

# Wet Transfer

Area Operations Guide Prepared for:



Israel

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## Introduction

This manual contains **Original Instructions** written to assist in the normal operation of the wet transfer area. This provides an overview only. For more detailed information regarding maintenance, please refer to the maintenance manual specific to the equipment being maintained. Personnel should undergo proper training before attempting to operate any piece of equipment.

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# 1 SAFETY OVERVIEW

This **Area Operations Guide** provides a brief overview only. For the safe operation and maintenance of specific equipment, read the **Gypsum Technologies Operation & Maintenance Manuals**. For **Safety** information see the **Gyptech Boardplant General/Safety Overview Manual**.

**Never put yourself at risk.**

**Many pieces of equipment have the potential to cause serious injury or even death. Be sure to understand the safety concerns related to a piece of equipment before undertaking or performing any maintenance or clean out procedure. Work with your supervisors to address any safety concerns prior to undertaking work.**

**CAUTION: This document should be read in conjunction with the Gypsum Technologies Equipment Manuals. This document provides an overview only. Important safety information is contained in the equipment manuals. This section is NOT a complete safety procedure for performing maintenance or cleaning functions.**

All personnel must operate in compliance with both company policies and local regulations.

All personnel must follow **Lockout/Tagout (LOTO)** procedures (see Section [1.1 Lockout / Tagout Procedures](#)).

**CAUTION: Equipment has the potential to cause severe injury or even death.**

**Important:** Before undertaking or performing any maintenance or clean out procedure, be sure to understand the safety concerns related to a piece of equipment. NEVER put yourself at risk.

**Note:** For any safety concerns, speak with your management prior to undertaking any work.

## 1.1 Lockout/TagOut Procedures

Before performing maintenance or cleaning procedures, always ensure the isolation of any potential sources of motive power (e.g., electrical, hydraulic, steam, compressed air, etc.) by implementing a lockout. Be aware that some equipment may store potential energy, such as those held in elevated positions by hydraulic or pneumatic pressure and may unexpectedly move or fall if pressure is released. Additionally, hazards could arise from the movement of equipment or materials located upstream or downstream of the locked-out machine.

The electrical lockout can be conducted either at the electrical panel or locally via a zone disconnect, depending on the equipment configuration. For pneumatic systems, remove pressure by locking out the

manual air disconnect switch. To further ensure safety, confirm that the equipment in the system is not operational after lockout. This can be verified by testing with the standard startup methods, such as the operator controls at the HMI station or the manual HOA switch, if available.

**The above procedure is recommended where no other lockout procedure is defined. Operating and maintenance staff must follow lockout procedures and operate in compliance with their company policy and local regulations.**

**CAUTION:** Equipment may move or suddenly fall.

**Important:** Before performing equipment maintenance or cleaning functions, ALWAYS Lock Out motive power sources (electrical, hydraulic, compressed air, pneumatic, etc.).

### 1.1.1 LOTO Procedure

Prior to performing any equipment maintenance or cleaning, this **LOTO** procedure must be followed:

1. Identify the equipment that needs to be locked out
2. Shut down equipment
3. Confirm **Area/Zone** is turned **OFF**
4. Open the **Disconnect** switch
5. Place a personal **Lock** on the switch to prevent system from being re-energized
6. Confirm that no personnel are in the **Area/Zone**
7. Test the **Lockout** by putting equipment or motor into **Manual** mode for a few seconds to confirm that it will not start, then back to the **OFF** position

To continue operation, remove **Lock** from the switch, and then turn switch back to the **ON** position.

## 1.2 Drive Panel Electrical Disconnect Switches

Drive panel electrical disconnects serve as a means of physically isolating a specific area. Each drive panel is equipped with a lockable, panel-mounted disconnect switch that isolates all motor circuits within that panel. Prior to performing maintenance or cleaning, ensure that the zones are turned OFF before opening the disconnect switch. Once the disconnect switch is opened, a lock must be applied to prevent the system from being re-energized. For additional safety, after opening the disconnect switch, the equipment or motor should be switched to manual mode for a few seconds to confirm that the motor will not start, and then returned to the OFF position.

## 1.3 Zone Electrical Disconnect Switches

The area is organized into sub-sections, referred to as "zones." The zone system is utilized for managing the starting and stopping of groups of equipment as well as for lockout procedures. Each zone is equipped with a dedicated electrical disconnect switch.

Zone electrical disconnect switches are used to electrically isolate a specific zone. To achieve this, the zone must be turned OFF prior to opening the disconnect switch. After the switch is opened, a lock must be applied to prevent the system from being re-energized. For safety, the equipment or motor should be placed in manual mode for a few seconds following the opening of the disconnect switch to verify that the motor will not start, and then returned to the OFF position.

**CAUTION:** Equipment may automatically start.

**Important:** To prevent equipment from being re-energized after an Electrical Disconnect Switch has been opened, ALWAYS place a lock on the switch.

## 1.4 Air Dump and Disconnect Valves

Equipment that requires compressed air is equipped with an electronically controlled air dump solenoid in conjunction with a manual valve for lockout procedures. In some cases, air pressure is automatically released from the equipment, while in others, manual air release is necessary by operating the manual Air Disconnect.

**CAUTION:** Equipment automatically dumps air pressure under some circumstances.

**Important:** Once air is dumped, ALWAYS ensure that air pressure has been isolated and locked out before servicing any piece of equipment.

## 1.5 Emergency Stop Pushbuttons

Emergency stop buttons are strategically located throughout the area. Activating any of these emergency stops will immediately halt the entire area or stop equipment in the safest manner possible, followed by Safe Torque off for the drives. To restore power to the equipment, the emergency stop button must be released, and the safety system must be reset from the operator console. The equipment will be re-energized after a reset. All emergency stop button locations for the wet transfer area are depicted in the image below.

**CAUTION:** Use E-Stops only in an EMERGENCY Only – NOT for normal shutdown.

**Important:** Using E-Stop Push Buttons for normal shutdown can cause equipment damage.



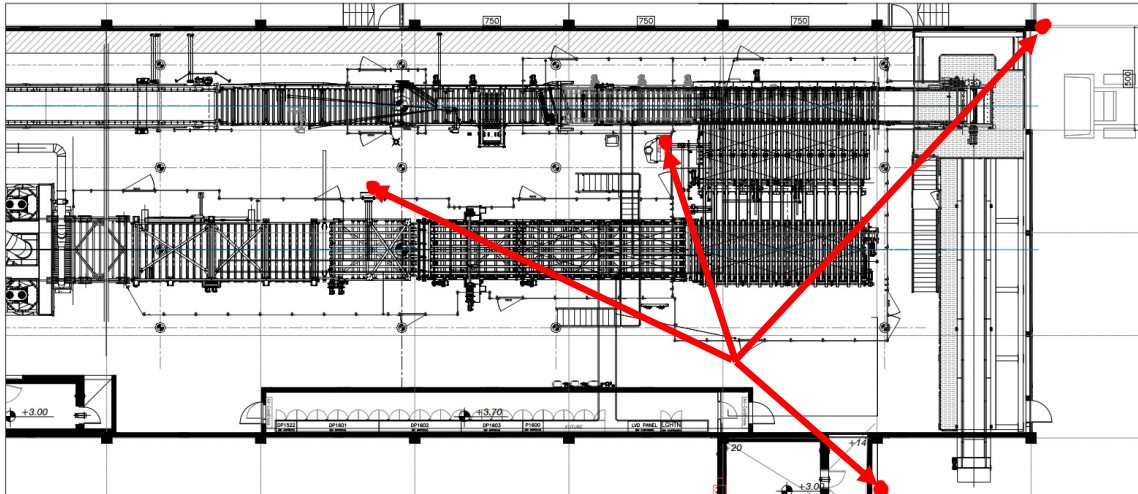


Figure 1: E-stop Locations

## 1.6 Pull Cords

All conveying equipment is protected by an interconnected emergency stop system. The emergency stop system can be activated by safety pull cords arranged along each side of the entire length of belt conveyors. Pulling one of the safety pull cords will stop the entire system. The conveyors are deenergized as quickly as possible, in some cases, with the aid of Dynamic Braking Resistors to eliminate excessive coasting.

