Joutseno sees benefits of polysulfide cooking

Metsä Fibre’s Joutseno mill in Finland started up the world’s largest single polysulfide cooking line. The technology for the preparation of polysulfide cooking liquor, and the digester modifications to take advantage of it, were delivered by ANDRITZ.

According to Metsä Fibre’s Vice President and Joutseno Mill Manager Risto Joronen, who was also the Project Director for this development with ANDRITZ, the use of polysulfide cooking liquor can help his mill to improve pulp qualities that offer a real benefit to papermakers.

“Since we started polysulfide cooking, our customers are noticing a reduction in specific energy required to refine our pulp and they are seeing some enhancements in fiber bonding,” Joronen says. “The bonding improvement is due to the retention of certain hemicellulose materials in the pulp.”

For its own part, Joutseno has increased fiber yield, which reduced the solids in the black liquor, which in turn reduced the load on the recovery boiler. Like many mills, Joutseno is recovery-limited. So, this is a big benefit. “The increase in yield and overall pulp production makes the investment in polysulfide economically beneficial,” Joronen says.

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Not traditional

“This was not a traditional mill-supplier project,” Joronen says. “It is a high-profile project for us because it impacts pulp quality. Our people have been studying this for several years. About one year ago, we decided to implement it at Joutseno. We collaborated on process development and have been full partners with ANDRITZ. This kind of collaboration is very important to us.”

Mäkelä explains that while the process is proven, it has not been used that often. “We delivered plants in past years to Canada, Japan, and other countries,” he says. “A new focus on increasing fiber yield of soft-woods, and overcoming bottlenecks in the recovery cycle without major capital investments, is causing mills to take a new look.”

More than a simple scale-up

The Joutseno mill, capable of producing about 2,000 t/d, is the largest single softwood mill in the world. By volume, the poly plant at Joutseno is almost three times bigger than any other plant. ANDRITZ has delivered. “Scaling up presented us with some challenges,” says Johan Engström, R&D Manager for cooking technology at ANDRITZ. “It wasn’t just a factor of making air and white liquor is blown through an activated carbon catalyst. The catalyst is also surface-treated with Teflon to make it water repellent and to lengthen its life. “Joutseno can control its process to obtain just the right level of polysulfide,” Lankinen says.

As orange liquor is pumped from the reactor, it passes through an air separator before arriving at a storage tank. The polysulfide reacts with carbohydrates in the wood at the beginning of the cooking process to stabilize them against alkaline decomposition.

Running well

“The project implementation was quite smooth,” Joronen says. “We kept the time schedule, starting up in May of this year. The MOXY process started up perfectly. We produce 9,000 m³/d with an excellent quality.”

The effectiveness of polysulfide liquor is dependent on the concentration, temperature, retention time, and where it is introduced into the cooking process. Engström explains. “Since polysulfide cooking can be performed at lower impregnation temperatures, we modified the Joutseno digester by adding heat exchangers and altering the cooking liquor circulations. The modifications are not expensive to implement, but are critical.”

The poly process

Mäkelä explains that the processes of converting the sodium sulfide in conventional white liquor into sodium polysulfide with some sodium thiosulfate – forming the characteristic orange liquor. “But before this step,” he says, “the white liquor is filtered to the highest possible degree by a polishing filter to prevent prematurity fouling of the catalyst.”

The polished white liquor is pumped to the top of the MOXY reactor. This air pressurized up. The digester is running very well now and we lost almost zero pulp during the start-up. The digester is running very well now at full speed.”

CONTACT

Markku Lankinen, ANDRITZ Sales Manager for white liquor plant. Selling to Risto Joronen, Joutseno Mill Manager in front of the MOXY reactor in the polysulfide cooking preparation plant.

Johan Engström, ANDRITZ R&D Manager for cooking technology, overseeing the modifications to Joutseno’s digester to take full advantage of the polysulfide cooking liquor.