

Frame Feeding Systems For Presses



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Frame Feeding System For Presses

One of the fundamental facts in the process of making fiberboard is that the fiber mat or wet lap is produced continuously, while the pressing of the mats or wet lap is a discontinuous process, so there has to be a system of transfer which overcomes this basic gap in the process. At least until the continuous press has proven itself in a fiberboard plant.

The state-of-the-art in the wet process is that some kind of carrier is used to bring the wet laps into the press (and out, of course), while in the dry MDF process mostly so-called caulless systems are employed.

This paper presents a system which originally was designed for the wet process, but which also has been successfully installed and operated in a dry process hardboard plant, although in a somewhat modified form.

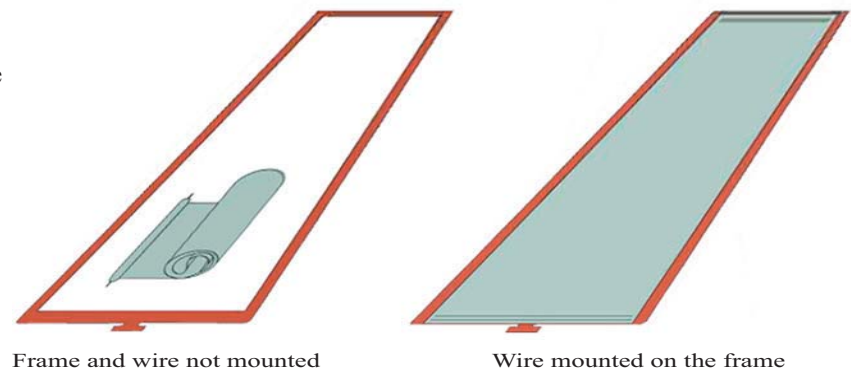
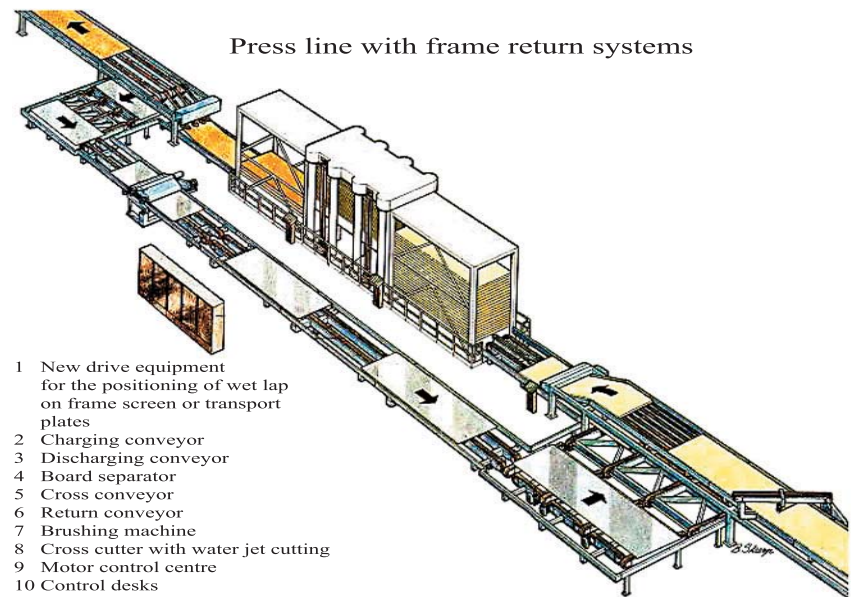
With the increase in production capacity the wet process hardboard forming and pressing lines have to be operated at increasingly higher speeds. With forming line speeds in the range of 30-50 m/min. (100-160 ft per minute) the traditional press feeding systems using cauls or transport plates have proved to be insufficient. The main problems have been the slipping and displacement of the screen as well as the mechanical handling of the caul at high speeds.

For example, the leading hardboard producers in the world, run their lines at a maximum forming speed of 52m/min. (170 feet per minute) and the return conveyors at well over 100 m/min. (330 feet per minute). It is easy enough to realize that such speeds cannot be achieved with a conventional caul type feeding system. The weight of a traditional caul for a press size of 4'x24' is 325 kgs (720 lbs.).

