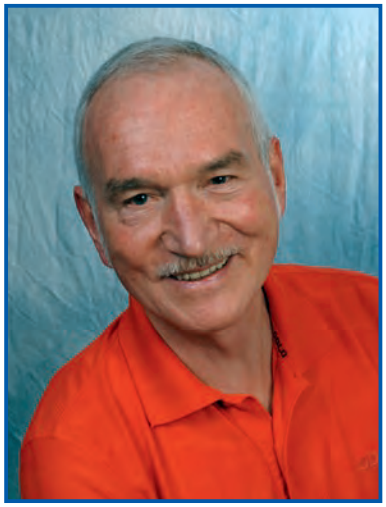
THE PRESS

Consultancy on Hydro-Dyn Press Systems

No. 4/2015

Hello from the Editor



Dr.-Ing. Ulrich Haupt

Dear Hydro-Dyn press user, dear user of Hydro-Dyn press consultancy, dear friend of Hydro-Dyn press technology,

After a longer period of time, you are finally holding the latest issue of "The Press" in your hands. This Newsletter provides again information on changes in the Hydro-Dyn press "world", on new developments made by the author as well as on technical experience recently gathered.

During the last years, consultancy on Hydro-Dyn press technology was provided by the author to press users world-wide, supporting them in their daily fight for a satisfactory product quality, in minimising production costs and in maintaining and improving press system reliability. So the author's actual work consists in a continuous collection of technical experience, the analysis of system weak points and the development of new solutions. Consequently, R&D activities make up for a substantial part of the author's business.

This Newsletter informs about various new developments that have already provided ample proof of their benefits in industrial practice.

A very important finding – as reported in the last article in the "New Development" section of this Newsletter – results in fundamental improvement of the Hydro-Dyn press based on an increased heat transfer and a more uniform pressure profile in the machine. The background is the elimination of the cooler oil leak flow, so that it is possible to achieve higher line speed, enhanced daily capacity and a better product quality. Results of this ongoing development work and tests on production presses are very encouraging.

What else is found in this Newsletter?
In addition to the activities described above, the author was involved in projects, where complete presses had to be moved to new production sites. He supervised disassembly and assembly of the press at the new production site within the frame of the following projects:

- A 16.4 m long and 2.1 m wide Hydro-Dyn press for particle board production operated by a company in Spain was sold to a particle board producer in Turkey.
- In 2009, another press for HP laminate production operated by the Swedish Perstorp AB was sold to Trelleborg Rubore AB, a manufacturer of rubber steel composites.
- Another 20 m long, 4 ft. wide Hydro-Dyn press for fibre board production was installed by a company in Vietnam. The author provided technical advice during the installation of the machine and its system on the new production premises close to the Cambodian border.

In addition, the spare parts manufacturer for Hydro-Dyn presses FMH presents the company and its products.

The last page is traditionally reserved for so-called Hydro-Dyn pioneers, the designation assigned to persons, who contributed substantially to the development of the press system. The article in the present edition is dedicated to Peter Hoffmann, well-known former head of the engineering department of the press manufacturer.

CONTENTS

What's new on Hydro-Dyn?

Hydro-Dyn press with 2 scraper pads at the top and bottom in the press out-feed area

Priorities in press development

During his work for companies using Hydro-Dyn presses, the author has become aware of their need to eliminate weak points in press performance, such as problems in product quality or irregularities in machine operation.

In addition to continuous support provided by Dr. Haupt in solving single difficulties on the machine, systematic R&D activities play a key role in the author's work with the following priorities:

The highest priority is attached to product quality improvement, which means to achieve maximum uniformity in the pressure profile including the product edges and – at the same time – a highly uniform heat transfer across the product width.

Another important priority in the R&D activities is the general increase in heat transfer resulting from the demand for higher line speed and higher daily capacity.

Thanks to the recently discovered leak flow below the pads and the possible elimination of this leakage, it is possible for the first time to increase the Hydro-Dyn press efficiency and to achieve higher machine capacity in operation. Please refer to the last section of this article for more detailed information.

