one pressure inlet, two ports providing pressure to a double-acting cylinder or actuator, and one or two outlets to exhaust pressure from the cylinder or actuator.



Photosensors



Photosensors detect the presence or absence of an object by emitting a light beam and looking for the return of the light beam.

There are several types of photosensors. A photosensor may receive a light beam that is reflected off an object (reflector or product), travels through a fiber optic cable(s), or is emitted by a separate emitter module of the sensor.

Some photosensors are only light operate or dark operate, while others can be switched between light operate and dark operate. When light operate, a photosensor energizes an output while seeing its own light. When dark operate, a photosensor energizes an output while not seeing its own light.



Proximity Sensors

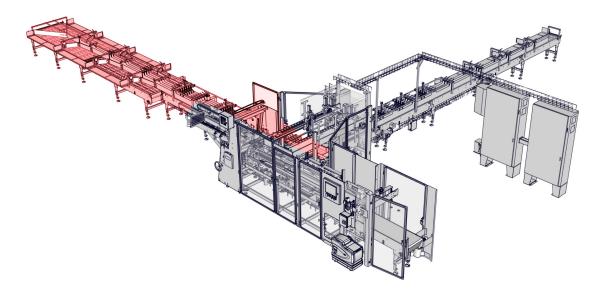


Proximity sensors are able to detect the presence of nearby objects without any physical contact. Proximity sensors detect the presence or absence of an object by emitting an electromagnetic or electrostatic field and looking for changes in the field.



Primary Components





The inline infeed is the machine section highlighted in red in the floor plan above. It has the following primary functions:

- Receives handloaded products into the required number of lanes of the inline infeed.
- Arranges products into the pack-pattern required by the active recipe.
- Loads each pack complement into a carton at the load station.

The inline infeed consists of the following primary components:

- Inline conveyor 1: This VFD-controlled conveyor receives handloaded products into the required number of lanes and advances products onto inline conveyor 2.
- Inline conveyor 2: This VFD-controlled conveyor receives products from inline conveyor 1 into the required number of lanes and advances products onto inline conveyor 3.



Inline Conveyors



- **Inline conveyor 3:** This VFD-controlled conveyor receives products from inline conveyor 2 into the required number of lanes and advances products onto inline conveyor 4.
- **Inline conveyor 4:** This VFD-controlled conveyor receives products from inline conveyor 3 into the required number of lanes and advances products onto the tamper conveyor.
- Tamper conveyor: This servo-driven conveyor receives products from inline conveyor 4 into the required number of lanes. With the load guides down, the tamper conveyor pushes products across the stopped metering conveyor and against the surge backstop.
- Load guides: The load guides rise through slots in the transfer deck at the downstream end of the tamper conveyor. An air cylinder moves the load guides down and up.



Tamper Conveyor

_	products onto the stopped metering conveyor.
	With a pack complement on the metering conveyor, the load guides rise to retain product surge during the load.
	drop the load guides, the Load Guides Cyl Ret (SV_30843) solenoid valve is actuated ten the IM metering line shaft position reaches the <i>Load Guides PLS</i> PLS window.
	irge release: An air cylinder moves the surge backstop to its upstream (toward the inper conveyor) and downstream positions.
	The surge backstop is at its upstream position (the surge release is closed) while the tamper conveyor pushes products onto the stopped metering conveyor.

☐ With a pack complement on the metering conveyor and the load guides up, the surge backstop moves downstream (the surge release opens) to relieve surge pressure.

The load guides are down clear of product, while the tamper conveyor pushes

The Surge Release Cyl Ret (SV_30847) solenoid valve is actuated to open the surge release.



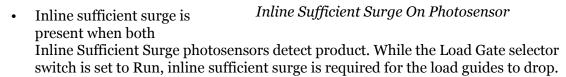
the	inline infeed, the following servos are cammed to the virtual IM metering line shaft, ich is cammed to the machine drive virtual axis:
	Lane guides: The lane guides servo moves the lane guides to their forward (moved downstream, toward the surge backstop) and back (clear of the arms) positions.
	• While the tamper conveyor pushes products onto the stopped metering conveyor, the lane guides are at their forward position to guide each lane of product to the surge backstop.
	• At the beginning of the IM metering line shaft cycle, the lanes guides move back, clear of an arm pushing a pack complement toward a carton at the load station.
	Metering conveyor: The stopped metering conveyor receives a pack complement from inline conveyor 4. The metering conveyor runs briefly while an arm pushes the pack complement toward a carton at the load station.
	Arm 1: This servo controls the horizontal motion of arm 1.
	Arm 1 lift: This servo controls the vertical motion of arm 1.
	Arm 2: This servo controls the horizontal motion of arm 2.
	Arm 2 lift: This servo controls the vertical motion of arm 2.
	Arm 1 and arm 2 take turns pushing a pack complement from the metering conveyor into a carton at the load station.
	e IM metering line shaft runs a 720 degree cycle with cycle stop positions at 360 and 0 (zero) degrees.
	The lane guides servo and the metering conveyor servo run 360 degree cams.
	The arm 1 servo and the arm 2 servo run 720 degree cams that are 360 degrees out of phase with each other.
	The arm 1 lift servo and the arm 2 lift servo run 720 degree cams that are 360 degrees out of phase with each other.
Se	nsors: The inline infeed has the following sensors:
	INLINE_LANE_1 _BALANCE (PX_30725) through INLINE_LANE_6 _BALANCE (PX_30735): Each of these proximity sensor monitors a flag in an inline conveyor 2 lane. These sensors are used for inline conveyor 1 and inline conveyor 2 control.

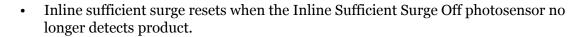


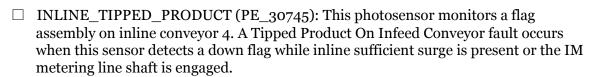
☐ INLINE_SUFFICIENT_ SURGE_ON (PE_30741): This photosensor monitors a flag assembly on inline conveyor 2.

> INLINE_SUFFICIENT_ SURGE_OFF (PE_30743): This photosensor monitors a flag assembly on inline conveyor 3.

These sensors are used for the following purposes:







□ PRODUCT_AT_END_OF_
INFEED_LANE_1
(PX_30801) through
PRODUCT_AT_END_OF_
INFEED_LANE_6
(PX_30811): Each of these
proximity sensors monitors
a flag on the surge backstop.

When all required lane's Product At Lane flags detect product (detect that their flags have pivoted), the load guides rise, the tamper conveyor stops, the surge release opens, and the virtual IM metering line shaft is enabled by product.



Product At End of Infeed Lane 1 through 6
Proximity Sensors

□ SURGE_RELEASE_EXT (PX_30825): This proximity sensor detects the Surge Release air cylinder while the surge release is closed.



SURGE_RELEASE_RET (PX_30827): This proximity sensor detects the Surge Release air cylinder while the surge release is open.

A Surge Release Air Cylinder Jam fault occurs when one of the following conditions is present:

- The Surge Release Cyl Ext solenoid valve is actuated, but the Surge Release Ret proximity sensor detects the air cylinder for a preset time or the Surge Release Ext proximity sensor does not detect the air cylinder within the allotted time.
- The Surge Release Cyl Ret solenoid valve is actuated, but the Surge Release Ext proximity sensor detects the air cylinder for a preset time or the Surge Release Ret proximity sensor does not detect the air cylinder within the allotted time.
- □ LOAD_GUIDE_EXT (PX_30821): This proximity sensor detects the Load Guides air cylinder while the load guides are up.

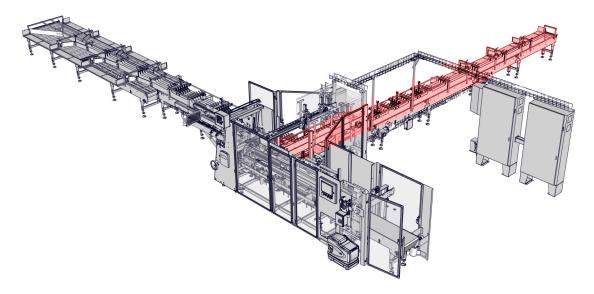
LOAD_GUIDE_RET (PX_30823): This proximity sensor detects the Load Guides air cylinder while the load guides are down.

A Load Guides Air Cylinder Jam fault occurs when one of the following conditions is present:

- The Load Guides Cyl Ext solenoid valve is actuated, but the Load Guide Ret proximity sensor detects the air cylinder for a preset time or the Load Guide Ext proximity sensor does not detect the air cylinder within the allotted time.
- The Load Guides Cyl Ret solenoid valve is actuated, but the Load Guide Ext proximity sensor detects the air cylinder for a preset time or the Load Guide Ret proximity sensor does not detect the air cylinder within the allotted time.



Right Angle Infeed Primary Components

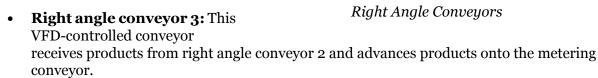


The right angle infeed is the machine section highlighted in red in the floor plan above. It has the following primary functions:

- Receives handloaded products into the required number of lanes of the right angle infeed.
- Arranges products into the pack-pattern required by the active recipe.
- Loads each pack complement into a carton at the load station.

The right angle infeed consists of the following primary components:

- **Right angle conveyor 1:** This VFD-controlled conveyor receives handloaded products into the required number of lanes and advances products onto right angle conveyor 2.
- **Right angle conveyor 2:** This VFD-controlled conveyor receives products from right angle conveyor 1 into the required number of lanes and advances products onto right angle conveyor 3.







Right Angle Infeed Primary Components (continued)

- IM (infeed metering)
 metering drive: When the
 active recipe loads product from
 the right angle infeed, the
 following servos are cammed to
 the virtual IM metering line
 shaft, which is cammed to the
 machine drive virtual axis:
 - ☐ Metering conveyor: The metering conveyor receives products from the right angle conveyor 3 into the required number of lanes and advances the products to the arms.



IM Metering Arm 1 and Arm 2

☐ Arm 1: This servo controls the horizontal motion of arm 1.

Arm 1 lift: This servo controls the vertical motion of arm 1.

Arm 2: This servo controls the horizontal motion of arm 2.

Arm 2 lift: This servo controls the vertical motion of arm 2.

Arm 1 and arm 2 take turns pushing a pack complement from the metering conveyor into a carton at the load station.

The IM metering line shaft runs a 720 degree cycle with cycle stop positions at 360 and 720 (zero) degrees.

	The metering	conveyor servo	runs a 360	degree cam
_	1110 111000111115	COLLIC OL DOLLIC	I dillo di , joo	acgree cam

- \Box The arm 1 servo and the arm 2 servo run 720 degree cams that are 360 degrees out of phase with each other.
- \Box The arm 1 lift servo and the arm 2 lift servo run 720 degree cams that are 360 degrees out of phase with each other.



Right Angle Infeed Primary Components (continued)

• **Sensors:** The right angle infeed has the following sensors:

□ RIGHT_ANGLE_SUFFICIENT_SURGE_ON (PE_30747): This photosensor monitors a flag assembly on right angle conveyor 2.

☐ RIGHT_ANGLE_
SUFFICIENT_SURGE_
OFF (PE_30749): This
photosensor monitors a flag
assembly on right angle
conveyor 2, downstream of
the Right Angle Sufficient
Surge On flags.

These sensors are used for the following purposes:

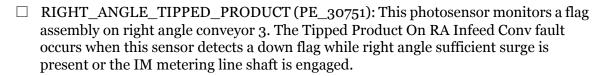
 Right angle sufficient surge is present when both Right Angle Sufficient Surge photosensors detect



Right Angle Sufficient Surge Off Photosensor

product. While the Metering selector switch is set to Auto, right angle sufficient surge is required for enabling the virtual IM metering line shaft.

• Right angle sufficient surge resets when the Right Angle Sufficient Surge Off photosensor no longer detects product.

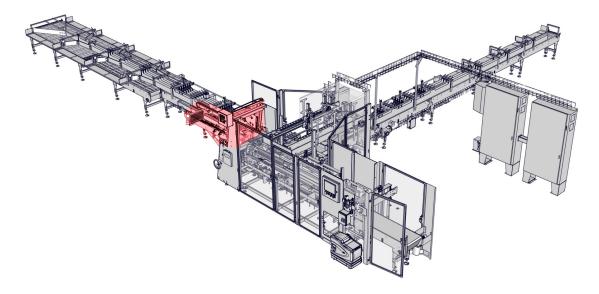


☐ PRODUCT_AT_LOAD (PE_30753): This photosensor monitors the load deck for product in front of the more downstream arm (the arm pushing product into a carton).

The *right angle product at load* condition is set if this sensor detects product while the IM metering line shaft position is within the *Check For Product* PLS window. The main line shaft is enabled by the IM metering if the *right angle product at load* condition is present (set) when the IM metering line shaft position reaches the IM metering's *Main Enable* recipe variable.



Magazine Primary Components



The magazine is the machine section highlighted in red in the floor plan above. Its primary functions are to provide a level of carton storage and to automatically feed cartons to the pickoff point at the magazine discharge.

The magazine consists of the following primary components:

- **Magazine drive:** A chain supports cartons in the magazine and conveys them to the pickoff point. The chain is driven by a motor, which is enabled by a sensor at the pickoff point.
- **Sensors:** The magazine has the following sensors:
 - ☐ BLANK_AT_FRONT_OF_ MAGAZINE (PX_30529): This proximity sensor monitors the magazine's pickoff point for cartons. The magazine drive motor is enabled while this sensor does not detect cartons and the main line shaft position is within a preset range of motion.

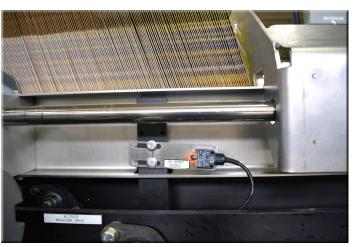


Blank at Front of Magazine Proximity Sensor



Magazine Primary Components (continued)

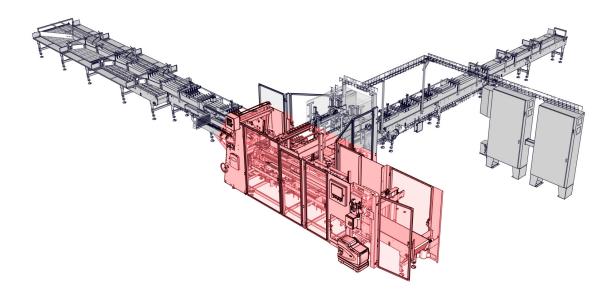
- ☐ LOW_MAGAZINE
 (PE_30527): This
 photosensor monitors the
 magazine for cartons. This
 sensor is used for the
 following purposes:
 - A Low Magazine alarm occurs when this sensor does not detect cartons for a preset time.
 - An Empty Magazine
 Fault occurs when this
 sensor does not detect
 cartons for a preset
 number of consecutive
 carton pick attempts.



Low Magazine Photosensor



Cartoner Main Primary Components

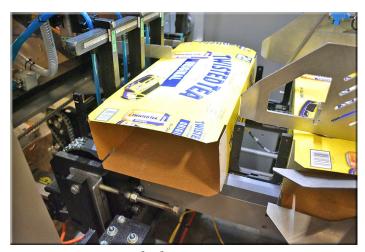


The cartoner main is the machine section highlighted in red in the floor plan above. Its primary function is to form knockdown cartons loaded with product into completed packages.

The cartoner main consists of the following primary components:

- **Main drive:** The following servos are cammed to the virtual main line shaft, which is cammed to the machine drive virtual axis:
 - ☐ MCB (motion control box): The MCB servo rotates a line shaft with box cams that control the motions of the upper setup arm, the lower setup arm, the carton seating blade, the funnel, the tuckers, and the end flap compression plates.
 - ☐ Trailing flights: The leading flights servo is cammed to the trailing flights servo.

The main flights receive a racked-open carton from the setup and advance it through the following stations: first idle, load, tuck, second idle, third idle, close, and compression. The main flights advance completed cartons into the discharge belts.



Racked-Open Carton



Cartoner Main Primary Components (continued)

- ☐ Backstop: The backstop is located at the non-loadside end of the load station. The backstop servo moves the backstop to its out and in positions:
 - The backstop is out, clear of cartons, while the main flights advance cartons away from and to the load station.
 - When a carton arrives at the load station, the backstop moves in to serve as a product backstop during the load.



Backstop

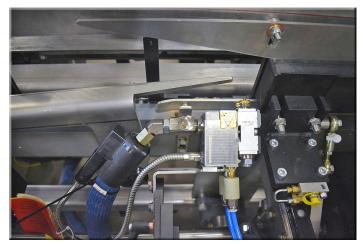
• **Carton setup upper vacuum:** Carton setup upper vacuum is provided by venturi-style vacuum generators.

To apply vacuum to the carton setup upper vacuum cups, the Carton Setup Upper Vacuum (SV_30601) solenoid valve is actuated while the main line shaft position is within the *Upper Setup Vacuum PLS* window.

• **Carton setup lower vacuum:** Carton setup lower vacuum is provided by venturi-style vacuum generators.

To apply vacuum to the carton setup lower vacuum cups, the Carton Setup Lower Vacuum (SV_30603) solenoid valve is actuated while the main line shaft position is within the *Lower Setup Vacuum* PLS window.

- **Glue guns:** The glue guns apply glue to the minor flaps of a carton approaching the compression station.
- Discharge belts (left and right): These VFD-controlled side belts receive cartons from the main flights and advance them onto the discharge conveyor.



Glue Gun



Cartoner Main Primary Components (continued)

- Discharge conveyor: This VFD-controlled conveyor receives cartons from the discharge belts and advances them onto the plant's take-away conveyor.
- **Sensors:** The cartoner main has the following sensors:
 - ☐ CARTON_IN_FLIGHTS
 (PE_30535): This
 photosensor monitors the
 main flights for a carton at
 the setup station.



Discharge Conveyor

CARTON APPROACHING

_LOAD (PE_30531): This photosensor monitors the main flights for a carton approaching the load station.