Here is where the Sigma Frame Feeding System proves its advantages. In this system the cauls are done away with: instead, a rigid frame of spring steel surrounds the wire screen. The screen is suspended between the end bars of the frame at both ends. The reduced weight of this carrier makes it possible to run a modern hardboard line at the speed which was mentioned above without any screen slipping problems. The weight of 325 kgs or 720 lbs for the 4' x 24' press caul which has

to be moved around has now been reduced to 150kgs(330lbs). If we compare a really big press, say 7'x 21', the weight difference is even greater. 470 kgs (1,040 lbs) for a caul is reduced to 150 kgs (330lbs). The frames are circulated around the hot press in the same way as in a conventional caul feeding system, which prevents shocks, which might distort the wet lap and which guarantees a correct position of the frame in the cage. This feature is even more important in a caul system, if run at high speeds. In addition to solving the screen slipping problem a number of further advantages are gained with the frame feeding system which

helps to improve the efficiency of a modern wet process fiber board plant. The loading cage is fitted with a pusher boom and the unloading cage with an extractor exactly of the same type as used for cauls. Both are driven either by 2-speed motors or by motors with continuous controlled acceleration and deceleration. The loader cage is fitted with a hydraulic receiver, which prevents shocks which might distort the wet lap and which might guarantees a correct position of the frame in the cage. This feature is even more important in a caul system ,if run at high speeds.



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- **No screen slipping.**
- **Improved heat transfer-means shorter press cycle and increased production capacity.**

The press cycle can be reduced, since there is no longer a caul to be heated up between the heating plate wear plate and the wet lap. In fact this improvement is so efficient that in itself it would cause too fast a heating up of the water to boiling point and the steam could cause the edges of the wet lap to blow out.

This fact has forced us to increase the mechanical squeeze-out of the water in the press and to do it quicker. The remaining water, which has to be evaporated, is thus less than in a conventional caul system.

- **Reduced weight of carrier means lower heat consumption and better heat economy.**

There is no longer a caul which consumes calories or BTU's for each press cycle, contributing to a better heat economy.

- **No caul plate thickness variations -means more uniform product thickness.**

Even good quality steel cauls have a thickness tolerance of ± 0.25 mm ($\pm .010$ ").

The press cycle is determined by the maximum board thickness (or thinnest spot in the caul).

- **Optimum use of press daylight openings.**

All cauls regardless of quality have a tendency to bend at the corners, which means that the press daylight opening has to be increased to accommodate the bent caul and the wet lap. In the frame feeding system, only the thickness of the wet lap determines the daylight opening. The frame is kept outside the heating plate at all times.

- **Positive guiding of the frames into the hot press- means exact positioning of wet laps on the heating plate, thus eliminating the risk of thick board edges.**

Positioning in the press has been a difficult problem. In comparison with other screen circulation systems, such as the vertical return with tow-bars or other systems with screens rolling up on a rod outside the press plate, the Frame system achieves a far better positioning, even better than with rigid cauls.

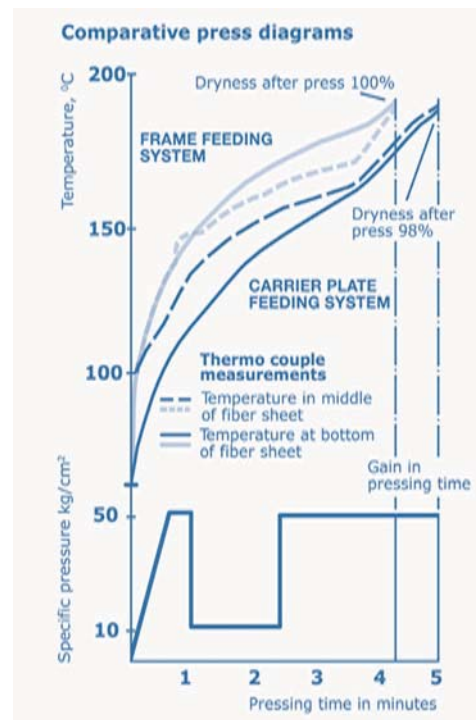
- **Continuous cleaning of frame-mounted wire screens is made possible.**

The fact that the frame with screen are circulated horizontally around the press means that the frames are constantly in sight for the operating crew. Any defects can be easily spotted and cleaning and washing is easy to accomplish in a horizontal in-line washing machine.

- **Corrosion problems with the cauls are entirely eliminated**

Again with the reference to other customers which operates at very low pH values, this has been a real problem.

As cauls are not used, these problems no longer exists.



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For wet processes the Frame Feeding System is installed in a number of plants in Brazil, Canada, India, Poland, Spain, Sweden, Venezuela och Zimbabwe the experience of the operation is very good. In addition to trouble free operation the cost savings is considerable compared with a conventional caul system.

Parallel with the development of the Frame Feeding System, we have also designed a modern horizontal conveying system, necessary for the successful circulation of the frames. The conveyor system is built up of modular units with the drive at one end of the unit.

