

Left: Worn bushing from a multi-daylight press

Above: Leaking hydraulic oil from a cylinder is collected in a tray

# Hydraulic presses need effective sealing

State-of-the-art continuous press lines have been taking an increasing share of the total manufacturing capacity of raw boards in Europe and globally. However, the majority of today's presses are still of the traditional hydraulic type.

These hydraulic presses also dominate lamination and postforming in the panel industry and this further increases the total number of hydraulic press lines in wood based panel plants.

The high investment requirement of a new continuous press line, combined with the current economic climate, puts pressure on the existing equipment for increased capacity/higher production, increased reliability, reduced operational and maintenance costs, reduced repair time and improved efficiency/profitability.

The ageing hydraulic press population, and the linear nature of the manufacturing process, are the other factors which make the reliability of the press more complex.

However, this reliability in general depends on the reliability of the hydraulic cylinders and their sealing components and systems within those cylinders.

Increasing capacity by increased hydraulic fluid pressure and operating speed, combined with damaged, scored, rod and plunger surfaces, worn bushes and metal components, creates very demanding operational conditions for the seal elements in the cylinders.

With the high-variation operational parameters and ever-changing physical

As a major component of presses, the effective operation of hydraulic cylinders is vital to successful press operation. A W Chesterton specialises in the design and supply of sealing systems for hydraulic press cylinders

conditions of the press cylinders, the original/traditional hydraulic seal solutions can face difficulties, says Chesterton.

Short lifetime, frequent seal replacement work and continuous hydraulic fluid leakage are some of the typical challenges that we face in hydraulic presses.

Headquartered in the US, AW Chesterton has been providing a wide range of sealing solutions for press and hydraulic cylinder applications in the panel industry.

The company's activities in designing and manufacturing seal components and systems for wood based panel hydraulic press lines started 30 years ago and incorporates engineered sealing solutions for all panel manufacturing lines, as well as laminating and postforming hydraulic press lines.

Chesterton says that the variety of press configurations (single-daylight, multi-daylight, down-stroke, up-stroke or short-cycle) have presented it with different challenges requiring the development of different sealing, bearing and cylinder protection solutions.

Serving the end-user, the company says it has already delivered seal systems for all types of presses, from all major press manufacturers.

It also says its sealing systems and solutions bring measurable advantages to

hydraulic press operators, saying there are several aspects to be taken into consideration during the selection process.

For instance, the physical condition of the press cylinders (worn bushes and scored, damaged surfaces) determine the optimum seal profile(s) and seal materials. The seal elements used have to be able to compensate for the radial motions of the plungers and conform to the surface irregularities to provide leak-free operation. In addition, the flexible lip design extends the sealing capability of the seals in certain seal groove space variations. This could be a real challenge where:

- The water based hydraulic fluid has already caused corrosion on the static surface of the seal cavity
- A high-friction seal set has already caused wear on the plunger surfaces and the plunger diameter is not constant along the working counter-face of the ram
- High friction wear has already caused a wavy surface on the stuffing box's static surface (micro motion of the stacked v-ring sets' lips).

The automatic sealing effect of lip seals should create the optimum sealing force and reduce the friction of seal lips and counter-face metal parts (plungers and cylinder bores), says Chesterton. Consequently,



Fitting a split seal to a multi-opening press

further wear is going to be reduced while the service lifetime of the seal systems is increased. In this way the expensive, time-consuming press shutdown and repair of press cylinders can often be avoided.

Furthermore, says the company, its new seal components can be retro-fitted and are compatible with existing seal cavity geometries – otherwise expensive modification works, which cannot be done on site, would be involved.

Difficult access to press cylinder stuffing boxes, complexity of the stuffing box disassembly and the hard working environment (for example high ambient temperature) require a split-seal solution. This split configuration simplifies the installation works and reduces the repair time dramatically, says the company.

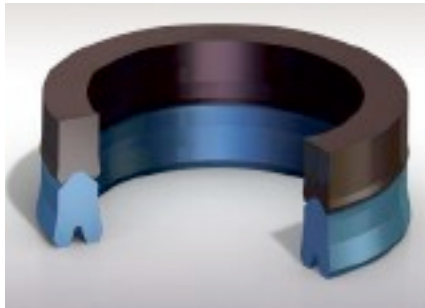
Chesterton says its modern seal design helps to provide leak- and maintenance-free operation, while eliminating the need for future shimming and adjustment work and releasing maintenance labour.