These sensors are used for the following purposes:

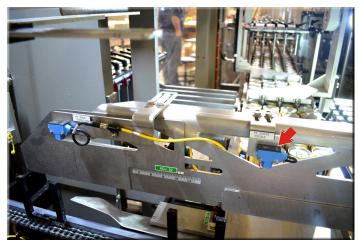
- The virtual IM metering line shaft is enabled by the main when both of these sensors detect a carton while the main line shaft position is within the *Check For Carton Approaching Load* PLS window.
- A Setup Missed 3 Blanks fault occurs when, during three consecutive attempts by the setup to set up a carton, the Carton Approaching Load photosensor does not detect a carton while the main line shaft position is within the *Check For L-Shaped Carton PLS* window.
- An L-Shaped/Missing Carton At Load Station fault occurs when the following conditions are present:
 - \Box The setup attempts to pick a carton.
 - ☐ In the next main line shaft cycle, the Carton Approaching Load photosensor does not detect a carton while the main line shaft position is within the *Check For L-Shaped Carton PLS* window.
- A Carton Not In Flights fault occurs when one of these sensors detects a carton and the other sensor does not detect a carton while the main line shaft position is within the *Check For Carton Approaching Load* PLS window.



Cartoner Main Primary Components (continued)

☐ CARTON_AT_LOAD (PE_30533): This photosensor monitors the main flights for a carton at the load station.

A Missing Carton At Load fault occurs when the loader line shaft is enabled by the main, but this sensor does not detect a carton while the main line shaft position is within the *Check For Carton At Load* recipe variable and the end of the cycle.



Carton At Load Photosensor

☐ CARTON_AT_GLUE

(PE_30541): This photosensor monitors the main flights for a carton approaching the compression station. The end flap glue guns are enabled in main line shaft cycles in which this sensor detects a carton at the beginning of the cycle.

- When enabled, the top end flap glue guns fire while the main line shaft position is within the *Top End Flap Glue Stripe 1* and *Top End Flap Glue Stripe 2* PLS windows.
- When enabled, the bottom end flap glue guns fire while the main line shaft position is within the *Bottom End Flap Glue Stripe 1* and *Bottom End Flap Glue Stripe 2* PLS windows.
- ☐ LEFT_END_FLAP_OPEN
 (PE_30543) and
 RIGHT_END_FLAP_
 OPEN (PE_30545): These
 photosensors monitor each
 carton for open end flaps.

DISCHARGE_SURGE_1 (PE_30547) and DISCHARGE_SURGE_2 (PE_30549): These photosensors monitor the discharge conveyor to ensure that cartons are advancing. The cartoner cycle dwells when these sensors' light beams are blocked for a preset time.



Left End Flap Open and Right End Flap Open Photosensors





Section 6

Maintenance

Maintenance Guidelines
Lubrication
Cleaning
Preventive Maintenance Guide
Motion Control Box Lubrication
Removing the Motion Control
Box
Servo Homing



Maintenance Guidelines



Personnel entering the guard package, without first locking out the power, risk accidental restart and potential serious injury or death. Do not enter the machine without first performing the lockout/tagout procedure required by your facility.



- Personal injury may occur. Always follow your facility's PPE (Personal Protective Equipment) program when operating or performing maintenance on the machine.
- Machine damage may occur. Failure to follow the recommended maintenance guidelines may result in excessive wear and damage to components.

The recommended lubrication, cleaning, and preventive maintenance guidelines are based on a standard plant environment. Consult your plant engineer before deviating from the recommended schedules. The machine may not contain some of the parts listed.

OEM Documentation

Original Equipment Manufacturer (OEM) documentation for purchased components is included. Follow the maintenance and operating procedures outlined in the OEM bulletins to ensure warranties remain in effect.



Lubrication

Color Coding

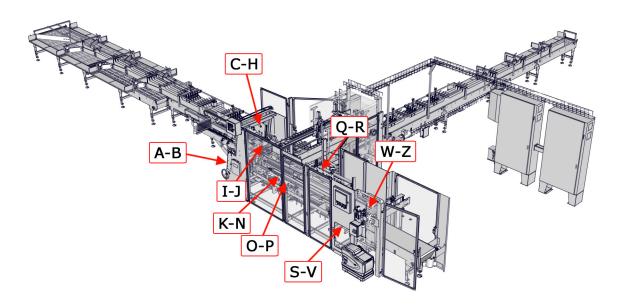


Grease zerks are color-coded to indicate frequency of manual lubrication.

Color	Lube Frequency
Red	20 Hours
White	80 Hours
Yellow	320 Hours
Blue	800 Hours
Green	6 Months



Lubrication Map - White (80 Hours)

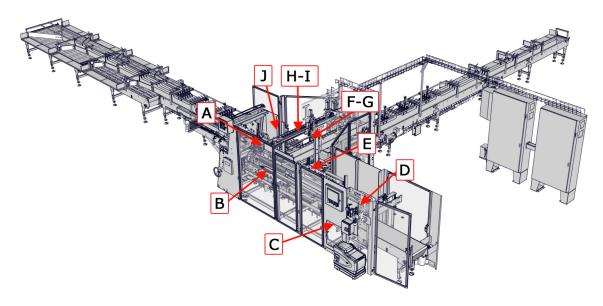


The floor plan above indicates the locations of the lube banks.

Location	Description	Location	Description
A-B	White Zerk Rod End - Cam Arm	K-N	White Zerk Red End - Lower Compression
C-D	White Zerk Rod End - Upper Setup	O-R	White Zerk Rod End - Tucker Arm
E-H	White Zerk Rod End - Lower Setup	S-Z	White Zerk Rod End - Discharge Guard
I-J	White Zerk Rod End - Upper Setup		



Lubrication Map - Yellow (320 Hours)

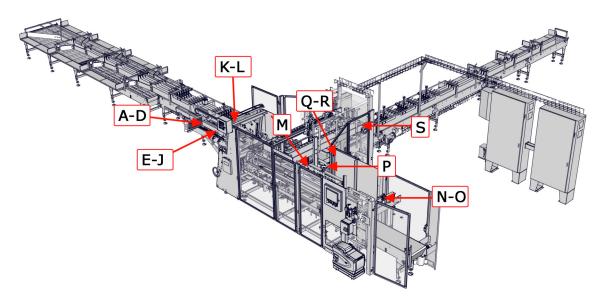


The floor plan above indicates the locations of the lube banks.

Location	Description	Location	Description
Α	Yellow 2 Bank - Setup Plate	E	Yellow 2 Bank
В	Yellow 1 Bank - Lower Compression	F-I	Yellow 3 Bank Loader Arm
C-D	Yellow 1 Bank - Discharge Guard	J	Yellow 4 Bank - Infeed Line Adjustment



Lubrication Map - Green (6 Months)



The floor plan above indicates the locations of the lube points.

Location	Description	Location	Description
А	Green Zerk Acme Screw - Blank Guide Adj	I	Green Zerk Acme Screw - Magazine Height Adj
В	Green Zerk Bushing - Magazine Follower	J	Green Zerk Acme Screw - Setup Side Plate Adj
С	Green Zerk Acme Screw - Magazine Belt Adj	K-L	Green Zerk Acme Screw - Setup Side Height Adj
D	Green Zerk Bushing - Magazine Follower	М	Green Zerk Acme Screw - Loader Arm Adj
E	Green Zerk Acme Screw - Blank Guide Adj	N-O	Green Zerk Acme Screw - Laser Coder Height Adj
F	Green Zerk Acme Screw - Magazine Height Adj	Р	Green Zerk Acme Screw - Case Holddown Height Adj
G	Green Zerk Acme Screw - Magazine Belt Adj	Q-R	Green Zerk Acme Screw - Product Guide Adj
Н	Green Zerk Acme Screw - Setup Side Plate Adj	S	Green Zerk Acme Screw - Loader Arm Adj



Lubrication Guide

Many components are minimum maintenance/lubed for life and do not require service. The chart below refers to components that are not minimum maintenance.

The recommended lubricants are the multi-purpose lubricants used by Douglas Machine. Refer to the OEM bulletins, component manufacturer websites, and lubricant manufacturer websites for additional lubrication information.



Machine damage or failure may occur when using incompatible lubricants. Use caution when changing over from the recommended lubricant to a lubricant other than what is listed below. Contacting the lubricant supplier is recommended.

Changing over to compatible lubricants should be gradually administered over a period of time until the excess lubricant being discharged from the component changes in consistency or color to the new lubricant. The amount of lubricant to be administered daily for changing over lubricants depends on the bearing size and type. Contacting the bearing manufacturer and the plant engineer is recommended.

The color-coding system supersedes the interval hours listed below.

Component(s)	Maintenance Task	Lubrication Type	Recommended Lubricant	Interval
Unsealed Bearings	Grease bearings without seals (include all brass bushings, RBC bearings, and cam followers).	Food Grade Grease	Lubriplate FGL-1	20 hours
Chains/Chain Oiler	Oil all chains, except flight chains and hand adjust chains. If the machine is equipped with a chain oiler, fill the reservoir as needed.	Food Grade Mineral Oil	Lubriplate FMO-200-AW	40 hours
Unsealed Gearbox	After the first 80 hours of operation, change the oil. Refer to the gearbox nameplate, OEM documentation, and manufacture website for additional information. Refer to the unsealed gearbox description in this table for additional lubrication information.	Food Grade Mineral Oil	Lubriplate FMO-900-AW	First 80 hours only
Rod Ends	Grease all rod ends, except mounting adjustment shafts or screws.	Food Grade Grease	Lubriplate FGL-1	80 hours
Sliding Parts	Lube sliding parts (shafts, hubs, cam followers, etc.).	Food Grade Grease	Lubriplate FGL-1	160 hours



Lubrication Guide (continued)

Component(s)	Maintenance Task	Lubrication Type	Recommended Lubricant	Interval
Bearings	Grease bearings with seals that rotate 360° per machine cycle.	Food Grade Grease	Lubriplate FGL-1	320 hours
Linear Bearings	Grease or change the grease every three months for non-washdown or dry environments. Linear bearings with seals are filled with lithium soap based grease number 1. When linear bearings operate over a long distance of travel or at high speeds, refill with grease of the same type through the grease fitting after the break-in period and before routine operation. An adapter is required for lubrication of THK LM Guides SHS15 and HSR15 (using a standard grease gun). Contact Douglas Machine or the linear bearing manufacturer for additional information.	Food Grade Grease	Lubriplate FGL-1	320 hours
Non-Moving Parts	Grease parts that do not move as part of machine operation (adjustment screw, adjustment handwheels, etc.).	Food Grade Grease	Lubriplate FGL-1	6 months



Cleaning



Frame and component finishes shall not be warranted if the equipment is installed in a wet environment or exposed to harsh cleaners or high-pressure wash downs.

Light Wash Down

Clean the non-electrical areas of the machine using an all-purpose, spray-on cleaner with a pH level between 5-10. Dry the machine with a clean, lint-free cloth. Lube sliding parts (hubs, shafts, cam followers, etc.) with a food grade grease after cleaning. Refer to the cleaning guide on the following page for additional information.



Cleaning Guide

Component(s)	Cleaning Method	Interval
Air Intake Water Trap	Check the sight glass for water buildup and sediment. Press the petcock to remove any residual moisture and particulate matter. Remove the trap and clean out any sediment.	8 hours
Flights	To remove dirt, wipe flight blocks, chains, and chain rails with a clean cloth sprayed with an appropriate cleaner.	8 hours or as needed
Glue and Compression Area	Use a scraper to remove cooled glue buildup from the compression plates, overhead plows, case squares, side rails, and other components.	8 hours or as needed
Glue Nozzles	After glue and nozzles have cooled, remove glue buildup and charring from glue nozzles with a stiff-bristled brush (do not use a steel brush).	8 hours or as needed
Machine Perimeter	Using a broom, sweep under and around the machine.	8 hours or as needed
Vacuum Cups	Wipe cups, including the centers, with a clean, lint-free cloth sprayed with an appropriate cleaner to remove all dirt, dust, and fiber buildup.	8 hours
Air Conditioner Filter	Clean or replace the filter.	40 hours or as needed
Air Cylinders	Wipe with a clean cloth to remove dust and dirt buildup.	40 hours
Magazine Area	Start vacuuming at the top of the magazine area and work down. Remove remaining buildup with a brush.	40 hours or as needed
Metering Belt	Clean the belts with a clean, soft, lint-free cloth sprayed lightly with an appropriate cleaner.	40 hours or as needed
Modular Chains (Table Top Chains)	Vacuum the surface of the chain over the chain bed to remove any loose debris. Wipe chain with a clean cloth sprayed with an appropriate cleaner.	40 hours or as needed
Photo Eyes and Reflectors	Wipe sensors and reflectors with a clean, soft, lint-free cloth sprayed with an appropriate cleaner to remove dirt buildup.	40 hours or as needed
Vacuum Filter	Blow out both the housing and filter with a low pressure air hose to remove debris. Be sure to wear protective eye wear. Wipe with a clean, lint-free cloth sprayed with an appropriate cleaner if necessary.	40 hours or as needed
Control Panels and Remote Buttons	Wipe control panels and remote buttons with a clean, soft, lint-free cloth sprayed with an appropriate cleaner to remove dust and dirt buildup.	160 hours or as needed
Entire Machine	Unless otherwise noted, spray non-electrical areas that have dirt buildup with an appropriate cleaner. Dry with a clean cloth.	160 hours or as needed
Guard Doors	Clean the guard doors with a clean, damp, microfiber cloth and warm water. Do not use any soap or chemicals on the guard doors. Immediately dry with a clean, dry, microfiber cloth. Start from the top of the door and clean downward. Replace microfiber cloths and water as needed.	160 hours or as needed



Preventive Maintenance Guide

Component(s)	Maintenance Task	Corrective Action	Interval
Control Panels	Check all lamps to ensure that they illuminate.	Replace burned out bulbs.	8 hours
Conveyor Belts	Check for wear and damage. Check for proper tension—the belt(s) should be able to convey the product/case without slipping.	Replace if worn or damaged. If a conveyor is comprised of multiple belts, replace all belts as a set to allow for even tensioning. Adjust tension if needed; do not overtighten.	8 hours
Pneumatic System	Close all doors and walk around machine, listening for air leaks.	Repair as needed.	8 hours
Vacuum Cups	Check the vacuum cups for excessive wear, cracks, or tears.	Replace damaged cups.	8 hours
All Moving Parts	Check that parts are secure and guarded.	Secure loose parts and replace guards if needed.	40 hours
Air Cylinder	Inspect the air cylinder, air lines, and air line fittings for air leaks. Push the piston into the cylinder to ensure it moves freely. Also check for play.	Secure loose air line fittings and air lines. Replace air line if leaking. Replace the cylinder if leaking or if the piston is operating incorrectly.	40 hours
Bearing (Drive)	A bearing is worn if the shaft, pulley, or sprocket noticeably shifts or wobbles when the machine is running. Check the seal to ensure it is properly seated and not damaged or leaking. Ensure the set screw is in place and secure.	Replace the bearing if it is worn or the seal is broken or leaking. Replace the set screw if it is missing. Tighten the set screw if it is loose.	40 hours
Chain (Drive)	Check chain tension. Refer to the mid-span movement chart in this section for more information. Inspect the chains for wear and and damage. The chain is worn when it has stretched and can no longer be adjusted or the rollers on the chain do not spin.	Increase or decrease tension by using the chain tightener but do not over-tighten. Replace the chain and sprockets if the chain is worn or damaged.	40 hours
Chain Rail	Check for wear.	Replace the chain rail, flight chains, and sprockets if the chain rail is worn.	40 hours
Fasteners	Check for loose or missing fasteners.	Tighten or replace fasteners.	40 hours
Flight Chains	Inspect the chains for wear and and damage. The chain is worn when it has stretched and can no longer be adjusted or the rollers on the chain do not spin.	If the chain is worn or can no longer be adjusted, replace the flight chains, sprockets, and chain rail as a set.	40 hours



Component(s)	Maintenance Task	Corrective Action	Interval
Guard Doors	Ensure the actuator and the switch are secure. Check that the latch is adjusted correctly. Examine all cable entries and connections.	Tighten the actuator and/or switch. Readjust or tighten the latch. Replace damaged cable entries. Retighten loose connections.	40 hours
Sprocket (Drive)	Inspect sprockets for wear. A sprocket is worn if the teeth are sharp and pointed. For sprockets with bearings: Inspect the bearings for wear and damage. A bearing is worn if the shaft noticeably shifts or wobbles when the machine is running. Check the seal to ensure it is properly seated and not damaged or leaking. If applicable, ensure the set screw is in place and secure. For sprockets with bushings: The bushing is worn if the shaft or roller noticeably shifts or wobbles when the machine is running.	Replace the sprocket and the chain if the sprocket is worn. Replace the sprocket if the bearing is worn or the seal is broken or leaking. Replace the set screw if it is missing. Tighten the set screw if it is loose. Replace the sprocket if the bushing is worn or damaged.	40 hours
Adaptor/Taperlock	Inspect adaptors to ensure they are secure. Verify that all bolts are in place. Use fingers to see if the bolts are tight. Do not use a wrench as it may change the torque setting.	If a bolt is loose, re-torque all bolts to the correct tension in the required sequence. Refer to OEM documentation or contact the manufacturer for instructions.	160 hours
Flight Sprockets	Inspect sprockets for wear. A sprocket is worn if the teeth are sharp and pointed.	Replace the flight sprockets, flight chains, and chain rail if the sprockets are worn.	160 hours
Modular Chain (Table Top Chain)	Inspect the chain surface for excessive wear. Check for broken links.	Replace chain if worn or broken. If the chain has broken links, check any adjacent decks to ensure they are not contacting the chain. Reposition the decks if necessary.	160 hours
Plastic Sprocket	Inspect the sprockets for damage. Check for cracked or broken teeth.	Replace damaged sprockets.	160 hours
Rod End	Check rod end movement to determine if it is worn. The rod end should swivel freely when not under load but exhibit no side-to-side movement on the rod end ball. Ensure the jam nut has not loosened.	Replace the rod end if it is worn. Tighten the jam nut if loose.	160 hours



