

Pelice – 2016

China – Product Developments and Innovations

04 | 2016



DIEFFENBACHER

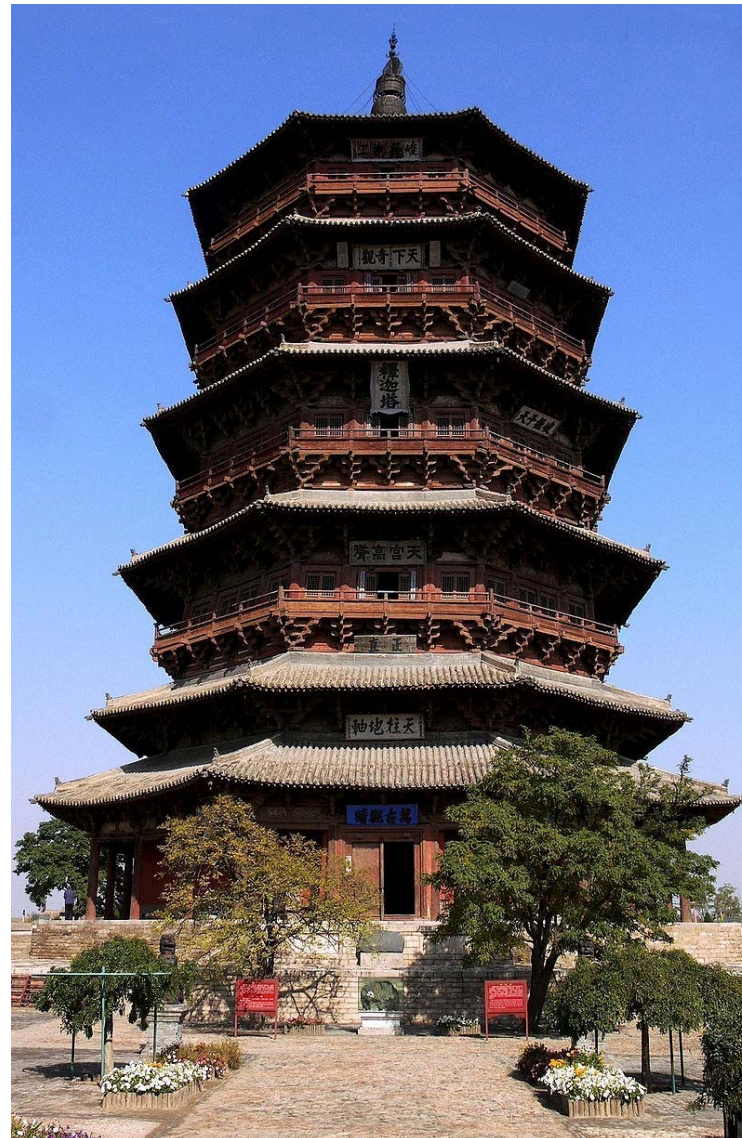
Agenda

- The Next 20 minutes
 - This is an overview of the history and a brief view of new and emerging technologies in China and Asia
- History
- Container Flooring Oriented Strand Board (OSB)
- Fine Surface Oriented Strand Board (OSB) (suitable for lamination)
- Alternative OSB Strands made with Low Cost Raw Materials
- Straw Board PB
- Other Innovations