**The pull cords are used to stop the belt conveyors and related equipment in an emergency or to prevent damage to the equipment. They must not be used for normal shut down of equipment or as a safety lockout.**

To restart the system after the pull cord has been activated, reset the pull cord switch then re-set the system from the operator control station.

Safety devices are monitored by the PLC and their status is displayed on the HMI. This allows for rapid troubleshooting when a problem occurs by quickly identifying which device has been activated.

**For a more thorough understanding of this mechanism please consult the detailed safety circuit electrical drawings and references.**

**CAUTION: Use Pull Cords ONLY in an EMERGENCY.**

**Important:** Using Pull Cords for normal Shutdown can cause equipment damage.

## 1.7 Gate Switches and Controlled Access

A physical barrier such as a safety fence often surrounds potentially hazardous areas that generally don't require access during normal operation. These areas are accessible only through designated safety gates. To open the gate the operator must request access and wait until the area has been safely shutdown and isolated before the gate will open. Once the operator has exited the area and closed the gate the system can be reset, and normal operation can be restored. No personnel should ever try to override this gate system or enter the gated area while equipment is operational.

**CAUTION:** Proper Lockout procedure must be followed to avoid hazards.

**Important:** A personal lock must be placed on the Safety Gate switch to prevent the gate from being locked behind a person.

### 1.7.1 Gate Access System

The **Gate Access System** is designed for incorporation into your **Lockout/Tagout (LOTO) Program**.

For **Gate Access**, from the **Gate Control Panel**, press the Yellow **REQUEST ACCESS** PB. The following sequence takes place:

1. PLC performs a controlled stop of the Zone
2. VFDs are put into STO
3. Automatic Safety Air Dump activates
4. Safety PLC verifies that all gate access prerequisites have been satisfied (STO and Air Pressure switch) and designated time delay expired
5. Gate Solenoid energizes to permit access to the zone
6. Safety Beacon slowly Blinks BLUE
7. Once the Safety Beacon becomes **Solid BLUE**, the Gate can be opened

**Note:** The Gate can be Locked in the **OPEN** position.

When the Gate is closed and the Safety Beacon slowly blinks **BLUE**, the Gate must be Locked by pressing the **BLUE Reset** PB on the control panel to reactive the Gate Solenoid. Once the Safety Beacon stops blinking and turns **OFF**, the Zone can be restarted by pressing the **White Zone Start/Stop** PB.

### 1.7.2 Gate Control Panel

Each **Gate** has a **Push Button** control panel with lights that indicate if it is safe to unlock the gate.

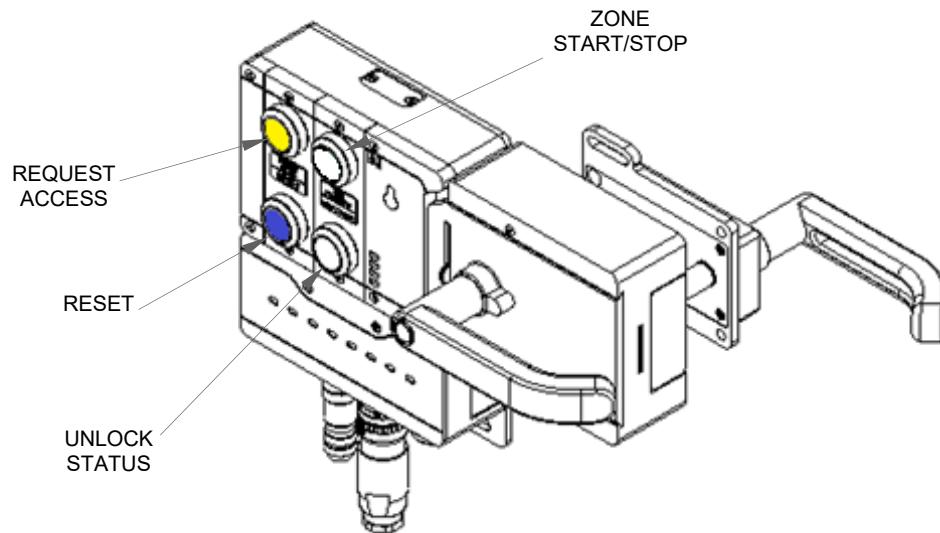


Figure 2: Gate Control Panel

Table 1: Gate Control Panel Push Buttons

Color	Push Button	When Pressed
YELLOW	REQUEST ACCESS	Releases Gate Handle when conditions are met, allowing access to a Zone
WHITE	ZONE START/STOP	Starts and Stops a Zone; button is Solid GREEN when a Zone is running
BLUE	RESET	Returns gate to Locked state
WHITE	UNLOCK STATUS	Gate Solenoid status

Table 2 Safety Beacon Gate Status

Beacon	Gate Status
OFF	Gate is <b>CLOSED</b> ; Locked

<b>SLOW BLINKING BLUE</b>	Gate is <b>CLOSED, Unlocked</b>  <b>Note:</b> RESET is required
<b>SOLID BLUE</b>	Gate is <b>OPEN, Unlocked</b>
<b>FAST BLINKING BLUE</b>	A <b>Safety Fault</b> condition exists  <b>Note:</b> RESET on <b>HMI Safety</b> screen, a technician may be required

## 1.8 HMI Safety Overview Screen

The status of the safety system and all safety devices can be viewed on the HMI by referring to the Area Safety Overview screen. While the HMI system provides an added level of safety and valuable information and diagnostic tools, none of its functions are to be considered a replacement for physically isolating equipment and being alert and aware of potentially hazardous situations.

## 1.9 Safe Torque Off

**Safe Torque Off (STO)** is an integrated safety function of the **Variable Frequency Drive (VFD)** which ensures that no torque generating energy can be applied to a Motor, and prevents unintentional starting in accordance with machinery safety standard EN 60204-1.

**CAUTION:** The STO function does **NOT** electrically disconnect VFDs.

**Important:** The STO only halts torque in the motor – power is usually still connected to the VFD.

When the **STO** stops pulses at the insulated-gate bipolar transistor (IGBT), it secures a drive, qualifies against the EN 60204-1 code, and then the motor or machining actuator does not restart until STO has reset. For a Variable Frequency Drive (VFD) without the **Safe Torque Off** function, time is needed to properly discharge before power is restored.

The **STO** function along with **Safety Gates** allow safer equipment functionality when accessing equipment for housekeeping and clearing jams.

## 1.10 HOA Functionality

**HAND-OFF-AUTO (HOA)** switch controls for Infeed control and Tipple Conveyor **Motor** are on Tipple infeed control panel located in Zone 3 at Tipple.

