

Successful rebuild of board machine 3 at Frohnleiten mill of Mayr-Melnhof Karton



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In January 1999, the Mayr-Melnhof group rebuilt board machine 3 (BM 3) at its Frohnleiten mill in Austria. The seven suction formers were replaced with two fourdrinier wires and new headboxes for underliner and middle layer. In the press section, a NipcoFlex shoe press ensures gentle drainage with high dry contents. The stock preparation system and approach flow systems have also been adapted.

Detailed scheduling and excellent cooperation of all companies involved made it possible to put the machine back into operation ahead of schedule, with enhanced quality and increased output.

The Mayr-Melnhof group and Frohnleiten mill

The Mayr-Melnhof board group, with 2,000 employees and an annual capacity of approximately 1.2 million tons, is the world's leading recycled board producer. The parent company of the Mayr-Melnhof board group is located in Frohnleiten, Austria. With an annual output of 375,000 tons, the Frohnleiten mill is also the largest producer of recycled folding boxboard in Europe.

BM 3 rebuild

Two board machines are presently operating at the Frohnleiten mill. In late 1997,

the decision was made to adapt BM 3 to the future market requirements by an extensive rebuild of the wet end. With an operating speed of 400 m/min, the suction formers had reached a limit where satisfactory sheet formation was no longer ensured. The main goal of the rebuild was, therefore, to improve the board quality in terms of formation with constant specific bulk and to increase the output.

The concept and the new components

BM 3 produces white lined chipboard (duplex and triplex grades). Before the rebuild, the sheet forming section included two fourdrinier wires for the top and back layer and seven suction formers for the middle layer. All layers are produced from 100% recycled furnish.

For high-quality grades, with special demands placed on bending stiffness, a small quantity of groundwood (refiner mechanical pulp) is added to the middle layer. Such pulp is supplied from a mill-owned refiner mechanical pulp system with a maximum output of 170 t/d.

To realize conversion into a multiple fourdrinier section, the existing fourdrinier wire for producing the top layer had to be extended to provide space for installing the new wires for the underliner and middle layer. On this fourdrinier wire, the top layer is formed, which is on the bottom side of the produced board web.

As a result of extending the length of the top layer wire, it was also necessary to



Fig. 1: Mayr-Melnhof Karton GmbH, Frohnleiten mill, Austria.

Fig. 2: Board Machine 3 before the rebuild.

reposition the existing headbox together with the approach flow system.

The new Step Diffusor headbox for the underliner is arranged in machine direction.

It is equipped with a centrifugal distributor to ensure as good fiber orientation as possible across the machine width. A new Step Diffusor headbox with pulsation attenuator and double diffusor block with intermediate chamber is also used on the middle layer wire. This ensures optimum conditions to eliminate variations in fiber orientation.

The middle layer is produced against machine direction; first it is couched with the underliner and both are then placed onto the top layer. The fines distribution of all layers can, thus, be utilized to ensure optimum bonding strength.

A hybrid former (DuoFormer D) is installed on the fourdrinier wire for middle layer. In this unit, up to 30% of the amount of water discharged in three

drainage zones are drained through a top wire. Apart from increasing the drainage capacity, the DuoFormer D unit improves formation. Due to the high layer weight, the formation of the middle layer influences the board quality significantly.

CD profile control is effected by a ModuleJet dilution water system at the headbox for the middle layer, since the highest layer weights are produced here, and the CD basis weight profile can be optimally adjusted by 72 valves across the machine width. For dilution, suction box water passing through a vertical screen is used.

The fourdrinier wire for the back layer, also operating against the machine direction, and its headbox have not been changed.

The couch press on the suction couch roll is followed by a double-felted suction press in the first nip position. The third nip is formed by a single-felted press. These components have not been changed.



**Dir. Dipl.-Ing. Martin Mühlhauser,
Technical Director of Mayr-Melnhof
Board Division, on the rebuild of
BM 3 at Frohnleiten:**

The modernization of BM 3 was Mayr-Melnhof's first project with the "new" Voith Sulzer Paper Technology. The team of Voith Sulzer Paper Technology and the staff at Frohnleiten have done an excellent job. What we appreciate in particular is that our customers are well aware of the superior quality of our product and that the same quality is now demanded from our competitors as well. With regard to BM 3 output, we have successfully set a new milestone in the development of enhanced white lined chipboard quality.

With the decision to replace the second press with a double-felted NipcoFlex press, Mayr-Melnhof has taken an innovative step forward. Within the Mayr-Melnhof group, this is the first shoe press used in a board machine. The maximum nip pressure of this press is 800 kN/m. However, to achieve optimum specific bulk, the press is not loaded with more than 500 kN/m during operation. Still, the dryness compared to that before the rebuild could be increased considerably.

Apart from the upgrades of wire and press sections, modifications were done by Andritz AG, Austria, in the stock preparation system (new disk filter and cleaner system for middle layer). The scope of supply from Voith Sulzer Paper Technology included the three new approach flow systems, a new couch broke chest and a separate line with vertical screen for headbox dilution water.

Startup completed in record time

The deadline for this rebuild was extremely short and could only be met by very detailed scheduling.

On January 4, 1999, the machine was shut down and the old suction formers were disassembled.

February 1, 1999, was the scheduled start-up date for the rebuilt machine.

Excellent and constructive cooperation between Mayr-Melnhof, Voith Sulzer Paper Technology and all other companies involved made it possible to com-

plete the rebuild slightly ahead of schedule, and to start production again on January 31, 1999.

Goals achieved

The rebuild was a success in a very short period of time:

Just four hours after start-up, salable board was produced. Only two days later, the highest output of BM 3, achieved before the rebuild, was already exceeded, and with better surface quality.

Compared to the suction formers, formation of the board could be greatly improved after a short optimization phase.

Improved sheet forming results in higher smoothness of the base board, which positively influences printability and/or the finishing and converting characteristics of the finished board.

This board quality has set new standards for white lined chipboard from recycled furnish in Europe.

The ModuleJet™ system of the headbox for the middle layer ensures the smallest 2-sigma values of the CD basis weight profile, and the NipcoFlex shoe press improves the moisture profile significantly, resulting in improved MG cylinder operation.

Just after the first few months, the guaranteed increase in production was far exceeded due to the satisfactory operation of the NipcoFlex press. Despite the high nip loads, high dry contents after the press section can be achieved through gentle dewatering by the shoe press, without reducing bending stiffness.

At the time when this article was written, the NipcoFlex press and the Qualiflex sleeve had been operating without any problems for nine months.

To strengthen the good and successful partnership between Mayr-Melnhof and Voith Sulzer Paper Technology, a meeting at St. Pölten took place in to 1999. Following a football match (unfortunately *not* successful for the Voith Sulzer team, but *very* successful for Mayr-Melnhof) and a very pleasant evening in the Austrian Wachau, both companies look forward to working together again on future projects.



Key data of BM 3:

- Wire width: 5,000 mm
- Design speed of new parts: 600 m/min
- Max. operating speed: 550 m/min
- Main grade: white lined chipboard (100% recycled furnish) of 300 g/m² at 400 m/min.

Main components of rebuild:

- Two wire sections including hybrid former DuoFormer D
- Two headboxes
- ModuleJet dilution water system for CD profile control
- Approach flow systems of new wire sections and of ModuleJet
- Extension and adapting of existing top layer wire
- Double-felted shoe press in second position
- New couch broke chest
- Engineering work for the entire rebuild
- Complete installation
- Supervision of startup.