Most of the listed features and consequent benefits are combined in the Chesterton 11K EZ Stack Pack seal design, says the company, pointing out that several successful applications and cases prove the value of the synergy of the new seal design concept with high-performance polymer materials.

“This optimised concept brought a long service life solution and smooth, parallel motion of press cylinders for different press applications such as multi-daylight up-stroke particleboard presses and single-daylight short-stroke high-speed laminating presses in



Repaired bottom bush of laminating press



Chesterton 11K split press seal

the same panel plant,” says Chesterton’s marketing manager István R Hajzer.

The reliability of the cylinders, and the service life of the seals, are heavily determined by the condition of the cylinder metal components. That is why the bronze bushes (guiding elements) of the press cylinders have an influence on the reliability, too. Worn, deformed bushes allow high radial force, excessive wear and deformation of the cylinders’ seal components, so shortening the service life and increasing the risk of hydraulic fluid leakage.

“The new technology allows us to make the repair of the existing, worn bushes fast and easy, eliminating the need to keep expensive spare bushes in stock,” says Mr Hajzer.

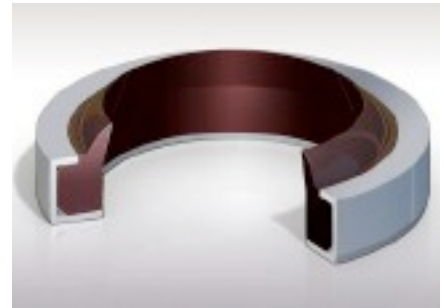
Chesterton’s non-metallic bearing bands are said to minimise repair time (thanks to the split design) and reduce the repair cost of the press cylinders, while a further advantage claimed is the elimination of metal-to-metal contact among the moving parts of the cylinders, thus prolonging life.

“The newest, high performance, bearing materials have higher carrying load than standard hydraulic bushing material SEA 660 graded bronze, so the non-metallic bearing band-upgraded bushes can withstand higher radial force, protecting the seal elements against excessive deformation and possible extrusion,” says Mr Hajzer.

“The bearing bands are manufactured from self-lubricating materials, so sliding is improved and friction reduced, while the ultra-tight-tolerance manufacturing of the



Repaired bush of single-opening PB press



W21K wiper ring

bands helps to maintain the precise concentricity of the main metallic components in the press cylinders.”

The third element of a modern sealing system is the wiper ring (excluders and scrapers), which provides protection to the seal components, cylinder and whole hydraulic system. The importance of such protective elements has been underestimated for a while, according to Chesterton, which says that today, the high performance wiper rings have become an essential part of effective sealing systems.

The basic requirement of a wiper is the positive-rake lip design which effectively wipes contaminants away from plunger/rod surfaces. Such protection prevents scoring of seal elements and metallic components of the cylinder, in addition to preventing system and hydraulic fluid contamination. The importance of effective wiping becomes obvious when considering the operational environment of the press cylinders, which is dusty and full of small abrasive particles. So the design of the wiper ring has to be combined with high-resistance polymer material technology.

The positive influence of the wiper rings can be measured by the extended lifetime of seal elements and by the increased reliability of the cylinders and presses, while the return on investment time utilising the high-performance wipers brings immediate results to the press owners, claims Mr Hajzer.

Besides delivering sealing solutions to end-user and wood based panel oem’s, Chesterton is involved in modernisation projects for press lines. This programme, called the Chesterton Press Cylinder Upgrade Programme, includes: Technical consultation, troubleshooting, on-site service and survey, hydraulic CAD engineering and redesigning for upgrading existing hydraulic presses.

“One of the possibilities to maintain the efficiency and profitability of press lines is to reduce the operational and maintenance costs of the equipment. That is why Chesterton’s goal is to provide state-of-the art engineering solutions, assisting panel manufacturers to improve equipment reliability, reduce downtime, operating cost and finally improve profitability,” concludes Mr Hajzer. ■