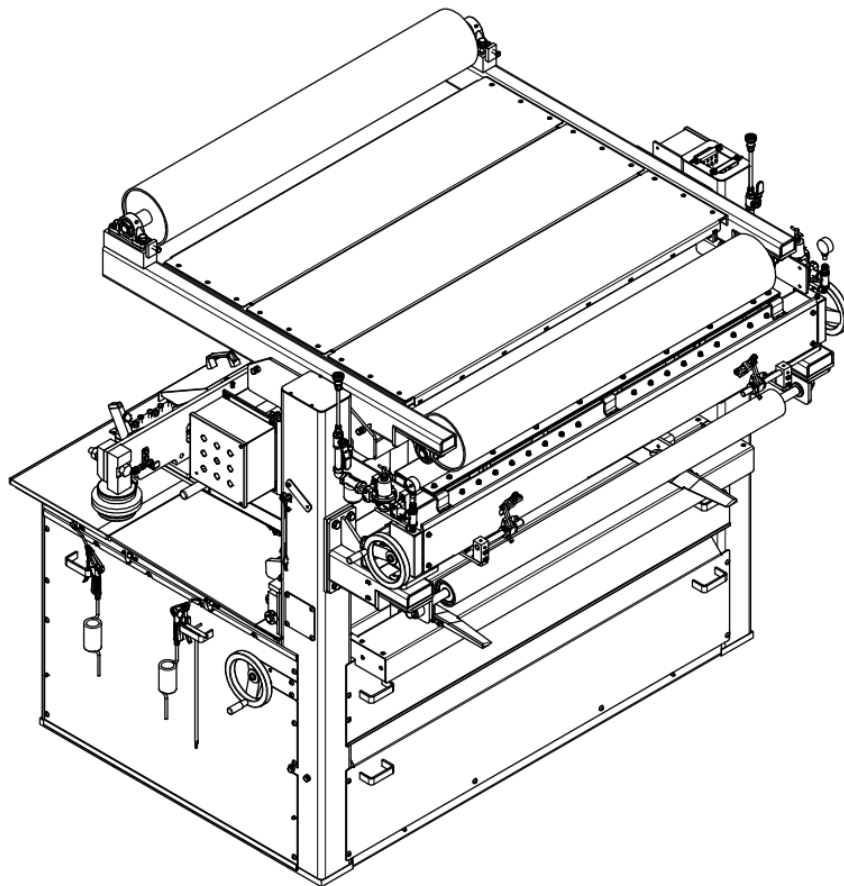


Forming Station

Maintenance Manual



Gyptech

Proven Technology Worldwide

Introduction

This manual contains **Original Instructions** written to assist in the maintenance of the forming table. For information regarding normal operation please refer to the Area Operator's Manual. Maintenance should only be performed by qualified, trained personnel.

TABLE OF CONTENTS

1 Safety Overview	4
1.1 Top Plate Automation	4
1.2 Cover Installation	4
2 Equipment Overview	5
2.1 Major Components.....	6
2.1.1 Thickness (Caliper) Control Components	6
2.1.2 Safety Bars	7
2.1.3 Glue Application.....	8
2.1.4 Edge Formation Components	9
2.2 Technical Data	10
2.2.1 Pneumatics	10
3 Maintenance Procedures	11
3.1 Lockout Procedures	11
3.2 Top Plate Installation	11
3.3 Bottom Plate Installation	12
3.4 Lifting Beam Setup.....	13
3.5 Change Overs	14
3.5.1 Forming Station Top Plate Changeover.....	14
3.5.2 Forming Station Hinge Plate Changeover.....	15
4 Maintenance Schedule	19
4.1 Daily Tasks.....	19
4.2 Weekly Tasks.....	19
4.3 Monthly Tasks.....	19
4.4 Annual Tasks	20
5 Troubleshooting	21
5.1 General	21

1 Safety Overview

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.

1.1 Top Plate Automation

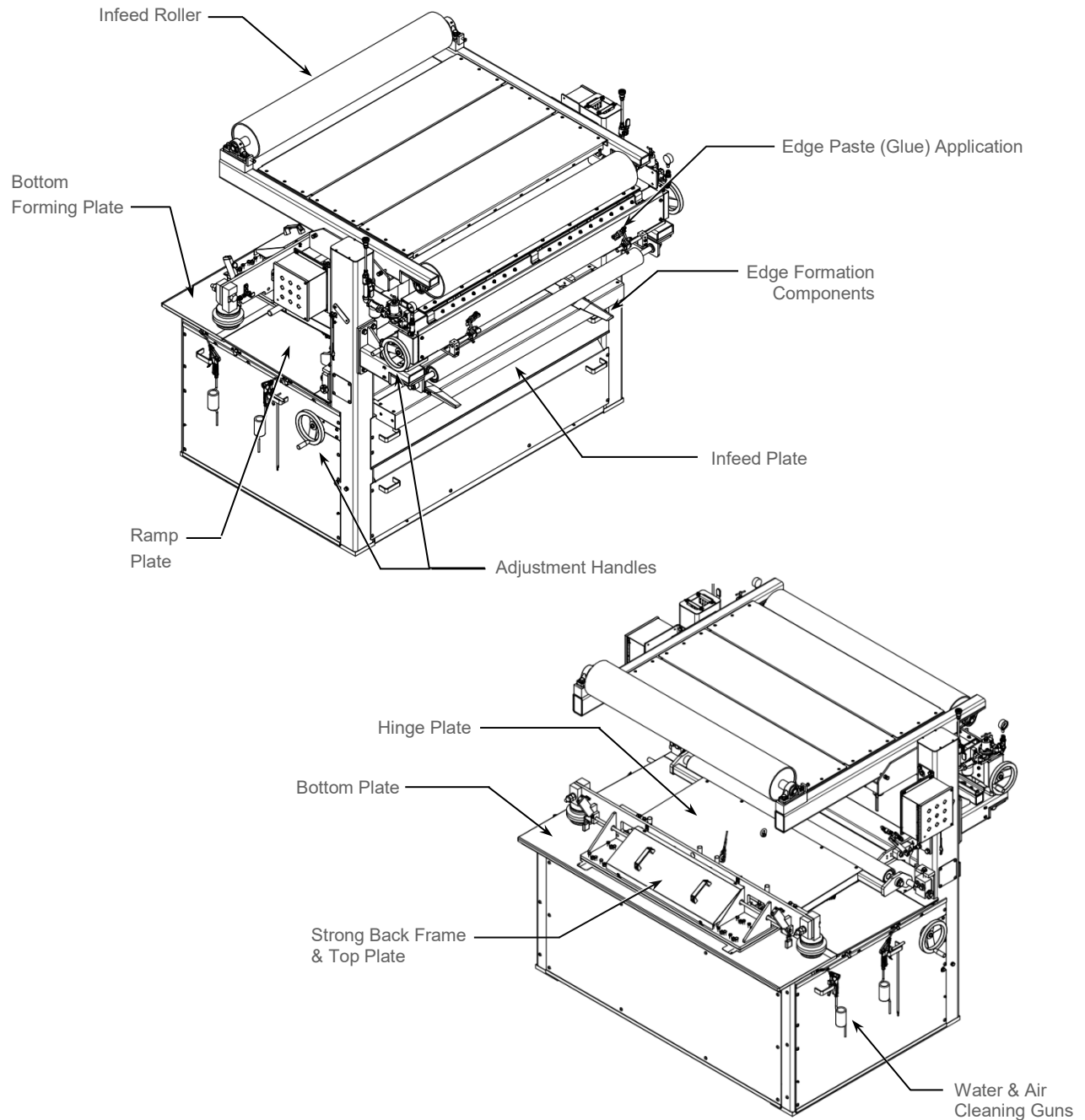
During normal operation, the top plate height adjustment is automated. Based on settings in the PLC, the top plate may move up/down at any time. Typical movement is very slow and over small distances, but if the forming plate has a paper break system installed, the top plate will move quickly. **It is very important that operators never reach under the top plate unless they have properly engaged the safety bars.** Similarly, when performing maintenance on the plate, do not reach under the top plate without using the safety bars or following the procedure noted below.