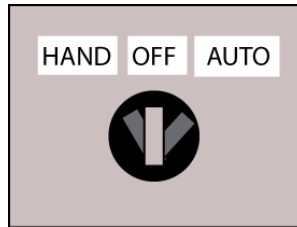


Figure 3 HOA Selector Switch Layout

Table 1.1 HOA Operations

Switch Position	Operation
<b>HAND</b>	<ul style="list-style-type: none"><li>Manually powers the Motor</li><li>Causes Motor to run, overrides any interlocks</li><li>Equipment runs continuously</li><li>Used only for maintenance purposes</li></ul>
<b>OFF</b>	<ul style="list-style-type: none"><li>Stops the Motor</li></ul>
<b>AUTO</b>	<ul style="list-style-type: none"><li>Normal operating position for the Motor, Automatic</li><li>Allows control from the PLC</li><li>Equipment responds appropriately to Line Start and Stop requests</li></ul>

### 1.10.1 HOA Safety

For Safety when cleaning or performing equipment maintenance:

1. Before a **Disconnect** switch is opened, the **HOAs** on **HMI** must be in the **OFF** state. Lockout the equipment at an isolation point (Drive Panel disconnect or Motor Circuit Breaker inside the Drive Panel, see Section 1.1.1 **Fehler! Verweisquelle konnte nicht gefunden werden.**)
2. Then, use the motor **HOAs** on the **HMI** to test for motion to confirm that the motor will not start and to ensure the correct disconnect is opened.
3. Return **HOA** switch to the **OFF** position

## 1.11 PLC Controls

Safety relays and all safety devices are monitored by the **Programmable Logic Controller (PLC)**. When a problem occurs, the **HMI** identifies which hard-wired device has been activated, and then displays status to aid in rapid troubleshooting.

## 1.12 Shutdown Guidelines

**General Safety Guidelines** to follow during **Shutdown**, and before any maintenance or repair work is started on motor-driven equipment:

- Confirm that the relevant control switch is in **OFF** position, and remains in the **OFF** position
- Confirm that power supply to equipment is shut off and locked at:
  - The main control switch
  - The local safety switch to the respective motors
- Display a “**WORK IN PROGRESS**” sign on the equipment
- NEVER make a by-pass connection of a **Safety** switch (not even if it's faulty) – Replace it!
- For any fault that could lead to personal injury, report this to the nearest person in responsibility
- Keep locking keys to relay cabinets, etc. in a safe place accessible only to authorized personnel

## 1.13 General Safety

Operating and maintenance staff must follow the [Lockout Procedure](#) and operate in compliance with their company policy and local regulations.

Refer to section **General Safety** in the Safety System manual.

## 2 Area Overview

The wet transfer area is designed to trim the newly formed boards to the specified length, orient them face-up to preserve the finish, and group the correct quantity of boards for subsequent entry into the dryer. The tipple and infeed mechanisms are employed to position the boards across multiple decks, enabling the controlled deceleration of boards and their eventual transfer into the dryer. Additionally, the wet transfer area comprises of wet reject system, which allows the PLC or operator to remove improperly formed boards from the production line, either during startup or due to various operational disturbances.

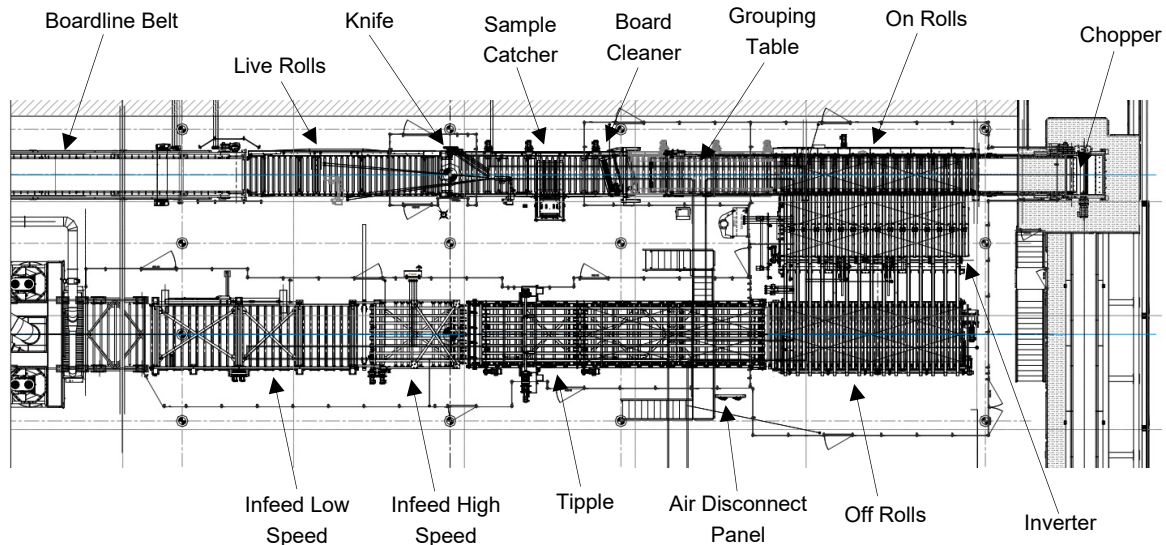


Figure 4: Wet Transfer General Arrangement

### 2.1 Wet Transfer Zones

The wet transfer is divided into 3 basic zones to accommodate isolating groups of equipment allowing proper locking out of energy sources. The wet transfer area zones contain the following equipment:

- **Zone 1**
  - Live Rolls
  - Knife
  - Grouping Table
  - Sample Catcher
  - Board Cleaner
  - Upper Wet Reject
  - Chopper
  - Wet Reject Belt Conveyor

- **Zone 2**
  - On Rolls
  - Lower Wet Reject
  - Inverter
  - Off Rolls
- **Zone 3**
  - Tipple
  - High Speed Infeed
  - Low Speed Infeed

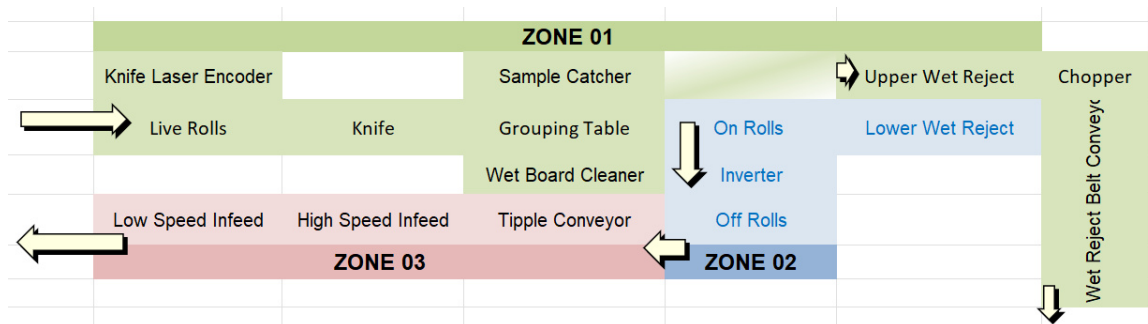


Figure 5: Wet Transfer Zones

## 2.2 Zone 1 – Live Rolls to Chopper

### 2.2.1 Live Rolls

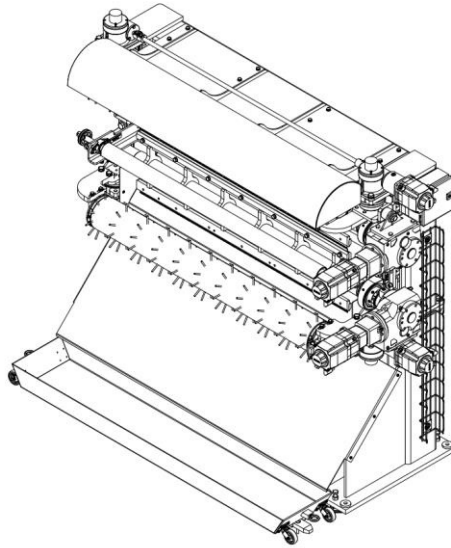
A set of rollers called Live Rolls convey the extruded line of wet board from the last **board line belt** to the knife, and as a part of the Board line draw functionality to compensate for the expanding nature of the extruded wet board.

The Live Rolls run at a speed determined by the Board line. The speed set-point is received from the Formulation area PLC. The motor percentage of FLA (Full Load Amps) and actual speed are returned to the formulation PLC, along with statuses such as ready status and fault status.