The next important objective of the author's R&D activities in Hydro-Dyn press technology are more stable operating conditions, which means to avoid line stops by reducing the failure rates of single press components.

Finally, the R&D work is focused on reduced operational cost, for example by reducing the wear of the Teflon surface, using seals with higher resistance and decreasing the thermal load on the silicone oil.

Stable steel belt tracking thanks to the development of an efficient scraper pad in the press out-feed area

NEW

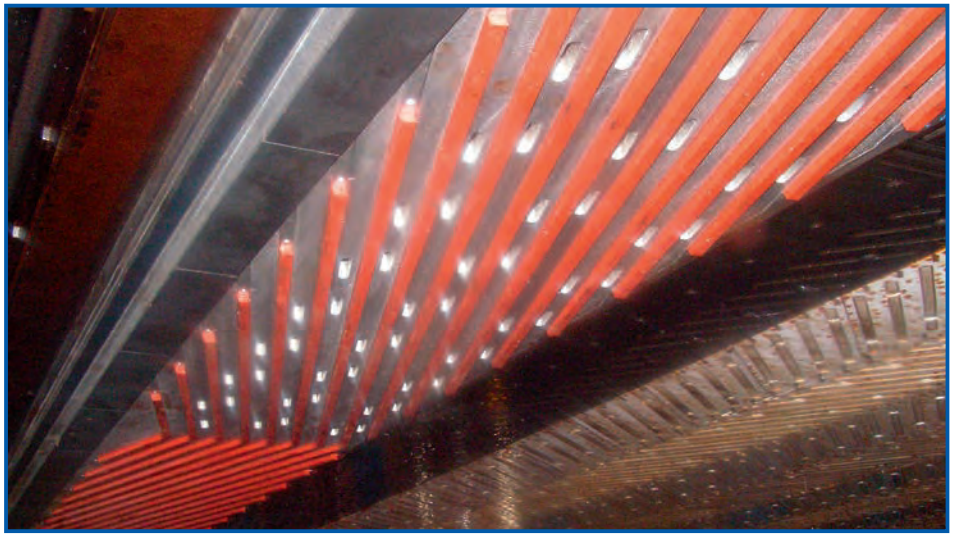
All Hydro-Dyn presses are equipped with a system of rubber and Teflon scrapers in the out-feed area. Their function is to clean the moving steel belt from silicone oil in order to provide a close contact between press drum and steel belt.

Poor function of the scrapers leads to steel belt off-tracking and line stops for correcting the steel belt position, which involve expensive interruptions to production. Efficient oil scraping from the steel belt is thus of prior importance to ensure cost-effective production.

Especially with machines operating at high line speed – e.g. thin fibre board production at about 70 m/min speed – the standard scrapers were no longer capable to provide an efficient function. The same applies to machines with very low cooling temperatures (~ 30 °C) in the press out-feed area, which involves high silicone oil viscosity.

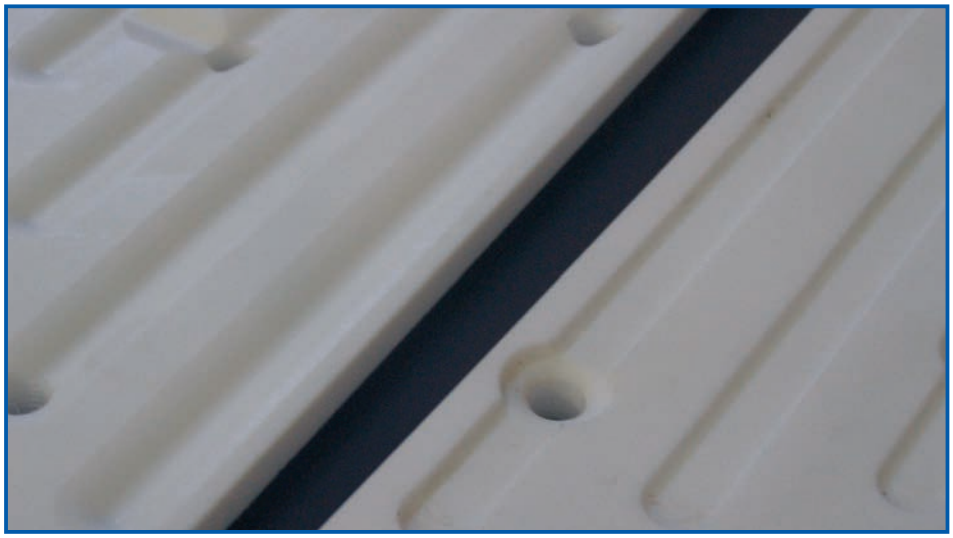
For these applications, the last or the last two pads were removed from the machine and replaced by special scraper pads. These pads consist of an Al plate with a number of small rubber profiles straight across the width.