1.2 Cover Installation

When starting up the forming plate after maintenance tasks, all covers should be re-installed. In the event that one of the side covers must remain off to observe inside, maintenance personnel must take the necessary safety precautions to keep the area clear and personnel safely away from moving parts. During normal operation, all covers must be installed to guard properly against pinch points inside.

2 Equipment Overview

The main functions of the forming table are glue application, initial edge formation and board thickness (caliper) control. Glue and edge formation functions are manually adjusted with hand wheels. Caliper controls are automated and driven by the recipe set points on the HMI.



2.1 Major Components

2.1.1 Thickness (Caliper) Control Components

The most critical components on the forming table are the top and bottom forming plates. Care should be taken to ensure the surface of the plates are not damaged. The bottom plate is rigidly fixed to the equipment frame while the top plate is mounted to a 'strong back' frame. The strong back frame is connected to two lifting shafts which in turn are coupled to a lifting beam. The geometry of the four items allows for height adjustments on either side of the plate without affecting the other side. Board thickness is set by raising/lowering screw jacks located under the lifting beam. To ensure accuracy on the plate gap, the lifting beam is also pulled down tight against the jacks via the air cylinder that also raises the plate for cleaning, etc. The plate gap is measured on either side by monitoring the lifting shafts via linear encoders.

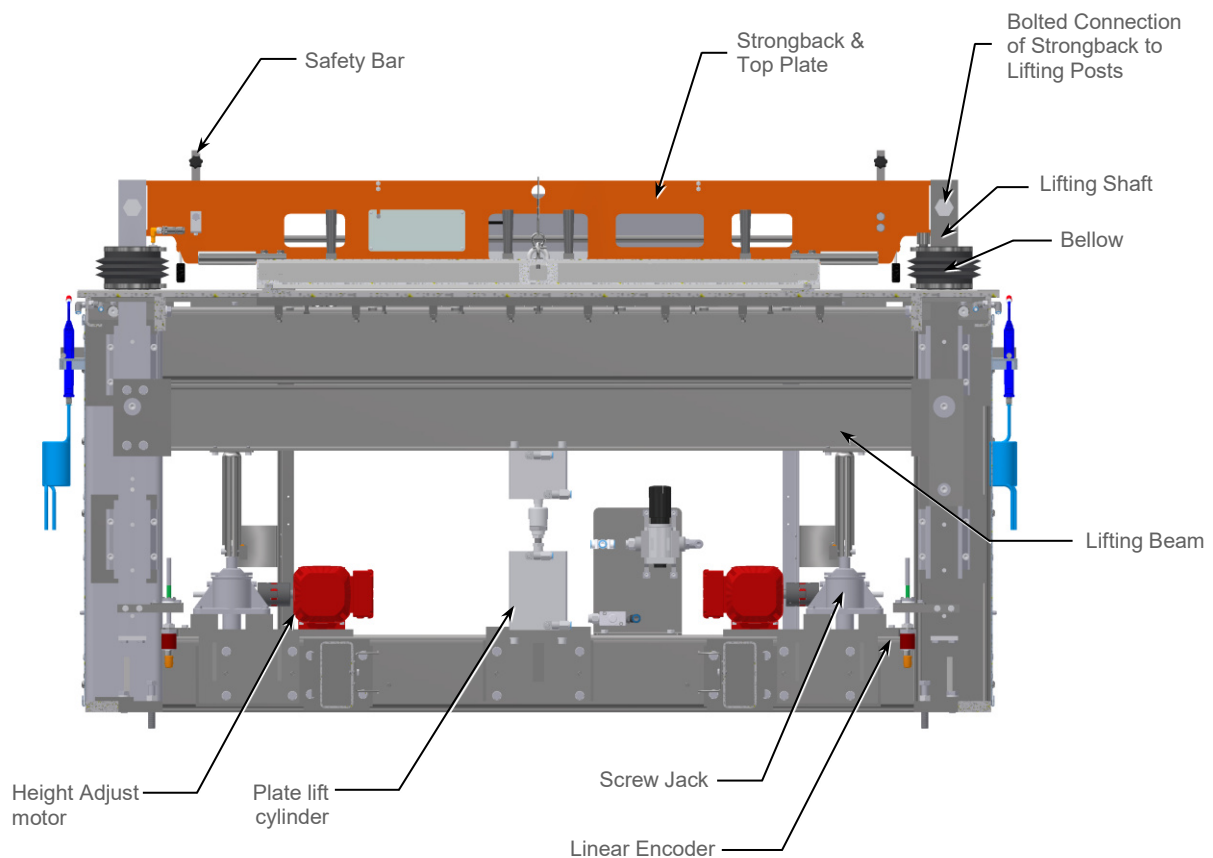


Figure 2: Forming Plate Lift Equipment

2.1.2 Safety Bars

The safety bars are located on the downstream side of the top forming plate. They are designed to prevent the top forming plate and strong back frame from suddenly dropping while work is being done beneath it. The safety bars can be locked in the down position.