Component(s)	Maintenance Task	Corrective Action	Interval
Shaft (Hex, Square, Spline)	Check for damage and wear. Check for burrs, nicks, and dirt buildup.	Replace a worn or damaged shaft. If the shaft inserts into a Lenze gearbox, a tool for inserting and removing shafts from a gearbox is available. Contact a replacement parts representative for more information.	160 hours
Spring	Check for broken or missing springs.	Replace damaged or missing springs.	160 hours
Take-up and Idler Sprockets	Inspect sprockets for wear. A sprocket is worn if the teeth are sharp and pointed. Ensure the bearing is secure and play is not evident.	Replace the idler sprocket if the sprocket or bearing is worn.	160 hours
Vacuum Stem Springs and Vacuum Block	Check spring tension; the vacuum stems should return to their up position when pressed. Inspect the bore in the block for wear caused by the stem. Ensure the block is secured to the setup arm.	Replace worn springs. Replace the block if worn. Tighten the bolts to secure the block if loose.	160 hours
Bearing (Pivoting)	A bearing is worn if the shaft, pulley, or sprocket noticeably shifts or wobbles when the machine is running. Check the seal to ensure it is properly seated and not damaged or leaking. Ensure the set screw is in place and secure.	Replace the bearing if it is worn or the seal is broken or leaking. Replace the set screw if it is missing. Tighten the set screw if it is loose.	480 hours
Belts	Check for proper tension. Belts are correctly tensioned when no slack is present while the belt is under full load. Check for wear.	Before adjusting belt tension, check the following: 1. If the pulley(s) wobble, inspect the bearing for damage or wear. 2. Replace damaged or worn belts - check for cracking, broken teeth, etc. 3. Realign pulley if there is abnormal wear on belt. If the above conditions are not present, adjust the belt using the belt tightener. If the belt can no longer be adjusted, replace the belt.	480 hours



Component(s)	Maintenance Task	Corrective Action	Interval
Compression Chains	Inspect the chains for proper tension, wear, and damage. If the chain is loose, slack will be present on the back side of the drive chain by the headshaft. The chain is worn when it has stretched and can no longer be adjusted or the rollers on the chain do not spin. Check that the plastic chain tabs are intact.	Adjust chain tension. Replace the chain and sprockets if the chains are worn or damaged. Replace broken chain tabs.	480 hours
Cushion Rollers	Check each cushion roller for damage and wear. Typically, the spokes of the roller will lose integrity.	Replace damaged cushion rollers.	480 hours
Gearbox	Inspect gearbox integrity. Check for oil leaks at seals.	Replace the gearbox if it is leaking. When using Lenze gearboxes, a tool for inserting and removing shafts from a gearbox is available. Contact a replacement parts representative for more information.	480 hours
Gun Belts	Inspect belt integrity and tension. Slack belts will vibrate when the machine is running. Check the splice on each belt to ensure it is secure. The belt may be tensioned too tightly if the splice begins to separate.	Replace the belt if it is damaged. Increase or decrease tension by adjusting the pulley position.	480 hours
Linear Bearing and Rail (Drive)	Inspect the guide and rail for wear and damage. The bearing is worn if it noticeably wobbles when the machine is running. Ensure the end seals are intact and the set screw is in place and secure. Check the rail for wear, which may also cause the bearing to wobble.	Replace the bearing if it is worn or damaged. Replace the rail if it is worn.	480 hours
Metering Belt	Inspect belts for damage and wear. Check for proper belt tension. Check the belts for signs of wear or damage such as splitting. Ensure the belts are not slipping while running. Check for slack in the belts. If product is slipping on the metering belts, the belts may be dirty.	Replace the belt if damaged or worn. If abnormal wear is present, reposition the pulley. If a belt is slipping or slack is present, increase tension.	480 hours

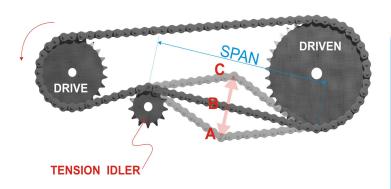


Component(s)	Maintenance Task	Corrective Action	Interval
Pulley	Check that the pulley easily turns and is properly positioned to keep the belt aligned and off the flanges.	Realign the pulley.	480 hours
Roller	Check the roller for excessive play, which indicates that the shaft is worn.	Replace worn rollers.	480 hours
Bearing (Adjusting Screw)	Inspect the bearings for wear and damage. Check the seal to ensure it is properly seated and not damaged or leaking. Ensure the set screw is in place and secure.	Replace the bearing if it is worn or the seal is broken or leaking. Replace the set screw if it is missing. Tighten the set screw if it is loose.	1000 hours
Bushing	Inspect the bushings for damage. A bushing is worn if the shaft or roller noticeably shifts or wobbles when the machine is running.	Replace damaged bushings. It may be necessary to replace the plate, mount, etc.	1000 hours
Cam Roller	Check for wear. The outer sleeve of the cam follower should rotate freely but fit snugly against the inner bearing. Check that the cam follower is secured to the bracket.	Replace worn cam followers. Tighten the bolts to secure the cam follower if loose.	1000 hours
Cam Tracks	Check cam track for debris, scoring, or grooving.	Replace the cam track if damaged.	1000 hours
Chain (Adjusting Screw)	Inspect the chain for proper tension/stretching.	Tighten the chain by removing a link; add a half link if necessary. To prevent changes to the changeover adjustment settings, ensure sprockets do not rotate out of position when replacing the chain.	1000 hours
Gear Rack	Check for nicks or burrs that might prevent the gears from properly meshing with the gear rack. Check for missing or broken teeth.	Replace a damaged gear rack.	1000 hours
Linear Guide and Rail (Adjusting)	Inspect the guide and rail for wear and damage. Ensure the end seals are intact and the set screw is in place and secure. Check the rail for wear, which may also cause the bearing to wobble.	Replace the bearing if it is worn or damaged. Replace the rail if it is worn.	1000 hours
Miter Gears	Inspect the miter gears for damage. Check for nicks or burrs that might prevent the gears from properly meshing. Check for missing or broken teeth.	Replace the miter gear if damaged.	1000 hours



Component(s)	Maintenance Task	Corrective Action	Interval
Miter Gearbox	Inspect gearbox integrity. Check for oil leaks.	Replace the gearbox if it is leaking.	1000 hours
Plastic Chain	Check for damaged links.	Replace damaged links.	1000 hours
Screw Block	Inspect the screw blocks for wear. Ensure the screw block is secure. The screw block is worn if it fails to hold the screw securely. Also check for screws that are binding and hard to rotate due to dirt or misalignment.	Tighten the bolts to secure the screw block if loose. Replace the screw block if it is worn. Clean the screw block if it is binding. Loosen the bolts and tap the screw block into place with a rubber mallet if misaligned.	1000 hours
Shaft Hub	Check for wear. The shaft hub should fit securely on the shaft and not rock or wobble.	Replace worn shaft hub. If shaft hub is worn, also check the shaft for wear. Replace the shaft if worn.	1000 hours
Sprocket (Adjusting Screw)	Inspect sprockets for wear. A sprocket is worn if the teeth are sharp and pointed.	Replace the worn sprocket.	1000 hours
Spur Gear	Inspect the spur gears for damage. Check for nicks or burrs that might prevent the gears from properly meshing with the rack. Check for missing or broken teeth.	Replace the spur gear if damaged.	1000 hours

Recommended Mid-Span Movement Chart



AC = Total possible mid-span movement

RECOMMENDED MID-SPAN MOVEMENT

Span	Horizontal Drives	Vertical Drives
10"	0.500"	0.250"
15"	0.750"	0.375"
20"	1.000"	0.500"
25"	1.250"	0.625"
30"	1.500"	0.750"
35"	1.750"	0.875"
40"	2.000"	1.000"
45"	2.250"	1.125"
50"	2.500"	1.250"

Motion Control Box Lubrication



Component	Lubrication	Interval
Bearings	Sealed	Lubed for Life
Cone Drive	Sealed	Lubed for Life
Cam Arms	Yellow Lube Bank	360 Hours
Cam Track	None	None

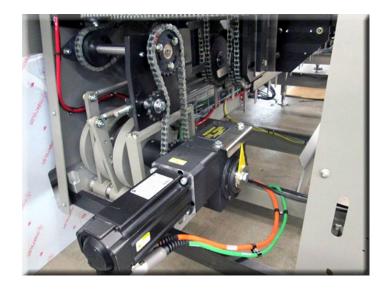
Inspect the cam followers and the cam tracks every 1000 hours.



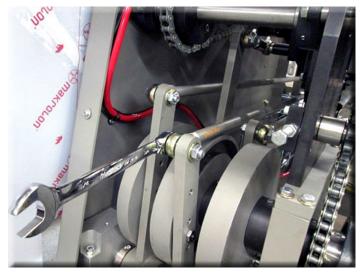
Removing the Motion Control Box

1. Press the Cycle Stop button.

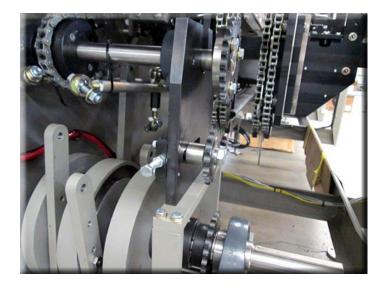
The yellow MCB pointer will be aligned with the cycle stop indicator mark.



2. Unhook the four connecting rods from the cam arms, using a 3/4" wrench. The bolts are 1/2" x 1-3/4" hex with 1/8" spacers and jam nuts.



3. Using tape or zip ties, secure the connecting rods out of the way.

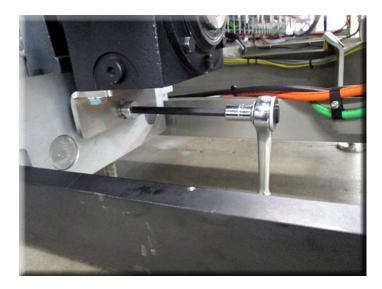


4. Using a 15/16" wrench, pull the end cap 5/8" bolt out to remove the servo gearbox and motor.

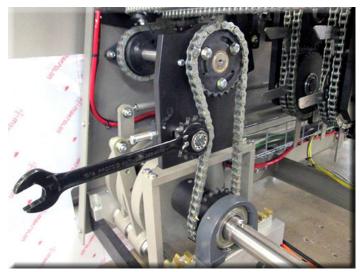




5. Using a 5/16" hex wrench, remove the 5/8" x 1" rotation limiter shoulder bolt.

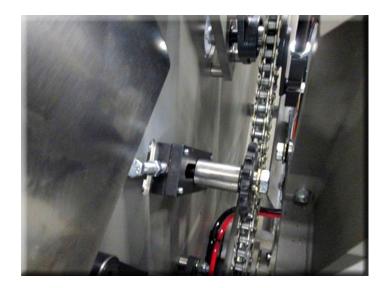


- 6. Slide the servo and gearbox off the shaft.
- 7. Remove the drive chain between the MCB and the cross shaft.

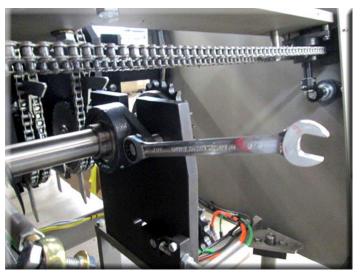




8. Loosen the chain that drives the setup shaft. This relieves tension on the cross shaft.



9. Using a 5/8" wrench, remove the outer 7/16" x 1-3/4" bearing bolts on the cross shaft.

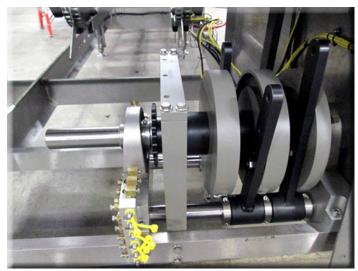




10. Using a 1/2" wrench, remove three 5/16" x 1-1/4" bolts to remove the bearing mounting plate with the chain idler attached.

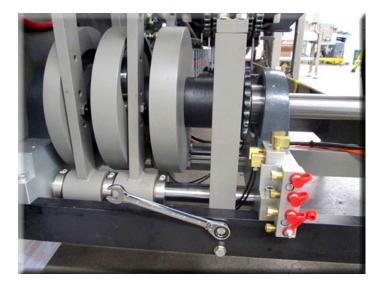


11. When re-installing, ensure that the hole pattern is opposite the sprocket side.

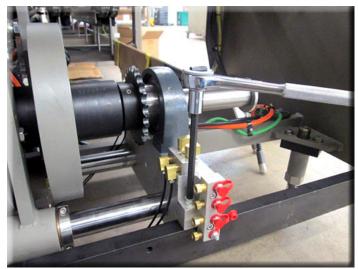




12. Using a 1/2" wrench, remove the four 5/16" x 1-3/4" bolts holding the bearing mount assembly.

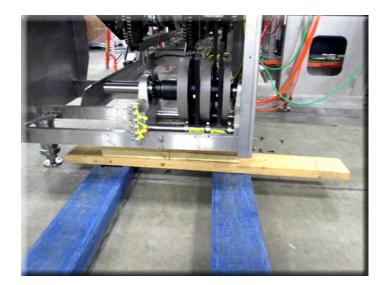


13. Using a 5/16" hex wrench, remove four 3/8" x 2" socket head bolts to remove the MCB.





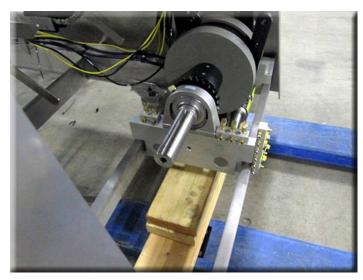
14. Remove the MCB using a pallet jack and blocking. This is the preferred method. However, if a jack is not available, the magazine bottom may be used as a hoist.



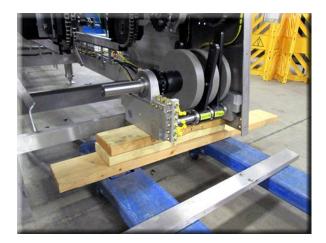
Use Steps 15 - 17 if using a pallet jack:

- 15. Raise the MCB off of the cross member.
- 16. Using a 9/16" wrench, remove the four 3/8" x 1" hex bolts to remove the cross member.
- 17. Lower the MCB with the jack and slowly back it out.

Proceed to Step 22.



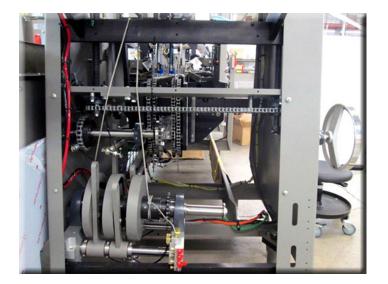






Use Steps 18-21 if using the magazine bottom as a hoist because a pallet jack is not available:

- 18. Adjust the magazine to allow it to raise several inches.
- 19. Tie the magazine bottom to the MCB shaft using a strong rope or straps, as shown in the photos.

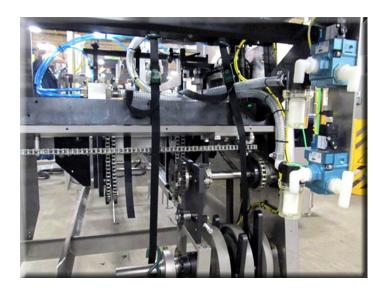




- 20. Raise the magazine slowly while guiding the MCB out of position.
- 21. When the MCB is lifted off of the frame members, swing it outward and lower it at the same time.

The MCB may need to be set onto blocks if the machine is spaced off the floor with longer legs as the magazine will bottom out.

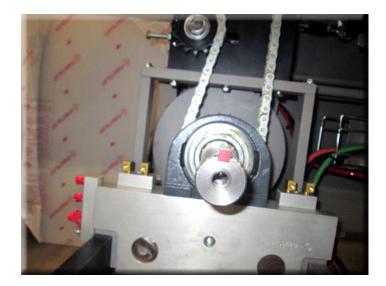
22. Reverse all steps to re-install the MCB. When putting the chains on, rotate the setup shaft to the bottom deadcenter position, as shown.







- 23. Position the shaft keyway on top of the shaft, as shown.
- 24. If needed, home the MCB servo by following the servo homing instructions located in the Troubleshooting section.





Servo Homing

The servos on the following pages are assigned an absolute reference position which is referred to as the home or zero position.

A servo may lose its home position and require rehoming if certain maintenance procedures are performed (belt replacement, servo drive replacement, etc.) or the machine is disassembled. Follow the procedure listed for each servo to set the home position.

Some servo drives have an offset for homing. The position may not be zero after pressing the Teach Home button.

If a servo drive fault occurs while rehoming, reset the system before another rehome attempt is made.



- Only maintenance personnel should home servos.
- Do not home the servo as part of normal fault recovery.



Product or machine damage may occur. Always clear product out of the designated machine area before homing the servo.



Jogging a Servo

NOTICE

Not all servos require using the jog wheel before teaching home. Some servos may use auto homing and other servos can be manually placed at the hard stop position. Follow the specific instructions for each servo before using the teach home process.

- 1. On the HMI, advance to the Maintenance Screen of the servo that requires homing.
- 2. Press the Up or Down arrow buttons to highlight the servo.
- 3. Press the Jog Disabled/Jog Enabled button to select Jog Enabled.
- 4. On the control panel, turn the jog wheel until the servo is at the desired position.
- 5. Set the Jog Disabled/Jog Enabled to Jog Disabled.

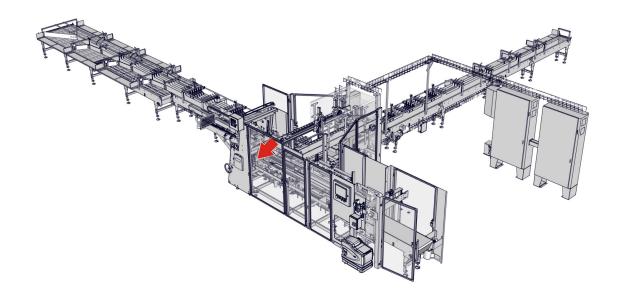
Refer to the individual servo's instructions on the following pages.