Close view of the scraper pad at the press out-feed



New V-shape scraper pad

Comparison of standard Teflon pad and new pad design with rounded oil grooves



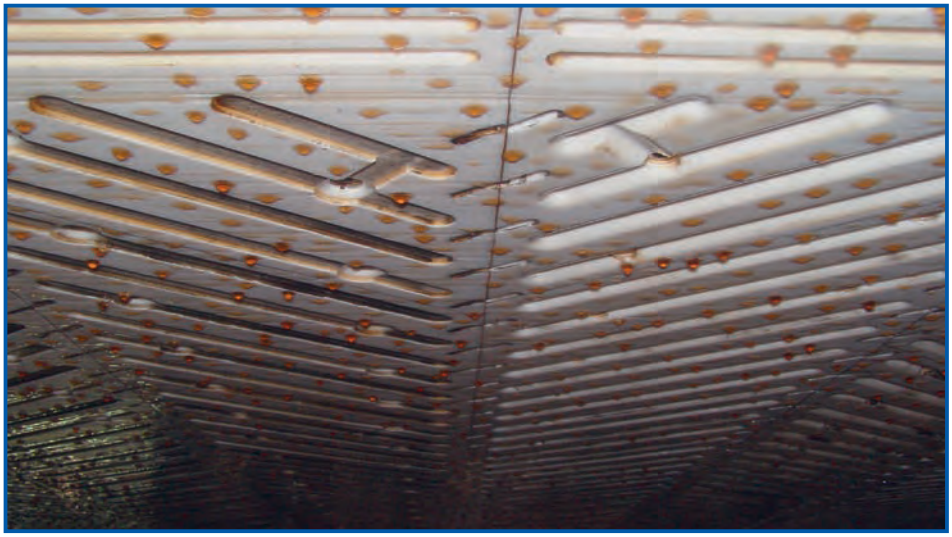
Standard Teflon pad with rectangular oil grooves

It turned out in daily production that even these scrapers could not eliminate completely steel belt tracking, especially under unfavourable operating conditions.

A new scraper pad was developed with the rubber profiles being fixed on the Al plate in V-shape to move the scraped oil to both sides and from there into the oil troughs of the press. In addition, the scraped oil is guided through the holes provided in the Al plate to the channels between heating platen and Al plate of the scraper pad in order to finally reach the oil troughs.

This type of scraper pad already works highly satisfactory in a press operating at high line speed.

Considering the high priority of stable press operation without steel belt off-tracking, an even more efficient version of the scraper pad similar to the one described above was developed to respond to extreme oil scraping conditions on the press.



Both Teflon pad types in the press after 3 years of operation in the machine

Using one of the above mentioned versions, no press user will have to accept oily press drums and interruptions to production due to steel belt tracking.

More uniform oil flow by a new design of the oil grooves in the Teflon pads NEW

Local wear marks on the Teflon pad surface indicate non-uniform flow when the fluid leaves the oil grooves. Numerous observations of this kind and systematic tests with alternative oil groove versions in the Teflon pads led to the development of a new pad design. These pads were installed in some presses to examine their behaviour and showed surprising results. The new pads turned out to be more resistant to wear and provided at the same time a more uniform oil flow in the press. Today, most Hydro-Dyn press users prefer the rounded oil groove pads for their press owing to the positive experience gathered.

