

Stafsjö
SINCE 1666

Case

Critical isolation solutions for Thermo-Mechanical Pulping



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The unique characteristics of the Thermo-Mechanical Pulp (TMP) make it an invaluable asset for high quality and strong paper products such as printing paper, book paper, newsprints and containerboard paper. Today and for years to come. The process equipment must comply high standards due to nature of the process involving high temperatures and demanding separation stages.

The Thermo-Mechanical Pulping (TMP) is recognized to be resource efficient. To start with, it provides an extremely high yield of 93% to 97%, which means that almost all original wood chips going into the process comes out as usable paper fibers. Although the TMP process requires lots of electrical energy to accomplish the fiber splitting and refining step, a majority of that energy is recovered as heat which is recycled numerous times, both upstream for preheating of wood chips as well as for drying of the paper in the paper machine.

Did you know the steam you sometime see coming out of a TMP paper mill is 100% water vapour, of which all valuable energy has been absorbed.

The mechanical process start with logs are fed into a large debarking drum and then further downstream to wood-chipper, cutting them into small wood chips measuring around 22 mm wide and high, with a thickness of 5 to 6 mm.

From wood chips to pulp stock

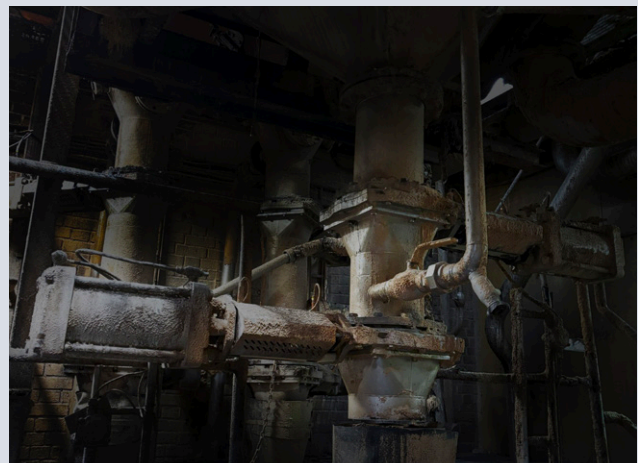
The process of making pulp of wood chips starts in the steam bin, heating the wood chips and evens out the moisture content. The wood chips are then transported to a chip washer where stones and other non-wood chip related materials are removed through a reject / scrap separator. High quality chips float to the surface and a paddle wheel pushes them over into a pumping bin. From this bin, water is used to transport the chips to a dewatering screw and further to a pre-heating bin where the wood chips are heated with steam. The heat treatment softens the lignin in the wood chips so that the fibers can be released more easily in the refiners. From this area, the chips are then fed into the refiners.

The refiner have giant metal grinding plates with grooved patterns, rotating at approximately 1500-1800 RPM. The gap between the grinding plates is about 0,1-0,6 mm. In this way, the wood chips are shredded into small fibers suitable for papermaking. The aim is to produce long straight fibers, not too short fragments. From the refiner, the pulp is fed into a steam separator and then further onto

a screening sequence to make sure all fibers are separated from each other. After screening, bleaching takes place if it is needed to reach desired level of brightness of the finished paper pulp. Awaiting next step of the process, the pulp is stored in large pulp stock storage towers.

Wood chip cleaning

In order to protect process equipment such as pipes, tanks, valves, refiners and in the final stage the paper machine, it is necessary to remove all non-wood material from the wood chips such as sand, stones and metal. This is normally carried out in a wood chip washer, early in the process, where a scrap separator separates wood chips from impurities. The heavy impurities sink to the bottom to be collected in a junc trap and the wood chips are further processed into a chip sump. The junc trap, collecting the impurities, are operated in a cycling interval. When the top inlet valve is open, the lower discharge valve is closed to collect reject. When the desired reject level is reached, junc trap inlet valve closes and the discharge valve opens. The process is repeated 24/7, all-year around. Stafsjö can provide several different knife gate valve solutions for this application, of which the RKO is most favored thanks to its ability to provide reliable isolation in combination with harsh rejects. To keep in mind though, resilient materials must comply with high media temperatures due to the pre-heating of water and wood chips in related processes.



