

BACKGROUND

Client and Purpose

- Shelterworks, Ltd. produces garden bed panels using a proprietary material called Faswall
- Faswall is roughly 85% mineralized wood chips and 15% cement



Figure 1. Raised garden bed made from Faswall panels

- Shelterworks seeking a safer and more efficient process for packaging Faswall panels onto pallets for shipment



Figure 2. Order of Faswall panels ready for shipment



Stack, Wrap, Repeat

Order Palletizing Line for Faswall Garden Bed Panels

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MIME Sponsor: Mark McGuire (*McGuire Mechanism*)

Line Requirements

Pallet Capacity	6
Max. Pallet Weight	2000 lb.
Operators	2
Max. Length	38 ft.

Two Key Design Objectives

Objective 1

Minimize injury risk for operators who are transferring panels between pallets

Objective 2

Increase order processing efficiency to maximize revenues for Shelterworks

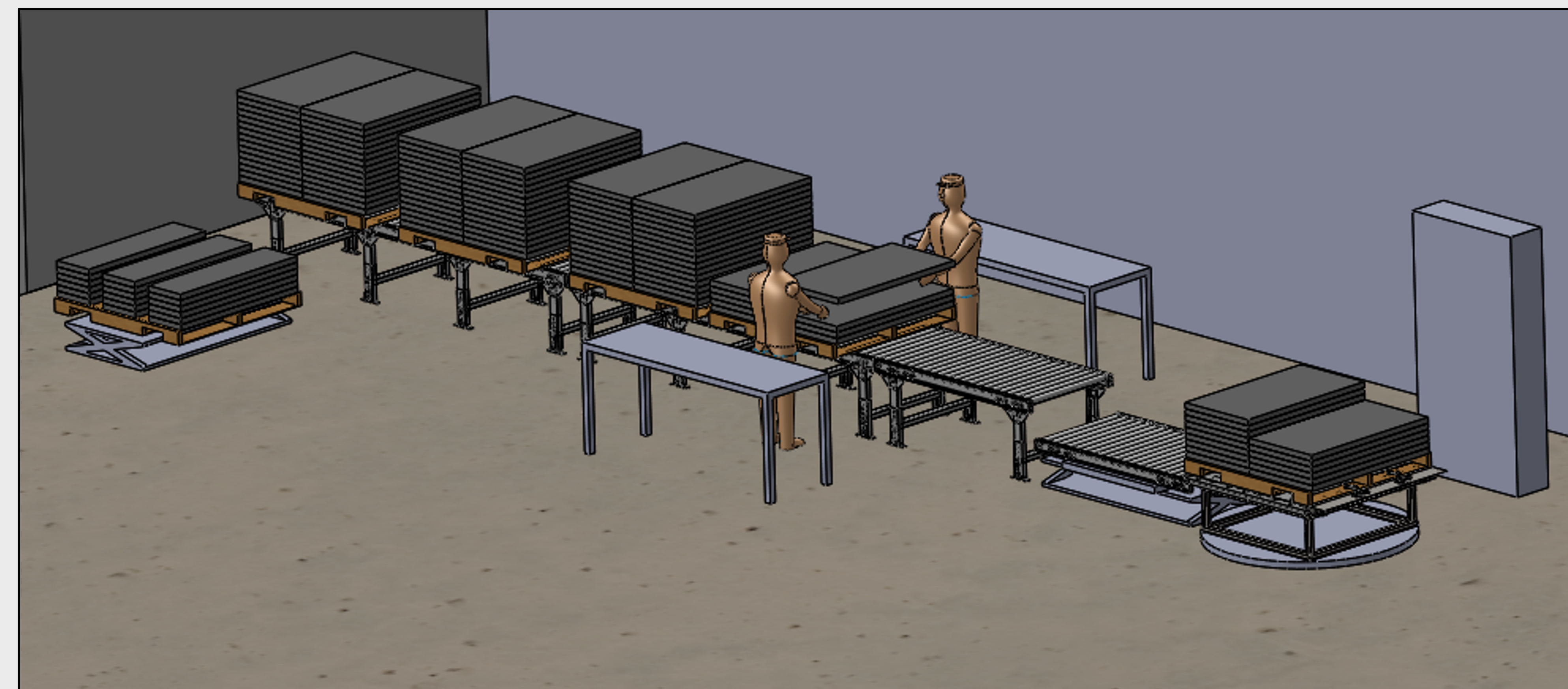


Figure 3. Finalized layout design represented in SolidWorks

Project Stages

Stage 1

Communicate with customer to establish design scope

Stage 2

Generate concepts for palletizing line

Stage 3

Finalize layout design and Bill of Materials

Stage 4

Procurement of off-the-shelf equipment and custom components

Stage 5

Onsite assembly and installation at Shelterworks facility

Critical Design Considerations

- Order quantities are completely custom, so the team needed to fix the main line of conveyors at a height that was ergonomically appropriate for both tall and short stacks of panels
- Conveyor stands need to support the worst-case-scenario weight of 2000 pounds per pallet
- Pallets need to be safely transferred from elevated roller conveyors to ground-level wrapper
- Static friction and shear stresses need to be evaluated with respect to acceleration of pallet wrapper