History



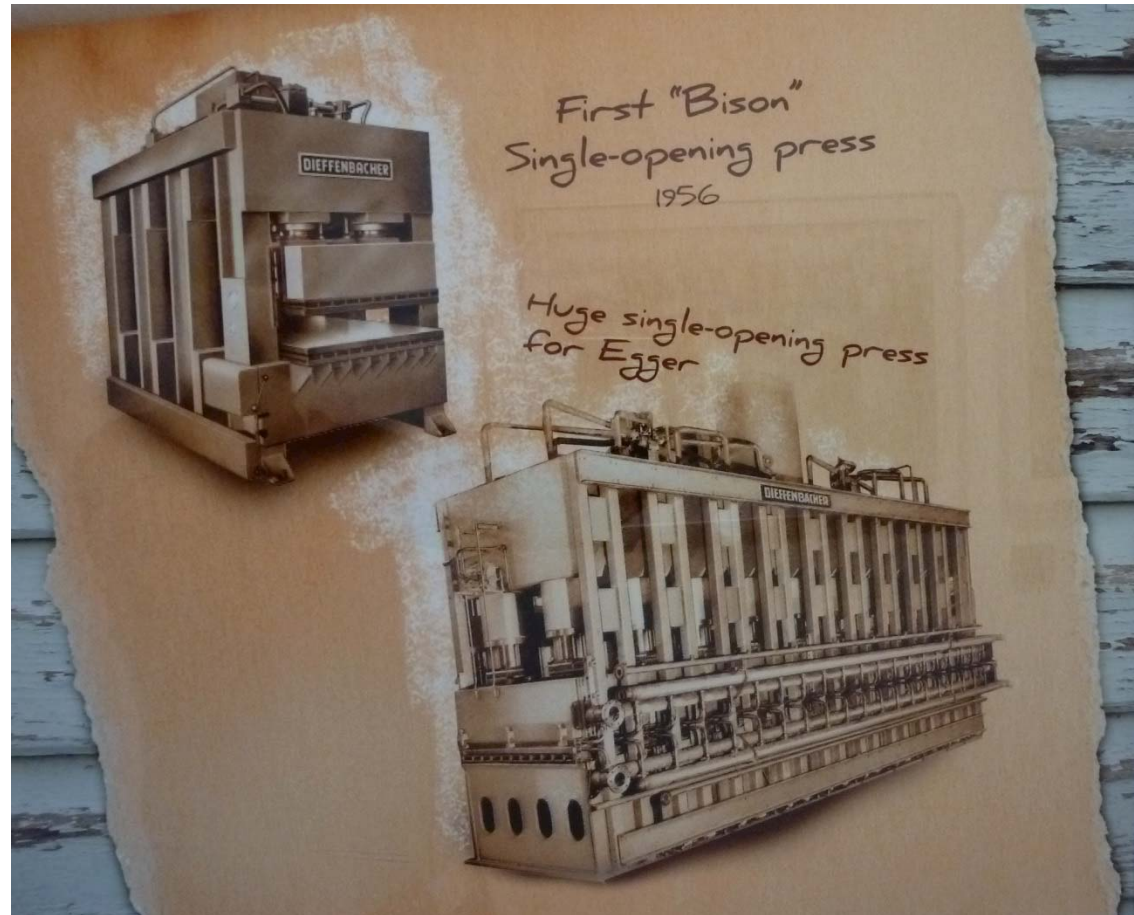
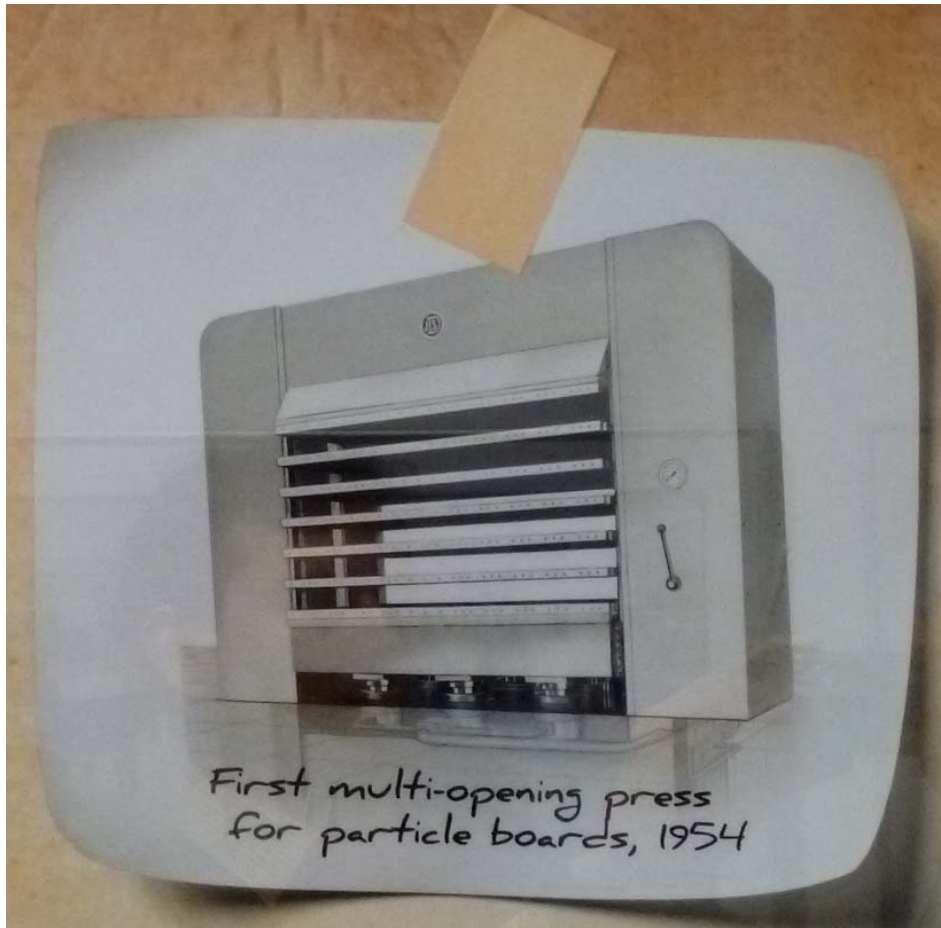
History



