

When you've been in business for 130 years, you learn a few things about adapting to change. So when Germany introduced new emissions targets, UPM's Schongau mill stayed ahead of the game with a major upgrade of its bubbling fluidized bed (BFB) boiler. Welcome to futureproofing.

Originally built in 1887, UPM's newsprint and supercalendered magazine paper mill in Schongau, Bavaria, Germany, has been taking the environment seriously for a long time.

Schongau was already deinking waste-paper in the early 1960s. Today, it has FSC, PEFC, EU Ecolabel, and German Blue Angel Ecolabel certification, as well as being ISO 14001 Environmental

limits for waste incineration plants. The mill's bubbling fluidized bed (BFB) boiler, which ANDRITZ originally supplied in the late 1980s, either had to be replaced or significantly upgraded.

UPM went with ANDRITZ again and decided to upgrade. Frömmrich says, "We did consider replacing the whole thing, but it's a really solid boiler and still in good condition."

the targets. Under the previous government limit of 200 mg NOx (at 11% O₂), the boiler had been emitting 170–190 mg NOx.

Frömmrich noted that "It exceeded my expectations. It was really very good."

A SHORT TIMESCALE

The installation of the new equipment and control system was carried out during a month-long shutdown during

strictly minimised. As a result, the planned timescale was "very optimistic," he says. And yet, "ANDRITZ planned it through side-by-side with us. The detailed engineering and implementation were very good. They supervised the work every day and we managed it."

From first contact to handing over responsibility to the customer, ANDRITZ and UPM put in two and a half years of hard work. From ANDRITZ's point of view, that meant the design, delivery, erection, and commissioning of all of the areas. As part of this process, Frömmrich appreciated that "ANDRITZ didn't treat every meeting as an excuse to charge a little more. We had a very good relationship."

The aim was to ensure even distribution of combustion air in the combustion chamber and recirculation of the flue gas to control the amount of oxygen available to react with the flame. The right air flow is also one of the factors necessary for proper bed fluidization, which is also necessary to ensure the correct pressure drop, otherwise non-uniform burning can create hot spots or dead spots. All of this helps to regulate the flame and bed temperatures, which optimizes combustion, thereby limiting CO levels and NOx emissions.

The rebuilt secondary air system now has more optimally laid-out air blowers to feed air in from the side walls, and optimally-designed air nozzles now cover

the complete cross area of the combustion chamber. Frömmrich points out that "the new system can handle a higher volume of air at higher pressure. Nothing now goes into the boiler that we can't control."

In the primary air system, the modernization raised the primary air temperature from 160 to 200°C, which helped to keep the bed temperature high even with low-calorific fuel mixtures.

The improved air staging also meant a big improvement in boiler temperature control. This resulted in a lower combustion chamber outlet temperature and the avoidance of temperature spikes and the related NOx and CO issues.



Management System and EMAS Eco-management and Audit Scheme accredited. On the energy side, Energy Management Systems ISO50001 and EN16001 are also in force. Schongau also typically recovers and uses or sells 97% of its waste as a product.

UPM Schongau's Project Engineer, Peter Frömmrich, was involved with this project from start to finish and he insists, "We need to protect what we have in the world. We have beautiful nature around our mill."

STANDING THE TEST OF TIME

In order not just to meet, but continue to beat, its environmental obligations, UPM Schongau took action when Germany lowered the national NOx emission

The wide-ranging 4.5-million Euro project resulted in a staged combustion concept, optimized air staging, improved bed fluidization, finer bed ash, and better combustion control.

So did it beat the targets?

Dr. Ulrich Hohenwarter, Director Global Sales & Products for ANDRITZ's Power Plant Service, was also heavily involved right from the start, and he admits it wasn't easy. But with the right equipment, control parameters, fuel mix and – crucially – trust between UPM Schongau and ANDRITZ, the upgraded plant's steam output and emissions are still ahead of the game. Even though UPM Schongau's BFB boiler is now almost 30 years old, its NOx emissions were brought clearly below

the summer of 2016, with handover in December 2016. Final refinements took place at the start of this year.

Frömmrich points out that the short timescale of the work was one of the key aspects of the project, which also involved a full suite of maintenance work around the boiler area. "This was a technically-demanding project to meet environmental targets on a tight timescale. We had to do a lot of preparation work and planning the timing was crucial. There was no room for error. We had to work multiple shifts 24/7 to stay on schedule." He explains that because the boiler is so important for getting rid of the waste – bark and fibre-containing sludge from Schongau itself, as well as from UPM's nearby Augsburg and Ettringen mills – downtime had to be

AIR TIME

The boiler now not only beats the new emissions targets, it also enjoys more stable operation – regardless of the fuel mix. Further benefits include reduced consumption of make-up sand and extended lifetime of pressure parts and main components. All of which mean lower costs, in the long run.