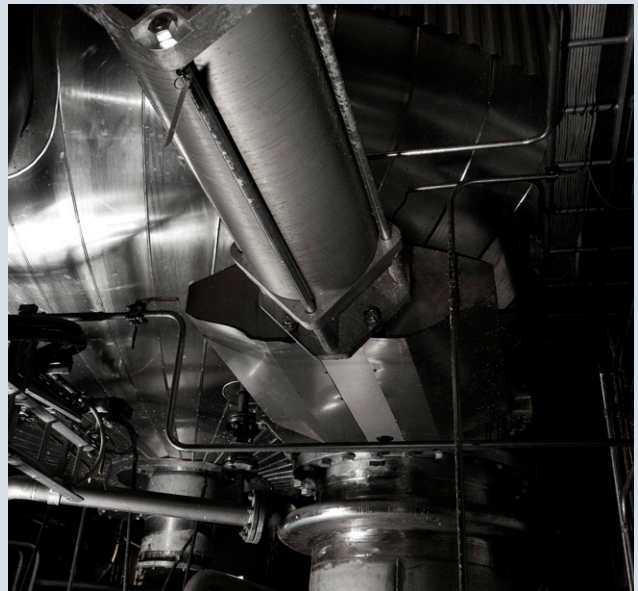
Stafsjö RKO DN 200 with adapter cone installed in a wood chip scrap separator.

Pulp stock isolation duties

Stafsjö have a wide range of reliable isolation valves suitable for tanks, pumps and pulp stock tower storage throughout the entire TMP plant. The knife gate valve is normally favored for its compact face-to-face, its full bore and its ability to cut through pulp stock and provide a reliable isolation. Different shut-off techniques are used, mostly depending on pulp consistency and duty (uni- or bi-directional sealing ability). Especially on the pump discharge side, it is important to consider potential reverse flow when the valve is closed.

In general, one can find the compact and versatile MV knife gate valve throughout the entire TMP process plant to isolate tanks, pumps and pulp stock storages. In case pulp consistency exceed 7% or when full bi-directional sealing ability is required, the through-going knife gate valve HG is normally recommended. The WB14E knife gate valve, introduced in 2016, may still be a bit rare to find in TMP processes commissioned decades ago, but it will not last for long before this will change as it adds valuable features such as full bi-directional sealing ability and dead-end service capability in a very compact package. Dead-end capability means the valve can act as maintenance block and all downstream equipment including flange can be removed on the downstream side while the valve retains its full sealing integrity.

Having high performance isolation valves such as knife gate valves installed around critical process equipment such as tanks, towers, pumps and control valves, are now more important than ever since maintenance shutdowns at mills that previously could have lasted for weeks now have to be carried out in hours or a few days.



DN 800 / 32" Stafsjö HG for pulp stock tower isolation (Pulp consistency 8-13 %).



DN 600 / 24" Stafsjö MV pulp stock tower installation.



DN 600 / 24" Stafsjö MV serves as maintenance block for the check valve.



DN 300 / 12" Stafsjö MV installed on pump suction side.

Recommended product range for Thermo-Mechanical Pulping



MV

This is a uni-directional high performance valve typically used throughout the entire TMP process plant for on/off and modulating duties on media such as TMP pulp stock, white water and waste water. The modular design and ease of maintenance, with replaceable sealing parts, ensures low cost of ownership and makes it a sustainable choice.



WB14E

This is a resilient seated high performance shut-off valve with superior flow characteristics, offering bi-directional zero leakage shut-off. A fully lugged valve body makes it suitable for dead-end service and a reliable product solution for the operators and maintenance personnel. This product, introduced in 2016, will add valuable features to the TMP process for many years to come.



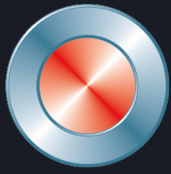
HG, HP & HX

This is an ideal product range for pulp stock tower isolation, available in a wide range of sizes, materials and pressure classes. The products feature through-going gates, allowing the valves to easily shut-off or to modulate through high consistency pulp stock. Superior flow characteristics, bi-directional isolation performance and ease of maintenance are other features included in the product concept.



RKO

This is a durable high performance valve with unique shut-off characteristics, designed to operate in heavy wearing applications typically HD cleaners and wood chip washers, where sand, stones and other contaminants are separated from the process fluids. Due to the nature of these applications, ease of maintenance is crucial and a natural part of the product concept.



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