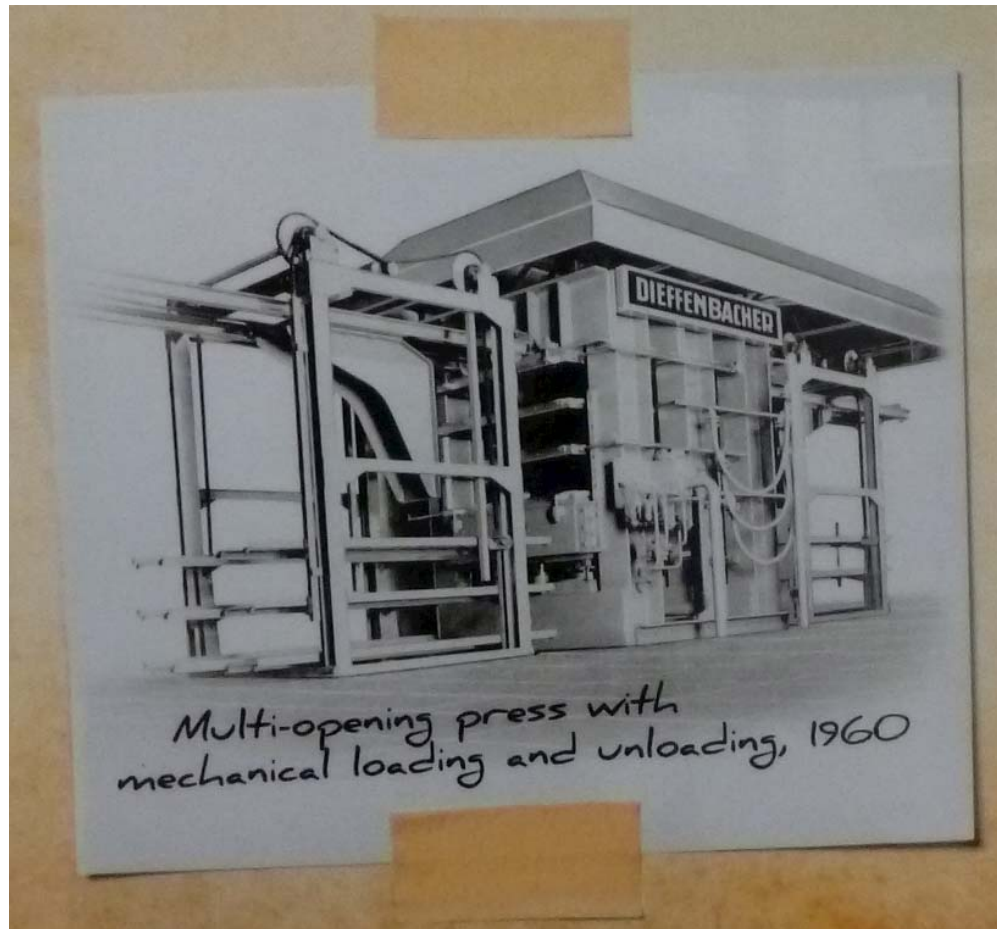
History



History



History



History



Multi-opening press
for OSB panels
1982



History – Dieffenbacher in China



Container Flooring Oriented Strand Board (OSB)



Container Flooring Oriented Strand Board (OSB)

