

IN FOCUS: Pulp & Paper



DURABLE, ABRASION AND WEAR RESISTANT SOLUTIONS

By 2020, it is estimated that paper mills globally will produce over 400 million tonnes of paper and paperboard every year.

Trends indicate that pulp and paper companies have increasingly combined their forest harvesting and lumber mill operations in a bid to increase the efficiency of their sourcing and production.

As a result, the number of functions and types of equipment found within paper mills has increased and the types of issues that can be associated with the pulp and paper process.

Wood Handling Process

Used to strip the bark from logs, de-barkers are among the most robust pieces of machinery operating within the industry, facilitating high volume processing at an early stage within the paper making process. This method creates an incredibly abrasive environment, progressively wearing the machine's components.

Durable repair composites, such as Belzona 1811 (Ceramic Carbide), are designed to withstand these harsh environments. They are often used to rebuild damaged equipment and provide long-term abrasion resistance.

Wood Chipping

The process of wood chipping causes continuous wear and abrasion from wood chips entering at high velocity, damaging the knives but, more importantly, the knife pockets as well.

Worn knife pocket profiles can further deteriorate the rotor assembly, as well as lead to the generation of off-size chips. Unsatisfactory chips will adversely affect the pulping process and the quality of the resultant paper, therefore this issue can be rather costly.

Pockets can be reformed using a 100% solids Belzona 1000 Series material, to create a perfectly mated profile. Future corrosion issues will be eliminated making the recurrence of worn knife pocket profiles unlikely.



Abrasion resistant lining on de-barker



Chipper disk pocket rebuilt with Belzona

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RANGE OF BELZONA REPAIR MATERIALS

The process of manufacturing paper is a long and complicated one. There are many different pieces of equipment involved, many of which can be repaired or protected by utilising a durable, abrasion and erosion resistant Belzona solution, such as:

Belzona 1111 (Super Metal)

- » Multi-purpose durable repair composite
- » Fully machinable using conventional tools
- » No shrinkage, expansion or distortion

Belzona 1321 (Ceramic S-Metal)

- » Long-term erosion and corrosion protection
- » High compressive strength
- » No shrinkage, expansion or distortion

Belzona 1341 (Supermetalglide)

- » Improved efficiency of pumps, pipes, valves and other equipment
- » Long-term erosion and corrosion protection
- » Long working life

Belzona 1811 (Ceramic Carbide)

- » High abrasion and wear resistance
- » Will not corrode
- » Fast cure rate ensures prompt return to service

Belzona 1812 (Ceramic Carbide FP)

- » Excellent resistance to fine particle abrasion and wear
- » Will not corrode
- » Fast cure rate ensures prompt return to service

Belzona 1813

- » High abrasion and wear resistance
- » Very high heat distortion temperature
- » High mechanical strength

COMPOSITES AND COATINGS FOR THE PULP AND PAPER INDUSTRY

Repair and protection against abrasion, erosion, corrosion, high temperatures and chemical attack

Wood Screening and Storage

The equipment involved in the processing of raw wood can suffer from a variety of problems. Chipper discs, for example may suffer from wear, whilst mill rolls and lumber transfer rollers may lose positive traction over time. Other equipment such as belt and screw conveyors, silos and storage tanks also suffer from abrasion and wear.

Belzona provide solutions to many of the problems related to storage and moving of the chips. With a versatile product range specifically designed to repair and prevent various abrasive wear conditions, Belzona has become the solution of choice for many pulp and paper plants where abrasion is an issue.



Grip system applied to transfer rolls at lumber mill

Pulping and Pumping

Regardless of the pulping methods, paper mill pumps are put under immense strain due to the transfer of viscous material throughout the pulping process. Together, the sludge and slurries combine a high solids content, copious amounts of entrained air and often processing chemicals, resulting in issues associated with erosion, corrosion and chemical attack.