### 2.2.2 Knife

The knife cuts the stream of incoming board according to required length and desired number of boards per group. The knife consists of two very sharp serrated blades, one upper and one lower. These blades are mounted 180° opposite each other and perform a cut by rotating in correlation to the direction and speed of incoming board. The knife is fed incoming board from the live rolls. On the live rolls is the knife laser encoder, which measures the passing board and sends this length information to the knife.





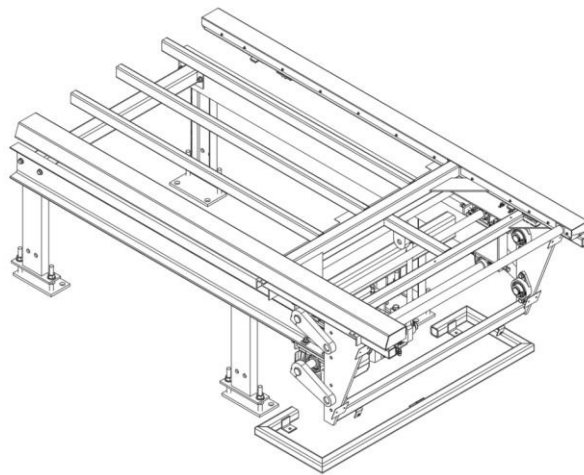
**Figure 6: Knife**

### **2.2.3 Grouping Table**

The grouping tables are roller conveyors that have multiple motors. These motors run together at board line belt speed until the knife has cut a complete group, they then accelerate to high speed for a pre-determined time to allow all the boards to clear each set of rolls, thus creating a gap between groups to allow for transfer time on the on rolls.

### **2.2.4 Sample Catcher**

The sample catcher consists of an electrically driven crank arm arrangement. When activated, the stainless-steel fingers rise to catch the cut sample as it travels along the grouping table. The fingers are then manually pulled back to a working position where the operator can retrieve the sample. The fingers are then lowered and returned to the ready position below the board path.



**Figure 7: Sample Catcher**

### 2.2.5 Board Cleaner

The Board cleaner is a rotating brush positioned at an angle to the board travel direction. It can be raised and lowered with an air cylinder.

### 2.2.6 Upper Wet Reject

The Wet Reject System includes a belt conveyor that removes waste board from the grouping table, diverting it from the production process. This system is activated during start-up and under various upset conditions.

Preferably, the upper wet reject is utilized over the lower wet reject as it prevents waste board, slurry, and debris from contaminating the on-rolls conveyor. The upper wet reject also has a higher discharge capacity and feeds the waste directly into the chopper, improving waste management efficiency.

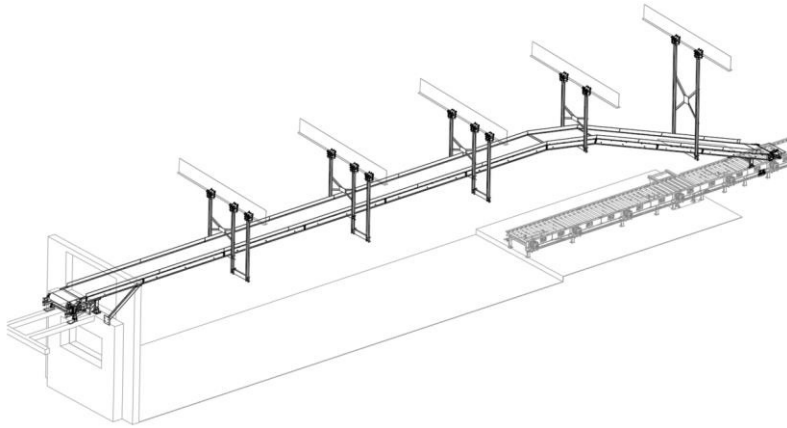


Figure 8: Upper Wet Reject

### 2.2.7 Chopper

The chopper receives wet waste board from the upper wet reject conveyor and reduces the particle size of the waste board. This makes the waste easier to handle and recycle.

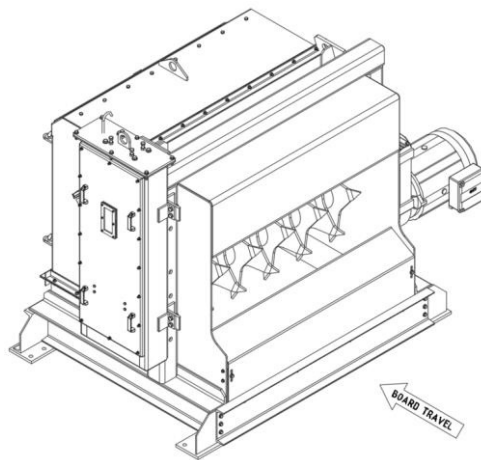


Figure 9: Chopper

### 2.2.8 Wet Reject Belt Conveyor

The wet reject belt conveyor brings the waste material away from the chopper outlet.

## 2.3 Zone 2 – On Rolls Conveyor to Off Rolls

### 2.3.1 On Rolls Conveyor

The on rolls is a roller conveyor that is raised and lowered by a pneumatic cylinder. The rollers rise to receive a group of boards from the grouping table at a high rate of speed. The boards will stop at a predefined position and the roller table lowers the board onto the transfer belts. The transfer belts can then move the group of boards laterally. After being lowered by the on rolls, transfer belts shift the board group laterally into the pitch side of the inverter. The belt will stop the board group at a predetermined position to be inverted. If there is congestion in the wet transfer area or a downstream upset condition, the rollers will remain raised and transfer board to the lower wet reject.

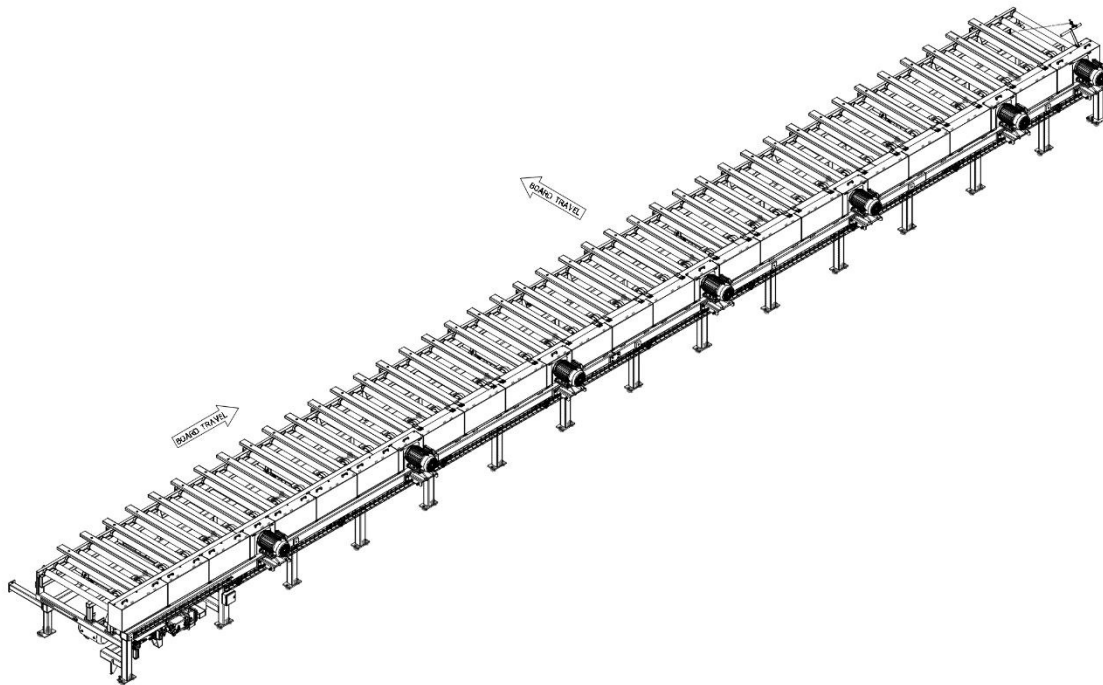


Figure 10: On Rolls

### 2.3.2 Lower Wet Reject

The wet reject consists of a belt conveyor, which removes board from the on rolls. This board is considered waste and will be removed from the process. The wet reject is used during start-up and during a number of upset conditions.

