# GeoTegrity LD-12-1850 Thermoforming Machine


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|---|---|
| **Manufacturer** | GeoTegrity / Quanzhou Far East Environmental Protection Equipment Co., Ltd |
| **Model** | LD-12-1850 |
| **Condition & Location** | New, uninstalled, in sealed shipping crates, in Vonore, Tennessee |
| **Year** | Manufacturing & UL certification completed in 2021 (in China). Delivered to U.S. January 2022. |
| **Power Supply** | 3 Phase 480V AC 60Hz |

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| **Capacity** | 1500 kg per day (SKU dependent, generally 1.3 to 1.7 MT per day) |
| **Platen Size** | 1850mm x 1850mm |
| **Machine Size** | 30’2” x 8’10” x 12’4” (9.2M x 2.7M x 3.75M) |
| **Tooling Included** | Complete set of tooling for generic 8”x8” single compartment clamshell container |
| **Required Connections** | Pulp supply line, whitewater line, return pulp line, vacuum pump, electric power |

# Background

- GeoTegrity operates 3 molded fiber and machine manufacturing facilities in Quanzhou, Xiamen, and Jinjiang; facilities total >2 million sq ft
- GeoTegrity has manufactured approximately 1,000 thermoformers, most for their own use, and more recently for sale to other molded fiber producers throughout Asia
- In May 2020, Genera commissioned GeoTegrity to redesign an existing large-format machine to US standards
  - The initial machine was anticipated to be a prototype for a substantial number of clone machines for Genera's planned capacity expansion at its Vonore facility
  - Machine is existing commercial design operating in Asia, modified to run on electric heating and meet U.S. electrical and safety standards
- A Genera R&D engineer spent 6+ months in Xiamen in 2020, working directly in GeoTegrity's facilities to support and oversee machine build, Genera's engineering contractor's FEL 3 design (for its expansion), tooling, stock prep, prototype molds for Genera's customers, and FAT and other onsite thermoforming trials with Genera's pulp
- Genera supplied pulp to GeoTegrity for Factory Acceptance Testing in September and October 2020. Machine met or exceeded all performance criteria during multiple commercial trials producing 100,000+ 8"x8" clamshell containers on the machine during trialing and optimization.
- GeoTegrity completed manufacture and testing of Genera's first GeoTegrity unit in China by the end of 2020
  - Genera required UL inspections, modifications, and certification, by both Chinese and US certifying entities. Final US-standard UL inspections were completed in Q2 2021
- Shipping the machine to the US proved challenging in a disrupted shipping market, finally arriving in Vonore January 2022.
  - The machine was placed and remains in storage at Genera's facility, still in two original unopened shipping crates (opening the shipping crates will damage the protective moisture seal packaging)

# Machine Upgrades & Improvements

***Relative to same model made for the Asian market***

- Electrically heated (vs. oil heated for Asian market)
- Machine has been UL certified (by both Chinese and US UL reviewers)
- Added a number of safety measures (design changes, guarding, e-stops, etc.)
- Allen Bradley / Rockwell PLC with dual ethernet ports inside each thermoformer control panel (US Rockwell version, standard is Chinese Siemens)
- Required all bolts, fittings, and interchangeable parts and components to be compatible with US standards and sourcing
- Required all major components, lines, etc. to be clearly labeled in English
- Modified to allow accumulation of taller stacks of finished products for conveyance forward

# Factory Acceptance Testing

***Conducted on a range of pulps and parameters, September & October 2020***

| Example Test Data from Test Date: | 2020.10.11 |
|---|---|
| Pulp infeed | Nonwood pulp blend |
| Fiber SR | 22° SR |
| Water-proof dosage rate | 0.7% |
| Oil-proof dosage rate | 0.9% |
| Product weight | 38g ± 3g |
| Total cycle time | 47sec ± 2sec |
| Forming cycle time | 5sec ± 2sec |
| Vacuum dehydration time | 7sec ± 2sec |
| Hot press cycle time | 25sec ± 2sec |
| Products collecting time | 10sec ± 2sec |
| Forming part consistency | 0.25% ± 1 |
| Hot press pressure | 120 MPA |
| Drying temperature – top mold | 215°-220° C |
| Drying temperature – bottom mold | 225°-230° C |
| Power consumption – efficient running power | 150-160 kw/hr |
| Power consumption – installed capacity | 330 kw/hr |
| 1-hour oil holdout at 100° C hot oil | Passed |
| 1-hour water holdout at 100° C hot water | Passed |