Severely damaged equipment, such as diffusers, rotary vacuum washers or liquid ring vacuum pumps, can be restored to their original profile and protected from deterioration using our range of epoxy repair materials and coatings. Belzona's cold-applied, paste-grade, metal repair composites, such as Belzona 1111 (Super Metal), can be used to repair cracked and holed pumps, providing outstanding chemical resistance.



Vacuum pump protected against corrosion

Screening, Cleaning, Beating and Refining

After successful screening, the pulp goes through mechanical processes known as beating and refining. Equipment commonly used in this process, such as cone refiners, hydrafiners and disc refiners, operate under extreme compression and tension which often leads to severe erosion and abrasion of the internal surfaces.

Incorporating ceramic aggregates prevents deformation and wear, providing long-term protection. To increase equipment life, wear resistant alumina tiles can be bonded and grouted in place to create a hard wearing, extremely abrasion resistant lining.



Abrasion resistant system incorporating tiles

Water Removal and Drying

As pulp contains 99% water, paper mills are very wet and warm environments, meaning various components used in this process are subjected to heat and high humidity. This, coupled with vibration, can cause wear and mechanical damage to shafts, bearings and casings.

Worn and damaged shafts can be repaired in situ, limiting the downtime and lost production costs which can be incurred. Bearing housings can be repaired utilising our erosion and corrosion resistant metal repair materials, which provide solutions that can extend the lifetime of equipment and return machinery to service in a fraction of the time. Dryer cans prone to leaks and steam loss can be also refurbished with Belzona metal repair composites and epoxy coatings.



Shaft repair on chipper disk



DE-BARKER PROTECTED AGAINST ABRASION AND WEAR

Abrasion resistant lining keeps paper mill operational

At a Polish paper mill, operated by Stora Enso, the hardened steel protection plates of its de-barker were wearing away at a rate of 2-3mm per year. The significant static and dynamic stresses associated with the process were severely abrading the equipment; therefore, Stora Enso required a solution to prolong the life of the equipment. However, if the problem was not resolved during the planned maintenance period, the customer could risk a stoppage to the plant and costly downtime.

As an existing customer, the mill contacted Belzona's Polish Distributor, Belse Sp, for further advice on the situation. Having completed a range of applications for the mill previously, they specified an abrasion resistant solution which, crucially, could be cold-applied within the designated maintenance period.

In addition, Belse had previously carried out an identical application for a de-barker. This had been a big success, particularly in terms of the longevity within a severely abrasive environment; therefore, the mill chose the Belzona solution to complete the repairs and lining of the de-barker.

Upon selection, the work was performed over the course of six days, including full surface preparation of both the wet and dry drum by grit blasting. Initially, the steel drums were coated using Belzona 1321 (Ceramic S-Metal), a ceramic filled epoxy coating, designed to combat highly corrosive environments. Additionally, a protective barrier of Belzona 1811 (Ceramic Carbide) was applied. Incorporating abrasion resistant ceramic aggregates, this system was chosen to provide the de-barker with long-term wear and abrasion



Each drum measured 10m in diameter



Grit blasting the de-barker drum

resistant characteristics, alleviating the issues it had been facing.

Due to the scale of the de-barker, which measured 10m (33ft) in length and 3.9m (13ft) in diameter, the paper mill was impressed that the application was completed within the designated timeframe so quickly and effectively. Pleased with the result, Stora Enso commented "The application on the dry and wet sections of the de-barker was good quality and completed on time. We recommend Belzona technology as a high quality and durable solution"



Application of Belzona 1321 (in grey) and Belzona 1811 (in red)

BELZONA PLAYS ITS PART IN RECYCLING

More than half of the paper produced every year comes from recovered sources, namely industry and business. Experts indicate that paper can be recycled an average of four to six times; however, this can significantly affect the process through which it can be recycled.

