



SMARNIP®
MINI SHOE PRESS

In 2003 PMT launched an innovative development on the paper machine market with its SMARNIP® Mini Shoe Press and the importance of this new development was immediately awarded with the Innovation Prize of the French ATIP International Congress. Since then, several installations have proven the suitability of the new concept under different circumstances. The features and the field experience of the SMARNIP® Mini Shoe Press are described in this technical paper.

THE IDEA

Since the first applications on packaging grades in the nineteen-eighties many shoe press installations have proven its dewatering advantages versus conventional roll presses, resulting in a quick payback on investment thanks to production increase and drying energy saving. The same benefits were also worth the shoe press application on graphic grades, where other sheet properties like bulk and roughness two-sidedness are to be taken into account.

The investigation on graphic papers, including coating raw stock and technical boards, brought PMT to the conclusion that conventional shoe presses are oversized for these grades since the aimed sheet properties do not allow the practical application of a common shoe press design linear load like 1,000 kN/m.

The installation of a conventional shoe press often also implies interventions on the paper machine and its surroundings, such as empowerment of the overhead crane, reinforcement of the civil structure and major refurbishment of the existing press section framework, with higher installation costs and longer return on investment.

In order to overcome such constraints and to find the right balance in terms of linear load between enhanced dewatering and sheet properties preservation, PMT developed and patented a shoe press with relatively smaller dimensions: the “SMARNIP® Mini Shoe Press”.

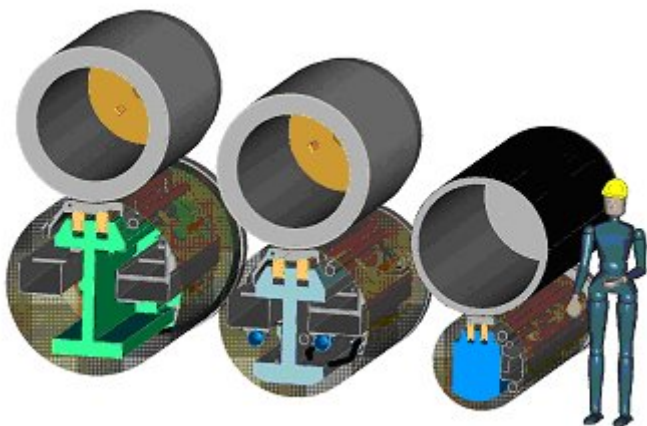


Figure 1. Illustration of SMARNIP® compared to conventional shoe presses

A comparison of typical pressure profile curves, at fixed specific pressure (kPa), applied by a roll press, a shoe press with a conventional 250 mm wide shoe and a SMARNIP® with a 100 mm wide shoe is shown here under.

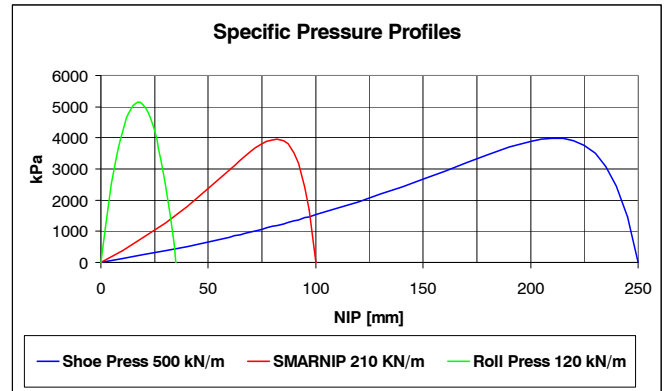


Figure 2. Typical specific pressure profiles

THE FEATURES

The SMARNIP® module, with a 700 to 1,100 mm diameter, a 70 to 125 mm shoe width and a 100 to 700 kN/m linear load, has similar overall dimensions to a Deflection Controlled Roll (DCR) and has the same features of a conventional shoe press: a pivoting concave shoe loaded by one or two full width cross-direction pistons and a polyurethane belt.



Figure 3. SMARNIP® Mini Shoe Press module

The main components of a SMARNIP® module are a central beam, to bear one or two shoe loading pistons, its heads, bearings and housings, a lubricating shower and a saveall for oil exhaust. The polyurethane blanket with its associated clamping and stretching devices completes the assembly.

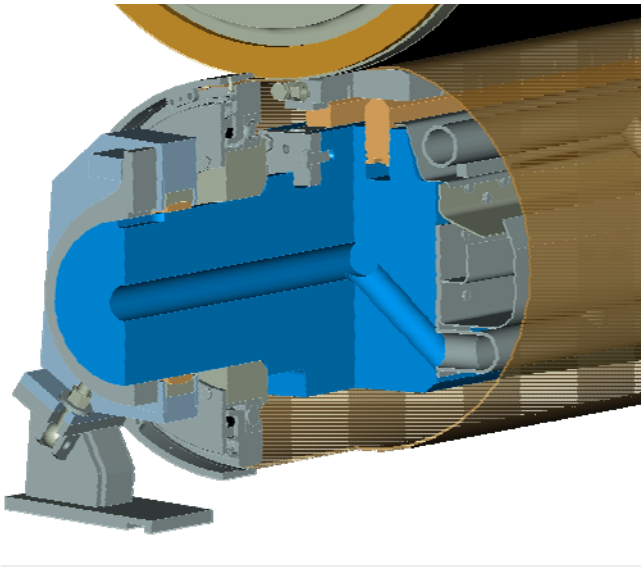


Figure 4. SMARNIP® Mini Shoe Press module cross-section

The shoe loading system with two pistons gives an operating flexibility to the SMARNIP® in order to achieve the optimum dryness-to-bulk ratio. The hydraulic pressure split applied to the shoe pistons can be easily set on the run in order to obtain different specific pressure profiles in machine direction.