Hohenwarter notes that every part of the emission-reduction package was necessary to deliver the promised performance, but he nevertheless points to the main highlights, which were the secondary air system, the FGR system, and the bed ash system.

In this case, both the primary and secondary air systems, as well as the FGR system, were modernized to bring the air staging up to the very latest technology.



UPM's newsprint and supercalendered magazine paper mill in Schongau, Bavaria, Germany



UPM Schongau team Peter Frömmrich, Ulrich Starker, Karl Welz and Max Wörnzhöfer, and ANDRITZ project manager Theo Bauer in the control room



New secondary air layer for advanced air staging to reduce NOx emissions.

The upgraded FGR system now also feeds the rebuilt primary air system and the two new ignition burners, too. It also helps to keep the boiler bed fluidized, as well as simplifying temperature control, meaning – yet again – more uniform combustion. It is clear that this was a common theme throughout – as Frömmrich says, “Like with the secondary air system, we now have much more control. We can now control a higher volume of air in more individual stages.”

All of this means more stable, reliable steam generation, which means lower emissions, lower costs, and longer parts life.

“WE GOT WHAT WE WANTED”

Another key part of the project was the modification of the bed ash system, including the wind screen with ash separator. The upgraded system at Schongau not only removes impurities from the

bed material, but also separates out the good sand for re-use, avoiding extra cost. “It really helps to save a lot of money for fresh sand,” Hohenwarter points out.

The system now also has no moving parts, meaning that Schongau’s BFB boiler now has maintenance-free recirculation of its bed material, resulting in better system availability and safety.

Frömmrich points out, “The modernization [which has a more enclosed set-up] has given us some big advantages. It’s running very well – we got what we wanted.”

Also, combined with the new FGR layer, the finer bed material and the right trim mean it has been possible to meet the new emissions targets without even having to use the SNCR (Selective Non Catalytic Reaction) system that UPM also decided to install at the mill.

Hohenwarter smiles when he reflects on this part of the project. “It was decided to play it safe, but I was 99% certain we wouldn’t need the SNCR system. We tested it out, but the modernized set-up at Schongau works so well that it’s just not necessary. It’s just used as a back-up system.”

Frömmrich admits that this was one of his highlights, too. “This was the big bonus of the project. We didn’t know if we’d be able to meet our targets with just the primary measures, but we did it. We don’t need the SNCR system and its ammonia, so we avoid additional costs and the



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PETER FRÖMMRICH
Project Engineer
UPM Schongau

“We need to protect what we have in the world. We have beautiful nature around our mill.”



New wind screen for advanced bed material recirculation.



DELIVERED PACKAGE

- Chip bin discharger
- Modernization of primary air system
- Modernization of secondary air system
- Modernization of flue gas recirculation (FGR) system
- New superheaters
- New Selective Non Catalytic Reaction (SNCR) system
- Optimization of bed ash system
- New low-NOx burners
- New fuel chutes
- Steam heater for secondary air
- Renewed brick lining
- Control and automation

technological and environmental challenges associated with that. The authorities preferred it this way, too.”

The investment also involved two new superheaters in the pressure part, as well as low-NOx ignition burners with integrated flue gas recirculation just above the secondary air system. Frömmrich explains, “We have been working very closely with ANDRITZ on the superheater side. We refined the combustion process and we have it well under control and it’s running really well.” Meanwhile, the new low-NOx ignition burners “have had a good effect,” says Frömmrich. “Emissions are down. ANDRITZ resolved some clogging issues by using pressurized air and it’s working well. Performance has increased significantly. This also enabled us to close and dismantle the old back-up boiler and its oil system, which we sometimes used to fire the old burners.”

TIME TO REFLECT

Summing up, Frömmrich says, “The project went really well.” UPM’s investment in this upgrade by ANDRITZ reduced the BFB boiler’s emissions, as well as improving

operating stability considerably. NOx emissions are now clearly below the new government limit, without even having to engage the new SNCR system.

Hohenwarter says ANDRITZ was right to be confident, “Even an old boiler can achieve good things when your modernization concept is right and both supplier and client know the value of good teamwork and open communication.”

Frömmrich adds, “When the people are right, the project usually runs right. UPM and ANDRITZ were honest with each other and it was a pleasure to work together. I’m guessing they felt the same at ANDRITZ – I’m still in touch with them today.”

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