Before doing any work underneath the top forming plate or strong back frame, ensure that the safety bars are in the down position to prevent the top forming plate or the strong back frame from lowering suddenly.

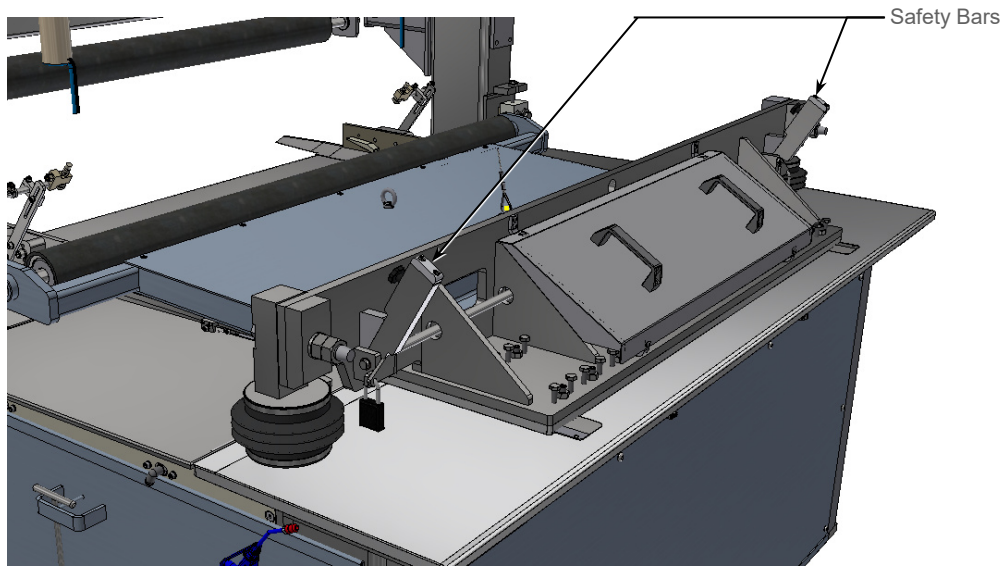


Figure 3: Safety Bars

2.1.3 Glue Application

Glue is fed to the regulators and filters on the sides of the forming station and through the Glue Assembly Energy Chains to provide glue to the Glue Valve and Applicator mounted on the Glue Shuttle. The Glue Valve actuates on and off based on the condition of the pump being on/off. You can adjust the width of the glue band by changing the glue nozzle for a different size, alternatively you can change the thickness of the glue band by adjusting the pressure on the spring loaded glue valve holder. The glue applicators are adjusted laterally using the upper hand wheels.

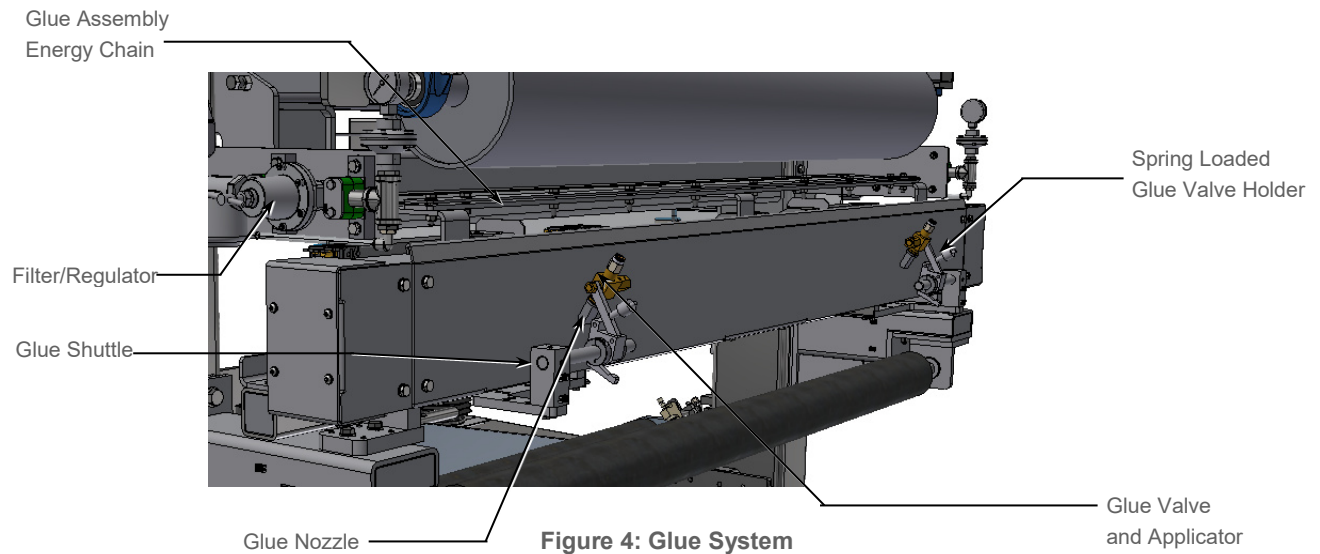


Figure 4: Glue System

2.1.4 Edge Formation Components

Initial edge formation is created using the folder guides on either side of the board stream. Folder guides include lead-ins, the main folder guide, paper folder, edge fingers and plate shims. Folder guides are manually adjusted for board width using the lower hand wheels. Edge fingers can be angled in or out by adjusting the second fastener holding them to the folder guides. Due to the continuous rubbing of the paper, all components should be routinely inspected for wear and replaced as required to ensure proper edge formation. It is also important to keep the components clean and remove any material buildup throughout the duration of running.

