

**SPECIAL
REPRODUCTION**

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AKTUELLE PAPIER-RUNDSCHAU

CROSSMEDIA-INFORMATION FÜR ENTSCHEIDER DER PAPIERWIRTSCHAFT

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[PAPIERERZEUGUNG]
Deutsche Papierproduktion schrumpft

[INGEDE]
Weniger Mineralölrückstände in Verpackungen

[PLAGIATE]
Lösungen zur Fälschungssicherheit

[PAPIERHERSTELLUNG]
Kalzium wird für Altpapierverarbeiter zum Problem

[SPECIAL]
**KARTON-
ERZEUGUNG UND
FÄLSCHUNGSSICHERHEIT**

[INNOVATION]
Papierumreifungssystem mit Papiergarn

RICHTER Pumps

Vacuum Pumps Service + Retrofit

- Stopping energy losses
- Increasing repair intervals





On-site analysis of a vacuum pump by Richter service engineers (here Heinz Heiliger, left and H. F. Laub)



Worn out vacuum pump impeller Siemens Elmo after sand blasting. The material deterioration of the impeller is marked in red.

[TITELSTORY]

MASSIVE ENERGY SAVINGS BY VACUUM PUMP RETROFITTING

The Company Wolfgang Richter of Düren analyzes, repairs and optimizes vacuum pumps. By means of on-site analysis the energy losses of each pump are identified and documented. The repair is done using highly wear-resistant special materials, which ensure that repair intervals and energy efficient operating periods are extended.

The company with three sites in the district of Düren can look back on more than 40 years' experience in overhauling complete aggregates and consumable parts in the paper industry. In the year 2005 the company started to intensify its services for overhauling vacuum pumps as part of the company's wide repair range and to thereby expand it into a separate business unit. Meanwhile centrifugal pumps, rotary piston pumps and head box pumps continue to be repaired and optimized as well. A growing number of paper producers relies on the pump service provided by Richter, which will move into its own factory in the near future: in the summer of 2012 Richter opens factory III "Pumps" in Düren.

Liquid ring vacuum pumps on paper machinery ensure optimal water drainage. If these are damaged or worn out, the gaps will become too large and the pump will have less suction power and energy is lost – initially unnoticed as the increased energy consumption is not recorded on the pump. "Unfortunately there is no indicator on the pump showing the current energy loss", says the junior Manager Dirk Richter. New vacuum pumps normally have to be

overhauled after four to six years depending on the use conditions. According to the information from Richter they nonetheless sometimes run for a longer period in the paper mills. "We recommend that our customers subject the pumps to a general repair at regular intervals. The intervals depend on the operating conditions. It was important to inspect and analyze

» Return of investment in less than one year in most cases «

the pumps regularly in order to discover deposits and enlarged gaps on the sealing surfaces.

Enlarged gaps are regenerated, i.e. returned to their original size by means of highly wear-resistant materials. Sections with deposits are coated with special composite materials after the deposits are removed and these materials will prevent new deposits or at least reduce them in the future.

These measures pay off, because energy efficiency deteriorates much more slowly and the time until the next cleaning or geometric regeneration can be prolonged considerably.

All types of liquid ring vacuum pumps, e.g. the types Nash, Siemens-Elmo, Bell are covered by the reworking service and likewise all rotary piston systems, also called Roots blowers, e.g. Hibon, Dörries. "Our focus is on repairing vacuum pumps with different materials and optimizing them so that they receive the optimal protection against wear and tear", says the mechanical and welding technology engineer Dirk Richter. For each section of the pump Richter selects the matching materials for reworking. Available as choices are various kinds of steel, stainless steels, highly wear-resistant composite materials that have been developed with the significant contribution of father and son Richter. Thermal injected anticorrosion protection layers, such as hard metals or Wolframcarbide (Tungsten) layers and ceramic layers until present used to be applied by subcontractors as needed. From now on they will be coated within



Side brackets coated with the composites that are adjusted to the relevant use conditions



Clogged Nash cone, the on-site analysis showed an 85% loss of performance



Cleaned Nash cone which was additionally coated with composites protecting against new deposits

the company on the new thermal coating system for roll coatings (see report apr nr. 02/2012).

After the overhaul, the pumps are then much more resistant against wear and tear than new pumps. Senior manager Wolfgang Richter says “We use only highly wear-resistant materials so that clearance losses can be reduced in the course of the operating life - even compared to new pumps.” Professional advice is provided at the Düren company by H. F. Laub who has 40 years of experience in the field of liquid seal pump service and who also attends the on-site inspections during which the condition of the pumps is examined in the paper mill. He calculates the losses of performance that are caused by gaps being too large and deposits, as well as the costs resulting thereof that are created for the paper producer each year due to the avoidable energy losses.