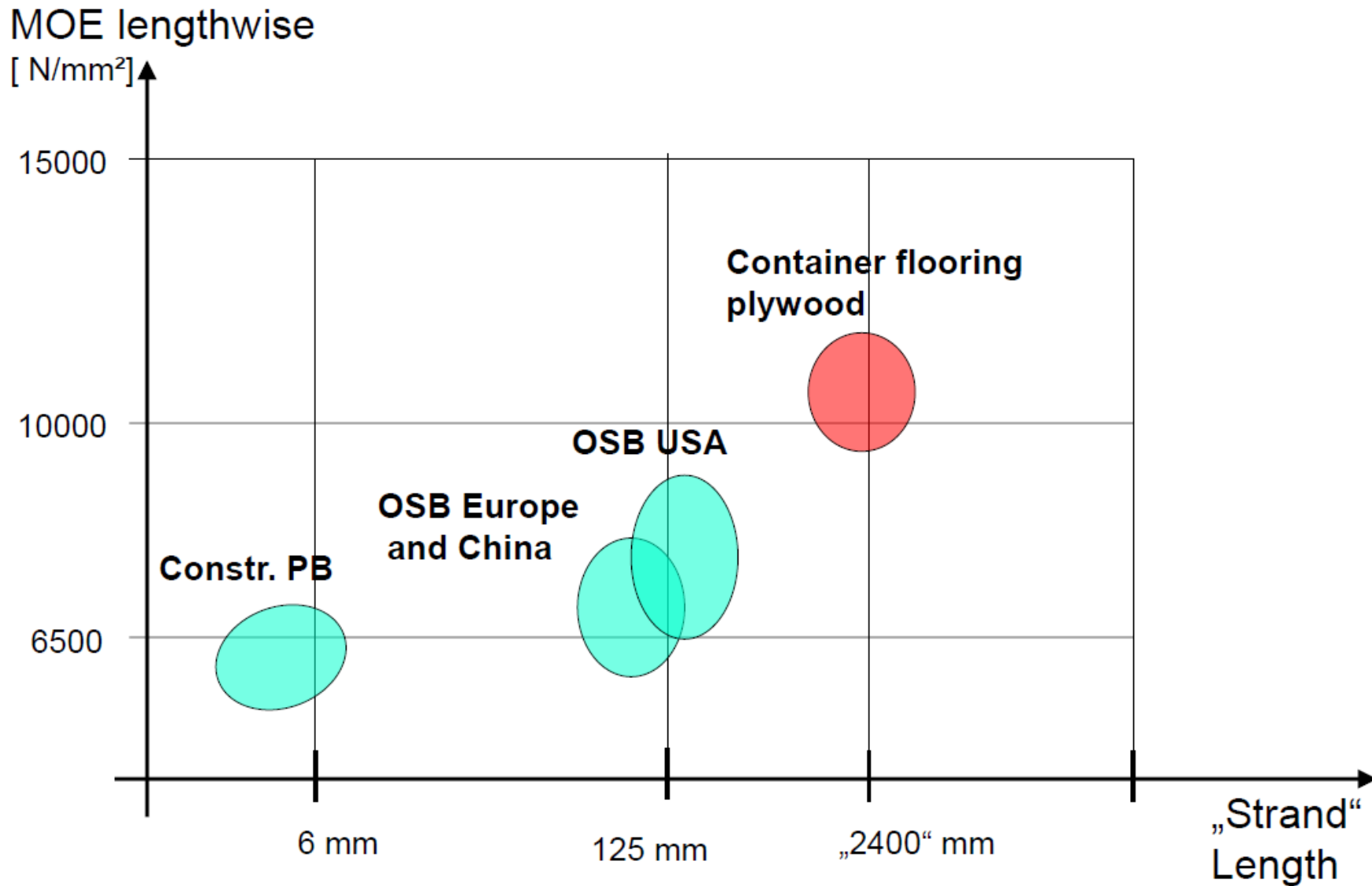
■ History

- Current demand for container flooring panels is estimated to be 1 million m³/year
- Container flooring panels from the 1960's were produced from tropical plywood
- Commonly used wood species for container flooring are Apitong and Keruing
- The typical lifetime of the flooring in the high humidity and salt air is 8-10 years
- Over the past 15 years tropical woods have been running in short supply
- Sometimes cut in Malaysia and Indonesia illegally and imported as logs into China
- Over the last several years only the surface layer veneers have been Apitong and Keruing
- There are about 30 plywood manufacturers in Asia making container flooring board
- Container flooring can not be made of steel as it is too slippery when being loaded
- Container flooring also needs to be able to be nailed to

Container Flooring Oriented Strand Board (OSB)

- Three (3) special tests must be passed to meet the original properties of container flooring using tropical plywood.
 1. The Anti-bending test with a span of 250 mm (~ 9.84")
 - Shear stresses occur in the center of the panel
 - Most cases of testing with the Keruing panel shows shearing on the centerline
 - OSB can pass this test using thin, long flakes
 2. The Bogie test with a forklift and 5 tonne & higher weight moving on the floor
 - OSB can pass the test with optimized orientation
 3. The Boil test where for 72 hrs it is boiled dried and repeated
 - Thickness swell with the Keruing plywood is 15%
 - OSB can pass the test having a small flake thickness AND increased MDI content

Container Flooring Oriented Strand Board (OSB)



Container Flooring Oriented Strand Board (OSB)

- Basic development of OSB as a substitute for plywood container flooring
 - Poplar logs were used with:
 - Moisture 100%
 - Density 410 kg/m³ (~25.6 lbs/ft³)
 - Age 14 years
 - Strand data from logs was:
 - Moisture 3%
 - Screened on a rotary drum screen
 - Thickness of ~ 0.8 mm
 - Length of 185 mm (~7.28")
 - Width of 10-30 mm (~0.4" – 1.2")
 - Formed to achieve a high degree of lengthwise orientation
 - Press choices are for container flooring OSB are:
 - Multi-Opening Press (MOP) or Continuous Press System (CPS)



Container Flooring Oriented Strand Board (OSB)

- Kangxin plant is producing OSB container flooring using:
 - Strander for 180 mm (~7.09") long strands
 - Dryer
 - Disk screens for long and short strands
 - Blenders for long and short strands
 - Five (5) head Forming station (SL - CL – SL - CL - SL)
 - CPS 40.2 m (~132 ft) long with a steam preheater



Container Flooring Oriented Strand Board (OSB)

- Summary on Container Oriented Strand Board
 - It is possible to replace the historical container board floor with container floor oriented strand board
 - What's needed:
 - Process knowledge
 - Effective drying without size reduction and constant moisture content
 - Screening with good separation of long and short strands
 - Forming with good orientation and good accuracy weight wise
 - Continuous steam preheating without decreasing the bending strength
 - CPS with very high specific pressure to achieve
 - High board density, low thickness deviation and low sanding allowance

Fine Surface Oriented Strand Board (suitable for lamination)



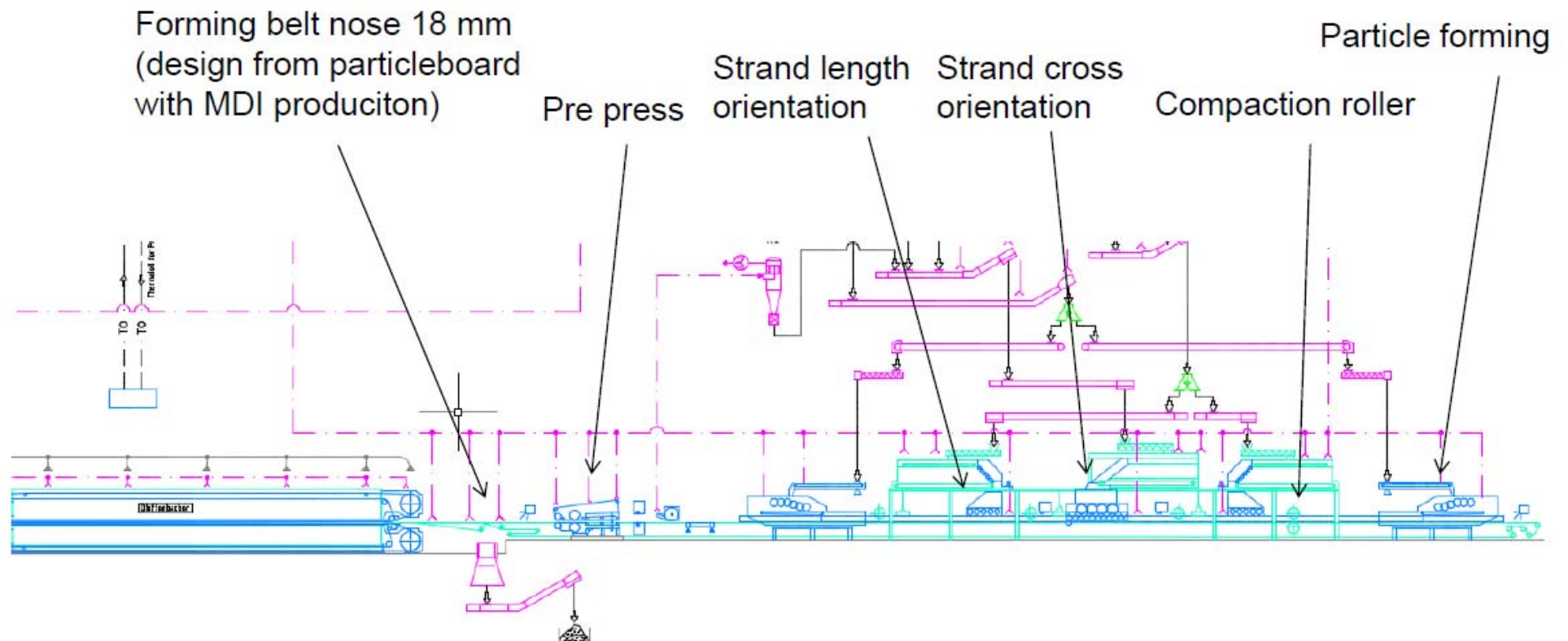
Fine Surface Oriented Strand Board (suitable for lamination)