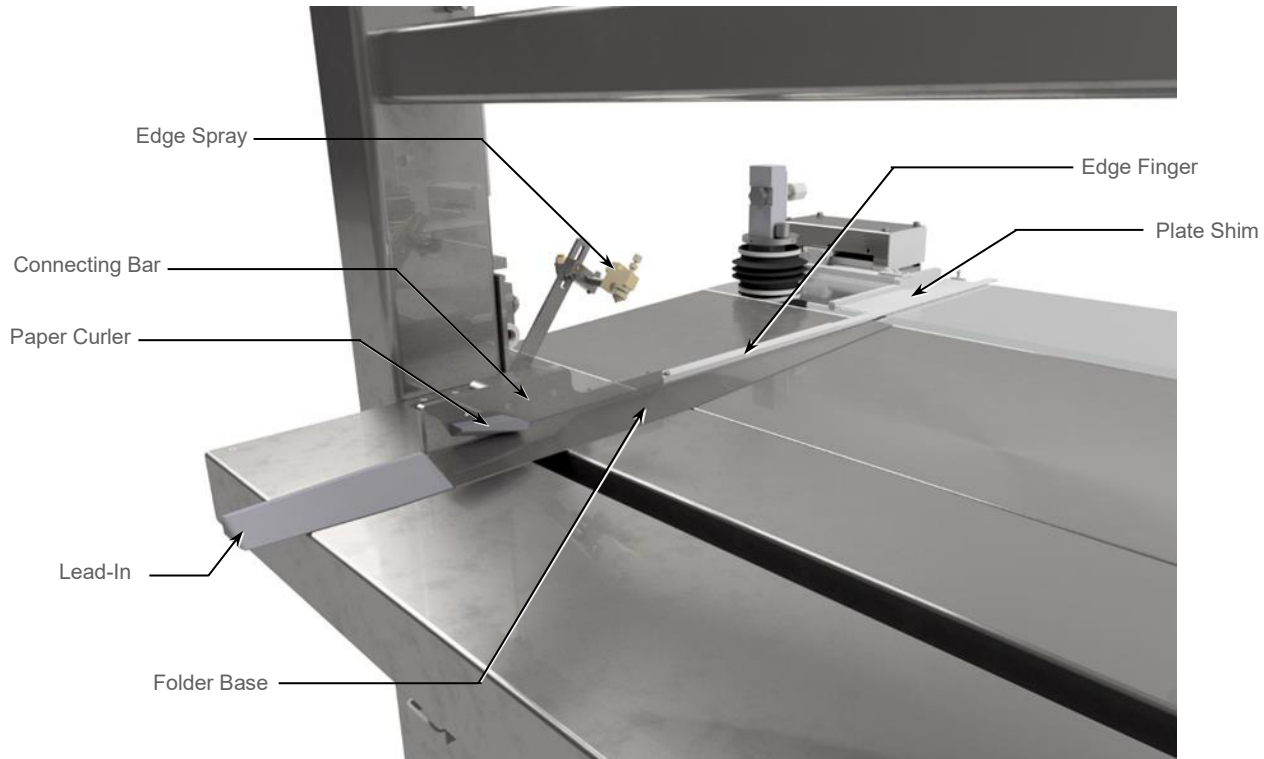


Figure 5: Edge Forming Components

2.2 Technical Data

2.2.1 Pneumatics

Refer to machine specific schematic drawings for details.

3 Maintenance Procedures

3.1 Lockout Procedures

As equipment may start automatically, always lock out any source of motive power (electric, hydraulic, steam, compressed air, etc.) before performing maintenance or cleaning functions. Note that potential energy may also be stored in some equipment such as those held in a raised position by hydraulic or air pressure and that such equipment may move or fall suddenly if pressure is removed.

Depending on the equipment layout, electrical locked out may be performed at the electrical panel or locally with a safety switch or disconnect. Air pressure is removed at locked out at the manual air disconnect switch. As a further safeguard, you must confirm that any equipment in the system being worked on is not operational after being locked out. Test for this by using the normal means of starting, i.e. the operator controls on the HMI station or the manual HOA switch.

The above procedure is a general recommendation. Operating and maintenance staff must follow lockout procedures and operate in compliance with their company policy and local regulations.

3.2 Top Plate Installation

When performing maintenance on the forming plate, it is recommended to block the top plate off the bottom plate prior to locking the equipment out. The blocking material should be slightly thicker than the last plate gap setting. It is important to use soft face material in order to avoid damaging the plate surfaces. With the top plate blocked up, the strong back frame can be unfastened from the lifting shafts. Note that the lifting shafts will drop slightly until the lifting beam settles back down on the screw jacks. Note that all compressed air will be exhausted when the equipment is properly locked out; there should be no trapped air in the lifting cylinder.

The following outlines the steps required to re-install a top plate:

- Mount top plate onto strong back frame; designed to sit tight against each other
- Fasten strong back frame to lifting shafts; bolts should be tightened to remove play but remain loose enough to allow frame to pivot on shafts
- Double nut bolts used to hold strong back frame to lifting shafts
- Cycle plate up/down to ensure smooth movement
- Calibrate plate gap measurements by lowering top plate onto verified shims. Set values in HMI. Repeat with second set of thicker shims. Set values in HMI and calibrate
- Utilize plate adjusting screws to obtain proper board profile based on feedback from the wet end.
This task should be performed by trained personnel only