Different types of wear and tear can occur with liquid seal vacuum pumps. Especially in the recycling paper sector, abrasion from solid particles has to be expected. It causes strong erosions on the housing and head pieces. Mechanical damages also result if the partial air pressure in the air/steam mixture falls short of 16 mbar because of cavitation. This can happen with high vacuum or high sealing water temperatures or a combination of both. The reason for this is the deculator in most cases. Corrosionlike damage can also be caused by the sealing water’s so called conductivity, meaning the capacity to conduct electricity. This physical value should be inspected on site at regular intervals. Vacuum pump Specialist H.F. Laub recommends inspecting the pump with an

endoscope at regular intervals, starting from a conductivity of 5500 microsiemens in order to detect alterations in the material immediately. As of 600 micro siemens with new pumps, the use of stainless steel was then required, and with overhauled pumps either an appropriate coating or a stainless steel covering.

» Energy loss
 of 200,000 Euro
 per year«

The analysis of the performance test had shown that the loss of performance on liquid seal vacuum pumps has doubled in the past 20 years from one percent annually to a rounded 2%. Playing an important part in this development are the substantially increased deposits, specifically in the discharge area of the cones or the slots in the control disks. According to the company, soiling caused by the increasing use of recycling paper has become more frequent and in addition, pumps are burdened by the proliferating use of chemicals in the recycling paper processing.

H. Laub has calculated that 35% loss of performance (m³/min) for a pump (100 KW, 100 m³/min) increases the performance factor (KW/m³/ min) by 35%. On the assumption of EUR 500/KW/year this means a loss of EUR 17,500/ year for this pump. If this is then multiplied by the number of pumps it can quickly happen with six pumps that the energy losses amount EUR

100,000 per year. “We consider only the vacuum pumps here in the assessment of the losses. The total loss on the machine should, according to customer information, be about twice the amount”, says H. F. Laub. For example, the paper remains more humid and must be dried later on with additional energy consumption. When applied to the example above, the energy losses then amount around EUR 200,000 per year.

At the latest every four years therefore, vacuum pumps should be inspected in a performance test so to ascertain the energy losses caused by wear and tear or clogging. Richter offers these tests to its customers and can provide precise information in this way regarding the pumps’ loss of performance. By means of supplementary endoscope inspections, the company in Düren can additionally detect deposits and damages. The customer receives a comprehensive overview in a concluding personal meeting as to the condition of their pumps. Normally, the return of investment for a pump overhaul with large pumps is considerably less than one year.



Comparison of Elmo control disks (new+old). The sealing surface that is decisive for the function is heavily corroded, the control clearance gaps are clogged, i.e. extreme energy loss.

“Because paper producers have their pumps overhauled and optimized by us, they can turn off pumps and thereby save energy additionally”, says Laub. In many cases the vacuum pumps in the paper mills were overdimensioned anyway. For this reason, the paper mills often do not notice that the pumps are already working in a poor condition. “Since inefficient pumps still provide enough vacuum so that the energy waste is initially not noticed.”

Besides the vacuum pumps, the company Richter repairs and overhauls centrifugal pumps, rotary piston pumps and head box pumps and at a minimum grants a 95-percent performance guarantee for every pump repair. In the repairs, Richter also renews bearings and seals, and readjusts the axial clearance. Furthermore, the company proposes replacing the expensive and hard-to-get Timken

bearings by cheaper, common pendulum roller bearings. To the present day, nine out of ten customers have decided for this modification.

All repairs are discussed in detail with the customer and adjusted to the existing operating requirements. By virtue of using highly wearresistant materials in the section of the gap, the runner and in the

housing, a prolonged operating life and an optimal pump operation is achieved.

Pump expert Laub perceives a clear advantage in the cooperation with Richter: “Because the company Richter is a repair shop and does not have to sell any spare parts, it can adjust 100 percent to its customers’ requirements. Therefore: what is being done here is custom tailored. What has fascinated me particularly is that Richter is very innovative and can always react within a short time.”

By now, about 50 to 60 pumps per year come to Düren for overhauling. A complete repair normally takes up to ten weeks. Dirk Richter: “But in urgent cases, we complete a general overhaul within two weeks - however, this only works in day and night shifts. For emergency repairs without general overhaul we are of course even faster.” | DB

Factory III “Pumps” Product Portfolio On-site service

- Analysis of the condition with calculation of the performance losses in Euro
- Assembly service

Liquid ring and vacuum pumps

- Nash, Cutes, Siemens-Elmo
- Bell, Sihl, Erwepa, Azmec

Rotary piston vacuum pumps (Roots blowers)

- Dörries
- Hibon
- Escher Wyss

Centrifugal pumps

- all makes

Pulp arrival pumps

- all makes

Other pumps, e.g.:

- Mono-pumps
- Color mixing pumps