A new connection between the Teflon pads NEW

It was found that the silicone oil passing the oil grooves in the Teflon pads does not necessarily take only the desired way, i.e. directly to the adjacent return grooves and in addition toward the oil troughs on both sides of the press.

Corresponding observations revealed a strong oil flow from the Teflon surface into the gaps between the single Teflon pads and from there below the pads to both sides.

Close view of the pad front side with overlapping pad edges. The gap between the Teflon pads will close by thermal expansion.

Higher line speed and more uniform press profile

NEW

The Hydro-Dyn press is a system with the heat transfer to the steel belt over the complete press surface being based on the contact with silicone oil. For this reason Hydro-Dyn can work at lower temperatures as compared to other press systems.

A surprising discovery was made, when in one press suddenly a 10°C higher product temperature was measured after a modification had been performed on the machine. It was the aim, to use this experience in order to achieve a generally better heat transfer and higher line speeds for existing machines.

A technical solution was developed to minimise this leak flow using so-called "overlapping pad edges", which virtually close this oil passage and keep the oil on the press surface.

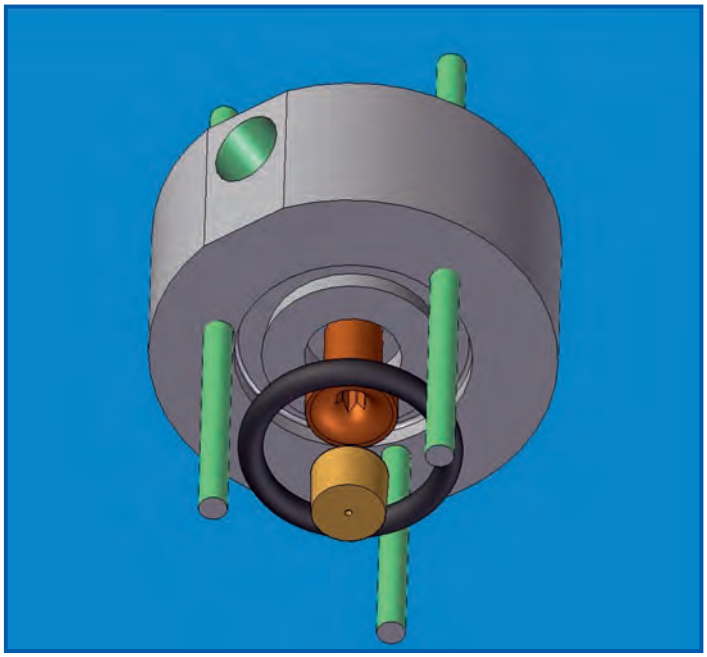
The benefits of this development have already convinced many press users and it is likely to become a standard feature in the future.

The mechanism behind this phenomenon in the mentioned press was studied and it turned out, that certain pressure conditions under the Teflon pads in all other presses produce a cooler oil leak flow. This leak flow is also an important reason for oil foaming.

By eliminating the leak flow – as with the mentioned press on which the surprising discovery was made – the temperature level of the supply oil can be increased, which will ensure an improved heat transfer and a higher line speed.

Test rigs with air and oil were manufactured by a group of engineers and the flow around a heating platen nozzle was simu-

Equipment for nozzle flow tests with air



Test rig design for flow investigations with oil

Test rig during oil flow tests

lated. All assumptions of a new flow model in this area could be confirmed by respective tests and technical measures were developed to eliminate the disadvantageous leak flow. In addition, these modifications will lead to a much more uniform pressure profile in the machine, which will be beneficial to the product quality.

The discovery even provides an explanation to most of the flow effects and wear observations that could not be explained so far.

Some press users were interested in the new development and already invited the author to present details on the encouraging research results.

Currently, measurements are being prepared and carried out on a press to examine the use of this technique in a production press and to compare the results with those obtained with the standard Teflon pad version.

Interested Hydro-Dyn press users are invited to contact Dr. Haupt for more detailed information in this matter.

A Hydro-Dyn press for particle-board production travels from Spain to Turkey

Start of the installation of the press and the components of the silicone oil circuits

At its site located at a two-hour car drive from Madrid, the Spanish company UTISA produces particle-board. As the company decided to increase its daily production capacity, the existing Hydro-Dyn press was no longer used and consequently offered for sale.

