

CCI Expertise and Equipment Contribute to CHP Success at Södra Cell Värö

By David Wold

"Application of CCI's thorough knowledge of thermal dynamics and their excellent valves in our new bio-fuelled Steam Plant gives us precision control of steam pressure and temperature to our processes," says Larry Kvarnström, Instrument Engineer at the Södra Cell Värö pulp mill. "As an added benefit, we produce more electricity than we need. We sell the excess to the grid as 'green' power."

In other words, the Södra Cell Värö pulp mill is a classic example of a well-functioning Combined Heat and Power (CHP) installation. A fundamental component of the facility is the new Steam Plant installed in conjunction with a new recovery boiler, which in combination with an existing bark boiler supplies more steam than is needed to produce 425,000 tpy of fully bleached market pulp.

Vast experience of CHP

"At the end of the day, we chose to work with CCI to optimize this project. They have experience of working round the world on CHP projects, and I must say that for this reason they provided us with a very competent sounding board while we planned the facility.

"CCI staff not only helped us to apply the principles of thermal dynamics to achieve an optimized operation but were also very willing to help us solve the problems that always crop up after you think a project is completed," says Mr. Kvarnström.

Mr. Kvarnström notes that the Steam Plant primarily functions to provide steam to the pulping processes while generating electricity is merely a benefit since electricity can be purchased from the grid if necessary. Without steam, however, there can be no pulp production.

"On the other hand, since installation of the new recovery boiler and Steam Plant, we no longer need to purchase electrical power and much less oil for the small oil-fired boiler we use for special purposes," says Mr. Kvarnström.



"Because we now can sell power at a special 'green' power price we save by not needing to buy electricity as well as less oil. This means that the estimated payback time for the Steam Plant will be much better than calculated," says Larry Kvarnström.

Green Power

"What's more, we now can sell power to the grid and because it is 'green' power or in other words environmentally friendly power produced from biofuel, we can sell it at a higher price. This fact plus the savings from needing to buy no electricity and less oil mean that the estimated payback time on the investment in the Steam Plant will be much better than calculated" says Mr. Kvarnström.

The main function of the Steam Plant is to reduce the steam pressure and temperature coming from the boilers to the particular pressures and temperatures required in the pulping process. In technical jargon this process is called steam conditioning.

At Värö, steam out of the recovery boiler is at 85 bar and 495° C while that released from the bark boiler is at 58 bar and 450° C. This steam is conditioned to three different pressures and temperatures: 30 bar and 340-350° C for soot blowing, 11 bar and 250° C for pulp production and 3.7 bar and 155° C for pulp drying.

Steam conditioning tools

The main tools for steam conditioning are a steam turbine and an Advanced Control System combined with modern steam conditioning valves and turbine exhaust/extraction desuperheaters.

Generating electricity is the task of the steam turbine and that is exactly what it does while steam passes through it. Steam extracted or exhausted from it continues on to the processes. The temperature of this process steam varies depending on the flow. Therefore it requires temperature reduction or desuperheating before continuing on to the processes. At Värö DAM-2025 desuperheaters from CCI perform this job.

DAM steam desuperheaters are equipped with multiple variable-section spray nozzles for large spray water flows. Each nozzle prevents flashing inside the nozzle while maintaining a certain water atomization pressure at any flow condition. The DAM distributes the spray water evenly in the steam desuperheater while permitting no pressure drop in the steam line.

Modern steam conditioning valves and an Advanced Control System are the other two essential steam conditioning tools in the Steam Plant. Steam conditioning valves are positioned parallel with the turbine. If the turbine is not available, they function as bypass valves to condition the steam to the exact requirements of the processes.

In addition to this task, at Värö the Advanced Control System working together with the steam conditioning valves is utilized to make up the difference between the pressure and temperature of the steam required by the processes and that being supplied by the steam turbine.

"Pressure and temperature from the boiler can vary and so do the requirements for steam in the process. For instance, the drying machine can stop running or the digesters malfunction for one reason or another. Export of electricity to the grid can be required at different degrees. Flexibility is built into the control system and the steam conditioning valves controlled by the Advanced Control System allow coping with these kinds of circumstances," says Mr. Kvarnström.

Critical steam conditioning valves

The VST-SE is the preferred steam conditioning valve at Värö. The valve features excellent steam conditioning rangeability, direct cooling water proportioning, long service life with low maintenance requirements and superior high rangeability (> 50:1) with water injection after final pressure reduction.

"For our purposes, we required valves that could open in less than two seconds when in bypass function," says Mr. Kvarnström. "The VST-SE fits the bill perfectly. In fact it opens in less than two seconds.

"It goes without saying that the availability of these valves and their operational efficiency must be high and it is," says Mr. Kvarnström.

Scope of Supply

2	Steam conditioning valves type	VST-125BSE
1	Steam conditioning valve type	VST-180BSE
3	Steam conditioning valves type	VST-90BSE
2	Stop valve type	VS-112BT
1	Stop valve type	VS-140BT
3	Stop valve type	VS-90BT
1	Desuperheater type	DAM-2025/3
1	Desuperheater type	DAM-2025/1
2	Desuperheater type	DA-O
14	Water valves type	840 G

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