- Property comparison
 - Technology can allow manufacturers to replace plywood suitable for lamination using lower cost raw materials
Board thickness 18 mm (softwood)

Board type	OSB EN3	Fines OSB top and bottom particles	Particle board	Plywood Furniture High quality China
Raw material	logs	Logs small diameter, slabs, saw dust, recycling material	Logs, slabs, recycling material	peeler logs
Density	610 kg/m ³	650 kg/m ³	630 kg/m ³	550 kg/m ³
MOR length	27 N/mm ²	20 N/mm ²	13 N/mm ²	30 N/mm ²
MOE length	4800 N/mm ²	3700 N/mm ²	2300 N/mm ²	3000 N/mm ²
MOR cross	16 N/mm ²	15 N/mm ²	13 N/mm ²	20 N/mm ²
MOE cross	2100 N/mm ²	2800 N/mm ²	2300 N/mm ²	2900 N/mm ²
I.B.	0.4 N/mm ²	0.4 N/mm ²	0.4 N/mm ²	0.3 N/mm ²

Fine Surface Oriented Strand Board (suitable for lamination)

- Typical production line with five (5) heads



Fine Surface Oriented Strand Board (suitable for lamination)

- Luli plant is producing Fine OSB and standard OSB
 - Long log strander
 - Two stage flaking
 - Dryer
 - Drum screen and flat screen
 - OSB blenders and PB blender
 - Five (5) Head Forming station (3-OSB heads and 2-Classifiers)
 - Special pre-press
 - CPS 40 m (~ 131 ft) long



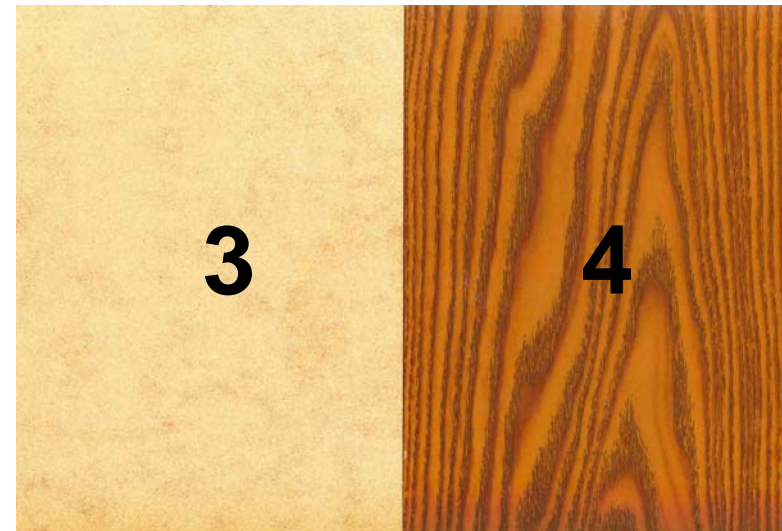
Fine Surface Oriented Strand Board (suitable for lamination)