In 2007, Masstas – a Turkish customer and producer of particle-board – bought the entire production line. The disassembly, the transport to Turkey and the installation near Mudurnu, situated halfway between Istanbul and Ankara, were planned. Dr. Haupt was charged with supervising the disassembly and erection of the press at its new working place.

This press with its 16.4 m long heating platen and 2.20 m production width forms the high pressure part of a machine. Its speed and production capacity can be increased by extending the length and adding a low pressure part at a later date.

Start of the pipe insulation work behind the press

The press features a heating and a cooling zone.

During the planning activities on site, it was decided not to use an existing building – as this would have involved many com-

High pressure pump station prior to the work for the heat insulation

promises – but to set up a completely new building for the production equipment for forming, pressing, stacking, storage and upgrading of the product.

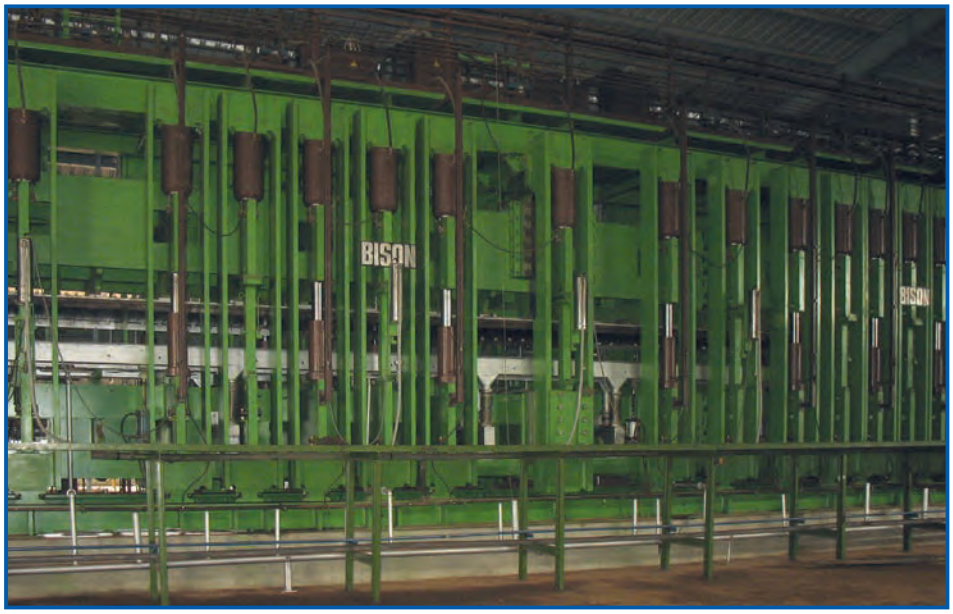
The complete production line, including the unwinding equipment of the press for direct in-line lamination, was installed in the new building and successfully started.

Some years ago, the production site of Masstas was taken over by Yildiz Entegre. This company finally needed an increased daily particle-board production capacity and installed a respective new press line to achieve the required production output. Since that time, the Hydro-Dyn press has been offered again for sale to future users.

