Reference story

New biomass boiler at Iggesund Workington, UK
Green power show

Fossil fuel free board mill
ANDRITZ EcoFluid boiler

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▲ Biomass feeding system to the BFB boiler

In March 2013, Iggesund Paperboard's new biomass boiler came online with the result that the mill is now virtually fossil fuel free. The bubbling fluidized bed boiler and complete woodyard were delivered by ANDRITZ.

▲ Ash handling system inside the BFB boiler

"We use the same amount of energy in production that we used a year ago, but now it all comes from renewable sources."

Timo Nieminen
Power Plant Manager
Workington Mill

ANDRITZ

▲ New biomass boiler island for Iggesund Paperboard is located in Workington in Cumbria, United Kingdom. Photograph courtesy of Holmen Group.

Scope of supply
BFB boiler and complete woodyard

Technical Data

- Biomass handling cap.: 1,000 m^3/h
- Storage volume: 20,000 m^3
- Steam output: 195 t/h
- Steam pressure: 102 bar(a)
- Steam temperature: 540° C
- Heating value: 6.5-11.6 MJ/kg

ANDRITZ delivery to Iggesund Workington plant consisted of a bubbling fluidized bed boiler island including biomass handling, crushing, chipping, screening, A-frame storage, biomass feeding, ash handling, and flue gas cleaning with ESP.

The BFB boiler can utilize forest residues, recycled sawmill chips, bark, sludge, and sawdust. The plant uses natural gas for start-up and load burners.

The first test firings were conducted between late 2012 and early 2013. The mill became fully operational in the spring of 2013.

▲ The boiler's design is based on ANDRITZ's well-proven Bubbling Fluidized Bed (BFB) technology combining high fuel efficiency with excellent environmental performance.

GREEN POWER SHOW

The drive to Iggesund Paperboard's Workington Mill, part of the Swedish Holmen Group, takes you through some of England's most dramatic and natural scenery – mountains, lakes, and sparkling streams flowing down to the coast of the Irish Sea. Situated on the edge of the county of Cumbria – the "Lake District" as it is more popularly known – the Workington Mill sits right in the middle of what can only be described as a "green power show." Wind turbines dot the shoreline, generating power for energy giant E.ON. Renewable energy is very big around here.

Iggesund's Paperboard's mill with its brand new woodyard may look to the uninitiated just like any other big new factory. However, to those in the know, this is one of Britain's showcase examples of manufacturing valuable products in the greenest and leanest way possible. And underneath the gleaming mill façade is the centerpiece of Workington's own "green power show" – a new biomass boiler supplied by ANDRITZ.

Luxury board

Over the years, Workington has developed a reputation for satisfying the higher end of the luxury board market. In fact, some of its top-of-the-range bright white boards are used for the glitzy celebratory side of life – including the packaging of chocolates and champagne or example – under its Incada brand. Important to supplying this market is the ability to produce good solid boxboard with the potential to print, foil block, and emboss. It is a highly competitive market to be in. Environmental excellence and sustainability have become increasingly important to the buyers of such board products.

Ola Schultz-Eklund, who has been Managing Director of the Workington Mill for 12 years, has overseen many of the changes that have taken place at the mill. "Making paper and board in the modern world is a tough business," Schultz-Eklund says. "You have to be lean to survive – even when you are in a niche business like we are. We have continually invested in product quality while making sure we are as lean as possible. In that space of time, we have become the benchmark for quality and printability in the boxboard market."

The right strategy

The Holmen Group decided in 2011 to boost the efficiency and profitability at Workington by investing in a new biomass power boiler. The boiler would not only reduce the amount of purchased energy, making the mill self-sufficient with self-generated green energy, it would allow the company to participate in the UK government's program where green energy producers can sell their Renewable Obligation Certificates (ROCs) to companies which continue to use fossil fuel. Says Schultz-Eklund, "There is no doubt that this project was the right strategy for the future of this mill. It would make us more sustainable, more efficient, more profitable – and would open up new revenue streams."

In March of that year, the Board approved the investment. By early April, the contract for PB 195 was in place with ANDRITZ. The design called for a fuel input of 147.5 MW. In terms of steam flow, the boiler would produce 195 t/h on wood-based biomass and 98 t/h with natural gas. Steam pressure was targeted for 102 bar (a) at a temperature of 540° C.

The ANDRITZ version of Bubbling Fluidized Bed technology was chosen specifically for the Workington mill as it had the flexibility to deal with the variety of biomass available in the mill – recycled sawmill chips, bark, effluent cake, and washings.

Anna-Maija Harju, ANDRITZ Product Engineer, says: "Our BFB boiler technology fits perfectly for Iggesund Paperboard because of its versatility in firing different biomass fuels and sludges. The design maintains combustion and evens out fluctuations caused by varying fuel qualities. The technology is very environmentally friendly, with emissions that are below, and sometimes far below, EU, domestic, and local regulations."