- First boards at Luli

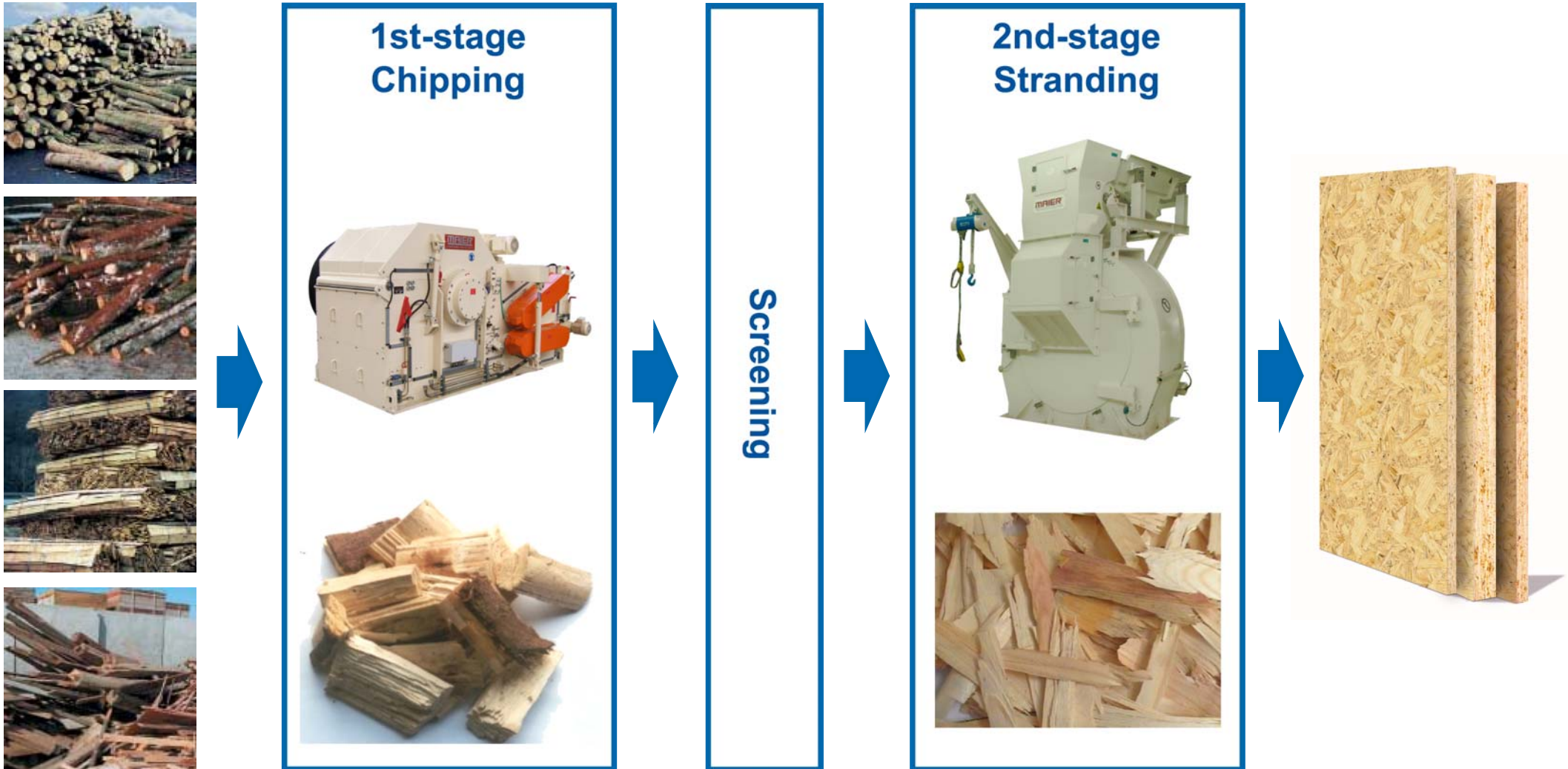


Fine Surface Oriented Strand Board (suitable for lamination)

- Summary of Fine Surface OSB (suitable for lamination)
 - Fine surface OSB similar to Particleboard EN 312 with grade P2 – P5 can be produced
 - Furniture grade with UF and MUF resin is suitable for lamination with melamine, phenolic paper or foil
 - Mat transfer on to the steel belt is critical with a special CPS infeed design
 - OSB EN 300 with grade 1, 2 and 3 can also be produced on the same line offering manufacturers increased product flexibility



Alternative OSB Strands with Low Cost Raw Material



Alternative OSB Strands with Low Cost Raw Material



Alternative OSB Strands with Low Cost Raw Material



Alternative OSB Strands with Low Cost Raw Material

■ Comparison of Mechanical Properties for Luli in China

Thickness of OSB acc. To Standard DIN EN 300: >10 up to 18 mm

Thickness of OSB: 16 mm (OSB - LULI)

Properties	Unit	Test method	Specifications	
			OSB/3 DIN EN 300 (622-3)	OSB B. Maier for Luli (China)
Bulk density	kg/m ³		650	627
Bending strength	N/mm ²	EN 310	20	28
Modulus of Elasticity	N/mm ²	EN 310	3500	4868
Internal Bond V20	N/mm ²	EN 319	0,32	0,87

Alternative OSB Strands with Low Cost Raw Material

- Summary of Alternative OSB Strands made with Low Cost Raw Material
 - Perfect solution for Asian OSB plants
 - Asian log quality has a significantly lower yield than in Europe or North America
 - Asian logs have more metal in them that can get screened out
 - Asian logs are not straight, not of constant length and not a constant diameter
 - Rubber wood tree tops and curved logs can not typically be used in long log flakers
 - Price for low quality rubber wood is only 20 € per wet tonne compared to 60 € per wet tonne for quality fiber