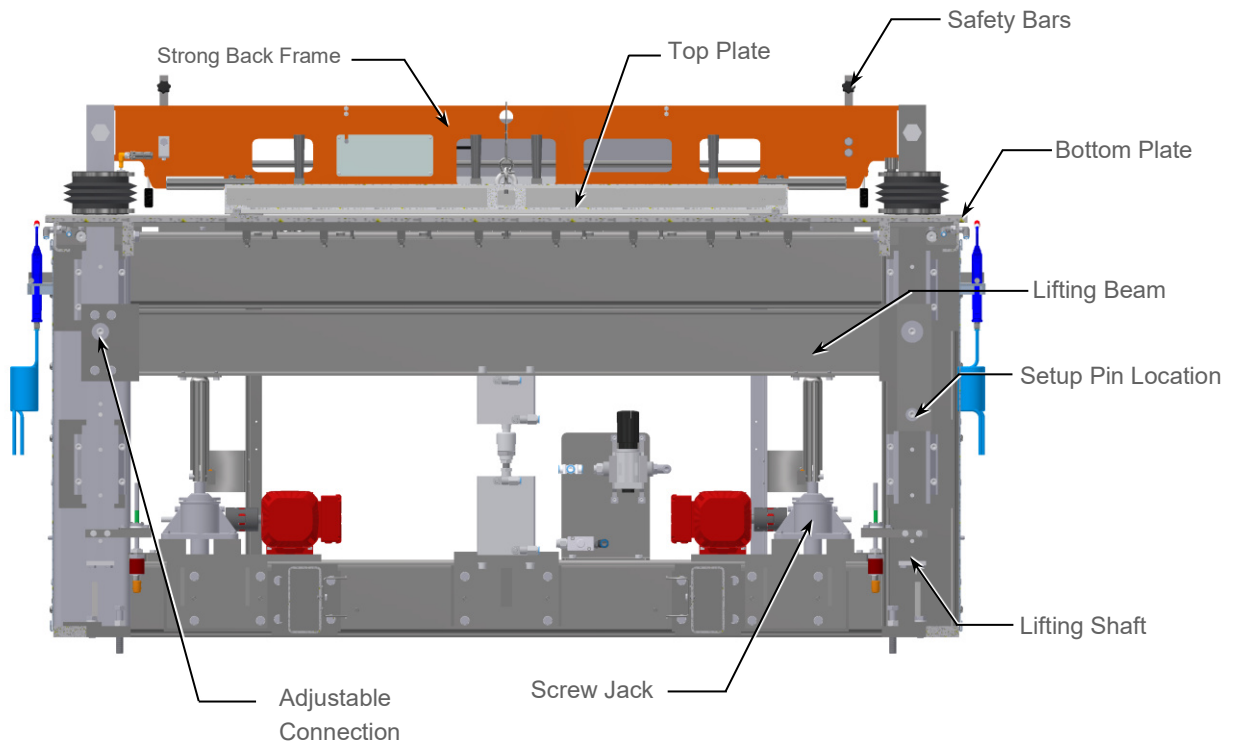


Figure 6: Top Plate Components

3.3 Bottom Plate Installation

The following outlines the steps required to remove and install the bottom plate:

- Follow the guidelines listed above for removing the top plate
- Remove the bellows and clamp rings from the lifting shafts. Top ring has set screws and adhesive; bottom ring held in place with adhesive only but can be removed after the bottom plate is out
- Unfasten the mounting bar connecting the ramp plate to the bottom plate
- Disconnect paper break sensor(s), if applicable
- Unfasten and lift the bottom plate off the frame
- Install new bottom plate and all other components in reverse order of steps listed above
- Calibrate plate gap measurements by lowering top plate onto verified shims. Set values in HMI. Repeat with second set of thicker shims. Set values in HMI and calibrate
- Utilize plate adjusting screws to obtain proper board profile based on feedback from the wet end.
This task should be performed by trained personnel only

3.4 Lifting Beam Setup

If the ability to adjust one side more than the other becomes limited, it can be corrected by adjusting the lifting beam. The beam may also require adjustment if any maintenance is performed that requires the beam to be disconnected from the lifting shafts. To set the beam back to its designed setup, complete the following steps:

- Lower top plate onto verified shims; lifting beam should be clear of both screw jacks
- Properly lock out the forming plate
- Loosen off the left side, adjustable connection on the beam (4 bolts)
- Install the 'beam setup' pin in the bottom right hole (pin fits snug in beam hole)
- Tighten the left side, adjustable connection on the beam
- Replace the 'beam setup' pin with the original pin located in the bottom, right hole. Original pin should be relatively concentric in the beam hole
- Replace machine covers, restart equipment
- Verify the top plate can be raised and lowered up to 2mm (0.080") on one side with the other side stationary. Perform this by making board thickness (caliper) adjustments to one of the screw jacks

3.5 Change Overs

Changeovers are required on the forming station for both the top plate and the hinge plate when handling 900mm or 600mm wide board.

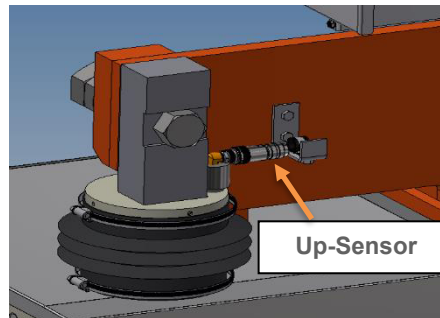
3.5.1 Forming Station Top Plate Changeover

The following steps are required to perform a changeover of the top plate to 600mm or 900mm

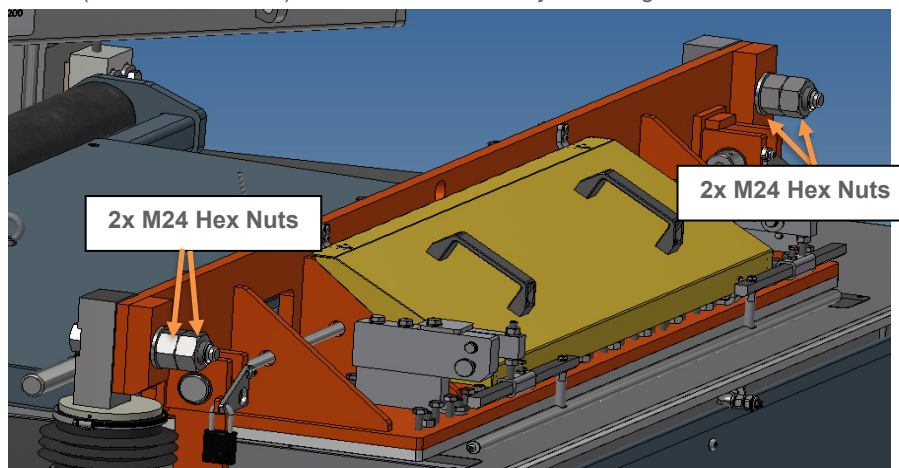
- 1) Begin by adjusting the setpoint for the plate to 13mm
- 2) The left-hand and right-hand folder guides will need to be moved 50mm outwards from the running position. This is to ensure they are out of the way during the change over process
- 3) After raising the top plate, place the piece of 12mm thick plywood in between the top and bottom plate and begin lowering the top plate onto the plywood.