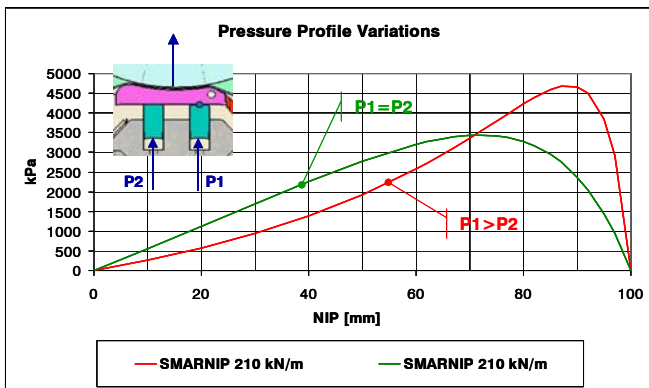


Figure 5. Pressure profile variations

At a further stage of the development a cross direction differential load control has been introduced for some specific cases in order to allow a zone controlled loading by means of mechanically independent loading elements and a more sophisticated hydraulic system.

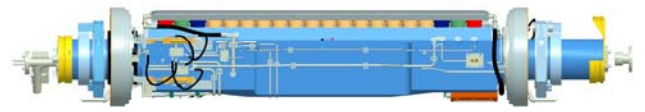


Figure 6. SMARNIP® Mini Shoe Press Multipiston Version

THE APPLICATION

The SMARNIP® was developed following extensive research and pilot studies, including pressing trials. Such a pilot trial was run on a two-nip press arrangement (double felted first press followed by a bottom felted second press) on a wood free furnish and the following comparative simulation studies were set up:

- Roll Press + Roll Press;
- Roll Press + SMARNIP®;
- Roll Press + conventional Shoe Press

The results clearly demonstrated that a SMARNIP® is able to increase the dryness out of press by up to 2 percent points more than a roll press at same bulk. Of course the actual dryness figure, achieved with a particular furnish, varies according to stock composition and ash content.

In general, the pressing performance of a SMARNIP® stands between those of a roll press and a conventional shoe press, while it is important to note that for bulk sensitive furnishes the results are very close to those obtained with a conventional shoe press.

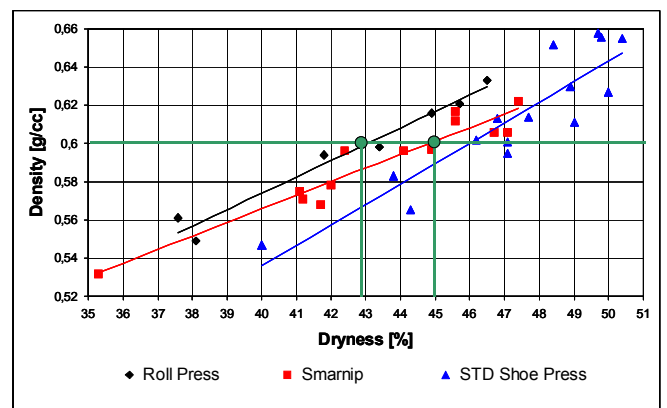


Figure 7. Pressing trials results (dryness/density)

The SMARNIP® application on graphic papers and in press section rebuilds is particularly noteworthy thanks to

- runnability improvement;
- outgoing dryness and production increase;
- improvement of paper quality parameters, such as Bulk and Smoothness;
- easy and flexible operation;
- less space required
- use of existing bridge crane

Amongst the installation advantages are the reduced weight of the SMARNIP® module and of the mating roll, which results in much easier handling of both, when compared to a conventional shoe press, and in no need of a new bridge crane or civil works

Since the SMARNIP® can be fitted into the same bearing distance of a DCR, it is possible to install it into an existing press section without modifications of the press framework. Further, in most applications, a conventional roll can be used to counteract the SMARNIP® shoe press loading, with no added cost for a DCR, usually required by a conventional shoe press.



THE FIELD EXPERIENCE

The SMARNIP® concept, with several proven references since it was invented by PMT in 2003, is now recognised by the market as reliable and suitable for all paper grades.

The first units were installed in France in the press sections of the existing PM5 and PM6 at the Papeterie de Clairefontaine in 2003 and 2004. These rebuilds delivered immediate benefits in terms of production increase and paper quality.

Since then, other successful installations followed in other countries and new projects are being developed for different applications like sack kraft, packaging grades, coated papers etc.

The references show dryness improvements close to what is achievable with a standard shoe press, resulting in production increase, energy saving and runnability gain. Paper bulk is generally preserved and in some cases improved, while sheet smoothness and two-sidedness are optimised according to the needs.

Important results have been achieved in terms of reliability of the SMARNIP® itself. Blanket life results to be much longer than any other existing shoe press and maintenance requirements are very low.



Figures 8 & 9. SMARNIP® references