Straw Board PB



Wheat Straw



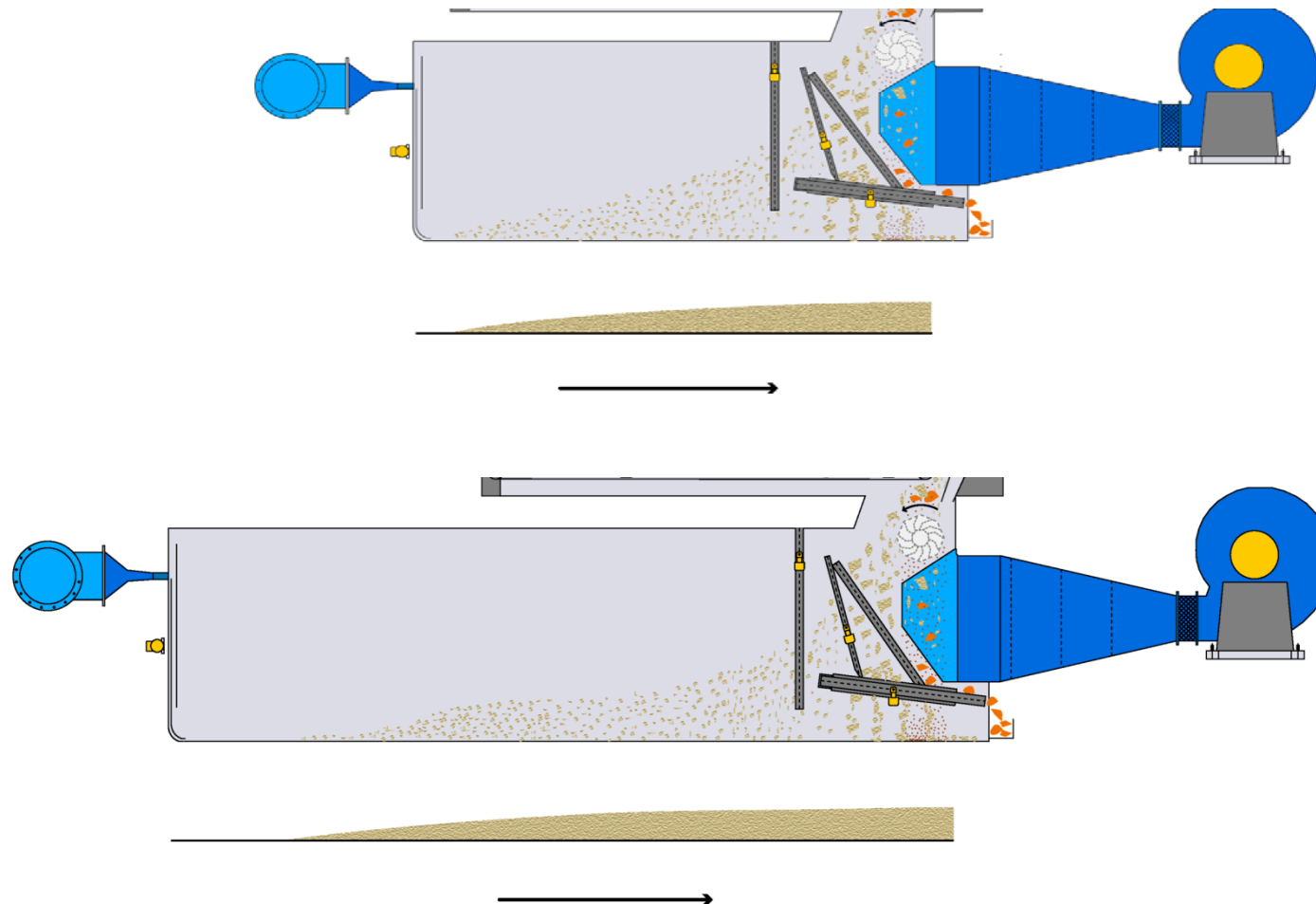
Rice Straw

Straw Board PB

- Straw Board PB
 - Has the same basic process as Particle Board from blending to stacking
 - In China Wanhua – 5 straw board PB lines
 - Product was developed together with Wanhua and consists of:
 - 100% Wood CL
 - 100% Straw SL
 - Can be used for:
 - Construction PB
 - Furniture PB
 - New CPS infeed system is required