# Tooling

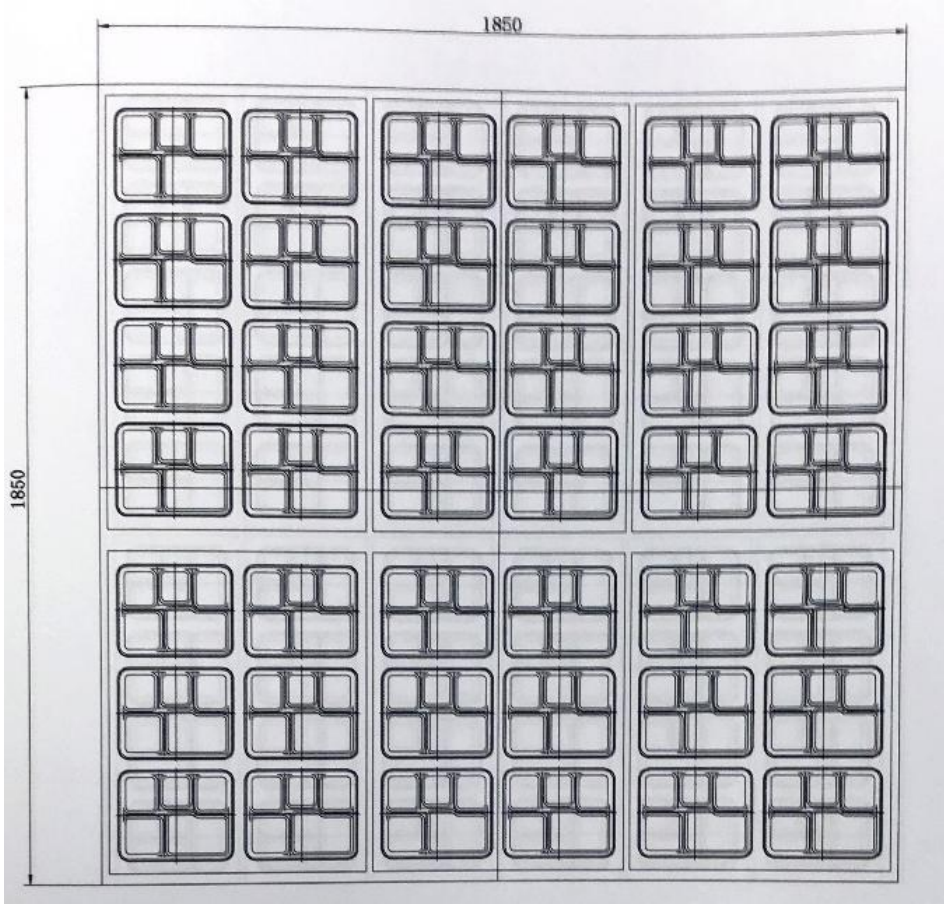
***Machine delivered with one set of 8”x8” hinged container tooling***

- 8”x8” single compartment hinged container, non-proprietary design
- 24 parts per platen
- 7075 aluminum alloy and H62 copper plate
- Ran >100,000 parts during testing
- Machine is shipped with molds installed
- Platen weight (molds): ~ 8 tons
- Tooling installation and maintenance from the front (finished product conveyor) end of the machine
- Tooling removal for major maintenance requires 3-ton fork truck

# Platen Layout Examples for Future Reference

***5-Compartment School Lunch Tray***

- 8.5” x 10.5” x 1.1”
- 42 pieces/platen
- @ 29 grams/tray
- 60 drops/hour (60 second cycle time)
- @24 hours/day = 69,480 pieces/day = 1753.92 g/day