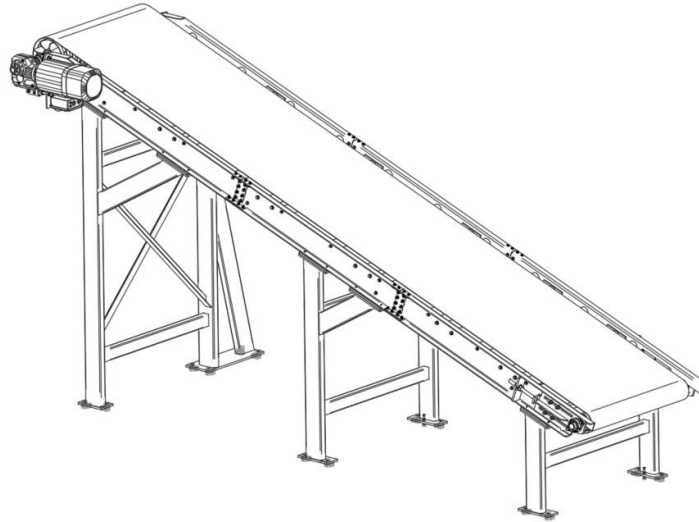


Figure 11: Lower Wet Reject

### 2.3.3 Inverter

The inverter receives board from the on rolls and flips them over. Board is received face down from the boardline, and it has to be face up when passing through the dryer. This is done to prevent damage to the face of the board. The inverter consists of two sets of arms referred to as the pitch arms and catch arms. The boards are lifted with the pitch arms, passed to and lowered by the catch arms. The start of the pitch arms is delayed by a small amount with respect to the start of the catch arms in order to optimize the cycle.

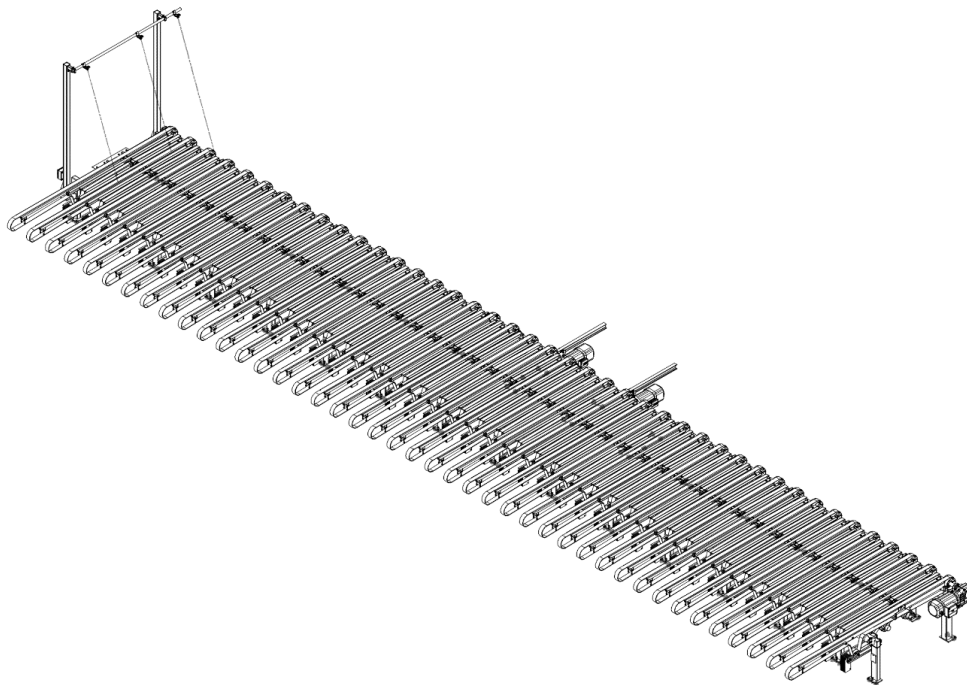


Figure 12: Inverter

### 2.3.4 Off Rolls

The off rolls is a roller conveyor that raises and lowers via pneumatic cylinder. The groups of board are transferred from the inverter onto the off rolls via the transfer belts and stop at a set position over the rolls. The roller table is raised and the rollers start to transfer the groups of boards to the return conveyors and tipple. When board is clear, the rollers stop and drop out of the way, ready for the next set of incoming boards.

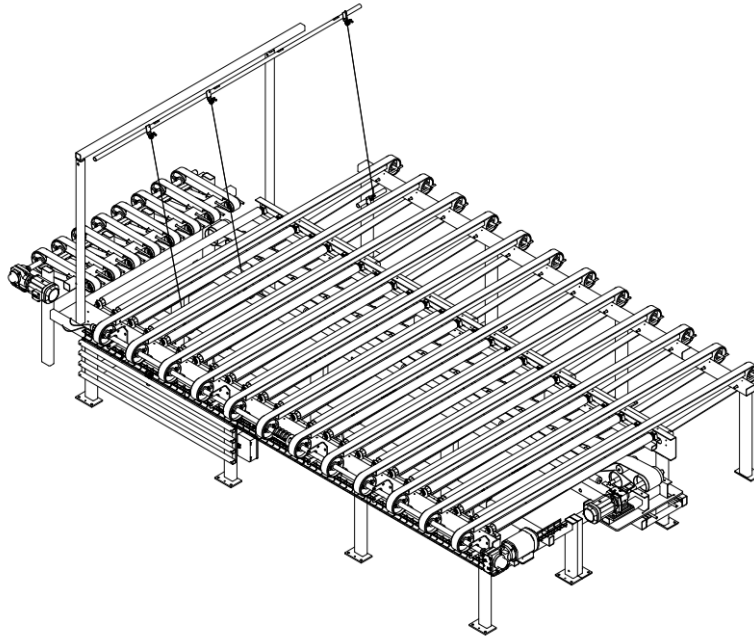


Figure 13: Off Rolls

## 2.4 Zone 3 – Tipple to Low Speed Infeed

### 2.4.1 Tipple

The tipple includes a driven belt conveyor and a hoist mechanism. The belts transport boards to the high-speed infeed, while the hoist moves the tipple up and down to feed boards into various decks of the infeed. Initially, the first set of boards is directed to the current deck; then, the hoist indexes to the next position, delivering the subsequent set of boards to the next deck in sequence. This cycle continues until each deck receives boards, at which point the sequence restarts.

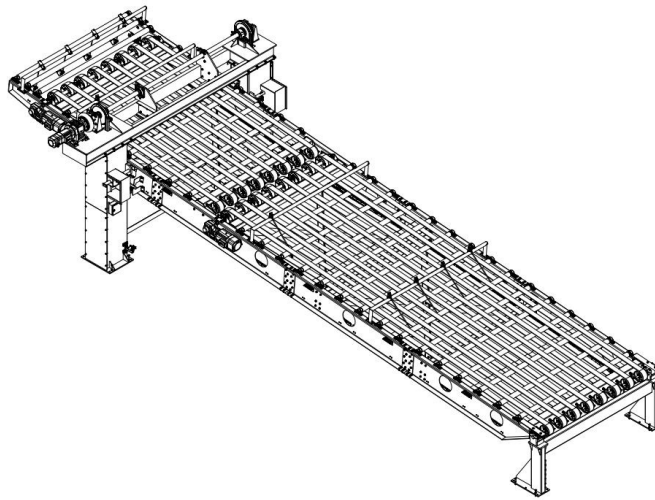


Figure 14: Tipple

#### 2.4.2 High Speed Infeed

The infeed system comprises multiple decks that correspond to the dryer's deck configuration, featuring both high-speed and low-speed sections. Boards enter each deck from the tipple at high speed and are subsequently decelerated to match the dryer's speed. During this speed transition, gaps between boards can be minimized to prevent end burning during drying.