Note: This is important to protect the top plate and bottom plate from damaging each other at any point during the swap.

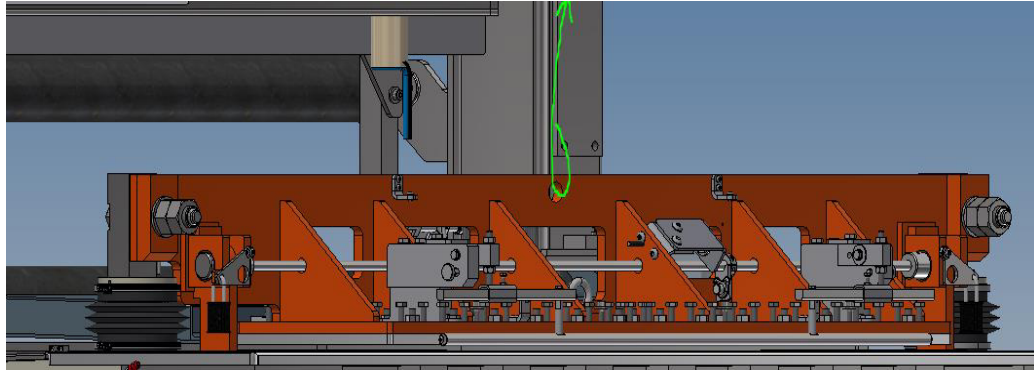
- 4) Perform a full lock out of the 15MF (mixing/forming) area. This includes both power and air
- 5) Next, disconnect the up-sensor at the connector. This sensor is located directly on the top plate assembly, on the left hand side of the machine.



- 6) Located on both sides of the top plate assembly is a hex head bolt that is fastened using two M24 hex nuts (36mm across flats). Remove these bolts by removing both the hex nuts shown below.



- 7) This next step requires the lifting of the top plate. Using a forklift with a hoist attachment or a sling attached to the hole on top plate assembly.

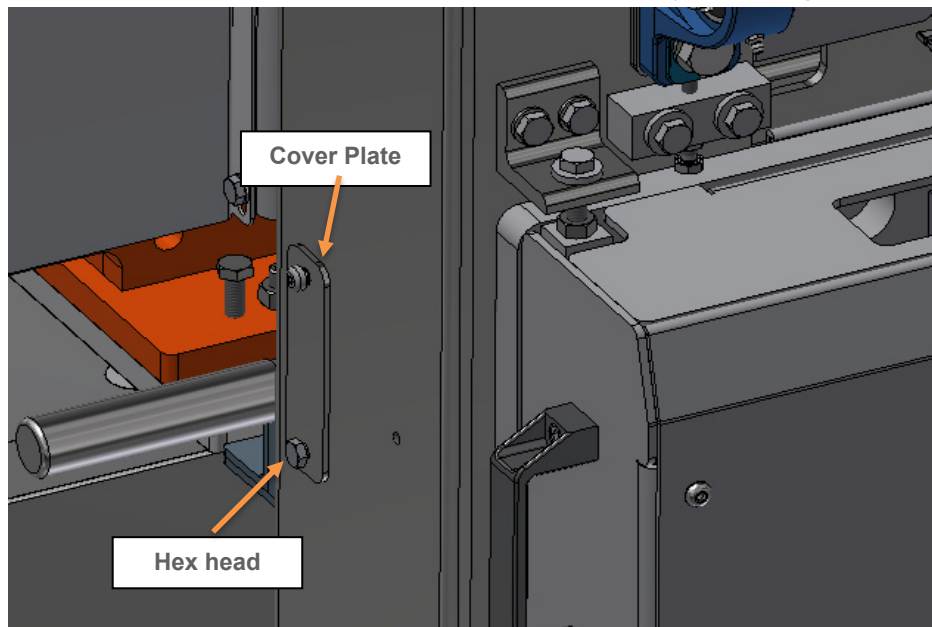


- 8) Once properly secured, the top plate will now be lifted and removed. Move the top plate away carefully to ensure it does not collide with other parts of the machine and lower onto a wood pallet on floor.
- 9) The removal of the top plate is now complete. **Note: Prior to installing the 600mm or 900mm top plate, the hinge plate needs to undergo the change over process. See section 3.5.2 below.**
- 10) Reinstallation of the top plate assembly is simply reversing steps 1)-9)

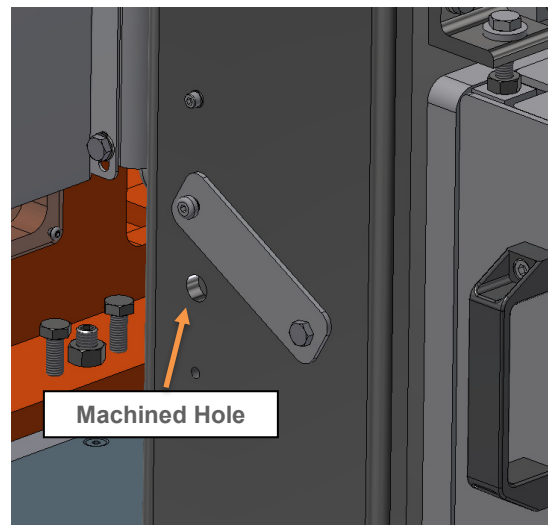
3.5.2 Forming Station Hinge Plate Changeover

Note: The following steps need to be performed once the top plate has been removed. See section 3.5.1 for instructions on how to remove the top plate.