Forming line, pre-press and main press

Press close to start-up

Fibre board press with cooling zone now operated in Vietnam



View of the central part of the MDF press after installation at the new site

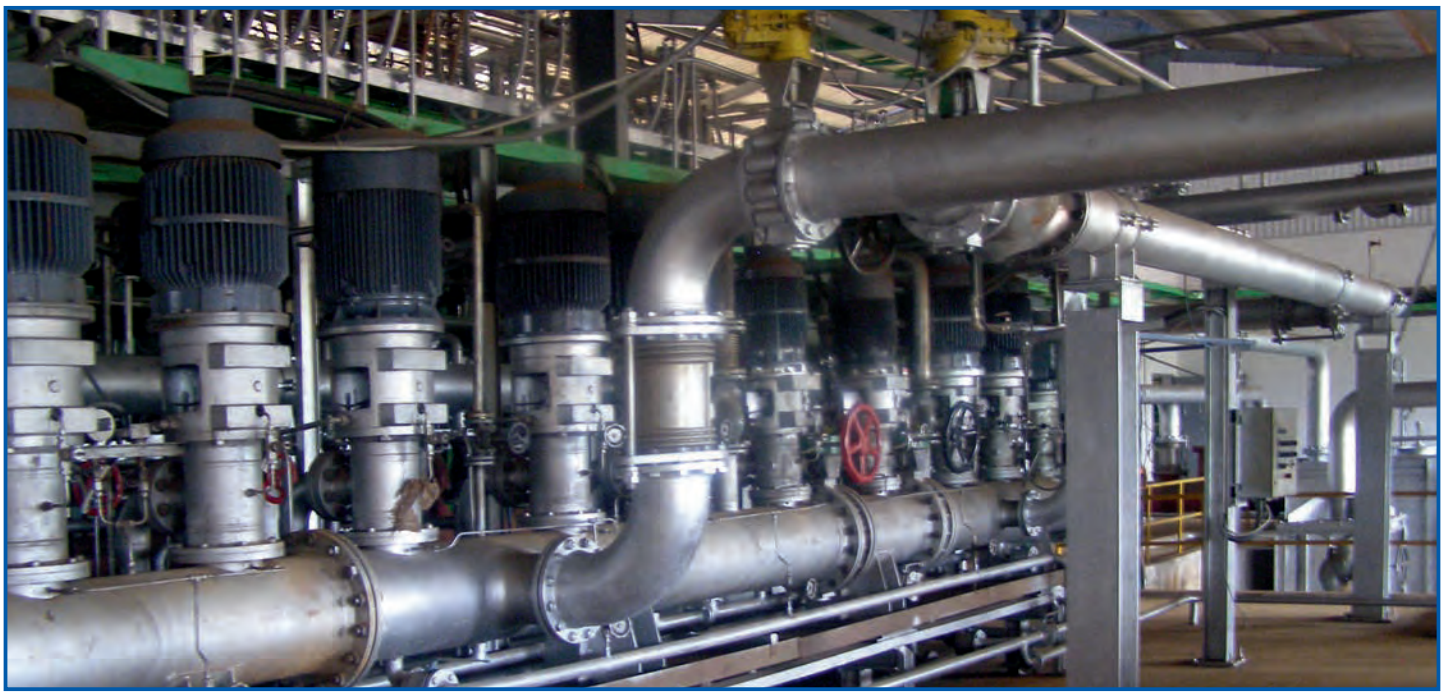
Heat exchanger and piping of the press cooling system

A Hydro-Dyn press for the production of MDF board is operated by the Company Long Viet MDF. The line is installed in an industrial area South-West of Ho Chi Minh City close to the Cambodian border.

This press is 20 m long (heating platen length) and 4 ft. wide and features a heating and a cooling zone. The press is working at a specific pressure level of 50 bar in the HP zone. Long Viet MDF installed the press at its future site and asked Dr. Haupt for technical support during installation and operation of the press line.

The author visited the new installation twice and inspected the equipment during assembly. He provided training in the function of the press system and its various components. Dr. Haupt informed the customer about the parts to be cleaned, to be measured and corrected, to be exchanged by new ones due to insufficient function and about correct lubrication. In addition, he provided advice on heating platen nozzle distribution, Teflon pads and on the system of oil scrapers and seals.

The press was started successfully in October 2011 and the line has been used for the production of MDF board since that time.