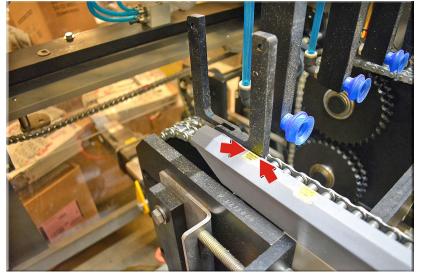




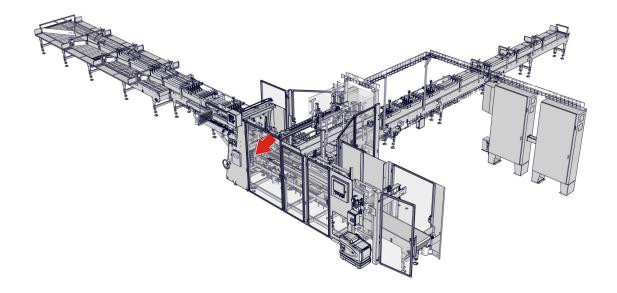
Trailing Flights



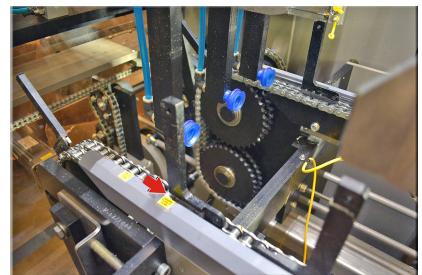
- 1. Advance to the Main Maintenance 1 Screen.
- 2. Press the Up or Down arrow buttons to highlight the Trailing Flights servo.
- 3. Set the Jog Disabled/Jog Enabled button to Jog Enabled.
- 4. Turn the jog wheel on the control panel until a trailing flight block aligns with the yellow position indicator.
- 5. Set the Jog Disabled/Jog Enabled button to Jog Disabled.
- 6. Press the Reset button.
- 7. Press the Teach Home button.
- 8. Follow the machine startup procedure in the Startup/Shutdown section to continue production.



Leading Flights

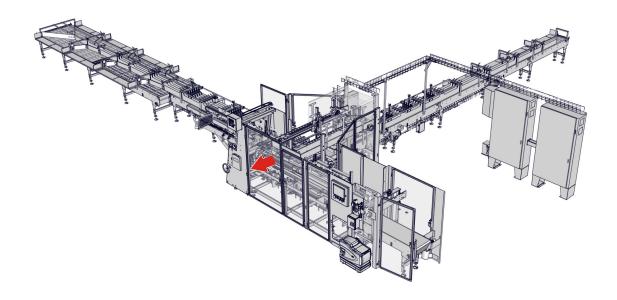


- 1. Advance to the Main Maintenance 1 Screen.
- 2. Press the Up or Down arrow buttons to highlight the Leading Flights servo.
- 3. Set the Jog Disabled/Jog Enabled button to Jog Enabled.
- 4. Turn the jog wheel on the control panel until a leading flight block aligns with the yellow position indicator.
- 5. Set the Jog Disabled/Jog Enabled button to Jog Disabled.
- 6. Press the Reset button.
- 7. Press the Teach Home button.
- 8. Follow the machine startup procedure in the Startup/Shutdown section to continue production.





MCB (Motion Control Box)



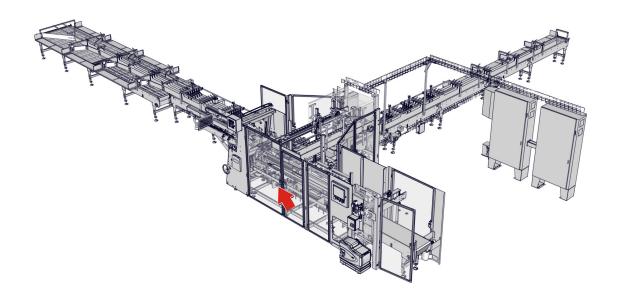
- 1. Advance to the Main Maintenance 1 Screen.
- 2. Press the Up or Down arrow buttons to highlight the MCB servo.
- 3. Set the Jog Disabled/Jog Enabled button to Jog Enabled.
- 4. Turn the jog wheel on the control panel until the MCB (motion control box) yellow position indicator aligns with the reference point as shown.



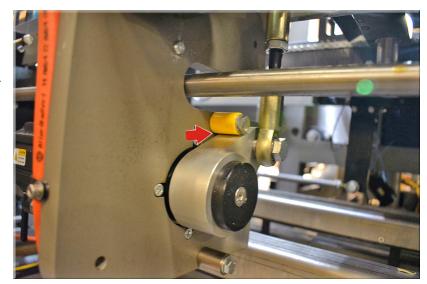
- 5. Set the Jog Disabled/Jog Enabled button to Jog Disabled.
- 6. Press the Reset button.
- 7. Press the Teach Home button.
- 8. Follow the machine startup procedure in the Startup/Shutdown section to continue production.



Backstop



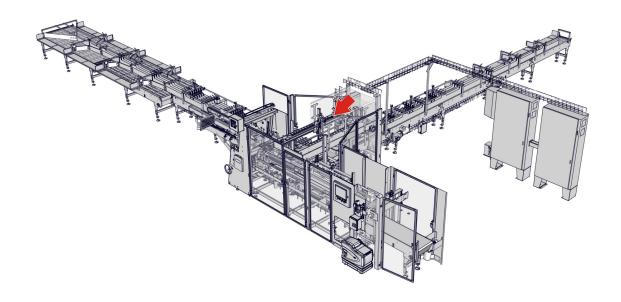
- 1. Access the Main
 Maintenance 1 Screen on
 the HMI.
- 2. Press the Up or Down arrow buttons to highlight the Backstop servo.
- 3. Position the backstop against the yellow position indicator.
- 4. Press the Reset button.
- 5. Press the Teach Home button.



- 6. Advance to the Machine Controls Screen.
- 7. Press the Machine Start button to continue production.



Arm 1



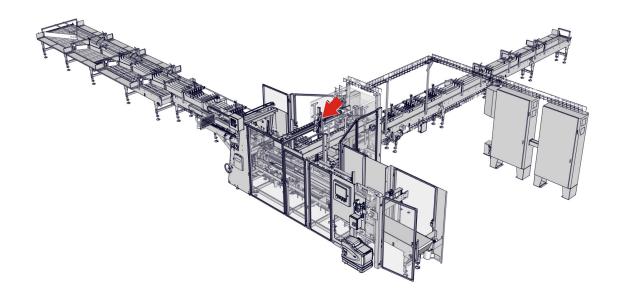
- 1. Access the IM Metering Maintenance Screen on the HMI.
- 2. Press the Up or Down arrow buttons to highlight the Arm 1 servo.
- 3. Position the arm 1 against the yellow position indicator.
- 4. Press the Reset button.
- 5. Press the Teach Home button.



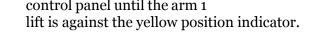
- 6. Advance to the Machine Controls Screen.
- 7. Press the Machine Start button to continue production.



Arm 1 Lift



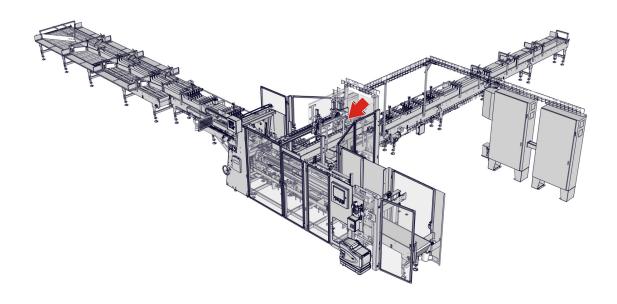
- 1. Remove the arm 1 loader head.
- 2. Access the IM Metering Maintenance Screen on the HMI.
- 3. Press the Up or Down arrow buttons to highlight the Arm 1 Lift servo.
- 4. Set the Jog Disabled/Jog Enabled button to Jog Enabled.
- 5. Turn the jog wheel on the control panel until the arm 1



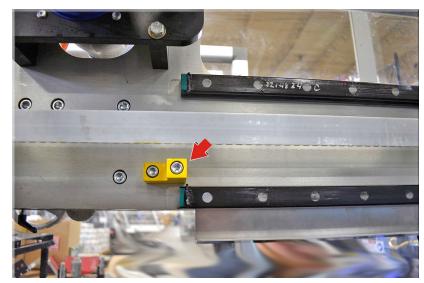
- 6. Set the Jog Disabled/Jog Enabled button to Jog Disabled.
- Press the Reset button.
- Press the Teach Home button.
- 9. Follow the machine startup procedure in the Startup/Shutdown section to continue production.



Arm 2



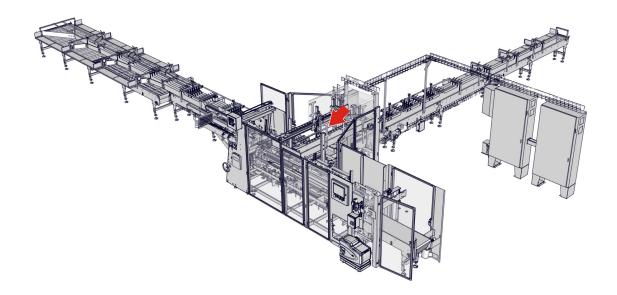
- 1. Access the IM Metering Maintenance Screen on the HMI.
- 2. Press the Up or Down arrow buttons to highlight the Arm 2 servo.
- 3. Position the arm 2 against the yellow position indicator.
- 4. Press the Reset button.
- 5. Press the Teach Home button.



- 6. Advance to the Machine Controls Screen.
- 7. Press the Machine Start button to continue production.



Arm Lift 2

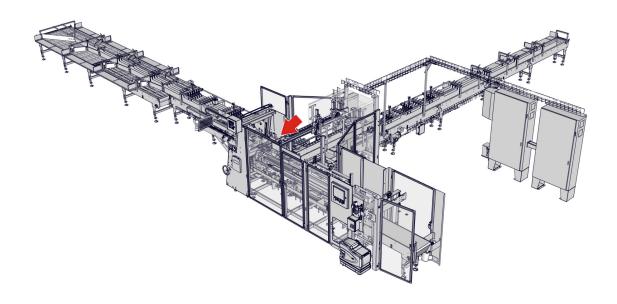


- 1. Remove the arm 2 loader head.
- 2. Access the IM Metering Maintenance Screen on the HMI.
- 3. Press the Up or Down arrow buttons to highlight the Arm Lift 2 servo.
- 4. Set the Jog Disabled/Jog Enabled button to Jog Enabled.
- 5. Turn the jog wheel on the control panel until the arm lift 2 is against the yellow position indicator.
- 6. Set the Jog Disabled/Jog Enabled button to Jog Disabled.
- 7. Press the Reset button.
- 8. Press the Teach Home button.
- 9. Follow the machine startup procedure in the Startup/Shutdown section to continue production.





Lane Guides



- 1. Access the IM Metering Maintenance Screen on the HMI.
- 2. Press the Up or Down arrow buttons to highlight the Lane Guides servo.
- 3. Position the lane guides against the yellow position indicator.
- 4. Press the Reset button.
- 5. Press the Teach Home button.



- 6. Advance to the Machine Controls Screen.
- 7. Press the Machine Start button to continue production.





Section 7

Recipe Screens

Recipe Variables Glossary of Terms



Recipe Variables

Machine Recipe Screen



This screen has the following text object:

External Speed Command: This text object displays the value of the line speed command from the remote interface. When the selected speed command type is external, this value is divided by the *Products Per Cycle* recipe variable to derive the nominal machine speed.

This screen has the following string inputs:

Speed Command (Recipe/External): This recipe variable specifies the speed command type.

- When Recipe is selected, the *Line Speed* recipe variable is used as a basis for machine speed control.
- When External is selected, an external speed command is used as a basis for machine speed control.

Right Angle Infeed: This recipe variable specifies the speed command type.

- When Not Used is selected, the machine loads product from the inline infeed.
- When Used is selected, the machine loads product from the right angle infeed.



Machine Recipe Screen (continued)

This screen has the following numeric inputs:

Line Speed: When the selected speed command type is recipe, this recipe variable is divided by the *Products Per Cycle* recipe variable to derive the nominal machine speed.

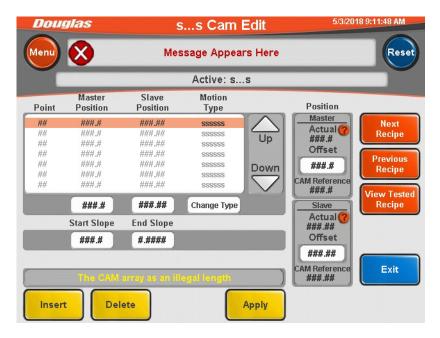
Max Speed: This recipe variable is divided by the *Products Per Cycle* recipe variable to derive the maximum machine speed.

Products Per Cycle: This recipe variable is divided into the external speed command and the *Line Speed* recipe variable to derive the nominal machine speed.

Production Code For Integration: This recipe variable provides a numeric value to the remote interface that corresponds with the recipe.



Global Cam Edit Screen



This screen has the following text object:

A text object displays the servo for which this screen is activated.

This screen has the following multistate indicator:

A multistate indicator displays status messages of the cam profile.

This screen has the following text objects and associated numeric inputs:

Master Position

Actual: This text object displays the actual position of the virtual master.

Offset: This numeric input specifies the master offset (cam start offset) value, which is used to phase a cam profile relative to its master axis. Positive values retard the cam profile relative to the master and negative values advance the cam profile. Editing this recipe variable is comparable to rotating a box cam on its physical line shaft.

Cam Reference: This text object displays the actual position of the virtual master minus the master offset value (minus the value of the master position *Offset* recipe variable).

Master Offset Position Help: This pop-up appears when the Master Position's help icon is pressed. The pop-up disappears when pressed.



Slave Position

Actual: This text object displays the selected servo's actual position (the value of the servo's ActualPosition tag element).

Offset: This numeric input specifies the selected servo's zero offset value, which is used to shift a cam profile's position relative to its servo's absolute zero position. Editing this variable is comparable to adjusting the length of a connecting rod driven by a box cam.

Cam Reference: This text object displays the value of the selected servo's ActualPosition tag element minus its zero offset value (minus the value of the slave position *Offset* recipe variable).

Slave Offset Position Help: This pop-up appears when the Slave Position's help icon is pressed. The pop-up disappears when pressed.



A cam profile's slave position *Offset* recipe variable must be established before its master position *Offset* recipe variable is set to a non-zero value (a cam profile's start position must be shifted relative to its servo's absolute zero position before the cam profile is phased to its master axis).

This screen has a list indicator with the following columns:

Point: This column displays the numerically indexed sequence of cam points.

Master Position: Each numeric value in this column displays the position of the master axis for the corresponding cam point. The first point must be zero and the last point must be a multiple of 360.

Slave Position: Each numeric value in this column displays the slave servo's actual position relative to its absolute zero position for the corresponding cam point.

Motion Type: Douglas Machine employs two distinct motion methods for servo control applications - interpolation cams and sine-constant-cosine-acceleration (SCCA) cams:

- **Interpolation cams:** In interpolation cams, the interpolation method used between cam points is based on a linear move (points connected by a straight line) or a cubic move (points connected by a cubic curve). Interpolation is defined as a method of calculating values between two known values.
 - □ **Linear (motion type o):** A linear segment uses zero acceleration (constant velocity), which produces a straight line between two cam points. There is no motion when the constant velocity is zero. Linear is used to pause (dwell) a servo, but can also be used to produce a constant velocity.



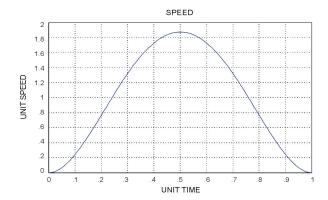
- □ **Cubic (motion type 1):** A cubic segment, which uses a non-linear acceleration profile, blends velocities between segments by producing a smooth curve between two or more cam points. The PLC automatically calculates the speed and acceleration necessary for a cubic move.
- **Sine-constant-cosine-acceleration (SCCA) cams:** SCCA cams use a more advanced motion system than the interpolation cams.
 - □ **Dwell (DWL, motion type 2):** The term *dwell* means no motion. The SCCA's DWL motion always results in no motion. The interpolation cams' linear motion can result in no motion, but does not always result in no motion.

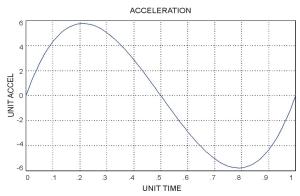
The DWL motion differs from the linear motion in the following ways:

- The linear motion is a means of fitting a straight line between points in a cam table. The linear motion can be a constant speed, a constant acceleration, a constant deceleration, or no motion at all.
- The DWL motion is a SCCA motion that causes no motion to occur. The DWL motion is not an interpolation method, but is a commanded condition of no motion.
- □ Constant velocity (CV, motion type 3): A constant velocity cam segment maintains an initial speed until the next cam segment is initiated. The constant speed can be positive or negative.
- □ **Sixth order polynomial (P5, motion type 4):** The P5 motion is a polynomial function. The position as a function of time is expressed as position (t) = $C5*t^5 + C4*t^4 + C3*t^3 + C2*t^2 + C1*t + C0$, where Co through C5 are constant values.

This motion's acceleration is computed as 5.774*distance/time² and its speed is computed as 1.875*distance/time.

The P5 motion can be a good motion choice when a combination of moderate speed and moderate acceleration, with the potential for optimal smoothness, is required. The P5 motion has more gradual changes in acceleration than the MS motion. If the MS motion seems to work, but is a little rough, the P5 motion may result in a smoother motion when the mechanical design is rigid.



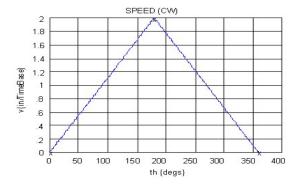


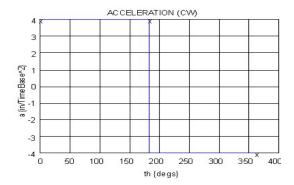
Sixth Order Polynomial



□ **Triangular velocity (TRIA, motion type 5):** The triangular motion has a triangular velocity profile. This motion is characterized by a constant acceleration for 50 percent of the move and a constant deceleration for 50 percent of the move. This motion's peak acceleration is computed as 4*distance/time² and its peak speed is computed as 2*distance/time.