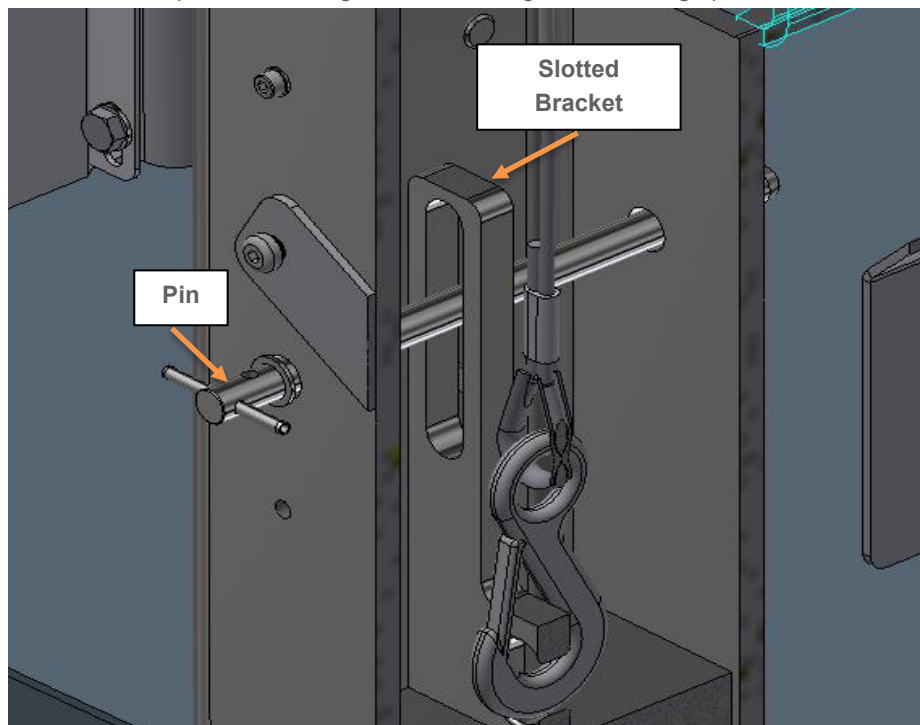
- 1) Begin by putting the hinge plate in the down position.
- 2) On the left-hand side of the machine, remove the cover plate by unfastening the hex head



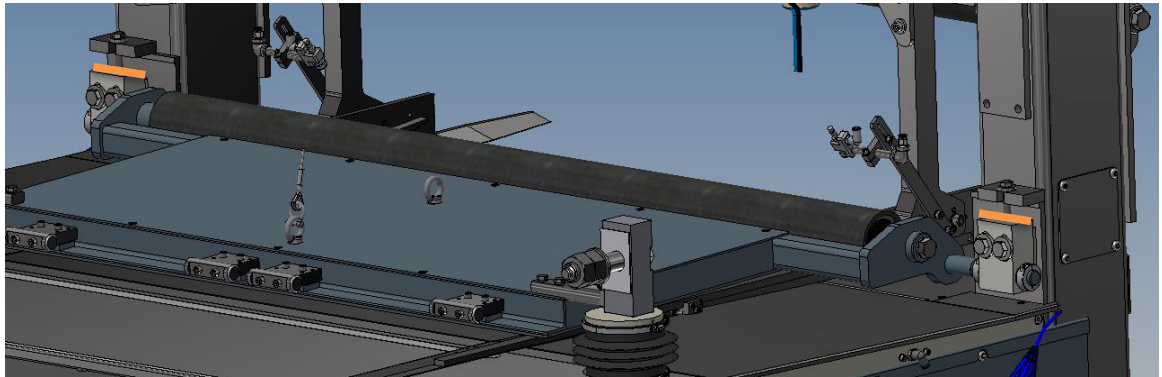
- 3) Swivel the cover plate to the threaded hole and re-fasten using the same hex head bolt. This will expose the machined hole.



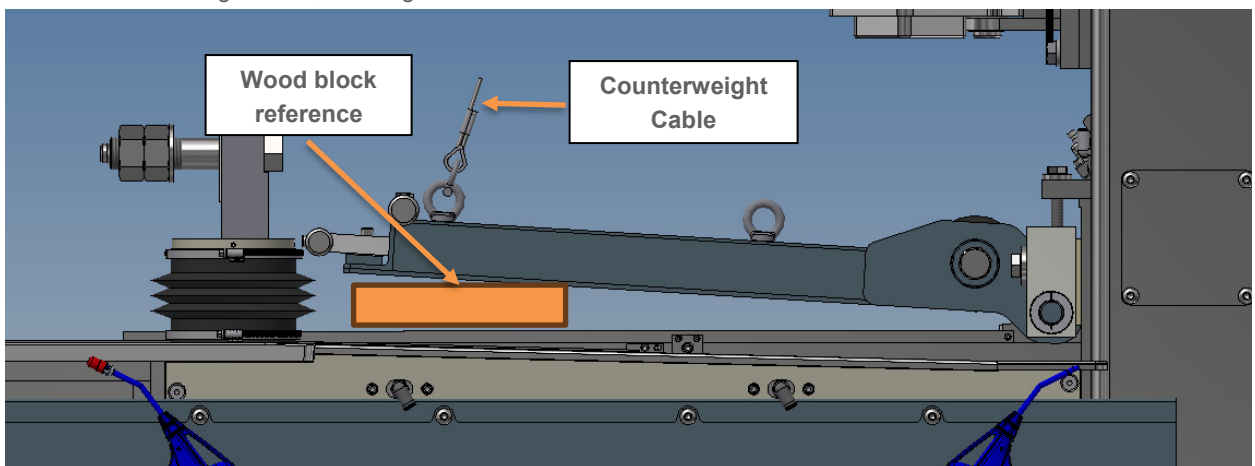
- 4) With the hole exposed, insert the pin into the hole. Please ensure that the pin goes through the holes in the HSS as well as the slotted bracket that is installed on the counterweights. See image below. This will prevent the weights from lowering when the hinge plate is removed.