High-pressure pumps of Long Viet's Hydro-Dyn press

Installation of a second Hydro-Dyn press at Trelleborg's production site in Kalmar/Sweden

Plant manager Ulf Johansson in front of new installation

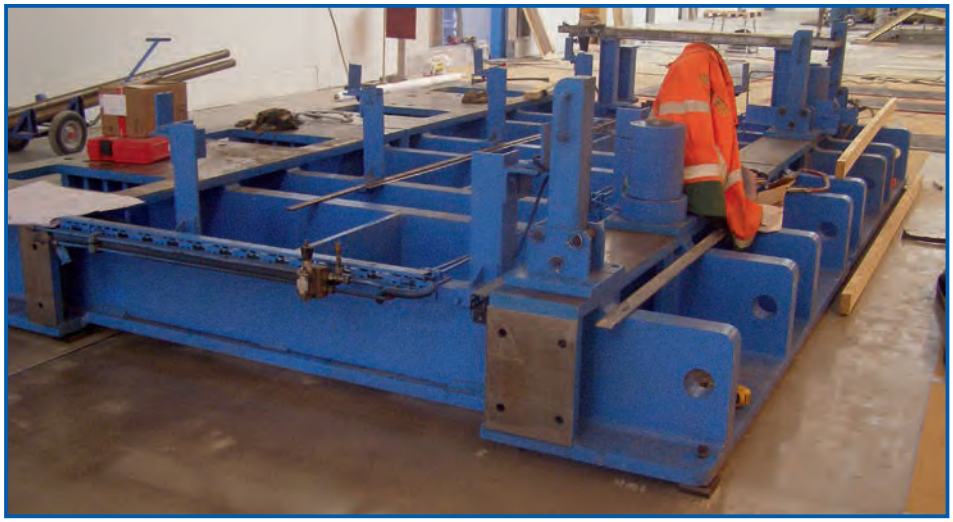
The new name of Trelleborg Rubore in Kalmar/Sweden is "Trelleborg Sealing Solutions Kalmar AB". The company is the leading manufacturer of noise suppression and anti-vibration systems for automotive and industrial applications.

Since 2002, Trelleborg has been operating a Hydro-Dyn press in its long continuous production line. Several years ago, the company decided to install a second line in order to respond to market demands. The new line features again an integrated Hydro-Dyn press with 70 bar specific press pressure.

The new press was disassembled at the former HP laminate production site in Perstorp and then installed in Kalmar after transport.

Dr. Haupt supervised the disassembly in Perstorp and the erection of the press in Kalmar, which started production in 2009. Since then, production with the machine has always been stable and satisfactory.

Trelleborg thanks Dr. Haupt for his contribution in this work as well as for the yearly supervision of maintenance operations performed on the presses of both production lines.

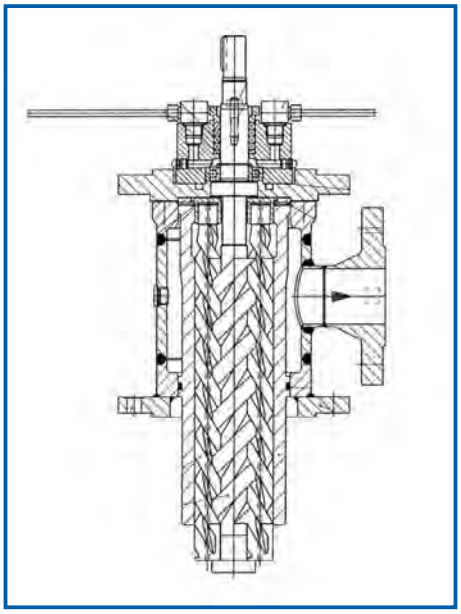


Press installation in Kalmar
Levelling of the steel carrier part of the press on the concrete foundation

Trelleborg's new Hydro-Dyn press in the second production line upon completion

FMH – The spare part source for your Hydro-Dyn press

Owner of FMH Guido Metzig in front of the 18 tons weight portal milling machine for the production of Hydro-Dyn press aluminium plates carrying Teflon pads



FMH supplies HP-pumps (screw pumps) for Hydro-Dyn presses

The German company FMH manufactures and supplies original spare parts for Hydro-Dyn presses world-wide. All parts offered are produced on the basis of original drawings and material specifications.

Since 1999, Guido Metzig, the owner and head of FMH, has been serving Hydro-Dyn press users in a direct business contact. This enables him to react to sometimes urgent demands for spare parts with the aim to minimise machine stops and negative impacts caused by missing spare parts. There is a long list of customers Guido could help in critical situations by overnight manufacture and fast delivery in the past.