Custom Systems

- Mounting interface between conveyor frame and H-stands

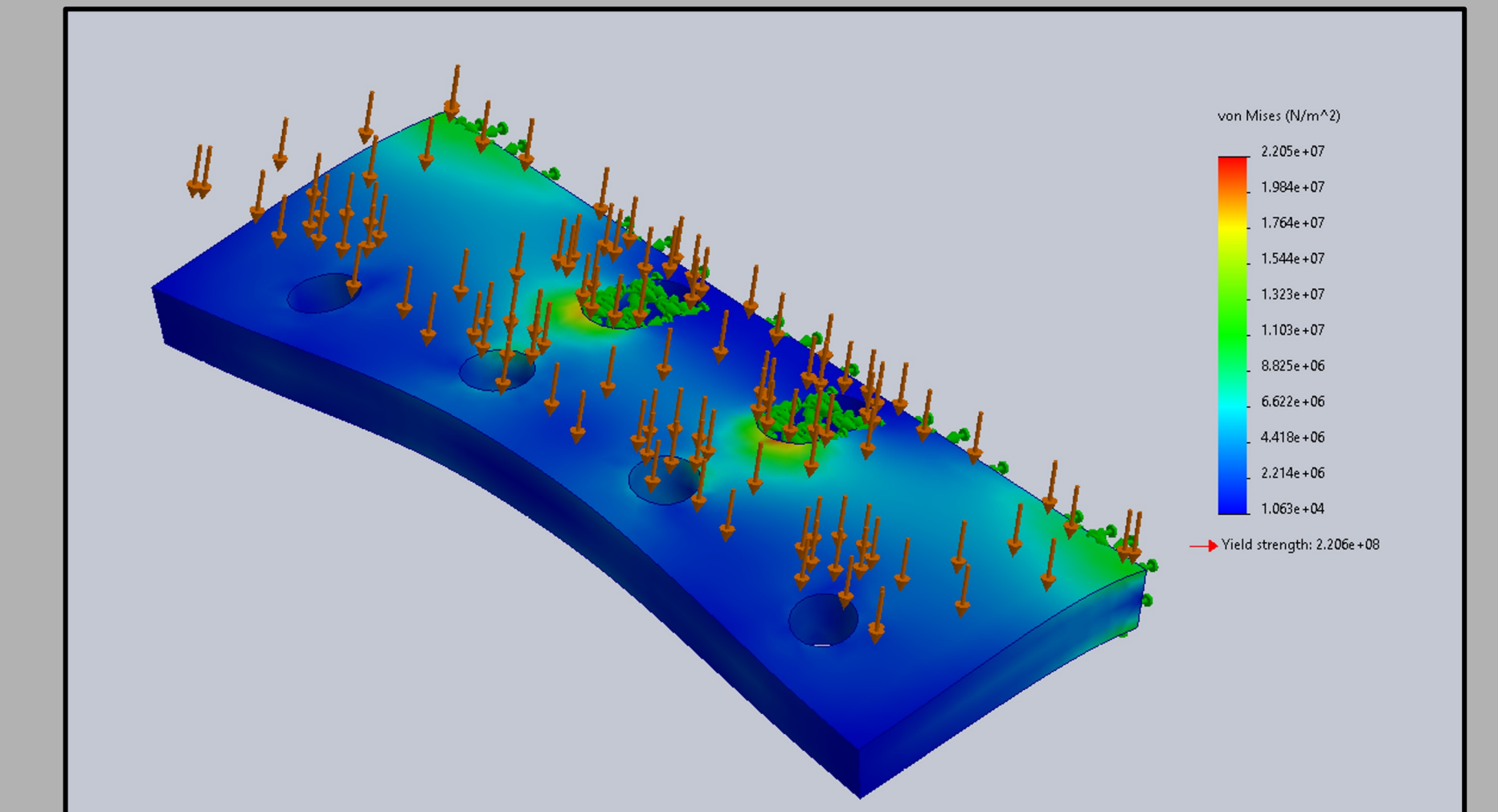


Figure 4. FEA simulation results (von Mises stress) for H-stand mounting plates under 625 lb. load

- Welded steel frame and scissor lift facilitates pallet transfer from roller conveyors to wrapper
- Mechanical clamps mounted to custom bracket ensure that pallet spins properly while being wrapped

Procurement Breakdown

Off-the-Shelf Equipment

- H-stand supports (11)
- Industrial weight scale (1)
- Mechanical clamps (2)
- Ball transfer table (1)
- Fasteners

Shelterworks Inventory

- Roller conveyors (3)
- Pallet wrapper (1)
- Workstation tables (2)
- Scissor lifts (2)

Designed Parts

- H-stand mounting plates (22)
- Clamp bracket (1)
- Wrapper frame (1)

Client Benefits

- Consistent palletizing procedure reduces cycle times
- Reduced risk of operator injury
- Clearly defined operator roles
- Improved inventory management