Each deck's high-speed infeed section includes belts and support rollers, with each deck powered by an independent drive for precise control. Upon board entry, the belts synchronize with the tipple's speed. Once the board clears the tipple, the belts decelerate to low-speed infeed settings. This indexing sequence ensures that each board clears the high-speed section before the deck resumes incoming board speed.

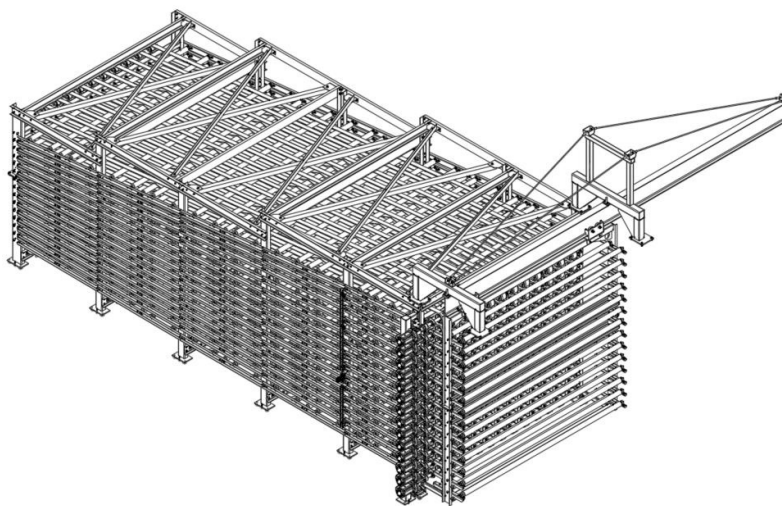


Figure 15: High Speed Infeed



### 2.4.3 Low Speed Infeed

The low-speed infeed consists of roller decks operating at the same speed as the dryer. This section receives boards from the high-speed infeed and transports them into the dryer. The length of the low-speed infeed is designed to provide the boards with the appropriate set time before they enter the dryer.

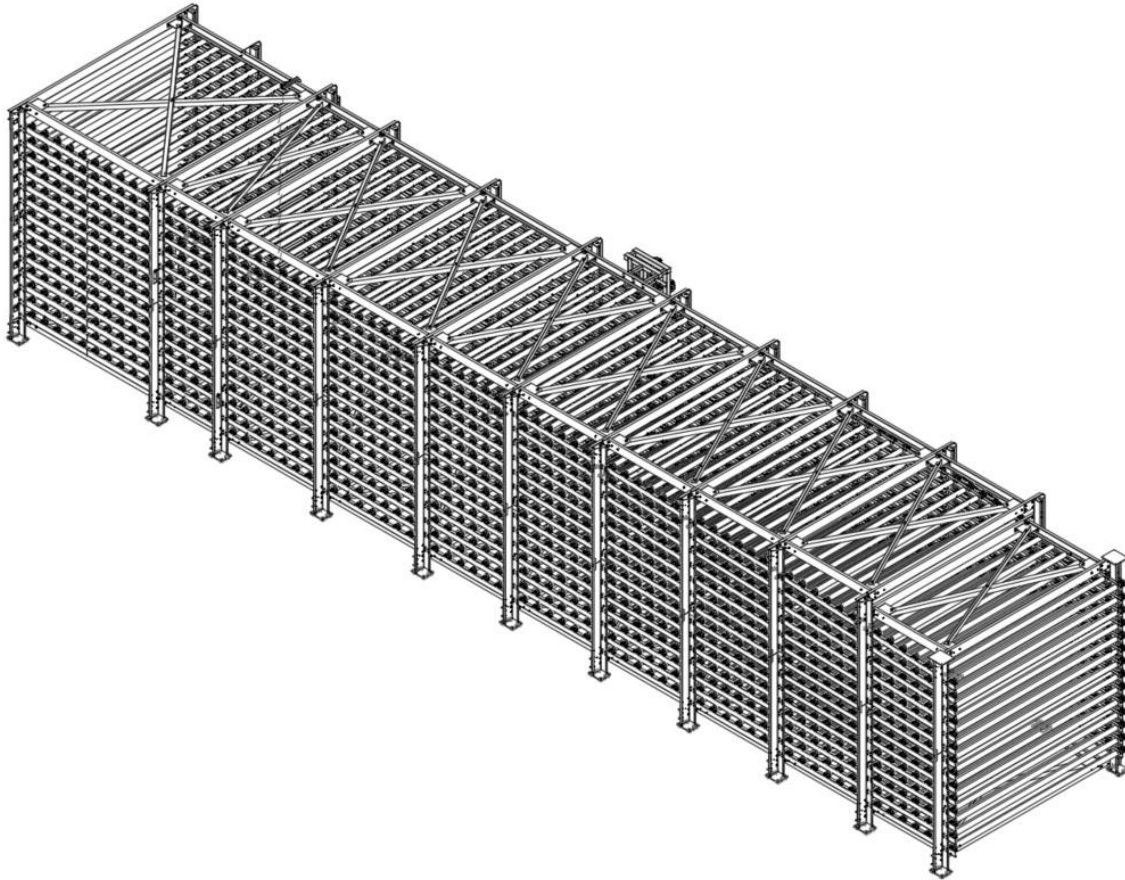


Figure 16: Low Speed Infeed

## 3 Operator Procedures

From the wet transfer operator station the operator can control most aspects of the wet transfer, knife sequencing, infeed and wet rejecting. There are also e-stop buttons located in key areas and pull cords along the board line. The wet transfer area is divided in sub-areas or zones. The zone system is used to manage the automatic starting/stopping of groups of equipment and for lockout purposes. Always lock out the electrical system and air supply for a zone before climbing onto the equipment to clear problems or work on the machine.

### 3.1 Wet Transfer Product Sizes

The wet transfer handles different sizes of wet board which vary in width and length. The wet transfer area receives a continuous stream of board and cuts it into boards of length up to 4.0 m. These boards have widths of 600 mm to 1220 mm, and thickness from 6.4 mm to 25 mm.

### 3.2 Starting and Stopping the Wet Transfer Area

Starting and stopping each zone in the wet transfer area is done by a single button located on either the operator control panel or on a graphics screen. The HMI indicates conditions not met prior to starting a zone. Before a zone can be started, these conditions must be met:

- All disconnects in the zone must be closed
- No emergency stop conditions can exist
- No external critical zone process faults can exist
- Air pressure needs to be operational

For conditions that fail during operation, the affected motor automatically shuts down and the HMI displays the reason for shutdown. Loss of operational air pressure will not shut down a zone. When a zone is shut down, it remains in a stopped state for several seconds to allow board in transit to stage properly before equipment is shutdown. Activation of any of the emergency stop buttons will shut down the entire wet transfer system. Emergency stop conditions include activation of any emergency stop button.

Each zone is a logical, functional collection of motors and devices. To start a zone – that is to say, make it ready for automatic functionality – requires the operator to press the zone start PB. This initiates the zone start sequence. The zone start sequence begins with sounding the area horn as a warning that a zone is starting. The zone on/off pilot light flashes while the zone is starting. Once a zone has started all equipment goes into its auto-ready state and the zone on/off pilot light is lit solid (no flashing).

When a zone is on, pushing the zone start / stop pushbutton on the control panel or the HMI will turn the area off with a delay, to turn off immediately press the start/stop pushbutton once more. Drives may remain powered and air pressure may remain. It is still necessary to power down and lock out the zone before entering to perform maintenance. This is the controlled way to turn a zone off and is the preferred method of stopping a zone in a non-emergency situation.