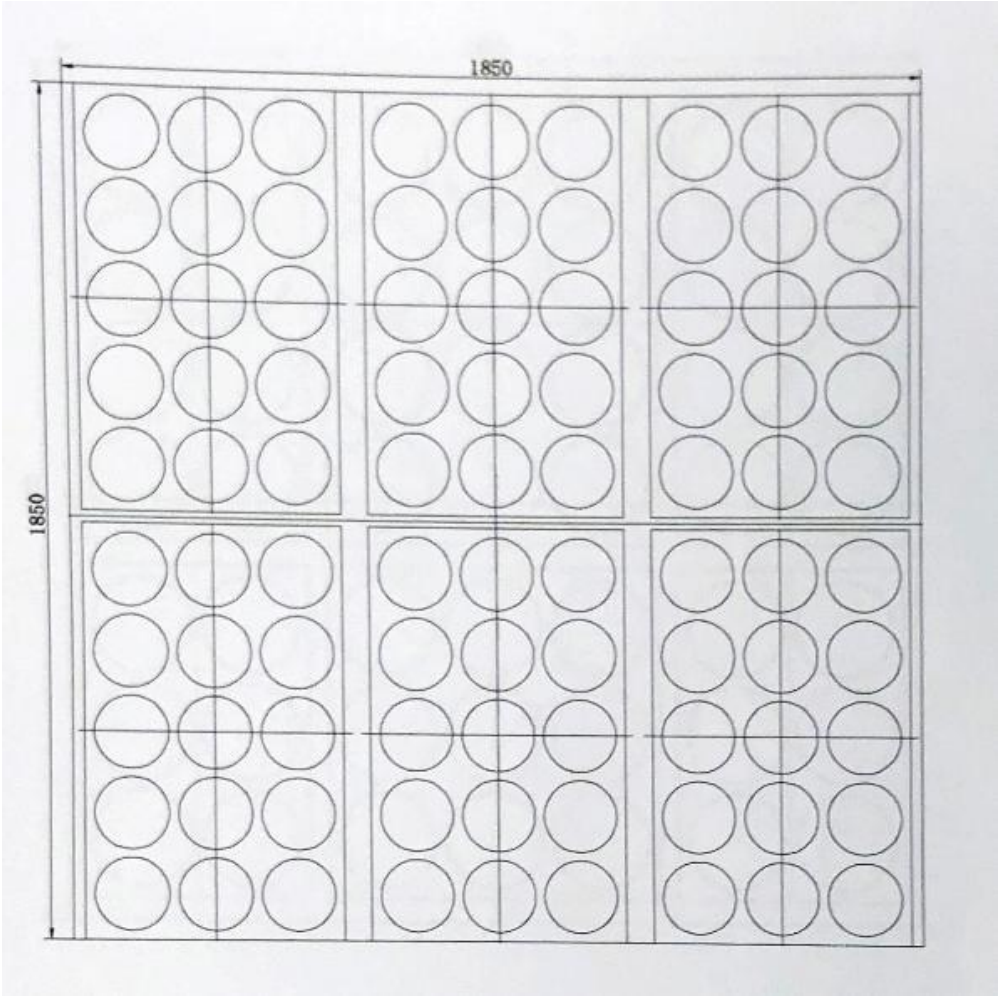

*Topside (face up)*

*Backside (face down)*

# Platen Layout for Future Reference

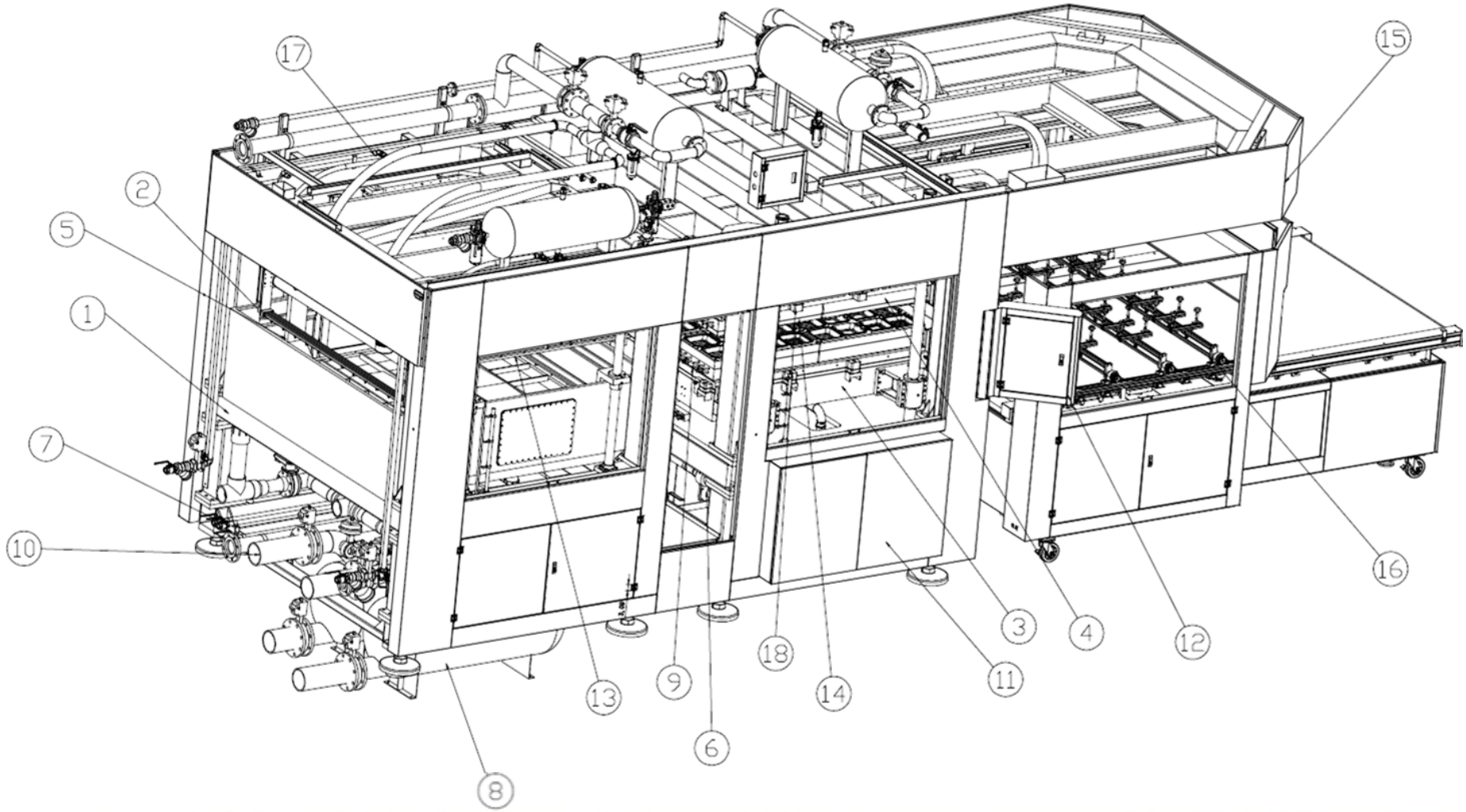
***12-oz Round Bowl***

- 12 oz round bowl
- 90 pieces/platen
- @ 11 grams/piece
- 55 drops/hour (65.5 second cycle time)
- @24 hours/day = 118,000 pieces/day = 1306.8 g/day