The Hydro-Dyn press structure – based on the principle of a gliding steel belt on an oil lubricated surface – includes typical wear parts. All moving parts, such as the steel belt or the pumps for example, are subject to wear and consequently need to be exchanged at the end of their service life.

But also the stationary components like Teflon pads, lip seals, scrapers, etc. are affected by wear during production and must be occasionally replaced. To ensure satisfactory product quality and stable machine operation, the use of worn parts must be avoided. This is an important economic issue.

As the components of Hydro-Dyn presses are made of very different materials like plastics, aluminium, steel and rubber that work together in the machine, accuracy in spare parts production is of fundamental importance. Different materials feature different heat extension rates, which must be allowed for. In addition, components behave differently in terms of thermal extension in hot and in cold press zones.

Your spare part supplier FMH has collected extensive experience in this field and offers suitable parts meeting the most different requirements as well as a high level of manufacturing accuracy to ensure outstanding dimensional stability of the parts.

In addition, various improvements in the design of Hydro-Dyn press components could be developed in recent years. FMH is cooperating with Dr. Haupt in the company's R&D activities, e.g. in producing prototypes of newly designed parts, evaluating their suitability and in solving practical technical questions.

FMH has built two different test rigs – one operated with air and the other with oil – that required fundamental research. The flow from the heating platen to the steel belt was simulated in these tests and surprising results could be obtained. Based on these findings, significant improvements in the heat transfer in the machine and in the pressure profile uniformity can be expected.

FMH continues to offer support to its customers in all questions around the choice, the use and the supply of original Hydro-Dyn press spare parts. Guido Metzig and his team are willing to provide the best possible service in Hydro-Dyn spare parts in terms of product quality, production time and costs.

FMH
Produktions-GmbH

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Peter Hoffmann – Pioneer of Hydro-Dyn

Peter Hoffmann

After the idea of a continuous press with steel belts gliding over an oil-lubricated surface had been developed in the past, this concept had to be turned into engineering and industrial reality.

The person behind this important work was Dipl.-Ing. Peter Hoffmann, head of BISON's press development at this early stage. Peter had committed himself with creativity and passion to designing the press and to calculating the parameters for all components.

Later on, Peter advanced to the position of BISON's head of engineering design department, responsible not only for Hydro-Dyn presses, but also for all machines for the wooden industry, such as formers, blenders, sanding machines, etc. and for the equipment used in the production of cement and gypsum board.

In this capacity, Peter was responsible for the design of many Hydro-Dyn presses manufactured in the years between 1985 and 1998. In these activities, he closely cooperated with the author, Dr. Haupt, and numerous press system improvements could be developed in this period.

Peter Hoffmann remained head of the mechanical design department even after Kvaerner, Metso and Siempelkamp took over BISON's business.

Working for Metso, he was also in charge of the design and development of Küsters or Metso double-belt presses.

In January 2014, Peter retired at the end of a successful professional career.

No other name is linked more closely to Hydro-Dyn press design and development than Peter Hoffmann. His open-minded willingness to provide technical support and readily assist colleagues and customers is widely appreciated and acknowledged. His fundamental knowledge on the design and construction of Hydro-Dyn presses forms the basis of his unparalleled reputation in this technical field.

In recent years, Guido Metzig, owner of the Hydro-Dyn press spare parts supplier FMH, and the author were faced with fundamental questions concerning the oil flow in the machine. A leak flow was detected that apparently affects the uniformity of the pressure profile and the heat transfer in the press to a high degree.

In this situation, Peter did not hesitate to cooperate with the group of engineers trying to solve this key problem. With his well-founded knowledge, he contributed to the design of test rigs, the evaluation of test data as well as to developing new parts for an improved function of the machine.

The author would like to express his gratitude for Peter's close and friendly cooperation in the past. The fruitful discussions with him and his competent technical input in the development of solutions to many problems were the key to the progress achieved.

Acknowledgements

The editor would like to express his thanks to all authors of articles in this issue of **THE PRESS** for their contribution. Thanks are also due to all companies that cooperated with the editor in turning ideas for press system improvement to reality.

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