### 3.3 Master Start Sequence

During the master start sequence at the mixer, board will need to be automatically rejected at the wet reject until the process stabilizes and proper recipe and formation setup is complete. The wet transfer operator needs to follow what is coming from the mixer and be ready to turn the reject off once saleable board is being made.

**Note:** The master start sequence at the mixer cannot start unless zone 1 of the wet transfer is on and ready.

### 3.4 Knife Operation

See knife maintenance manual for more information.

The knife has various diagnostic, setup and control functions. Under normal operating conditions the knife will function automatically, and the operator only needs to setup the number of cuts of each length or product to be made. The knife may also be operated manually to move the blades into maintenance positions and to check the alignment at the cut position.

**Note:** Remember that the knife blades are very sharp.

**SAFETY:** Never operate the Knife manually when the guarding is removed or while someone is working on or near the equipment.

#### 3.4.1 Homing the Knife

Homing of the knife does not have to be done after power has been removed. It should only be necessary after a motor or controller has been replaced. However, if homing is required, it should only be done when there is no board present at the knife. In order to perform a home, the knife must be placed into manual and the home button pressed. An indicator will show that the knife is homing. The home function needs to be complete prior to placing the knife back into auto mode. The knife rotates at a very slow speed while homing, depending upon where the knife blade is located when a home function is commanded; it may take a few seconds to be completed.

**Note:** All homing controls are located on the HMI screen.

#### 3.4.2 Jogging the Knife

Each knife blade can be jogged independently from the other. The knife must be placed into manual mode before the jog button can be pressed. As long as the jog button is pressed the blade will rotate. When the knife is placed back into auto mode, the blades will return to their ready positions.

**Note:** Knife Jog buttons are located on the HMI screens.

#### 3.4.3 Performing a Length Change

Performing a Length Change is done for a length modification greater than 25mm. A fully transferrable set needs to be available for transfer before changing the cut length of the Knife. This ensures that boards being fed into the dryer are paired up, preventing un-even drying and rejecting at the take-off.

The Knife Batching system has a cut-list of 10 lengths that can be queued up by an operator. Each item in the queue contains information about the Knife cut length (in millimeters) and quantity required. The

batching system cycles through items in the queue as required. At any point, lengths can be changed manually. Once the manual option is activated, the Knife will wait as required for a fully transferrable set to be available before changing lengths.

The option to clear an entry clears values in that row but leaves it available for another length. Another push button allows deletion of any given row, which will shift the remaining list up one row. A third push button allows the swapping of two adjacent rows facilitating a list re-ordering in case of production requirement changes.

Length changes that need to be synchronised with the Mixer change-over and/or printer change should be initiated at the Mixer. The WT sends the Mixer pulses every time it is okay to change lengths (every other group). The Mixer coordinates its own changeover which can be tracked to the Knife. The Knife changes as necessary at the appropriate time.

### 3.5 Wet Reject

The wet reject system will activate under specific upset conditions, including improper cutting at the knife, instability in the mixing or forming processes, or downstream equipment issues that cause board backup within the wet transfer section. The operator can also manually engage the reject by pressing the reject button on the HMI (Human-Machine Interface). When the button is illuminated, the reject function is active; when unlit, the reject is inactive.

The following conditions will initiate the wet reject:

- The Wet Reject operator push button is pressed.
- A zone within the wet transfer system is turned off.
- A fault occurs in one of the VFD drives in Zone 02 critical for maintaining board flow.
- The dryer is not ready to accept board.

#### 3.5.1 Upper Wet Reject

The upper reject system is activated either manually, by pressing the Upper Reject Push Button (PB), or automatically in response to specific reject conditions. To deactivate the reject, the operator must press the Upper Reject PB again, unless the reject was triggered by a single or multiple board automatic reject condition.

#### Upper Wet Reject Conditions

Automatic upper wet reject conditions generally fall into two categories: continuous reject and single/multiple board reject.

##### Continuous Reject Conditions:

Continuous reject conditions will activate the upper wet reject and maintain it until all reject conditions are cleared and the Upper Reject Push Button (PB) is pressed.

The continuous reject conditions are as follows:

- Fault detected in Zone 02
- Zone 02 not fully in auto mode
- Zone 02 not fully ready
- On-rolls sensor 1 remains active after on-rolls have stopped
- Off-rolls not ready for board transfer

- Encoder active (if applicable)
- Side reject activated
- Long board detected on the tipple
- Possible infeed jam detected at the tipple end
- Tipple not ready
- Knife not ready

#### **Single/Multiple Board Reject Conditions:**

Single/multiple board reject conditions are specific to certain events and result in rejecting a calculated amount of board. These conditions include:

- Automatic length change, triggering a calculated board reject
- Dryer not ready
- Infeed crash avoidance triggered
- Soft or uncut board detected

### **3.6 Tipple**

The tipple has various diagnostic and control functions on the HMI. Under normal operating conditions the tipple will index and load board automatically. However, under some circumstance it may be necessary to operate the tipple manually to remove board or clear a jam. Always lock out the equipment before servicing or performing maintenance and never operate the tipple manually while someone is working on or near the equipment.

#### **3.6.1 Homing the Tipple**

Homing of the tipple hoist does not have to be done after power has been removed. It should only be necessary after a motor or controller has been replaced. In order to perform a home, the tipple must be placed into manual mode and the home button pressed. All tipple homing controls are located on the HMI screen. An indicator will show that the tipple is homing. The home function needs to be complete prior to placing the tipple back into auto mode.

#### **3.6.2 Indexing the Tipple**

The tipple can be manually indexed from deck to deck. The tipple must first be placed into manual mode and the tipple hoist up or down index buttons can be pressed. The tipple will move up or down in increments of one deck with respect to which button is pressed. When in auto mode, if the tipple does not index, the reject will automatically turn on to prevent board jams into the infeed.

### **3.7 Manual Cleanout**

In the event of an operational disruption, a manual cleanout procedure may be required to back boards out of the dryer infeed. Follow these steps for effective cleanout:

1. **Preparation:** Stop Zone 03 before running the infeed decks in reverse to prevent auto mode faults. Clear any faults by turning off the zone, setting the manual/auto selector to auto, then returning it to manual.

2. **Tipple Positioning:** Manually index the tipple up or down until it aligns with the deck from which boards need to be removed.
3. **Reverse Tipple Belts:** In manual mode, press the reverse button to run the tipple belts in reverse, while the off rolls raise and also run in reverse.
  - **Note:** Zone 02 must be active for proper functionality.
4. **Reverse Infeed Decks:** The high and low-speed infeed deck corresponding to the tipple position will automatically run in reverse. Once the board is mostly on the high-speed section, press the high-speed deck button to match the tipple belt speed for smooth removal.
  - **Note:** Ensure minimal stagger between boards to maintain smooth unloading.
5. **Board Transport and Rejection:** Cleared boards will travel down the tipple, onto the off rolls, and rejected boards will stop on OffRolls either by clearance of sensor or by initiating Side Reject.
6. **Tipple Belt Stop Mechanism:** If additional boards are unloaded, the tipple belt will stop automatically once it reaches capacity limits to prevent board collisions.
7. **Off Roll Rejection:** Boards will be Side Rejected when initiating Side Reject via push button. Once boards are clear, turn off Side Reject via same button.
8. **Repeat Cleanout as Necessary:** If boards remain on the tipple belts, the off rolls will rise and run in reverse, allowing the boards to transfer onto the off rolls. Repeat this rejection process until all undesired boards are cleared.
9. **Return to Auto Mode:** Once the unwanted boards are cleared, set all selectors back to auto mode. The off rolls will stop and lower, the tipple belts will resume forward movement, and Zone 03 can be reactivated. The infeed is now ready to resume production.