Because this motion is simply created with two CA motions, there is considerable jerk at the beginning, midpoint, and end of the motion.

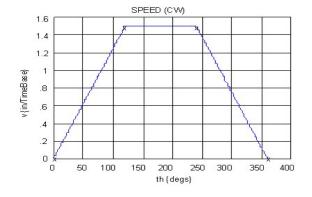


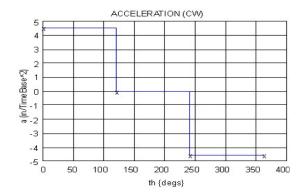


Triangular Velocity

□ **Trapezoidal velocity (TRAP, motion type 6):** The trapezoidal motion is characterized by constant acceleration for one third of the time, constant velocity for one third of the time, and constant deceleration for one third of the time. This motion's peak acceleration is computed as 4.5*distance/time² and its peak speed is computed as 1.5*distance/time.

Like the TRIA motion, the TRAP motion has infinite jerk at the transitions of the acceleration.



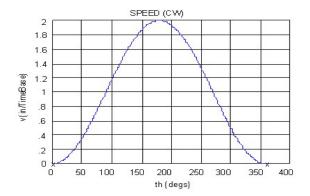


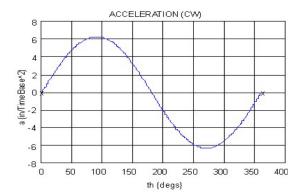
Trapezoidal Velocity



□ **Cycloidal (CYC, motion type 7):** The cycloidal motion is based upon an acceleration that is closely related to the sine function. This motion's peak acceleration is computed as 6.2832*distance/time² and its peak speed is computed as 2.000*distance/time.

This motion's acceleration transitions smoothly like a sine function, which minimizes jerk.

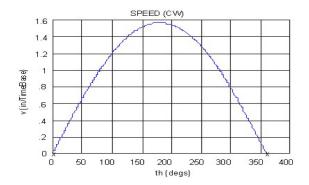


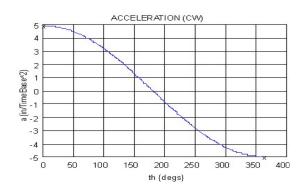


Cycloidal

☐ **Harmonic (HARM, motion type 8):** The harmonic motion is based upon an acceleration that is closely related to the cosine function. This motion's acceleration follows a cosine curve, which causes its acceleration to be at its maximum when the motion begins.

Because this motion begins and ends at peak acceleration, consider using this motion only in advanced applications that require the blending of cycloidal or harmonic half cycles.



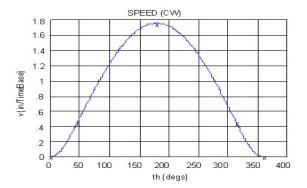


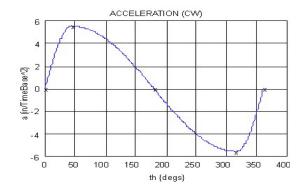
Harmonic



☐ **Modified sine (MS, motion type 9):** The MS motion is applicable to many high speed applications. This motion performs well when starting and stopping high inertial loads. Its acceleration is computed as 5.528*distance/time² and its speed is computed as 1.7596*distance/time.

The MS motion has higher acceleration, but lower speed than the MT motion. The MS motion is good for controlling high inertia loads because its total kinetic energy is lower than that of the MT or CYC motions.

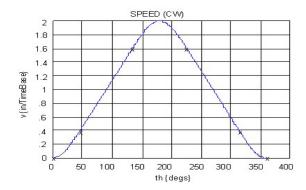


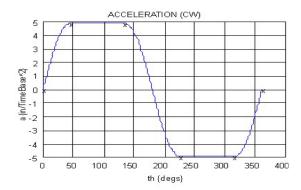


Modified Sine

☐ **Modified trapezoid (MT, motion type 10):** The MT motion is applicable to many high speed applications. This motion performs well for applications that benefit from less acceleration than the MS motion, but can handle a slightly higher speed than the MS motion. Its acceleration is computed as 4.8881*distance/time² and its speed is computed as 2.0000*distance/time.

The MT motion has an uncanny way of moving slowly at the beginning and end of its motion. This motion is often great for vacuum arms, but keep in mind that it has a higher speed than the MS motion.





Modified Trapezoid



☐ **Motion types 11 and above:** These motion types are used for blended cam motions. These motion types are reserved for Douglas Machine engineers and are not intended for customer use.

This screen has the following numeric inputs:

The numeric input below the Master Position column in the list indicator is used to specify the Master Position parameter for the selected cam point.

The numeric input below the Slave Position column in the list indicator is used to specify the Slave Position parameter for the selected cam point.

The following numeric inputs are used for servos that do not dwell (pause) every cycle:

- **Start Slope:** This recipe variable specifies the StartSlope speed operand of the MCCP (Motion Calculate Cam Profile) instruction, which calculates a cam profile based on an array of cam points. The start slope is the boundary condition for the first slope of the profile. It is only valid for a cubic first segment and is used to specify a slope through the first point.
- **End Slope:** This recipe variable specifies the EndSlope speed operand of the MCCP (Motion Calculate Cam Profile) instruction, which calculates a cam profile based on an array of cam points. The end slope is the boundary condition for the last slope of the profile. It is only valid for a cubic last segment and is used to specify a slope through the last point.

This screen has the following momentary pushbutton:

Change Type: This button accesses the Select Desired Motion Type Display, which is used to specify the motion type of the selected cam point.



Infeed Recipe 1 Screen



This screen has the following text objects:

Tamper Conv Speed: This text object displays the tamper conveyor's commanded run speed.

Infeed Conv Speed: This text object displays inline infeed conveyor 1's commanded run speed.

This screen has the following numeric inputs with help messages. When an item's help icon is pressed, a help message (the text that follows the item below) appears. The help message disappears when pressed.

Number Of Lanes Used: Enter the number of lanes used for this infeed.

Products Per Lane: Enter the number of products that are required to fill one lane at the Product Stop Position.

Product Length (D.O.T.): Enter the Product Length in the direction of travel (DOT).

Tamper To Stop Distance: Enter the extend position of the Lane Guides.



Infeed Recipe 2 Screen



This screen has the following text objects:

Tamper Conv Speed: This text object displays the tamper conveyor's commanded run speed.

Infeed Conv Speed: This text object displays inline infeed conveyor 1's commanded run speed.

This screen has the following numeric inputs:

Tamper Conveyor Speed Multiplier: This recipe variable specifies an overspeed factor for the tamper conveyor.

Infeed Conveyor 4 Speed Multiplier: This recipe variable specifies an overspeed factor for inline conveyor 4.

Infeed Conveyor 3 Speed Multiplier: This recipe variable specifies an overspeed factor for inline conveyor 3.

Infeed Conveyor 2 Speed Multiplier: This recipe variable specifies an overspeed factor for inline conveyor 2.

Infeed Conveyor 1 Speed Multiplier: This recipe variable specifies an overspeed for factor inline conveyor 1.

Product at Surge Release Debounce: This recipe variable specifies the preset value of each Product At End Of Lane Flag debounce timer.



IM Metering Recipe 1 Screen



This screen has the following text objects:

Arm Lift 1 Torque: This text object displays the arm lift 1 servo's torque feedback value.

Arm Lift 2 Torque: This text object displays the arm lift 2 servo's torque feedback value.

Main Enable: This text object displays the value of the *Main Enable* recipe variable.

Line Shaft Position: This text object displays the actual position of the virtual IM metering line shaft.

This screen has the following numeric inputs:

Cleanout Cycle Counter Preset: This recipe variable specifies the number of metering cycles in the cleanout mode.

Cleanout Meter Conv Increase Distance/Gap: This recipe variable specifies the amount of product gap increase that the metering conveyor creates during cleanout.

Arm Lift Low Torque Limit: This recipe variable specifies the value of each arm lift servo's Torque Limit attribute while the arm lift is within the low torque zone.

Programmable Limit Switch

On Deg: Each of these recipe variables specifies the leading edge of a PLS window.

Off Deg: Each of these recipe variables specifies the trailing edge of a PLS window.



IM Metering Recipe 1 Screen (continued)

Main Enable: This recipe variable is used for the following purposes:

- When the inline infeed is used, the main line shaft is enabled by the IM metering when the IM metering line shaft position reaches the *Main Enable* recipe variable.
- When the right angle infeed is used, the *right angle product at load* condition is set if the Product At Load (PE_30753) photosensor detects product while the IM metering line shaft position is within the *Check For Product* PLS window. The main line shaft is enabled by the IM metering if the *right angle product at load* condition is present (set) when the IM metering line shaft position reaches the *Main Enable* recipe variable.

This screen has the following PLS windows:

Out of Position To Main: This PLS window specifies the IM metering line shaft range of motion in which the arms have the potential to be in mechanical conflict with the main.

Check For Product: When the right angle infeed is used, the *right angle product at load* condition is set if the Product At Load (PE_30753) photosensor detects product while the IM metering line shaft position is within the *Check For Product PLS* window. The main line shaft is enabled by the IM metering if the *right angle product at load* condition is present (set) when the IM metering line shaft position reaches the *Main Enable* recipe variable.

Check For Product Gap: When this machine shipped from Douglas Machine, this PLS window was not being used by the PLC program.



IM Metering Recipe 2 Screen



This screen has the following text object:

Line Shaft Position: This text object displays the actual position of the virtual IM metering line shaft.

This screen has the following numeric inputs:

Programmable Limit Switch

On Deg: Each of these recipe variables specifies the leading edge of a PLS window.

Off Deg: Each of these recipe variables specifies the trailing edge of a PLS window.

Carton Loaded Position: A carton is considered loaded when the IM metering line shaft is greater than this recipe variable.

Infeed Conv. 1 & 2 Speed Multiplier: This recipe variable specifies an overspeed factor for right angle infeed conveyor 1 and right angle infeed conveyor 2.

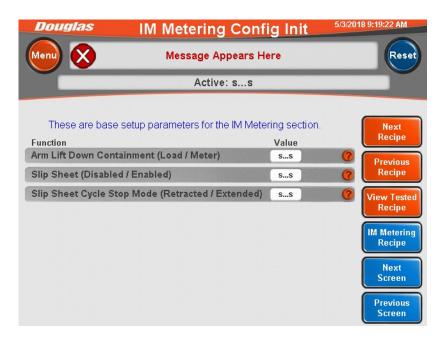
Infeed Conveyor 3 Speed Multiplier: This recipe variable specifies an overspeed factor for right angle infeed conveyor 3.

This screen has the following PLS window:

Load Guides PLS: To drop the load guides, the Load Guides Cyl Ret (SV_30843) solenoid valve is actuated when the IM metering line shaft position reaches this PLS window.



IM Metering Config Initialize Screen



This screen has the following numeric inputs with help messages (depending on the application of this machine, one or more of this items may be invisible). When an item's help icon is pressed, a help message (the text that follows the item below) appears. The help message disappears when pressed.

Arm Lift Down Containment (Load/Meter): Arm Lift Contain - Meter Cycle controls when the Arm Lift is commanded down to fully contain the product with the front contain. When "Load" the lift will contain the product just before the load begins. When "Meter" the lift will contain the product just before the gap is created.

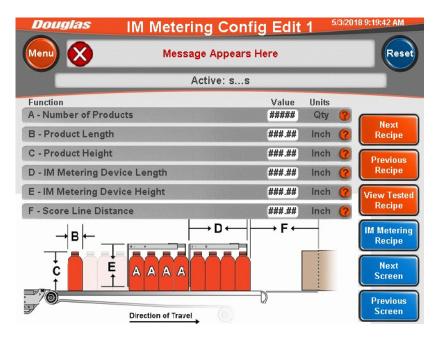
Slip Sheet (Disabled/Enabled): IM Metering Slip Sheet Enable in the "Enabled" mode uses the slip sheet to pull a gap for the load paddle. In the "Disabled" mode the load paddles are using the natural gap made by the product to divide the two load groups. The slip sheet does not move in this mode.

Slip Sheet Cycle Stop Mode (Retracted/Extended): Slip Sheet Cycle Stop Mode when "Retracted" puts the Slip Sheet retract at the end of cycle. When "Extended" it puts the Slip Sheet retract after "F". When "Extended" the Load/Return stroke is slowed down by 30 deg. Note: When "Extended" use "K" to slow the end of cycle move of the Slip Sheet.



7.16

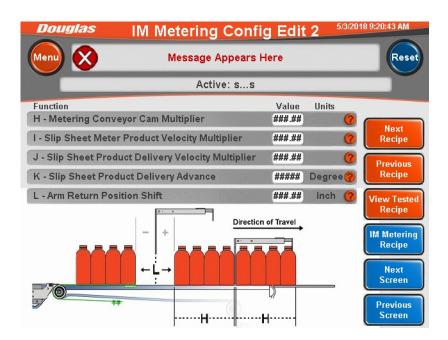
IM Metering Config 1 Screen



- **A Number of Products:** A Number Of Products is the number of products in the direction of travel of the infeed, in one lane, and contained in between the two Arms at cycle stop.
- **B Product Length:** B Product Length (Inches) is the length of one product in the direction of travel of the infeed.
- **C Product Height:** C Product Height (Inches) is the vertical measurement of one product.
- **D IM Metering Device Length:** D IM Metering Device Length (Inches) is the distance from the back side of the Arm Metering Device to the front side of the Arm Metering front contain. This measurement is to include any bolt heads that may increase this measurement. If the IM Metering does not have front contain the value is "o". Default value is o.
- **E IM Metering Device Height:** E IM Metering Device Height (Inches) is the measurement of the change part device vertical dimension. When installed measure from the top of the arm to the bottom most point of the IM Metering Device change part. Default is 11.88.
- **F Score Line Distance:** F Score Distance (Inches) is the distance from the score line of the case to the front edge of the product at cycle stop that is being loaded. This shifts the placement of the complete IM metering system at cycle stop. Default is 12.5.



IM Metering Config 2 Screen



This screen has the following numeric inputs with help messages (depending on the application of this machine, one or more of this items may be invisible). When an item's help icon is pressed, a help message (the text that follows the item below) appears. The help message disappears when pressed.

H - Metering Conveyor Cam Multiplier: One of the following help messages is displayed:

- When the *Slip Sheet (Disabled/Enabled)* recipe variable is set to dis*abled*, the following message is displayed: H Meter Conveyor Cam Multiplier is used to increase or decrease the velocity of the Meter Conv. When set to "1.0" the Meter Conveyor is matching the velocity of the Arm Lift head in the meter cycle. Default value is 0.95.
- When the *Slip Sheet (Disabled/Enabled)* recipe variable is set to *enabled*, the following message is displayed: H Metering Conv Cam Multiplier is used to decrease the travel of the Metering Conv after the Load paddle has entered the product. A smaller value equals less travel. This is used to gather the product back to the paddle before the start of the next cycle. Default value is 0.95.
- I Slip Sheet Meter Product Velocity Multiplier: I Slip Sheet Meter Product Velocity Multiplier increases or decreases the speed of the Slip sheet during the meter segment (before pulling a gap and after the Relieve Compression segment) of the cam. Greater than 1.0 will increase the distance it travels during this segment. Default value is 1.0.
- **J Slip Sheet Product Delivery Velocity Multiplier:** J Slip Sheet Product Delivery Velocity Multiplier increases the speed of the slip sheet to carry the product to the back of the Load paddle when entering the product gap. Default value is 1.0. Typically set from 2.0 7.0.



IM Metering Config 2 Screen (continued)

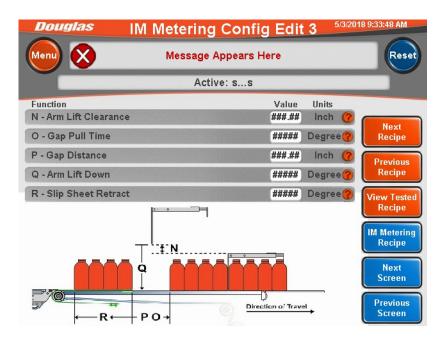
K - Slip Sheet Product Delivery Advance: One of the following help messages is displayed:

- When the *Slip Sheet (Disabled/Enabled)* recipe variable is set to *disabled*: K Slip Sheet Product Delivery Advance (Degrees) increases the amount of degrees that is used for the final move when coming to cycle stop. Using "K" will slow down this move causing less product slippage on the slip sheet. Default value is o. Typically set between 10-30.

 **Warning This may affect lineshaft enables.
- When the *Slip Sheet (Disabled/Enabled)* recipe variable is set to *enabled*: K Slip Sheet Product Delivery Advance (Degrees) increases the amount of degrees that is used for "J". The time is taken from the Load/Return of the Loader. Default value is o. **Warning This may affect lineshaft enables.
- **L Arm Return Position Shift:** L Arm Return Position Shift is used to shift the Arm position when entering the Product Gap. A positive value will shift the Arm downstream in the gap and a negative value will shift the Arm upstream in the gap. Default value is o.



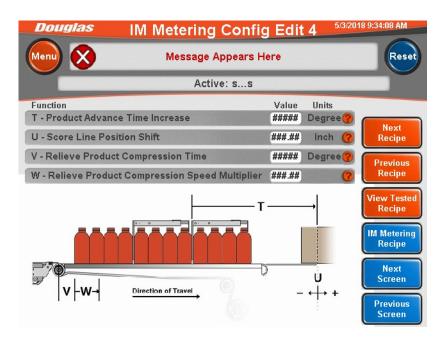
IM Metering Config 3 Screen



- **N Arm Lift Clearance:** N Arm Lift Clearance is the distance, in inches, between the Arm Lift mechanisms when one passes over the other. Default is 1.0.
- **O Gap Pull Time:** O Gap Pull Time (Degrees) is the amount of time given to the Load Conveyor to pull the gap. Increase this to slow down the gap creation. Default is 60. Typically set between 60 100 degrees.
- **P Gap Distance:** P Gap Distance (Inches) is the size of the gap created. Creating a larger gap will increase the speed that it is created at. This can be slowed down by increasing "O" at the same time. Default is 2.0. Typically set between 1.0 2.0 inches.
- **Q Arm Lift Down:** Q Arm Lift Down (Degrees) is the amount of time used to move the Arm Lift down into the Product Gap. Default is 45. Typically set between 30 45 degrees.
- **R Slip Sheet Retract:** R Slip Sheet Retract (Degrees) is the amount of time given to retract the slip sheet. This can be lowered from the default when having trouble with a "clean" shear point of the product when creating a gap. Default is 45. Typically set between 25 45 degrees.