Belzona solutions can be utilised throughout the recycling process, including the following scenarios:

Conveyor belts:

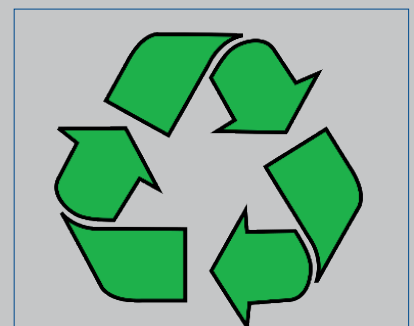
Transporting the recycled materials to the next stage of the process is necessary throughout the recycling plant. These conveyor belts can become damaged after catching and can be repaired using Belzona's range of rubber repair materials, such as Belzona 2111 (D&A Hi-Build Elastomer) and Belzona 2311 (SR Elastomer).

Balers:

Balers are commonly found in recycling facilities, packaging together large amounts of recycled materials. Problems can arise if operators avoid preventive maintenance tasks or simply ask too much of their balers.

Issues with the hydraulic systems are frighteningly common, resulting in pump and cylinder damage. Improper knife adjustment will also cause expedited wear, as well as cylinder leaks. Belzona 1212 can be used for these emergency situations, providing a surface-tolerant metal repair solution.

Finally, the baler jaws can be susceptible to abrasion damage from compacting various materials. Coating the jaws with Belzona 1321 (Ceramic S-Metal) protects them from further abrasion, in addition to offering excellent corrosion resistance.



BELT REPAIR RESTORES RECYCLING PROCESS

The transfer of recycled paper is an important aspect of the recycling process, one which can affect the entire plant if damaged. At a paper mill in São Paulo, Brazil, loading the recycled paper onto the conveyor belt involved careful manoeuvring of the fork lift truck. However, after catching on the forks, the rubber belt became extensively torn and the process was halted.



Traditional repair using vulcanisation would have involved an emergency call out from a specialist contractor, who would have had to travel from another city. Overall, this option was costly and resulted in unacceptable downtime. As a result, the mill chose an alternative, fast-curing elastomer to complete the application.



Cutting back the top cover, the torn rubber was abraded and conditioned, before using Belzona 2311 (SR Elastomer) to repair the damage belt. Incorporating Belzona 9341 (Reinforcement Tape), the system provided a long-lasting, abrasion resistant solution. In two hours, the Belzona repair allowed the equipment to return to service with minimal disruption.

PAPER MILL RECEIVES WELCOME PUMP PROTECTION

Belzona coatings extend pump lifespan by three times

In 2010, at an Italian paper mill, the casing and internal components of a cast iron, submersible sludge pump were suffering from particular problems relating to transfer of viscous slurries. In fact, the pump was barely lasting a maximum of two years in service before requiring major overhaul and replacement.

Overall, this was costly, both in terms of replacing the equipment and the downtime that was associated with the dismantling and installation of new pump components. After careful selection, a combination of erosion-corrosion resistant systems was chosen to complete the application.

After initially rebuilding the metal loss in the pump using Belzona 1311 (Ceramic R-Metal), it was internally coated with Belzona 1321 (Ceramic S-Metal). This coating offered significant erosion-corrosion protection, whilst simultaneously providing a barrier against chemicals used in the pulping processes. Finally, the pump was coated externally using Belzona 5811 (Immersion Grade), designed to preserve equipment operating under immersed conditions.

Originally coated in 2010 with Belzona, six years later the customer opened the pump for mechanical maintenance. Throughout its six-year service life, the pump faced zero downtime due to Belzona erosion-corrosion protection and, impressively, the coating was found to be in excellent condition. However, it was decided to refresh the coatings in order to prepare the pump for more years of service in sludge; therefore, the original coating was roughened before applying a new layer on top.



Pump originally coated in 2010

This polymeric solution continued to extend the pump's in service life further, saving the company significant replacement costs. The client expressed their satisfaction that their maintenance costs were reduced and the equipment was protected in the long term against the dangers of erosion-corrosion.



Components still excellent six years on



Recoated for future service in sludge

For more information, please contact your local Belzona representative:



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