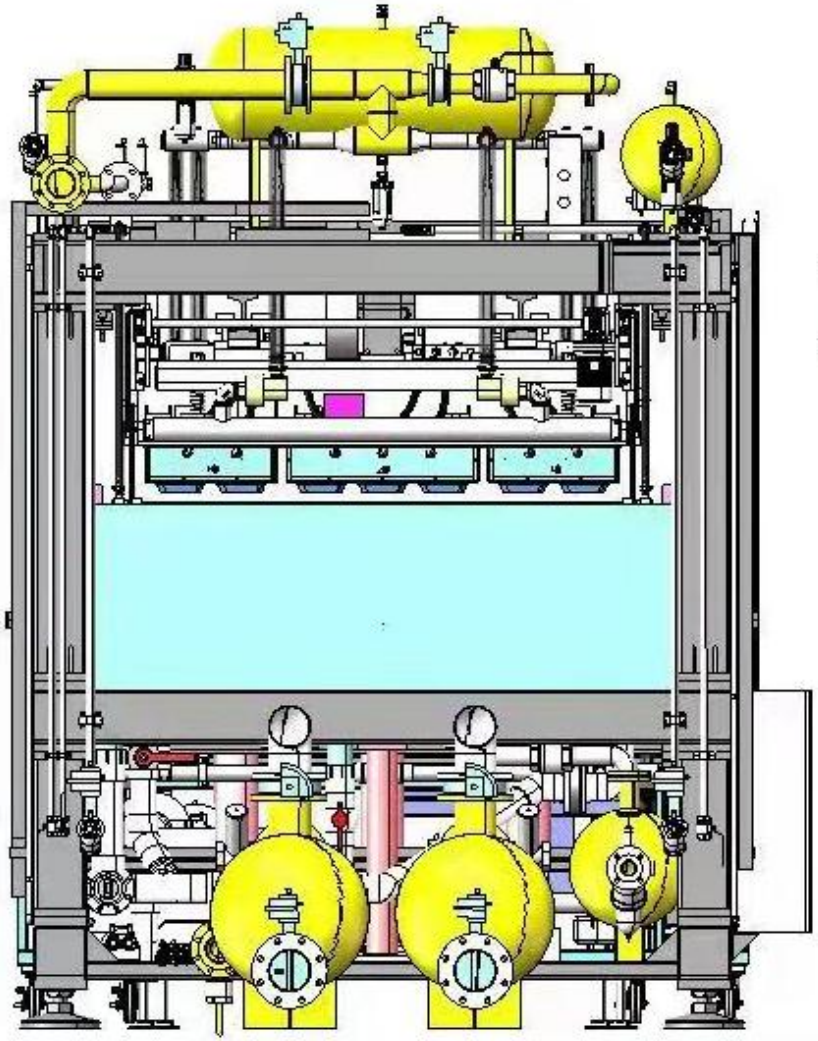


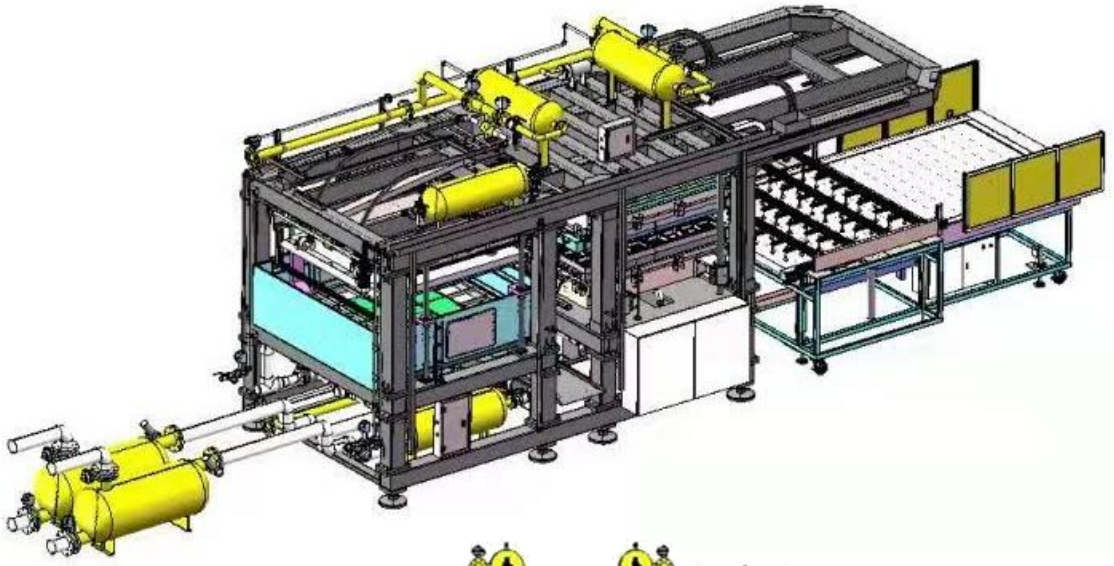
# Machine Components

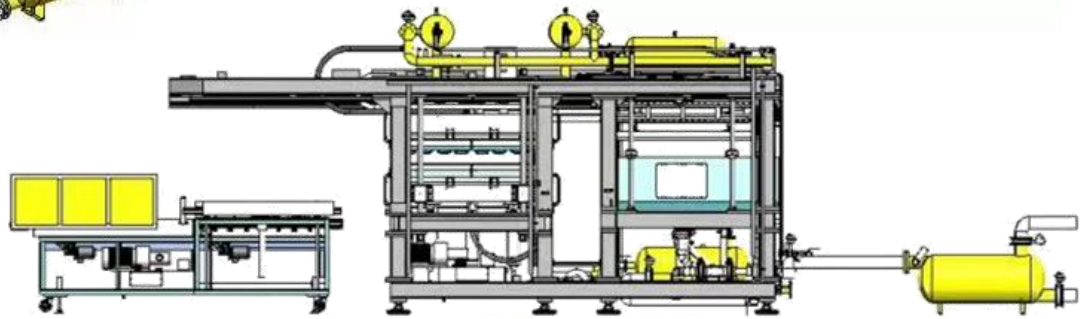
1 Equipment Rack Assembly (1)
2 Molding assembly (1)
3 Pressing component (1)
4 Moving assembly (1)
5 Cleaning wire mesh components (1)
6 Hydraulic power system (1)
7 Pneumatic components (1)
8 Vacuum forming system (2)
9 Pressing & curing system (1)
10 Slurry quantitative system (1)
11 Electrical control system (1)
12 Computer programming control system (1)
13 Molding mold (1)
14 Hot-pressing molds(1)
15 Exterior panel assembly (1)
16 Manipulator collecting device (1)
17 Water supply system (1)
18 Cooling equipment (2)