IM Metering Config 4 Screen



- **T Product Advance Time Increase:** T Product Advance Time Increase (Degrees) increases the amount of time to advance the product. This will slow the product advance motion down but speed up the return motion. Default is o. Typically set between 0 70 deg. **Warning This may affect lineshaft enables.
- **U Score Line Position Shift:** U Score Line Position Shift is used to shift the Arm position at the end of its product delivery travel. A positive value will advance the product farther downstream. Default value is **o**.
- **V Relieve Product Compression Time:** V Relieve Product Compression Time (Degrees) is an amount of time that is used during the beginning of the cycle to release product compression. This is used in conjunction with "W". Default value is 30, typically set 30 to 150.
- **W Relieve Product Compression Speed Multiplier:** W Relieve Product Compression Speed Multiplier increases or decreases the speed of the Slip Sheet during the beginning of the cycle. This is used in conjunction with "V". This will be a change in speed of the slip sheet in relation to the Arm moving forward. Default value is 1.0, typically set 0.5 1.5.



IM Metering Config 5 Screen



- **A1 Dwell in Case:** A1 Loader Dwell In Case (Degrees) is the amount of time the Arm will dwell in the case. This time comes from the Load/Return motions. Default is 10. Typically set between 10 30. **Warning This may affect lineshaft enables.
- **B1 Arm 2 IM Metering Device Offset:** B1 Arm 2 IM Metering Device Offset (Inches) is used to place Arm 2 IM Metering device at the same position as Arm 1 IM Metering device when at the upstream cycle stop position. Determine the Arm 1 upstream position then use "B1" to position Arm 2 the same.
- **C1 Slip Sheet Slave Offset:** C1 Slip Sheet Slave Offset (Inches) is the position the slip sheet will be at when in the retracted position. This is positioned just behind one full pack pattern when the pattern is tight to the Arm IM Metering device at cycle stop.
- **D1 Arm Lift Time Increase:** D1 Arm Lift Time Increase (Degrees) increases the amount of time to lift the IM Metering device after advancing the product and the Arm begins its return. Default is 0.
- **E1 Arm Lift Down Time Increase:** E1 Arm Lift Down Time Increase (Degrees) increases the amount of time to lower the IM Metering device after the Arm has returned. Default is o.
- **F1 Arm Lift Start Up Delay:** F1 Arm Lift Start Up Delay is the amount of time in degrees to delay the arm from lifting after loading product into the case.



IM Metering Config 5 Screen (continued)

G1 - Arm Lift Load Down Degree Delay: G1 - Arm Lift Load Down Degrees Delay is the amount of time in degrees to delay the Arm Lift from moving down to the load position. This needs to be set so it doesn't hit the product under the arm as it is starting the motion to load product into the case.

H1 - Arm Lift Load Down Degree In Position: H1 - Arm Lift Load Down Degree In Position is the degree when the Arm Lift will be at the load position to enter the case.



Main Recipe 1 Screen



This screen has the following text objects:

Line Shaft Position: This text object displays the actual position of the virtual main line shaft.

Carton Rate: This text object displays a running average of the main line shaft speed.

This screen has the following numeric inputs:

Check For Carton At Load: A Missing Carton At Load fault occurs when the IM metering line shaft is enabled by the main, but the Carton At Load (PE_30533) photosensor does not detect a carton while the main line shaft position is within this variable and the end of the cycle.

When this item's help icon is pressed, the following help message appears: Check For Carton At Load - This should be when a carton is first detected at the "Carton At Load" sensor. Jog the Main Lineshaft to determine this position. Nuisance Missing Carton At Load Faults may occur if not set properly.

Programmable Limit Switch

React mSec: Each of these recipe variables specifies the speed compensation value for a PLS window.

On Deg: Each of these recipe variables specifies the leading edge of a PLS window.

Off Deg: Each of these recipe variables specifies the trailing edge of a PLS window.



Main Recipe 1 Screen (continued)

Discharge Belts Speed: This recipe variable is used to calculate the discharge belts' commanded run speed relative to the main line shaft speed.

Discharge Conveyor Speed: This recipe variable is used to calculate the discharge conveyor's commanded run speed relative to the main line shaft speed.

This screen has the following PLS windows:

Carton PLS window.

Upper Setup Vacuum: To apply vacuum to the carton setup upper vacuum cups, the Carton Setup Upper Vacuum (SV_30601) solenoid valve is actuated while the main line shaft position is within this PLS window.

Lower Setup Vacuum: To apply vacuum to the carton setup lower vacuum cups, the Carton Setup Lower Vacuum (SV_30603) solenoid valve is actuated while the main line shaft position is within this PLS window.

Main Out Of Position: This PLS window specifies the main line shaft range of motion in which the main has the potential to be in mechanical conflict with the arms.

Check For L-Shaped Carton: This PLS window is used for the following purposes:

- A Setup Missed 3 Blanks fault occurs when, during three consecutive attempts by the setup to set up a carton, the Carton Approaching Load (PE_30531) photosensor does not detect a carton while the main line shaft position is within this PLS window.
- An L-Shaped/Missing Carton At Load Station fault occurs when the following conditions are present:
 The setup attempts to pick a carton.
 In the next main line shaft cycle, the Carton Approaching Load photosensor does not

detect a carton while the main line shaft position is within the Check For L-Shaped

Check For Carton Approaching Load: This PLS window is used for the following purposes:

- The virtual IM metering line shaft is enabled by the main when the Carton In Flights (PE_30535) photosensor and the Case Approaching Load (PE_30531) photosensor detect a carton while the main line shaft position is within this PLS window.
- A Carton Not In Flights fault occurs when one of the Carton In Flights (PE_30535) photosensor or the Case Approaching Load (PE_30531) photosensor detects a carton and the other photosensor does not detect a carton while the main line shaft position is within this PLS window.



Main Recipe 2 Screen



This screen has the following text objects:

Carton Rate: This text object displays a running average of the main line shaft speed.

Line Shaft Position: This text object displays the actual position of the virtual main line shaft.

This screen has the following numeric inputs:

Programmable Limit Switch

React mSec: Each of these recipe variables specifies the speed compensation value for a PLS window.

On Deg: Each of these recipe variables specifies the leading edge of a PLS window.

Off Deg: Each of these recipe variables specifies the trailing edge of a PLS window.

This screen has the following PLS windows:

Top End Flap Glue Stripe 1 and **Top End Flap Glue Stripe 2**: The top end flap glue guns are enabled in main line shaft cycles in which the Carton At Glue (PE_30541) photosensor detects a carton at the beginning of the cycle. When enabled, the top end flap glue guns fire while the main line shaft position is within these PLS windows.

Bottom End Flap Glue Stripe 1 and **Bottom End Flap Glue Stripe 2:** The bottom end flap glue guns are enabled in main line shaft cycles in which the Carton At Glue (PE_30541) photosensor detects a carton at the beginning of the cycle. When enabled, the bottom end flap glue guns fire while the main line shaft position is within these PLS windows.



7.26

Glossary of Terms

Absolute Encoder: A feedback element that generates a unique digital code for each absolute linear or rotary position. To minimize errors, an absolute encoder usually provides the digital feedback signal in Gray Code.

Absolute Move: A move to a specified absolute position relative to a fixed zero position.

Absolute Position: A position referenced to a fixed zero position.

AC Motor: A motor that converts single or multiple phase alternating electrical current into mechanical energy.

Acceleration: The rate of positive or negative change in velocity as a function of time. Negative acceleration is usually referred to as deceleration.

Actual Position: The position value currently registering on a feedback element.

Actual Velocity: The velocity value currently registering on a feedback element.

Array: A numerically indexed sequence of elements of the same data type.

Cam Element: A cam point on a cam profile and the cam segment immediately to the right of the cam point.

Cam Point: A position within a cam profile determined by the coordinates of the master and slave axes.

Cam Profile: A representation of motion depicted by an array of cam elements. Cam profiles consist of a start point, an end point, and all points and segments in between.

Cam Segment: The path from one cam point to the next cam point.

Central Processing Unit (CPU): The decision-making and data storage section of a programmable logic controller.

Closed-Loop System: A motion control system that seeks to maintain a measured process variable at a set point in spite of unmeasured disturbances. A closed-loop system generates a corrective error signal by comparing one or more feedback signals to desired parameters. Feedback devices are typically encoders, resolvers, tachometers, or LVDTs (linear variable differential transformers).

Command Position: The target position used by a closed-loop system to move the feedback element to match.

Command Velocity: The target velocity used by a closed-loop system to move the feedback element to match.



Control Variable (CV): The computed output or value used to control the process in a closed-loop system.

Counter's Accumulated Value: The number of events counted by a counter since the counter was last reset.

Counter's Preset Value: A counter value programmed in advance that triggers a counter action. When a counter's accumulated value equals its preset value, its done bit is set.

DC Motor: A motor that converts direct electrical current into mechanical energy.

Decrement: A finite decrease in a variable quantity. For example, each time a down counter is triggered, its accumulated value is decremented by one.

DOT: Acronym for direction of travel, which specifies that a dimension is parallel with container or product flow (not across the machine).

Drive: An electronic device that can control the speed, torque, horsepower, and direction of an AC or DC motor.

Electronic Camming: When electronic camming is executed, a slave axis is synchronized to a master axis according to a specified cam profile.

Electronic Gearing: When electronic gearing is executed, a slave axis is synchronized to a master axis at the specified ratio (e.g., 1.345) or slave counts to master counts (e.g., 1:3).

Encoder Resolution: A measure of the smallest positional change that can be detected by an encoder. For rotary encoders, this is the number of unique electrically identified positions occurring in 360 degrees of input shaft rotation.

Feedback: The signal(s) returned from a feedback element.

Feedback Control Loop: The closed-signal feedback path in a closed-loop system.

Feedback Element: An element (transducer) in a closed-loop system that converts motion, position, pressure, flow, or temperature to an electrical signal for comparison to the command signal.

Frequency: The number of periodic cycles per unit of time.

Home Position: The reference position for an axis' absolute positioning movements. This position is usually defined by a home limit switch and/or encoder marker. It is normally set at power up and retained as long as the control system is operational.

Homing: A method of calibrating an axis to a known position. It involves moving an axis to a physical position at which the system assigns a predefined value to the servo's position.



Human-Machine Interface (HMI): The console at which a person interacts with the controller of a machine or system.

Increment: A finite increase in a variable quantity. For example, each time an up counter is triggered, its accumulated value is incremented by one.

Incremental Encoder: A feedback element that generates a digital signal to indicate each incremental change of linear or rotary position.

Incremental Move: A move to a specified incremental position.

Incremental Position: A position expressed relative to the current position. It is usually expressed in relation to a move that is an increment from the current position.

Indexing: An axis or axes in the process of moving to a preprogrammed position at a defined velocity and accel/decel rate.

Input Device: A device that supplies signals or data through input circuits to a controller.

Latched: In PLC logic, an output bit is considered latched if it remains set when the qualifying conditions that set the bit are removed. A latched output bit can be one of the following:

- Output Latch (OTL) instruction: An OTL sets its output bit when the qualifying conditions are present. The output bit remains set until unlatched (reset), typically by an Output Unlatch (OTU) instruction.
- Self-latched: An output bit set by qualifying conditions and held set by an input bit with the same address as the output bit branched around a portion of the qualifying conditions. The output bit is reset by the removal of a condition(s) within the rung.

Linear Encoder: A feedback element that directly converts an absolute linear position or an incremental linear position into a digital signal.

Master Axis: An axis to which an axis is slaved in an electronic gearing or position cam application. A master axis may be a servo drive axis, a virtual axis, or an encoder.

Modulo Result: The undivided remainder that results from dividing one numeric value by another. Modulo instructions are used in PLC programs to roll a rotary position value that exceeds a rotary cycle's total number of units into the next cycle. For example, the modulo result of 378 degrees with a 360 degree cycle is 18 (378 divided by 360 is one with a remainder of 18). The modulo result of 738 degrees with a 360 degree cycle is also 18 (738 divided by 360 is two with a remainder of 18).

Negative Feedback: Feedback that is subtracted from the input reference signal. Negative feedback forms the basis for closed-loop systems.

Offline: A state in which a device is not in direct communication.



Offset: The steady-state deviation of a controlled variable from a fixed set point. For example, the difference between an actual zero reference point and a programmed zero reference point.

One-Shot: A programming technique that sets a bit for only one program scan.

Online: A state in which a device is in direct communication.

Open Loop: A motion control system with no external sensors to provide corrective error signals.

Output Device: A device that receives signals or data from a controller.

PLS Windows: Programmed ranges of motion of a PLS (programmable limit switch) that are used for position dependent events, such as actuator control, registration, and fault detection.

Position Loop: A closed-loop system in which the controlled parameter is the mechanical position. It usually uses an encoder or resolver as a feedback device.

Position Unwind: Position unwind provides infinite position range to a rotary axis by returning its axis position to a starting value without backward axis motion. An Unwind value is the distance in feedback counts for a rotary axis that is added or subtracted to the axis position to maintain the position within a specified range.

Process Variable (PV): The current state or value of a process controlled by a closed-loop system.

Programmable Limit Switch (PLS): A high speed hardware or software control that converts the rotary motion of a physical or virtual shaft into digital signals. PLSs are typically used to program PLS windows (ranges of motion) for position dependent events such as actuator control, registration, and fault detection.

Programmable Logic Controller (PLC): A solid-state industrial control system that consists of a central processing unit (CPU), input/output interface, and user-programmable memory.

Proportional, Integral, Derivative Control (PID): An intelligent I/O module or program instruction providing automatic closed-loop operation of process control loops. For each loop, this module or instruction can perform proportional control and, if desired, integral control and/or derivative control.

- Proportional control causes an input signal to change as a direct ratio of the correction error signal variation.
- Integral control causes an output signal to change as a function of the integral (sum) of the correction error signal over a time duration.
- Derivative control causes an output signal to change as a function of the rate of change of the correction error signal.



Reset: Defines the status of bits (Booleans) and values (non-Booleans). Reset indicates that a bit is binary o (Off) or that a value is zero.

Resolver: A position transducer that uses magnetic coupling to measure absolute shaft position during one revolution.

Rotary Encoder: A feedback element that converts rotary position (absolute or incremental) into a digital signal. Often, the directly measured rotary position is used to determine a linear position through gearing.

Safe Off: A procedure that ensures that power will not travel from a drive to its motor.

Servo Axis: An axis that is directly commanded to move to a given position or at a given velocity.

Servo Drive: A drive that contains an embedded servo loop that controls some portion of its servomotor's dynamics. Typical servo drives contain an embedded velocity servo loop to control the attached motor at a given speed.

Servo Loop: The feedback control loop in a closed-loop system that controls a servomotor.

Servomotor: A motor used in a closed-loop system that is capable of being precisely controlled. A resolver or encoder provides constant and highly accurate feedback of the motor's exact position, speed, and torque to the motor's servo drive.

Set: Defines the status of bits (Booleans) and values (non-Booleans). Set indicates that a bit is binary 1 (On) or that a value is a non-zero number.

Set Point (SP): The commanded state or value of a process controlled by a closed-loop system.

Slave Axis: An axis that follows a master axis in an electronic gearing or position cam application. For example, a servo that is cammed to a virtual line shaft.

Speed Compensation: Many programmed PLS windows have an associated speed compensation (*React ms*) setting on the HMI. Though machine speed varies (ramps up and down), actuator reaction times and sensor response times remain constant. The purpose of speed compensation is to maintain proper synchronization between a machine and its devices over the entire range of machine speeds.

Stepper Motor: A specialized DC motor that allows discrete positioning without the use of feedback.

Synchronization: A condition that occurs when several functions of a machine (mechanical, servo, or software) follow a common master and are in a specific position relative to this master.

Timer's Accumulated Value: The time intervals elapsed by a timer since the timer was last reset.



Timer's Preset Value: A timer value programmed in advance that triggers a timer action. When a timer's accumulated value equals its preset value, its done bit is set.

Transducer: A general term for a feedback element.

Unlatched: Refer to the term *Latched*.

Variable Frequency Drive (VFD): A drive that controls an AC motor's speed and torque by varying the motor's input frequency and voltage.

Velocity: A vector quantity that denotes magnitude (speed) and direction in relation to a given time frame.

Velocity Loop: A closed-loop system in which the controlled parameter is velocity. It usually uses a tachometer as a feedback device.

Virtual Axis: An axis with full motion planner operation, but not associated with a physical device. For example, virtual main drive (axvMAIN_DRIVE), virtual main line shaft (axvMain_LineShaft), and virtual meter master (axvMeterMaster).





Section 8

Troubleshooting

General Troubleshooting
Message Troubleshooting



General Troubleshooting

This troubleshooting guide offers possible problems, causes, and solutions to assist the operator in returning the machine to a normal operating condition. This guide should serve as a reference tool for many possible solutions. Some conditions may not apply to this machine. Refer to the message troubleshooting guide following this section of the manual for solutions to specific fault messages.

If the solutions provided do not return your machine to its normal operating condition or if a machine condition you are experiencing is not identified, please contact Douglas technical support, 24 hours/7 days a week at 320.763.5507 or service@douglas-machine.com.

Problem: Machine will not operate in Jog Wheel mode

	Cause	Solution
1.	There is no electrical power.	Check the power source.
2.	There is no air pressure.	Inspect the air lines.
3.	A guard door is open.	Check and close the guard doors.
4.	The emergency stop circuit is activated.	Deactivate all emergency stop buttons.
5.	The main disconnect switch is off.	Place the main disconnect switch in the on position.
6.	The fault circuit is activated and not cleared.	Check the selector switch.
7.	The motor fuse is faulty.	Check the motor fuse.