## 4 Troubleshooting

Given the complex nature of these machines, this section provides only fundamental mechanical troubleshooting methods. If the maintenance procedures detailed below do not resolve the issues, it is recommended to contact a Gyptech representative for further assistance.

### 4.1 Knife

Problem	Possible Causes	Possible Solutions
Depth of cut is not uniform from side to side	Knife blade is damaged or in crooked. Top blade is not level side to side.	Replace or adjust knife blades. Ensure blade is properly installed in clamp
Board is cutting crooked. End is not square.	Knife is not square to conveyors.	Use squaring adjusters on Knife to fix knife's perpendicular alignment to the board line.
Board is not cutting.	Blades are dull. Board is too soft.	Replace knife blades. Increase setting agents at the mixer to have sufficient set at the knife.

### 4.2 Tipple Hoist

Problem	Possible Cause	Possible Solution
Hoist stops at the fully raised or fully lowered position	Tipple over-travel limits reached. If either of these limits are made the Tipple will stop. Indication displays on the HMI.	It will be necessary to find the source of the problem, which may require Maintenance assistance.  The Tipple can be placed into Manual Mode and lowered or raised away from the triggered limit.  If the Tipple is reading the incorrect deck, it may be necessary to run a home sequence.

## 5 MAINTENANCE

*For equipment and machinery maintenance procedures, please refer to BoardPlant General Maintenance Manual – Document CAIS-GMM-100000\_BoardPlant.*

### 5.1 Safety Information



#### **Danger!**

Risk of severe injury or death from touching live components. Do not perform work on live components.

Working on electronic equipment may only be performed by qualified personnel.

Keep switch cabinets closed. Access to the switch cabinets is only allowed by authorized personnel.



Repair loose connections and damaged cables immediately. Perform work only with main switch turned off and locked out.

Cable must not be jammed or crimped. Cables must be routed to avoid tripping hazards and damage to cables.



#### **Warning!**

Only perform maintenance work on the equipment if the main switch is disabled and locked out. Display a clear sign “Caution - Work in process – Do not start machine!”



#### **Warning!**

Safe operation of the equipment is only guaranteed if every protection device is properly installed and working.

Do not operate the equipment without all guards.

Protective devices may only be removed with the main switch turned off.



#### **Warning!**

Risk of injury due to improper use of compressed air.

Before performing maintenance work, open the air dump valve and lock out.

Ensure all residual pressure has escaped the equipment before performing maintenance work.

Never direct the end of a compressed air hose at loose objects.

**Warning!**

Work on hydraulic devices may only be performed by qualified personnel.

Be aware that residual pressure may be trapped in the system. Ensure all residual pressure is relieved before working on equipment.

Hydraulic devices may be suspending loads even when the equipment is locked out. Ensure these loads are supported by secondary means before performing work.

**Warning!**

Slip hazards may be caused by spilled oil, lubricants or other process fluids.

Immediately clean up spills! Cleaning cloths must be properly disposed of.

**Warning!**

Fall hazards present.

Working on components of the equipment, e.g. on top of conveyors, cause fall hazards. Always use safe walking surfaces. Wear non-slip protective footwear.

**Warning!**

Possible permanent damage of skin caused by contact with oils, lubricants and solvents of all kinds.

Avoid skin contact with oils, lubricants and solvents.



Wear protection gloves using oils, lubricants and solvents.

After clothes come into contact with oils, lubricants and solvents, they need to be changed and washed.

**Warning!**

Risk of injury or death from entanglement or shearing.

Entanglement and shearing hazards are present when working on belts, rollers, cylinders, etc. Do not reach into the hazard area.

**Warning!**

Risk of injury or death from crushing.

Crushing hazards are present when working on various equipment including lift tables, even when the equipment is locked out. Use physical restraints when working on these pieces of equipment. Reference the supplier documentation.

**Caution!**

Risk of injury because of incorrect programming.

Do not make unauthorized changes to the programmable systems.

**Warning!**

Using non-licensed spare parts can cause injuries and equipment damage.  
Use only original spare parts indicated on the spare parts drawings.

**Warning!**

Burn hazard by hot motor and gear unit.  
Wait until motor and drive cooled off.

**Laser radiation hazard class 2.**

Risk of injury from laser radiation!  
These hazards can be found at various electronic components, e.g. laser encoders, laser measuring devices

To prevent damage to the gypsum board machine or risk of serious injury during maintenance, observe the following precautions:

- Troubleshoot and resolve issues only if you have the required qualifications.
- Lock out and tag out the machine to prevent accidental restart.
- Always verify the machine's shutdown status with a second person for added safety.
- Secure the operating area around movable machine parts to prevent unauthorized access.

## 5.2 Performing Maintenance Tasks

**Warning!**

Perform maintenance on equipment only when the main switch is turned off and secured against reactivation with a padlock. Display a warning sign stating, "Caution - Work in Progress – Do Not Start Machine."

For corrective maintenance on the equipment, no special tools provided by the supplier are required; refer to the supplier's documentation. Repair work may only be performed by authorized personnel in compliance with national regulations for occupational safety. All work on the machine's electrical systems must be conducted by qualified electrical technicians.



**Before starting corrective maintenance, follow these precautions:**

- Secure the maintenance area thoroughly.
- Turn off the main power supply using the main switch and lock out the machine to prevent accidental restart.
- Isolate all pressurized components and secure them against unintended reactivation.
- For replacement of larger components, ensure that appropriate lifting equipment is available.
- When replacing lifting components, underpin adjacent machine parts to prevent potential collapse.
- Immediately replace any faulty machine parts.
- Use only spare parts specified in the bill of materials.
- Ensure that collection trays are available for any materials hazardous to groundwater (e.g., oils, lubricants).

**After completing maintenance and before restarting the machine, perform the following:**

- Re-secure all disconnected connections properly.
- Verify that all previously removed protective devices and covers are reinstalled correctly.
- Confirm that all tools, materials, and equipment have been cleared from the work area.
- Ensure that all safety devices on the equipment are functioning correctly.

## 5.3 Maintenance Schedule

The following table summarizes the recommended maintenance intervals.

### 5.3.1 Daily Tasks

Task	Notes
Visually inspect machine for debris buildup.	Remove buildup only when safe to do so.

### 5.3.2 Weekly Tasks

Task	Notes
Clean all accumulated dust and debris from equipment, specifically any photo eyes.	Remove buildup only when safe to do so.  Do not use harsh chemicals that could damage the sensors. Glasses lens cleaner recommended.
Inspect knife blades	Check for blade damage and alignment.
Observe sample catcher for proper operation cycle.	If problems occur, the root cause must be determined. Replace any worn components that could be slowing down actuation speed.

### 5.3.3 Monthly Tasks

Task	Notes
Drain air filters.	
Inspect all diamond top belts.	Check for damage and proper tension. Repair/replace if required.
Check lubrication of all bearings for belts/rollers.	Follow bearing manufacturer guidelines. Do not over-grease bearings.

Check the unit for air leaks.	Repair any leaks before returning the equipment to operation.
Inspect condition of roller drive chains.	Clean and lubricate chains if required.
Inspect condition of Tipple hoist chains.	Clean and lubricate or replace chains if required.

#### 5.3.4 Semi-annual Tasks

Task	Notes
Inspect timing belt drives	Replace belts if the proper tension cannot be set.
Inspect roller drive chains	Replace chains if they are worn.
Check the pressure settings on all the air regulators.	Re-adjust settings to original values (see air schematic drawing)

#### 5.3.5 Annual Tasks

Task	Notes
Check all bolts on moving parts for tightness.	Torque as per grade and size.
Inspect all rollers for wear, damage, warp	Replace if showing signs of excessive wear or impending failure.
Inspect all bearings.	Replace any roller bearings if there is excessive noise/vibration/play.

**END OF DOCUMENT**