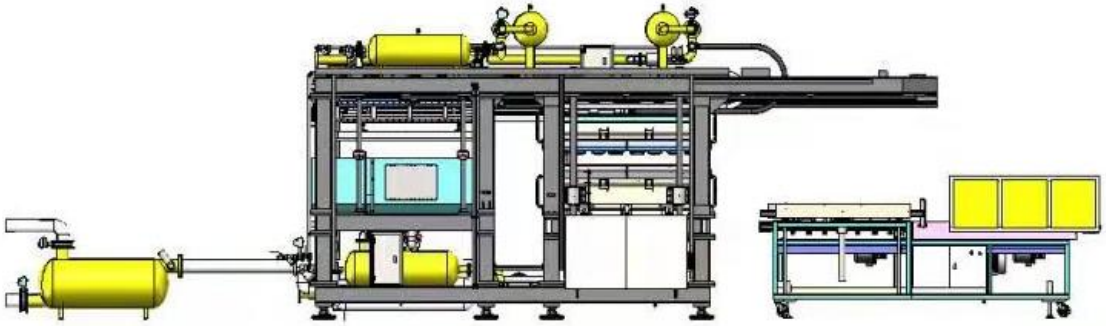


# Drawings

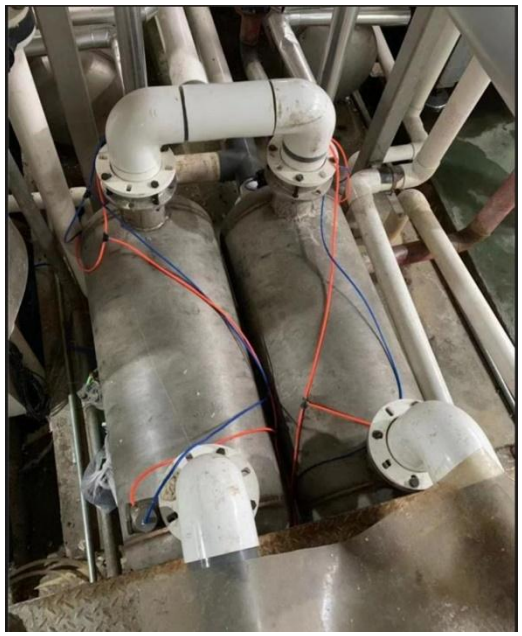








# Temporary Installation for FAT



*Water & gas separator tank for vacuum & air compressor*

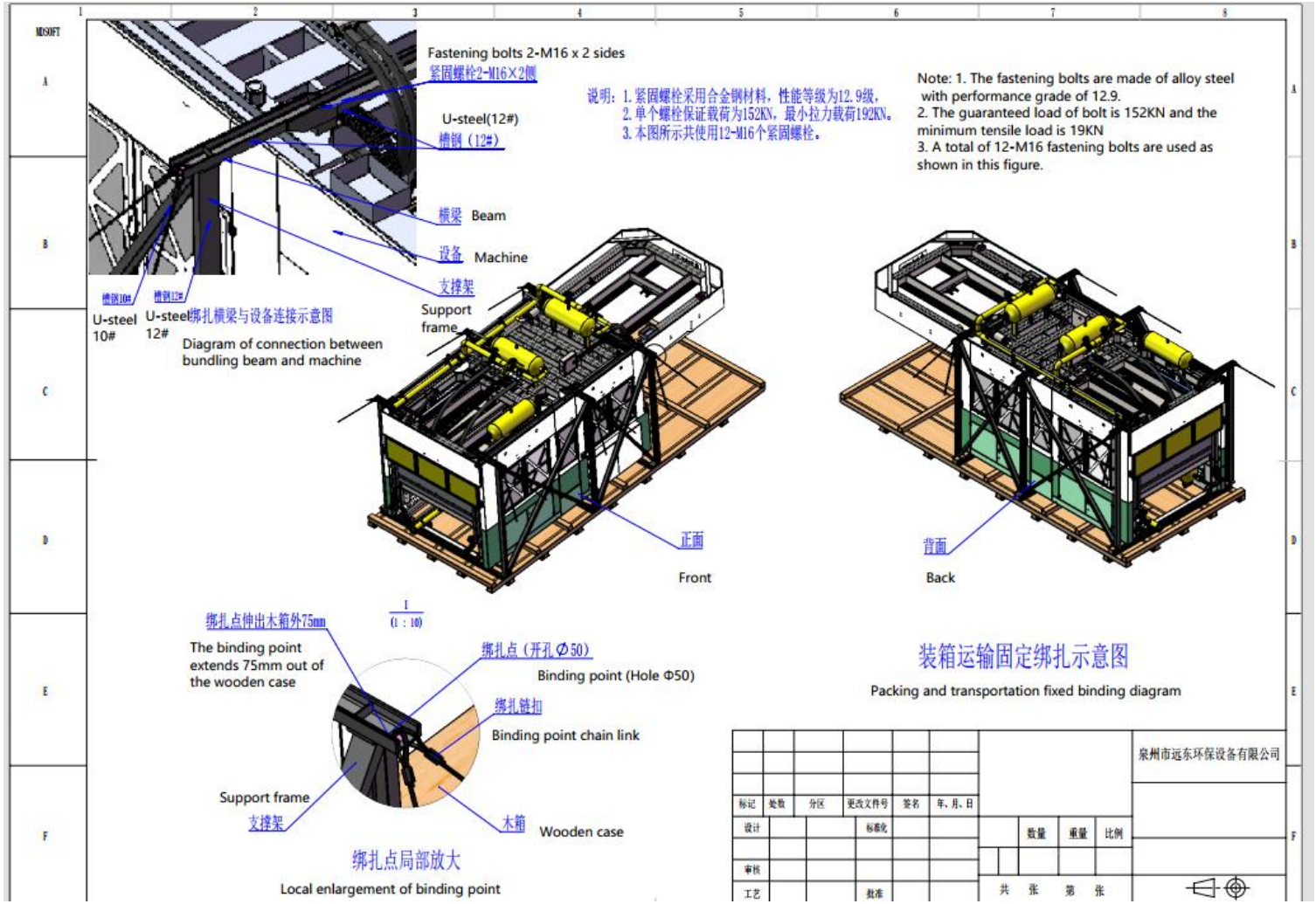
*Electric heating control cabinet (not included; to be US-built)*

# Shipping Crate #1

| | |
|---|---|
| Dimensions: | 8.54*3.7*4.12 = 130.18 cbm |
| Weight: | 45,100 kgs |
| Contents: | Main machine assembly |
| Packing Method: | Custom pallet, shrink wrap, wooden case, vacuum seal moisture barrier, steel bracing with fixed lashing bolts |

# Fixed Binding & Packaging for Transport (Crate #1)

*Mafi loading onto Ro-Ro vessel for maritime transport*



# Shipping Crate #2

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|---|---|
| Dimensions: | 4.97*3.26*2.9 = 46.99 cbm |
| Weight: | 3,500 kgs |
| Contents: | Stacker table/conveyor, vacuum separator, air separator, 8 machine blocks, spare parts, 128 boxed cases of product samples |
| Packing Method: | Custom pallet, shrink wrap, steel bracing, wooden case, vacuum seal moisture barrier |