Problem: Machine will not operate in Auto mode

	Cause	Solution
1.	Refer to 1-7 above.	Refer to 1-7 above.
2.	A program condition was not met.	Check the PLC program.
3.	The surge eyes are not reading.	Check the surge eyes.



General Troubleshooting (continued)

Problem: Machine will not pull blanks

	Cause	Solution
1.	The vacuum generator is defective.	Replace or repair the vacuum generator.
2.	The vacuum line is defective.	Replace or repair the vacuum line.
3.	The vacuum cups are not making proper contact with the case.	Adjust the vacuum cups according to the case/tray.
4.	The vacuum line is clogged with dust.	Check the line.
5.	The low surge eye is not reading.	Check the low surge eye.
6.	The sufficient surge switch is not satisfied.	Check the sufficient surge switch.
7.	The blanks are not feeding far enough forward.	Adjust the magazine sensor(s).
8.	The blanks are pinching or binding; the cups cannot pull the blanks.	Move the end of magazine switches toward the magazine.
9.	The vacuum generator is not turning on at the proper time.	 Check that the machine is properly timed. Check the recipe variable settings.

Problem: No vacuum

	Cause	Solution
1.	There is an air leak.	Check the hoses and fittings to the vacuum generator.
2.	There is a malfunction in the vacuum systems.	Check the vacuum system controls.
3.	The vacuum generator is not turning on at the proper time.	 Check that the machine is properly timed. Check the recipe variable settings.

Problem: Improper case blank setup

	Cause	Solution
1	. The hold back clips are not in the proper position.	Adjust the blank hold back clips.
2	. The blank is not set up correctly in the flights	The magazine height adjustment may not be at the correct setting. Refer to the changeover adjustment setting chart for the correct recipe setting.
3	. The blank is not centered on the flight chain.	The magazine side guides may not be at the correct setting. Refer to the changeover adjustment setting chart for the correct recipe setting.



General Troubleshooting (continued)

Problem: Blanks falling through magazine

	Cause	Solution
1.	The magazine side guide is out too far.	Adjust the side guide.
2.	The magazine top bar is too high.	Adjust the top bar.

Problem: Glue begins prematurely

Cause	Solution
The glue timing is incorrect.	Check that the glue stripe PLS window is correct.
	2. Check that the flight chains are properly homed.

Problem: Glue pattern unadjustable

	Cause	Solution
1.	There is a malfunction in the glue system.	Repair or replace the glue system.
2.	The program is not set correctly.	Check the glue program.

Problem: No glue

	Cause	Solution
1.	The glue reservoir is not on.	Turn the glue reservoir on and allow time to heat to the proper temperature.
2.	The glue selector switch is not on.	Turn the glue selector switch to on.
3.	The glue air pressure is not on.	Turn the glue air pressure on.
4.	The glue is not up to temperature.	Wait for the glue to heat properly.
5.	The applicator nozzles on the machine are clogged.	Use the glue test buttons to test the nozzles. Place a corrugated panel at the gun and use the appropriate button to discharge glue onto the panel.
6.	The tank is out of glue.	Fill the glue tank.



General Troubleshooting (continued)

Problem: Glue system

	Cause	Solution
1.	The glue tank is not heating properly.	Turn the heat down on the hoses and guns.
2.	A fault message appears when turning the glue tank on.	Hose(s) may not be plugged in.
3.	There is not enough glue applied to the corrugate.	Increase the size of the nozzle or air pressure. Caution! Too much air pressure will cause the glue to splatter on application.
4.	The glue coming from the glue guns is stringy.	Raise the glue temperature.
5.	The glue bounces off the case/tray.	Lower the glue temperature or air pressure to the glue tank.

Problem: Display blank

	Cause	Solution
1.	The display is in screen saver mode.	Touch the screen to reactivate.
2.	The machine is not reset.	Press machine reset.
3.	There is no power to the display.	Turn the power on.
4.	The fuse is faulty.	Replace the fuse.

Problem: No control voltage at device

	Cause	Solution
1.	The master switch is off.	Set switch to on.
2.	There is no voltage at the fuse or device.	Check the fuse and the circuit between the fuse and the device.
3.	The power dropped because the e-stop or guard door circuits are not active.	Reset the e-stop or guard door safety faults.



Message Troubleshooting

Machine Modularity

This machine is made up of discrete modules (sections). The machine also has a machine (system) module.

- Each module of this machine has its own set of display messages.
 - The highest priority active message is displayed on the message display.
 - The machine module messages consist of messages related to the PLC and those that are not unique to one of the discrete modules.

The message controller within the PLC program manages what message (or messages) is displayed on the system overview display. The message controller uses the following process:

- a. The messages within each module are grouped into message categories. The lowest priority messages are grouped in the category with the lowest value; the highest priority messages, in the highest value.
 - The PLC logic sends the value of each module's highest active message category (the message category with the highest priority active message) to the message controller logic.
- b. The message controller compares the value of all the modules' highest active message category to determine the value of the highest value of all message categories.
- c. Each message in the highest message category is displayed on the system overview display. If more than one message is in the highest message category, each message is displayed for a few seconds.



System Troubleshooting

A

Message	Cause	Solution
Air Dump Valve Faulted Check Incoming Air Supply	The most likely cause of this fault is that one of the safety relay's channels is not up (LED is green when the channel is up). There may be a problem with the incoming air, the dump valve, or the dump valve safety rated relay. The safety circuit consists of two separate parallel circuits that must have continuity for the machine to run. The safety relay opens (or does not close when reset) if a problem develops in either circuit. If both channels are up, it is likely that the safe off loop (Y1 and Y2 terminals) does not have continuity.	 A safety relay with only one channel up will not reset until both circuits have been opened and then closed. Put a device in the safety circuit to a position that opens both circuits. Close all devices in the safety circuit. Press reset. If the safety relay does not close (both LEDs green), check the open channel for continuity. Check the incoming air, the dump valve, and the dump valve safety rated relay. If both channels have continuity but the relay will not reset, check the continuity of the safe off loop.

 \mathbf{C}

Message	Cause	Solution
Cleanout Mode Enabled	The <i>cleanout</i> selector switch is set to on. The cleanout mode disables the tipped product fault and overrides the need for sufficient surge.	When desired, set the switch to off to exit the cleanout mode.
Communications Failure With Line	Communication with line control has failed.	Check the status of line communications.



D

Message	Cause	Solution
Discharge Surge	 Packages are backed up to the discharge surge photosensor. The photosensor or reflector is dirty or out of alignment. 	Wait for package surge to clear. Check the photosensor and reflector for blockage or misalignment.
Downstream Not Ready	A remote signal indicates that downstream equipment is not ready to receive packages.	 Check the status of downstream equipment. Wait for the backup condition to clear.
Dry Cycle Mode Running	Caution: This feature is only intended for experienced maintenance personnel. The <i>dry cycle</i> selector switch is set to on. The dry cycle mode allows the machine to cycle without products and blanks.	When desired, set the switch to off to exit the dry cycle mode.

E

Message	Cause	Solution
Electronic Fuse Blown in Infeed J-Box	There is an internal fuse fault on an output device in this enclosure. This fault may be caused by a short or an overload at an output point.	 Check the indicators on the output modules and troubleshoot the affected circuit (wiring or defective device on output). When the problem is resolved, press reset.
Electronic Fuse Blown in PLC Enclosure	There is an internal fuse fault on an output device in this enclosure. This fault may be caused by a short or an overload at an output point.	 Check the indicators on the output modules and troubleshoot the affected circuit (wiring or defective device on output). When the problem is resolved, press reset.



Message	Cause	Solution
E-Stop Safety Circuit Open Check All Safety Wiring	The most likely cause of this fault is that one of the safety channels transitioned (changed state), but the other safety channel did not transition within the discrepancy time. When a fault is detected, the input and status for both channels are set to low (off). The I/O indicators of a Safe Input Status module have the following meanings: Off: Safety input is off or the module is being configured. Yellow: Safety input is on. Red: A fault in the external wiring or input circuit has been detected. Flashing red: A fault in the partner input circuit of a dual-input configuration has been detected.	Perform the following steps to reactivate the safety input data: 1. Determine and correct the cause of the fault. 2. Open the safety inputs (put a device in the safety circuit to a position that opens both circuits). 3. Allow the input-error latch time to elapse. When the red I/O indicator turns off, the input data is activated. 4. Close all devices in the safety circuit. Press reset. If the fault does not clear, check the open channel for continuity.
Ethernet Rack 02 Comm Fault	Communication with this rack has failed.	Check the status of this ethernet rack. Check the ethernet cabling and the ethernet switch.
Ethernet Rack 03 Comm Fault	Communication with this rack has failed.	Check the status of this ethernet rack. Check the ethernet cabling and the ethernet switch.



 \mathbf{G}

Message	Cause	Solution
Guard Door & Entry Switch Circuit Open Check All Safety Wiring	The most likely cause of this fault is that one of the safety channels transitioned (changed state), but the other safety channel did not transition within the discrepancy time. When a fault is detected, the input and status for both channels are set to low (off). The I/O indicators of a Safe Input Status module have the following meanings: Off: Safety input is off or the module is being configured. Yellow: Safety input is on. Red: A fault in the external wiring or input circuit has been detected. Flashing red: A fault in the partner input circuit of a dual-input configuration has been detected.	 Perform the following steps to reactivate the safety input data: Determine and correct the cause of the fault. Open the safety inputs (put a device in the safety circuit to a position that opens both circuits). Allow the input-error latch time to elapse. When the red I/O indicator turns off, the input data is activated. Close all devices in the safety circuit. Press reset. If the fault does not clear, check the open channel for continuity.
Guard Door X Open	This guard door is open.	 When the reason for the open guard door has been resolved, verify that all personnel are out of the machine. Close the guard door and then press reset.

I

Message	Cause	Solution
Infeed HMI Emergency Stop	This emergency stop button has been pressed.	When the reason for the emergency stop has been resolved, pull out the emergency stop button and then press <i>reset</i> .
Infeed HMI Entry is Allowed	The infeed HMI's <i>machine entry</i> selector switch is set to allowed, which opens the guard door safety relay.	Before setting this selector switch to off, determine why this switch was set to allowed. When desired, set the selector switch to no and then press <i>reset</i> .
Inline Infeed Remote Emergency Stop	This emergency stop button has been pressed.	When the reason for the emergency stop has been resolved, pull out the emergency stop button and then press <i>reset</i> .



 \mathbf{L}

Message	Cause	Solution
Local Control Mode Selected Change Switch to Production Mode	The <i>control mode</i> selector switch is set to local. This mode bypasses line control logic.	When production mode is desired, set the switch to prod.
Local Ethernet Module Fault	Ethernet module slot 2 has faulted.	Check the status of the ethernet module.
Low Air Pressure	The incoming air pressure has dropped below the requirements of this machine.	 Check the air source. Check the pneumatic system for leaks. Check the operation of the pressure sensor. Ensure the machine's pneumatic components (blow-offs, etc.) are not consuming excessive amounts of air.

 \mathbf{M}

Message	Cause	Solution
Machine Recovering	The servos are recovering to their proper positions.	If this message persists after repeated attempts to initiate recovery (machine start, handwheel, manual cycle, etc.), a servo's cam profile may be missing. Save the online program and call Douglas Machine tech support.
Machine Running	The machine has run latch. There are no faults or other status conditions present.	If this message is displayed even though the machine is not running (cycling), it is possible that a condition without a message is dwelling the machine. Check the PLC program for a condition that is dwelling the machine and set up a message for the dwell condition.
Machine Stopped By Line	The machine has stopped in response to a remote interface signal from the line.	Check the status of the line.
Machine Stopped Recipe Was Changed	The machine stopped because a recipe variable was edited. It is preferable to cycle stop the machine before editing the active recipe.	Check the recipe settings. When desired, press <i>reset</i> and then restart the machine.



Message	Cause	Solution
Magazine Safety Switch No Blanks Detected	The magazine safety switch does not detect blanks in the magazine.	To reset the safety faults, place blanks in the magazine and then press <i>reset</i> .
Main HMI Emergency Stop	This emergency stop button has been pressed.	When the reason for the emergency stop has been resolved, pull out the emergency stop button and then press <i>reset</i> .
Main HMI Entry is Allowed	The main HMI's <i>machine entry</i> selector switch is set to allowed, which opens the guard door safety relay.	Before setting this selector switch to off, determine why this switch was set to allowed. When desired, set the selector switch to no and then press <i>reset</i> .

P

Message	Cause	Solution
PB Station Emergency Stop	This emergency stop button has been pressed.	When the reason for the emergency stop has been resolved, pull out the emergency stop button and then press <i>reset</i> .
PB Station HMI Entry is Allowed	The main HMI's <i>machine entry</i> selector switch is set to allowed, which opens the guard door safety relay.	Before setting this selector switch to off, determine why this switch was set to allowed. When desired, set the selector switch to no and then press <i>reset</i> .
PLC Clock Is Wrong - Check ESM Set Clock From HMI (Menu > Date & Time)	The PLC and HMI clocks were incorrect on machine power up (their current times were earlier than the last recorded time before the machine powered down). When this fault occurs, the PLC program sets the clocks to the last recorded time before the machine powered down.	 The Energy Storage Module may be faulted. Replace the ESM, if necessary. Refer to the description of the PLC Energy Storage Module Minor Fault message. Set the PLC clock to the current time (when the PLC clock is set, the PLC program sets the HMI clock). To set the PLC clock, use the Set Date/Time Screen, not the PV Config Screen.



Message	Cause	Solution
PLC Clock Was Wrong On Power-Up Check ESM, Verify Time	The PLC clock was incorrect on machine power up, but the HMI time seemed correct (the PLC clock's current time was earlier than the last recorded time before the machine powered down, but the HMI time was not earlier). When this fault occurs, the PLC program sets the PLC clock to the current HMI time.	 The Energy Storage Module may be faulted. Replace the ESM, if necessary. Refer to the description of the PLC Energy Storage Module Minor Fault message. Verify that the HMI time is correct. If the time is incorrect, set the PLC clock (when the PLC clock is set, the PLC program sets the HMI clock). To set the PLC clock, use the Set Date/Time Screen, not the PV Config Screen.
PLC Energy Storage Module Minor Fault Check PLC Minor Faults Tab While Online	An Energy Storage Module minor fault has occurred.	 While online with the PLC, open Controller Properties and select the Minor Faults tab to find a description of the fault. To avoid losing data, save the PLC program to an external location before replacing the Energy Storage Module.

S

Message	Cause	Solution
Servo Group Not Synced	The servo group has not synchronized.	Check the ethernet cables for proper connections.
Servo Power Supply 10200 Faulted	This servo power supply faulted.	Check the fault code. Refer to the servo manual for aid in troubleshooting.
Servo Power Supply Not Ready Check AC Input Power	The servo power supply is in the precharge state.	Check the AC power to the servo power supply.



T

Message	Cause	Solution
Test Mode Running	Caution: The test mode bypasses product surge speed control, which could result in product metering jams due to loss of infeed prime. To place the machine in the test mode, press the <i>reset</i> button three times while pressing the main drive <i>cycle stop</i> button.	 While in the test mode, press the machine start button to increase the machine speed. Press the cycle stop button to exit the test mode.

 \mathbf{U}

Message	Cause	Solution
Unknown Fault Machine Faulted, No Fault Array Bit Set	The machine was shut down by a fault that is not mapped to the fault array.	While online with the PLC, find the fault and map it to the fault array.

 \mathbf{W}

Message	Cause	Solution
Warning, Main Cabinet Temp Too High, Check Cooling System	This enclosure's <i>high temp</i> temperature sensor detected an overtemp.	 Check the status of the air conditioner. Clean its air filter. Check the enclosure for overheating components.



Main Troubleshooting

B

Message	Cause	Solution
	The most likely cause of this fault is a position error due to an obstruction in the path of the axis.	If there is a jam, determine and correct the cause of the jam and then clear the jam.
Backstop Servo Fault	This fault may be caused by a loose wire in a servo cable terminal.	 If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.

 \mathbf{C}

Message	Cause	Solution
Carton Not In Flights Remove Blank Before Restarting	Neither the carton in flights photosensor nor the carton approaching load photosensor detected a blank. A blank may not have been set up properly and is still somewhere in the machine.	Remove an errant blank from the machine.
Check "Carton Approaching Load" Sensor	 The photosensor is dirty or out of alignment. The photosensor's operating distance needs to be adjusted. 	 Clean the photosensor's lens. Check the sensor's alignment. Check the photosensor's sensitivity.
Check "Carton At Glue" Sensor	 The photosensor is dirty or out of alignment. The photosensor's operating distance needs to be adjusted. 	 Clean the photosensor's lens. Check the sensor's alignment. Check the photosensor's sensitivity.
Check "Carton At Load" Sensor	 The photosensor is dirty or out of alignment. The photosensor's operating distance needs to be adjusted. 	 Clean the photosensor's lens. Check the sensor's alignment. Check the photosensor's sensitivity.



D

Message	Cause	Solution
Discharge Belts VFD Fault	The VFD circuit has detected an error.	Check the drive for fault codes. Refer to the VFD manual for aid in troubleshooting.
Discharge Conveyor VFD Fault	The VFD circuit has detected an error.	Check the drive for fault codes. Refer to the VFD manual for aid in troubleshooting.

 \mathbf{E}

Message	Cause	Solution
Empty Magazine	The <i>low magazine</i> photosensor did not detect cartons for a preset number of consecutive carton pick attempts.	Fill the magazine with cartons.
Ethernet VFD_101XX Comm Fault	Communication with this device has failed.	Check the status of this ethernet device. Check the ethernet cabling and the ethernet switch.

 \mathbf{G}

Message	Cause	Solution
Glue System Not Ready	 The glue system is not at its preset run temperature because of one of the following reasons: There has been a loss of power to the glue system. The glue system has been started and is in the process of warming up. Too much cold glue was added to the reservoir at one time. 	 Determine and correct the cause of the power loss. When the glue system is started, wait at least 35 minutes for the glue system to warm up. Gradually add glue to the reservoir.