The belts which are used give us full support for the frame over its entire length. This long contact surface gives a much better drive than a roll contact would do, without any slip. There are no transmission chains with slack to be taken up at each start and stop. The start and stop is smooth and no distortion of the wet lap is caused.

The vertical movement of the transfer stations at the corners is achieved with pneumatic bellows for fast and accurate raising and lowering of the transfer conveyors. The mating station is perhaps the most critical point in the line.

In addition to the above mentioned advantages the risk of any speed differential, which could stretch or compact the wet lap, is eliminated. Another very important requirement is the squareness of the wet lap.

The cross cutting unit used in the Sigma Feeding System is of the high pressure water jet type with two nozzles for a clean cut. The weight of the jet nozzle carrier can be kept very low, so the cut will be straight.

The movement is achieved with a special type of pneumatic cylinder without a piston rod. The carrier starts its transfer movement always at the same point which assures very good repeatability in the length of the wet laps. The function of the wet lap conveyor is extremely important.

To avoid sideways wandering of the wet lap, the belts are guided in a V-groove with a corresponding profile vulcanized on to the bottom surface of the belts. This feature effectively prevents the wet lap from taking a diagonal position or getting a banana shape. Also available with broadband on certain installations.

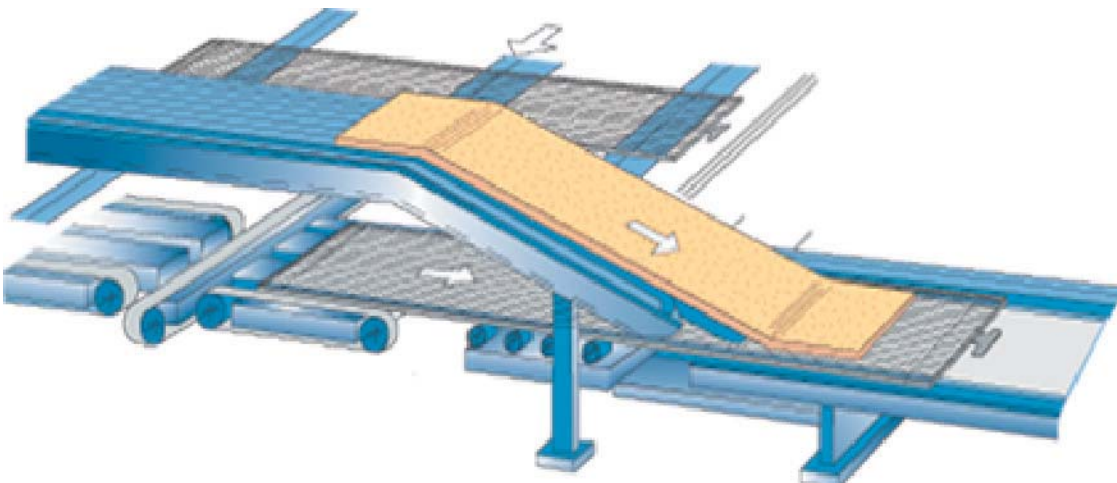
The silent operation of the whole system contributes to a better working environment for the operating crew. The whole feeding system is based on standardized units, using basically the same components whenever possible. This will have a very positive effect on maintenance and reduces the spare parts stock to a minimum.

By taking full advantage of the features described above it has been possible for us to design a modern feeding system that allows for the higher transport speeds that are necessary in high capacity fiberboard plants both wet and dry.

In other words the feeding system is no longer the bottleneck of a plant. Much of the same design philosophy has been applied to more conventional caul-type feeding systems which are of course still very much in use in the great majority of existing plants.

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The modular design of this system will allow for great flexibility in retrofits. Several successful plant modernizations have been carried out, using these conveyors. Our program of conveyor equipment also includes tipples with feeders for heat treatment trolley including doublelaying equipment as well as sheet separators. Some of the general features of all feeding systems are.



Mating station for placing wet laps on frame screens

Frame Feeding System For Presses



- **Simple structure.**
- **Few components, extensive standardization**
- **Easy to adapt to different purposes and board sizes.**
- **Modular sections to facilitate installation and assembly.**
- **Long life of the rubber belting, easy to change.**
- **Low maintenance costs, few breakdowns.**
- **Thermally stable belts, same for all sections.**
- **Drive and tensioning pulleys adjustable.**
- **High standard of cleanliness, very low noise level.**

In conclusion, we believe that any new line in the wet process field should be designed for frame screen feeding, i.e. without cauls. The system is also to be recommended for any retrofit of existing caul feeding lines, provided there is space enough between the press plates and the columns for the guiding rule that is required. In a retrofit the press hydraulic system may also have to be modified for increased water squeeze-out capacity.



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It will pay off!**

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will pay off!



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