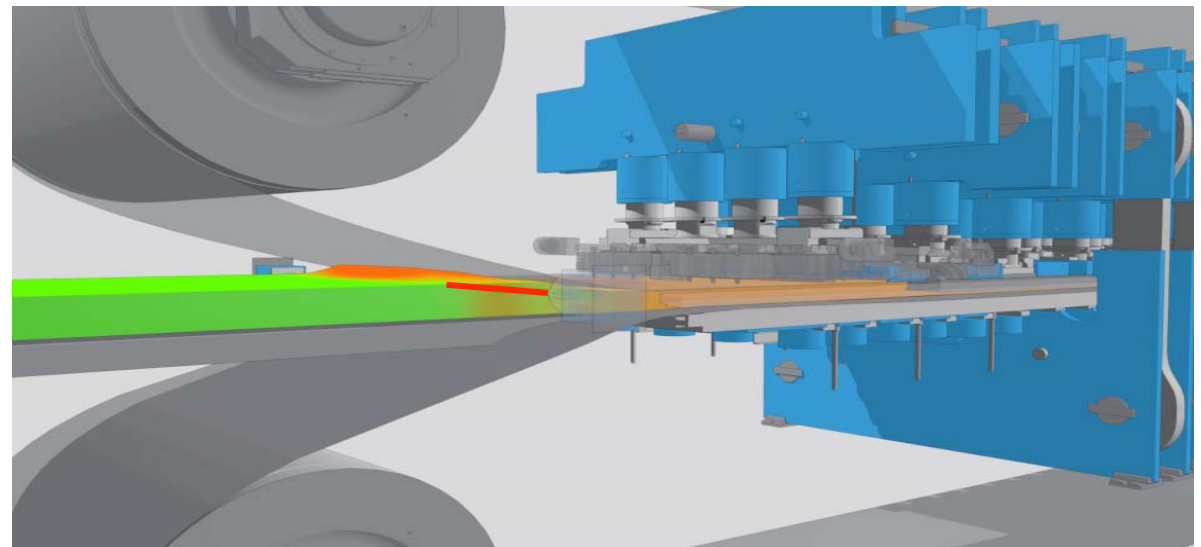
Straw Board PB

- New 3m longer wind former is required for Straw Board PB



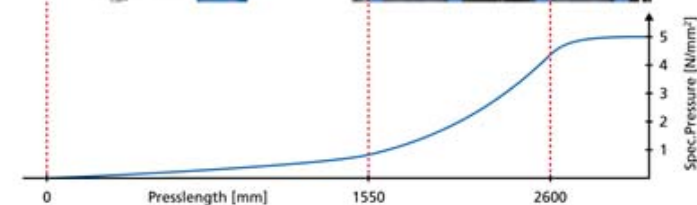
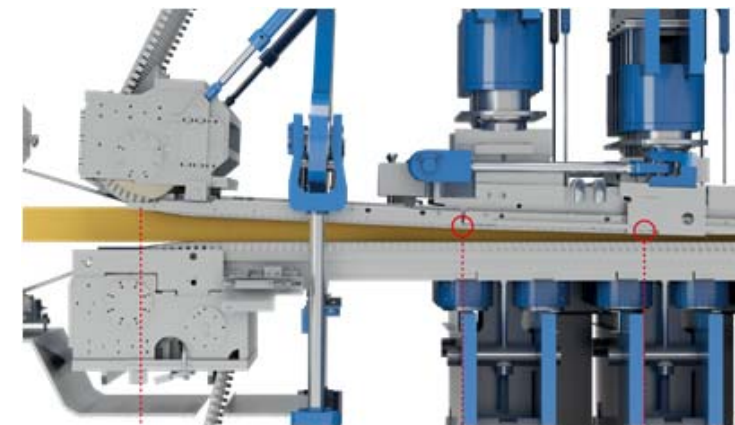
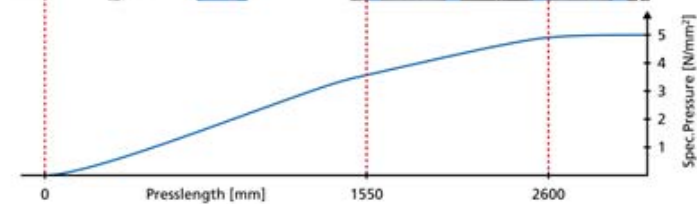
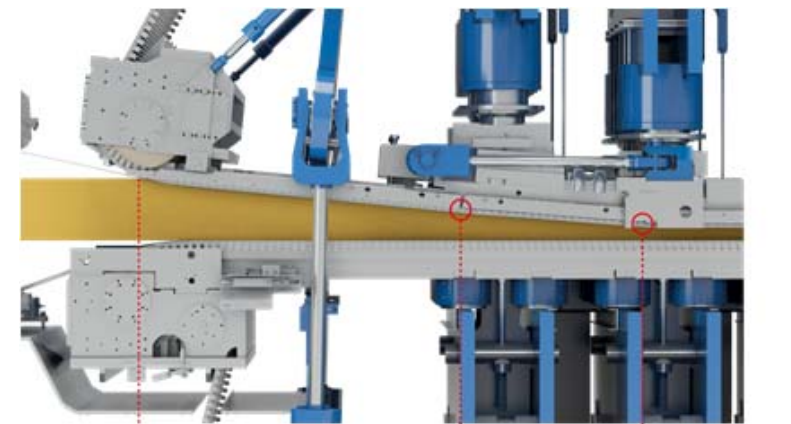
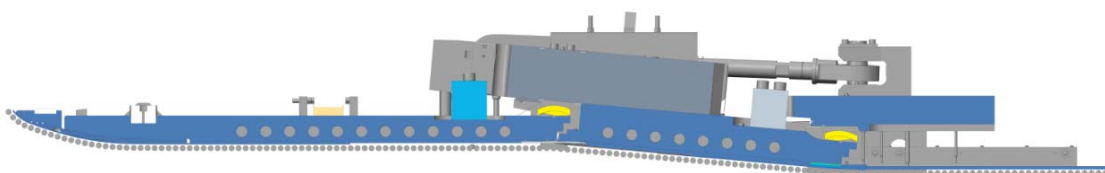
Other Innovations

- CPS Infeed System – 100% MDI
 - History
 - MDI resinated Particleboard mat has no cold tack
 - Large gap at press infeed has caused problems
 - The degassing of the mat has to be done slower than UF resinated material to avoid blow outs
 - New System
 - Horizontal transfer to the steel belt
 - Vertical distance is now only 6 mm
 - Bottom steel belt has a positive angle for mat transfer
 - Double hinge infeed allows clamping of the mat



Other Innovations

- Double Hinge System allows:
 - mat to be clamped and compressed slightly
 - Less de-aeration lengthwise and more to the mat edges
 - fast trouble free de-aeration of the mat combined with fast pressure build up
 - Multi-pot cylinders assist in de-aeration
 - End result is optimal adjustment for product requirements



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