 \mathbf{L}

Message	Cause	Solution
L-Shaped / Missing Carton At Load Station	The setup attempted to pick a carton, but the <i>carton approaching load</i> photosensor did not detect the carton. This fault may be caused by a missed pick or an L-shaped carton.	 Determine and correct the cause of the fault. For cause and solution, refer to the Setup Missed 3 Blanks message. Remove an errant carton from the machine.
Laser Coder 1 Not Reset Check Laser Coder 1 Unit	A PLC input signal indicates that the laser coder 1 is not ready.	Check the status of laser coder 1.
Laser Coder 2 Not Reset Check Laser Coder 2 Unit	A PLC input signal indicates that the laser coder 2 is not ready.	Check the status of laser coder 2.
Laser Coder In Bypass Mode	The <i>laser coder</i> selector switch is set to bypass.	When desired, set the switch to on to enable the coder.
Laser Coder Not Ready	A PLC input signal indicates that the laser coder is not ready.	Check the status of the coder.
Leading Flights Servo Fault	The most likely cause of this fault is a position error due to an obstruction in the path of the axis. This fault may be caused by a loose wire in a servo cable terminal.	 If there is a jam, determine and correct the cause of the jam and then clear the jam. If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.
Left Discharge Belt Thermal OL	The motor is drawing excessive current.	 Determine and correct the cause of the overcurrent. Reset the motor protector and then press <i>reset</i>.



Message	Cause	Solution
Left End Flap Open	 The left end flap open photosensor's beam has been blocked because of one of the following reasons: The photosensor detected hanging chad on a carton. The photosensor or reflector may be dirty or misaligned. The glue is not applied or is improperly applied to the carton. The glue or glue components (glue gun, glue lines, etc.) are not at the proper operating temperature. The compression is not exerting the correct amount of pressure on the flap. 	 Remove the hanging chad from the carton. Check the alignment of the photosensor and reflector; clean if necessary. Check the following: the glue selector switch is set to on, the glue station sensor is operating properly, the glue gun solenoid valves are operating properly, the glue nozzles are not plugged, the glue guns are positioned properly, and if the glue tank is working properly. Check the glue manufacturer's operating specifications. Check the machine adjustments. After correcting the fault, ensure all unglued packages are removed from the line.
Low Glue Level	 The glue level is low. The low level sensing switch is stuck or not working properly. 	 Check the glue level. Add more glue if the tank is less than half full. Check the switch for proper operation. Replace the switch, if necessary.
Low Magazine	The <i>low magazine</i> photosensor detects a low level of cartons in the magazine.	Fill the magazine with cartons.

\mathbf{M}

Message	Cause	Solution
Main Lineshaft State Machine Fault	A motion instruction for this virtual line shaft erred.	If this fault persists, save the online program and call Douglas Machine tech support.
Main Module Cam Calculate	A cam calculate error occurred for a servo on this module.	Check this module's cam profile data and correct the faulty data.
Error Check Cam Entry Screens		If the profile data seems correct, save the online program and call Douglas Machine tech support.



Message	Cause	Solution
Main Module Homing Error	The home task of the selected servo has erred.	 If the servo uses a homing sensor, check the operation of the sensor. Check the servo power and safety wiring. Check the servo for an internal fault. Reinitiate servo homing. If this fault persists, save the online program and call Douglas Machine tech support.
Main Module Recovery Failed	A servo(s) on the module failed to recover within the allotted time.	Perform the following steps to reinitiate recovery: 1. Open a guard door on the section to disable the servos. 2. Close the guard door. Press reset to reset faults and enable the servos. 3. Press the recover machine button on the Machine Maintenance Screen to recover the machine. 4. If this fault persists, save the online program and call Douglas Machine tech support.
Main Module Servos Not Enabled Check Power and Safety Wiring	A servo(s) on this module is not enabled.	Check the servo power and safety wiring.
Main Servo Configuration Failed	With a servo(s) on this module enabled, the PLC program attempted to run the servo's servo configure routine.	Perform the following steps to recover from this fault: 1. Open a guard door on this section to disable the servos. 2. Close the guard door. Press reset to enable the servos. 3. Perform a first scan on the PLC program to initialize the servos. 4. If this fault persists, save the online program and call Douglas Machine tech support.
MCB Servo Fault	The most likely cause of this fault is a position error due to an obstruction in the path of the axis. This fault may be caused by a loose wire in a servo cable terminal.	 If there is a jam, determine and correct the cause of the jam and then clear the jam. If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.



Message	Cause	Solution
Missing Carton At Load Remove Product Before Restarting	With the loader line shaft enabled by the main, the <i>carton at load</i> photosensor did not detect a carton. The carton may have been removed from the load station or was not set up properly and is still somewhere in the machine.	 Remove an errant carton from the machine. Manually remove all products from in front of the loader.
Multiple Main Servos In Jog Mode	More than one axis is slaved to the virtual jog wheel.	To view which servos are slaved to the virtual jog wheel, scroll through the servos on this module's Maintenance Screen while viewing the state of the jog disabled/jog enabled button.

R

Message	Cause	Solution
Right Discharge Belt Thermal OL	The motor is drawing excessive current.	 Determine and correct the cause of the overcurrent. Reset the motor protector and then press <i>reset</i>.
	The right end flap open photosensor's beam has been blocked because of one of the following reasons: 1. The photosensor detected hanging chad on a carton.	 Remove the hanging chad from the carton. Check the alignment of the photosensor and reflector; clean if necessary.
Right End Flap Open	 The photosensor or reflector may be dirty or misaligned. The glue is not applied or is improperly applied to the carton. The glue or glue components (glue gun, glue lines, etc.) are not at the proper operating temperature. The compression is not exerting the correct amount of pressure on the flap. 	 Check the following: the glue selector switch is set to on, the glue station sensor is operating properly, the glue gun solenoid valves are operating properly, the glue nozzles are not plugged, the glue guns are positioned properly, and if the glue tank is working properly. Check the glue manufacturer's operating specifications. Check the machine adjustments. After correcting the fault, ensure all unglued packages are removed from the line.



S

Message	Cause	Solution
Setup Missed 3 Blanks	Cartons were not detected at the setup because of one of the following reasons: 1. Cartons are not advancing in the magazine. 2. Vacuum cups are not making contact because the cartons are warped. 3. There is a vacuum blockage. 4. Vacuum cups are worn. 5. There is an obstruction in the path of the setup or the setup is not adjusted correctly. 6. The carton approaching load photosensor is not working properly.	 Check the magazine adjustments. Check for warped cartons. Check for blockage in the vacuum cups and lines. Replace the vacuum cups. Check the setup travel. Check the operation of the sensor.

 \mathbf{T}

Message	Cause	Solution
	The most likely cause of this fault is a position error due to an obstruction in the path of the axis.	If there is a jam, determine and correct the cause of the jam and then clear the jam.
Trailing Flights Servo Fault	This fault may be caused by a loose wire in a servo cable terminal.	If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.

W

Message	Cause	Solution
Waiting For Laser Coder	A local PLC input signal indicates that the laser coder is not ready.	Check the status of the coder.



Inline Infeed Troubleshooting

E

Message	Cause	Solution
Ethernet VFD_101XX Comm Fault	Communication with this device has failed.	Check the status of this ethernet device. Check the ethernet cabling and the ethernet switch.

I

Message	Cause	Solution
Infeed Module Cam Calculate Error	A cam calculate error occurred for a servo on this module.	 Check this module's cam profile data and correct the faulty data. If the profile data seems correct, save the online program and call Douglas Machine tech support.
Infeed Module Homing Error	The home task of the selected servo has erred.	 If the servo uses a homing sensor, check the operation of the sensor. Check the servo power and safety wiring. Check the servo for an internal fault. Reinitiate servo homing. If this fault persists, save the online program and call Douglas Machine tech support.
Infeed Module Recovery Failed	A servo(s) on the module failed to recover within the allotted time.	Perform the following steps to reinitiate recovery: 1. Open a guard door on the section to disable the servos. 2. Close the guard door. Press reset to reset faults and enable the servos. 3. Press the recover machine button on the Machine Maintenance Screen to recover the machine. 4. If this fault persists, save the online program and call Douglas Machine tech support.
Infeed Module Servos Not Enabled Check Power and Safety Wiring	A servo(s) on this module is not enabled.	Check the servo power and safety wiring.



Inline Infeed Troubleshooting (continued)

Message	Cause	Solution
Infeed Product Jam Check Tamper Area for Missing Product	For a preset time, a tamper remained open while inline conveyor 4 was running. The most likely cause of this fault is a product jam that prevents product from advancing to a product at end of lane flag.	 Check for a jam in the infeed lanes. If there is not a jam, check the operation of the <i>product at lane</i> flags. Manually move product to the surge backstop.
Infeed Servo Config Failed	With a servo(s) on this module enabled, the PLC program attempted to run the servo's servo configure routine.	Perform the following steps to recover from this fault: 1. Open a guard door on this section to disable the servos. 2. Close the guard door. Press reset to enable the servos. 3. Perform a first scan on the PLC program to initialize the servos. 4. If this fault persists, save the online program and call Douglas Machine tech support.
Inline Waiting for Product	Sufficient product surge is not detected on the inline infeed.	 Check for a jam in the infeed lanes. Wait for incoming product.
Inline Conveyor 1 VFD Fault	The VFD circuit has detected an error.	Check the drive for fault codes. Refer to the VFD manual for aid in troubleshooting.
Inline Conveyor 2 VFD Fault	The VFD circuit has detected an error.	Check the drive for fault codes. Refer to the VFD manual for aid in troubleshooting.
Inline Conveyor 3 VFD Fault	The VFD circuit has detected an error.	Check the drive for fault codes. Refer to the VFD manual for aid in troubleshooting.
Inline Conveyor 4 VFD Fault	The VFD circuit has detected an error.	Check the drive for fault codes. Refer to the VFD manual for aid in troubleshooting.

 \mathbf{L}

Message	Cause	Solution
Load Guides Air Cylinder Jam	The load guides did not reach their forward or back position within the allotted time.	 Check the path of the load guides for an obstruction. Check the proximity sensors and the air pressure on the cylinder.



Inline Infeed Troubleshooting (continued)

 \mathbf{M}

Message	Cause	Solution
Multiple Infeed Servos In Jog Mode	More than one axis is slaved to the virtual jog wheel.	To view which servos are slaved to the virtual jog wheel, scroll through the servos on this module's Maintenance Screen while viewing the state of the jog disabled/jog enabled button.

S

Message	Cause	Solution
Sufficient Surge Jam on Inline Infeed Check for Tipped or Stuck Cans and Reset	Inline sufficient surge off was not present while inline sufficient surge on was present. This fault may be caused by tipped or stuck products	 Determine and correct the cause of the fault. Stand the tipped product upright or clear the product jam. If there is not tipped or jammed product, check the operation of the sensors.
Surge Release Air Cylinder Jam	The surge backstop did not reach its forward or back position within the allotted time.	 Check the path of the surge backstop for an obstruction. Check the proximity sensors and the air pressure on the cylinder.

 \mathbf{T}

Message	Cause	Solution
Tamper Conveyor Servo Fault	The most likely cause of this fault is a position error due to an obstruction in the path of the axis.	 If there is a jam, determine and correct the cause of the jam and then clear the jam. If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.
Tipped Product On Infeed Conveyor	The <i>inline tipped product</i> photosensor detected a down flag while sufficient surge was present or the metering was engaged. This fault may be caused by tipped product or by a product jam upstream of the tipped product flag assembly.	 Determine and correct the cause of the fault. Stand the tipped product upright or clear the product jam.



IM Metering Troubleshooting

A

Message	Cause	Solution	
	The most likely cause of this fault is a position error due to an obstruction in the path of the axis.	If there is a jam, determine and correct the cause of the jam and then clear the jam.	
Arm 1 Lift Servo Fault	This fault may be caused by a loose wire in a servo cable terminal.	If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.	
	The most likely cause of this fault is a position error due to an obstruction in the path of the axis.	 If there is a jam, determine and correct the cause of the jam and then clear the jam. 	
Arm 1 Servo Fault	This fault may be caused by a loose wire in a servo cable terminal.	If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.	
	The most likely cause of this fault is a position error due to an obstruction in the path of the axis.	If there is a jam, determine and correct the cause of the jam and then clear the jam.	
Arm 2 Lift Servo Fault	This fault may be caused by a loose wire in a servo cable terminal.	If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.	
	The most likely cause of this fault is a position error due to an obstruction in the path of the axis.	 If there is a jam, determine and correct the cause of the jam and then clear the jam. 	
Arm 2 Servo Fault	This fault may be caused by a loose wire in a servo cable terminal.	If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.	

E

Message	Cause	Solution
Ethernet VFD_101XX Comm Fault	Communication with this device has failed.	Check the status of this ethernet device. Check the ethernet cabling and the ethernet switch.



I

Message	Cause	Solution
IMmetering Lineshaft Out Of Position Perform GoToZero On IMmetering Module	For a preset time, the IM metering line shaft was disengaged while not at its cycle stop position.	 Manually remove any products from the metering area. Access the IM Metering Controls Screen and press the <i>goto zero</i> button to run the IM metering line shaft to its cycle stop position.

 \mathbf{L}

Message	Cause	Solution	
	The most likely cause of this fault is a position error due to an obstruction in the path of the axis.	If there is a jam, determine and correct the cause of the jam and then clear the jam.	
Lane Guides Servo Fault	This fault may be caused by a loose wire in a servo cable terminal.	If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting.	

M

Message	Cause	Solution	
Metering Arm Cam Calculation Error	An arm cam profile error has occurred.	 Check the arm 1 and arm 2 cam profile data and correct the faulty data. If the profile data seems correct, save the online program and call Douglas Machine tech support. 	
Metering Arm Lift CAM Calculation Error	An arm lift cam profile error has occurred.	 Check the arm lift 1 and arm lift 2 cam profile data and correct the faulty data. If the profile data seems correct, save the online program and call Douglas Machine tech support. 	
Metering Conveyor CAM Calculation Error	A metering conveyor cam profile error has occurred.	Check the metering conveyor cam profile data and correct the faulty data. If the profile data seems correct, save the online program and call Douglas Machine tech support.	



Message	Cause	Solution	
Metering Conveyor Servo Fault	The most likely cause of this fault is a position error due to an obstruction in the path of the axis. This fault may be caused by a loose wire in a servo cable terminal.	 If there is a jam, determine and correct the cause of the jam and then clear the jam. If there is not a jam, check the servo drive for fault codes. Refer to the servo manual for aid in troubleshooting. 	
Metering Is Preloading, Verify Product is up to back of Arm	The right angle conveyors and the metering conveyor are advancing products to the registration position (against the back of an arm).	 Check that incoming products are standing upright and are being registered against the back of an arm. The infeed preload mode resets when the right angle sufficient surge on flags detect product. 	
Metering Module Cam Calculate Error Check Cam Entry Screens	A cam calculate error occurred for a servo on this module.	 Check this module's cam profile data and correct the faulty data. If the profile data seems correct, save the online program and call Douglas Machine tech support. 	
Metering Module Homing Error	The home task of the selected servo has erred.	 If the servo uses a homing sensor, check the operation of the sensor. Check the servo power and safety wiring. Check the servo for an internal fault. Reinitiate servo homing. If this fault persists, save the online program and call Douglas Machine tech support. 	
Metering Module Recovery Failed	A servo(s) on the module failed to recover within the allotted time.	Perform the following steps to reinitiate recovery: 1. Open a guard door on the section to disable the servos. 2. Close the guard door. Press reset to reset faults and enable the servos. 3. Press the recover machine button on the Machine Maintenance Screen to recover the machine. 4. If this fault persists, save the online program and call Douglas Machine tech support.	
Metering Module Servos Not Enabled	A servo(s) on this module is not enabled.	Check the servo power and safety wiring.	



Message	Cause	Solution	
Metering Running, One or more Conveyors Off	The IM metering module is running, but a right angle conveyor(s) is not running.	When desired, press the <i>machine</i> start button or the IM metering's conveyor start button to start the conveyors.	
Metering Servo Config Failed	With a servo(s) on this module enabled, the PLC program attempted to run the servo's servo configure routine.	 Perform the following steps to recover from this fault: Open a guard door on this section to disable the servos. Close the guard door. Press reset to enable the servos. Perform a first scan on the PLC program to initialize the servos. If this fault persists, save the online program and call Douglas Machine tech support. 	
Multiple Metering Servos In Jog	More than one axis is slaved to the virtual jog wheel.	To view which servos are slaved to the virtual jog wheel, scroll through the servos on this module's Maintenance Screen while viewing the state of the jog disabled/jog enabled button.	

\mathbf{R}

Message	Cause	Solution		
Right Angle Conv 1 VFD Fault	The VFD circuit has detected an error.	Check the drive for fault codes. Refer to the VFD manual for aid in troubleshooting.		
Right Angle Conv 2 VFD Fault	The VFD circuit has detected an error.	Check the drive for fault codes. Refer to the VFD manual for aid in troubleshooting.		
Right Angle Conv 3 VFD Fault	The VFD circuit has detected an error.	Check the drive for fault codes. Refer to the VFD manual for aid in troubleshooting.		
Right Angle Waiting for Product	Sufficient product surge is not detected on right angle conveyor 2.	 Check for a jam in the infeed lanes. Wait for incoming product. 		



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Message	Cause	Solution	
Tipped Product on RA Infeed Conv Reset Machine At Metering Area	The right angle tipped product photosensor detected a down flag while sufficient surge was present or the IM metering was engaged. This fault may be caused by tipped product or a product jam upstream of the tipped product flags.	 Determine and correct the cause of the fault. Stand the tipped product upright. or clear the product jam. When the HMI's tipped product reset button is pressed, the machine resumes operation. 	



Message	Cause		Solution
Verify Prod is up to the Back of	After a metering fault is corrected, this message prompts the machine operator to verify that product is registered against the back of an arm.	a r	Check that product is registered against the back of the arm at the egistration position (the more upstream arm).
the Arm, Then Push Reset		p	f necessary, manually push product against the back of the arm.
			Press the <i>reset</i> button to reset his message.