As a follow-on in May, ANDRITZ received the order from Workington for the biomass receiving and handling system. This included all the equipment for receiving and storing biomass fuel up to a capacity of 1,000 m^3/h as well as all the conveying equipment to supply the boiler. Part of this delivery was the installation of a horizontally fed HHQ-Chipper for chipping logs, and a horizontally fed crushing line for other wood wastes. The storage facility delivered by ANDRITZ is an A-frame structure with a capacity of 20,000 m^3 of biomass.

The A-frame building is an essential ingredient in the whole mill operation as it helps regulate the moisture content in the wood in a range of 37-57% depending on the materials. The mill at Workington uses around 800,000 t/a of wood, a combination of sawmill chips, roundwood, energy crops, and other biomass, mostly from Scotland and northern England.

From the A-frame, the chipped and crushed biomass is transferred into two holding silos before entering the boiler.

▲ (Left to right): Mikko Hänninen, ANDRITZ Boiler Commissioning Engineer; Manne Koskinen, ANDRITZ Woodyard Technician; Timo Nieminen, Workington's Power Plant Manager; and Ville Virtanen, ANDRITZ Commissioning Engineer in the boiler house.

No option for delays

The plan was to allow 24 months for the complete project from demolition of existing buildings to start-up. Crucially there was a strict deadline – the new boiler had to be synchronized to the national grid by February 15, 2013. The pressure was really on.

"There was quite a lot of work to be done before the installation could begin, as we had to decommission one of our board machines, remove it, and demolish the building to make way for the power plant," says Timo Nieminen, Workington's Power Plant Manager. "Then there were foundations to pour and construction of all the housing for the new boiler."

As Nieminen recalls, there was a sudden flurry of activity around the mill as the deadline began to loom in the distance. "A whole host of different nationalities began arriving to concentrate on their part of the project," he says. "This was a really intriguing part of the project for me, the way that Spanish, Polish, Swedish, and Finnish technicians – at one time 400 contractors – worked alongside the British mill team, and very impressively got the job done."

The first gas firing of the ANDRITZ boiler took place on December 22, 2012. This was followed by the first solid fuel firing on February 1, 2013. "But the really good day came on February 15, 2013 when we synchronized to the grid and reached our goal," Nieminen says. "We were completely operational and producing power in April, and took over the boiler from ANDRITZ on May 15th."

Throwing down challenges

The Holmen Group, it seems, likes giving challenges to its employees as well as its suppliers. Instead of importing a group of biomass energy experts to run the new power plant, Holmen selected team members from the Workington Mill. This included Bill Williams, Lead Technician, who enjoyed the retraining in the art of power and steam generation. "This project has been an amazing experience for me," says Williams. "We watched as the boiler was built, then fired up. It was incredible to see how the suppliers sped up towards the end to make the start-up deadline. The learning curve for us has been steep and fast, but the ANDRITZ team has been great in helping us move up the curve. They are very knowledgeable and professional."

Have the targets been hit? "Absolutely!" exclaims Nieminen. "We use the same amount of energy in production that we used a year ago, but now it all comes from renewable sources. Our team has achieved great things. The boiler availability has been near 100% since we took it over. With the continued support of our supplier partners, we intend to keep uptime high."

The Workington Mill management and work force make it abundantly clear that they are extremely proud of the mill being entirely self-sufficient in terms of energy – and that by doing so, they have cut carbon emissions by more than 190,000 t/a. Or, as they like to tell customers, "We cut our annual emissions by 60,000 automobiles a year."

Schultz-Eklund concludes: "This project has had some immense challenges, but ultimately we went from a situation where our competitiveness was being affected by really poor power and steam output to a situation where we are self-sufficient and even exporting power to the national grid."

Clearly, Iggesund Workington is the brightest star in the Cumbria area's "green power show."

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Anna-Maija Harju, ANDRITZ Product Engineer for power systems ▼

"Our competitiveness was being affected by poor power and steam output. Now we are energy self-sufficient, even exporting to the grid."

Ola Schultz-Eklund
Managing Director
Workington Mill

▲ ANDRITZ delivered the biomass receiving and handling system as part of the project. This included a chipping line for logs and a crushing line for wood waste. The A-frame building in the background stores 20,000 m^3 of biomass. The Workington Mill uses around 800,000 t/a of wood, mostly from Scotland and northern England.

▲ Manne Koskinen, ANDRITZ Woodyard Technician, talks with an operator as they observe wood chips being fed to the BFB boiler.

Biomass power
for sustainable production and profits

Green energy solutions from ANDRITZ. Using biomass fuels for power generation offers important environmental and economic benefits. The key is to design a flexible solution, capable of handling the variations in biomass materials and moisture contents. ANDRITZ delivers complete solutions – from biomass receiving to fuel feeding to combustion (boilers or gasifiers) to ash handling to on-going service. BFB and CFB boilers from ANDRITZ are proven in installations around the world. Rebuild services enable conversion of existing boilers to biomass firing and co-firing. ANDRITZ has been a leading technology and service partner for forest products companies for many decades. Talk to us about sustainable, renewable solutions.

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