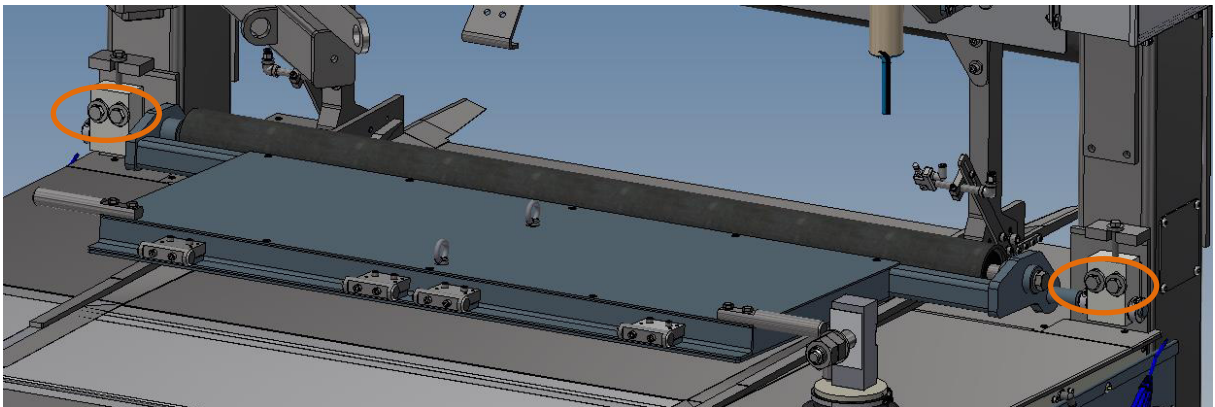
- 5) Proceed to scribe lines on the HSS above the blocks, as shown below with the orange lines, to mark the elevation of the block. This scribed line will allow the 54inch hinge plate to be installed at the same elevation as the currently installed hinge plate.



- 6) With assistance, proceed to lift the hinge plate roughly into the position shown. Once in position, insert a wood block under the hinge plate to ensure it does not lower. This will introduce slack in the counterweight cable, allowing for an easier removal.



- 7) With the counterweight cable removed, the following hex bolts, outlined in orange below, can be removed.



- 8) Similar too the lifting of the top plate assembly (steps 7-8 in section 3.5.1), the hinge plate assembly can be lifted using the existing eyebolts and removed from the forming station.
- 9) To install the 900mm or 600mm hinge plate, reverse steps 1-8 above.
- 10) Once the 600mm or 900mm hinge plate is installed, the equivalent top plate can now be installed.
- 11) With all components installed, proceed to calibration of the top plate.

4 Maintenance Schedule

The following table summarizes the optimal maintenance intervals.

4.1 Daily Tasks

Task	Notes
Clean all slurry off folder guides, top of table, forming plates, hinge plate...	
Clean slurry head sensor, if applicable	
Monitor condition of folder guide adjustments. Ensure hand wheels turn with ease	

4.2 Weekly Tasks

Task	Notes
Clean out edge paste filters, inspect operation and wear of applicator valves and nozzles	
Inspect condition of folder guide components; replace as necessary based on wear	
Inspect condition of ramp, hinge, top and bottom plates	
Check operation of any water spray units; clean out any filters involved	

4.3 Monthly Tasks

Task	Notes
Inspect bellows located on lifting shafts. Replace immediately if there is any damage	It is critical to ensure the bellows do not leak water and/or slurry. The bellows are required to keep the linear rails and bearings clean and operating smoothly
Inspect condition of paper rollers and bearings	Hinge plate roller specifically, as it is closest to the slurry and water on the table
Calibrate plate gap measurements	
Inspect machine for air leaks	

4.4 Annual Tasks

Task	Notes
Inspect condition of all stainless steel plates/surfaces	
Consider lubrication of all linear bearings	Refer to manufacturers manual for details

5 Troubleshooting

Due to the intricate nature of the equipment, this section will outline only basic mechanical approaches to problem solving. Should the maintenance steps outlined below fail to fix the issues, we recommend contacting a Gyptech representative.

5.1 General

Problem	Possible Cause(s)	Possible Solutions
Too little or no edge paste	<ul style="list-style-type: none">-running low on supply-edge paste skid system error-filter plugged-regulator set too low-applicator nozzle clogged	Check edge paste supply/skid system. Clean out filter and applicator nozzle. Check pressure setting on regulator.
Too much paste	<ul style="list-style-type: none">-regulator set too high	Adjust pressure setting on regulator.
Folder guide cannot be adjusted in/out	<ul style="list-style-type: none">-physical obstruction-adjustment screw binding	Check for physical obstructions and clean area. Inspect condition of adjustment screw, adjustment nut and associated bearings.
Initial board edge formation incorrect	<ul style="list-style-type: none">-improper creasing-folder guide setup incorrect	Corrective action should be taken by trained personnel only. Several adjustments can be made to the folder guides including position, angle...
Top plate does not raise	<ul style="list-style-type: none">-inadequate air supply-solenoid/valve failure-physical binding	Ensure forming plate has proper air supply pressure. Verify solenoid/valve is cycling when requested. Inspect bolted connections, linear rails and bearings on top plate lifting system for binding.
Top plate does not fully return to down position	<ul style="list-style-type: none">-see possible causes listed above for 'does not raise'	Most likely, the possible cause is related to physical binding. Plate typically returns to correct running position even without compressed air.
Unable to make board thickness change to one or both sides	<ul style="list-style-type: none">-gear motors not running-screw jack failure-physical binding	Verify gear motors run when requested. Ensure lifting beam is resting on top of screw jacks. Inspect system for possible binding.
Board thickness profile incorrect	<ul style="list-style-type: none">-top plate not set correctly-slurry head profile changed-slurry consistency changed	Corrective action should be taken by trained personnel only to adjust top plate. Note that both slurry head profile and slurry consistency (mix ratios, foam structure, stucco quality) can affect board thickness profile.
Paper break remains active (if applicable)	<ul style="list-style-type: none">-water or slurry still present-surface of paper is wet	Sensor should dry out as paper continues to slide over surface. Ensure no additional water or slurry is contacting paper upstream of forming plate.

END OF DOCUMENT

Gypsum Technologies Inc.

578 King Forest Court
Burlington, Ontario
Canada L7P 5C1
Tel: +1 (905) 567-2000
Fax: +1 (289) 288-0570
info@gypotech.ca

Gypotech AB

Norrgatan 15
Växjö SE-352 31
Sweden
Tel: +46 470 705640
Fax: +46 470 705650
info@gypotech.se

Gypotech GmbH

Eulatalstrasse 31
86633 Neuburg/Donau
Germany
Tel: +49 8431 5387 0
Fax: +49 8431 5387 20
info@gypotech.de