ORC MODULES ENERGIZE PANEL PRODUCTION

Turboden's ORC modules are providing energy efficiency in wood-based panel production, says Alessandro Guercio, Turboden's biomass sales and business development manager, who also reports the latest project win at Spanish PB producer Tableros Hispanos

Wood-based panel production is an energy demanding process, both for heat and power.

Particleboard and OSB production need heat mainly for drying wood particles while MDF needs heat for drying wood fibres and also for steam production to the refining process.

Although some natural gas is still occasionally used, the main primary source of energy for heat production to drying process is biomass, in the form of waste wood such as sanding dust, panel scraps, branches and low-grade wood not suitable for panel production.

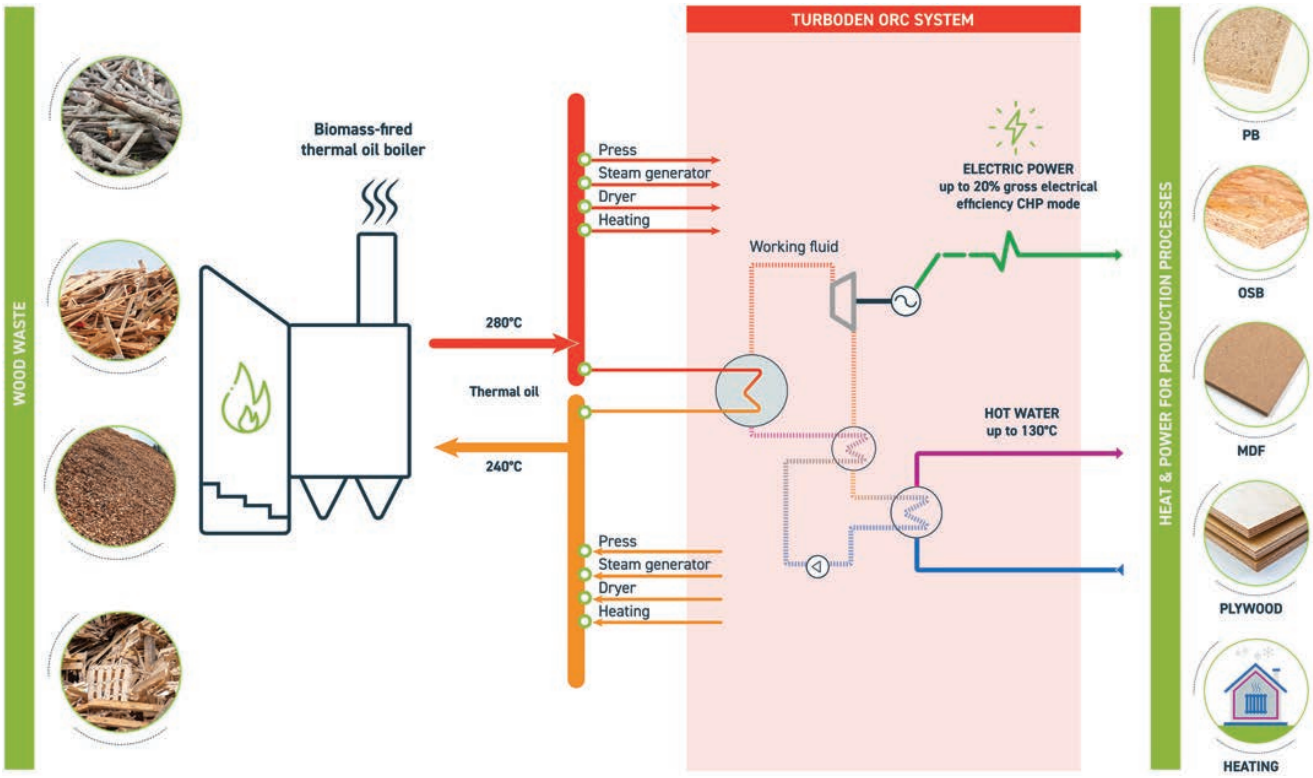
On the other hand, the electricity demand is commonly supplied by the electricity grid, exposing the producer to electric grid price variations a well as carbon footprint.

Renewables such as solar and wind are spreading in all territories and applications, but natural unpredictability of these sources doesn't fit with the steady and continuous demand of the production process.

The implementation of combined heat and power (CHP) systems is the right solution to reduce the power demand from the electricity grid through on site renewable electricity generation.

A biomass-fired CHP system converts the heat coming from a biomass combustion into electric power for own consumption and useful heat mainly for drying processes. The drying technology plays an important role in maximising the integration with CHP systems. In particleboard and OSB production, belt dryer technology is the best solution to maximise the CHP integration, having a belt dryer fully compatible with the

Above: *Turbdoen ORC system*



Above: *Infographic showing working of ORC system*

heat production of CHP systems (typically hot water <110°C).

An MDF flash dryer is also compatible with CHP integration, in this case through an air preheater integrated in the dryer, which heats the fresh air up to 100°C before entering the mixing chamber.

The available technologies for biomass CHP in the range of size of wood industry interests are two – conventional steam cycle and Organic Rankine Cycle (ORC).

Compared to the conventional steam cycle, ORC offer various technical and operative advantages, as shown in the infographic *(see above)*.

Among them, an important advantage in favour of the ORC is that it can be integrated with a standard biomass-fired thermal oil boiler, technology always present in panel production to heat up the thermal oil for the presses.

In this way the ORC integrates the production process as it was a heat user such as presses or indirect steam generator to refiner. There is no need for any high pressure superheated steam boiler which necessitates continuous supervision by a patented operator, no need for qualified operators, and no need of water or water treatment.

WOOD-BASED PANELS INDUSTRY REFERENCES

Turboden currently has more than 340 references in biomass application running, mainly in Europe, North America, South America and Asia, with a special focus on the wood industry.

An extract of references in the wood-based panel manufacturing sector was displated at the LIGNA exhibition. The list has been recently updated with a new order just finalised for Tableros Hispanos, a Spanish producer of high-quality particleboard based in Lugo, which will integrate the ORC with a biomass-fired thermal oil boiler and belt dryer. Thanks to this implementation it will be possible to decarbonise the production process, eliminating the consumption of natural gas and strongly reducing the electricity demand from the grid.

Among our historical customers is Kastamonu Entegre, one of the largest producers of wood-based panels in the world. Kastamonu Entegre produces particleboard, MDF, OSB and laminate flooring for the furniture, decoration and construction sectors. High-efficiency Turboden ORC units were preferred in the projects that were installed in factories in Balıkesir and Kastamonu provinces and produced electricity from wood waste and residues from production processes.

While the Balıkesir project only produces electricity, the cogeneration ORC system that produces electricity and hot water was preferred in the Kastamonu project. The electricity production capacity of both projects is 13.6MWe.

In addition to this, hot water is produced between 90°C – 110°C in the Kastamonu project. The hot water obtained is used for chip drying in the belt drying system and in other parts of the process. Thanks to the flexible operation of Turboden ORC, 90°C hot water is produced in the summer months and 110°C hot water is produced in the winter months. ●

Turboden, a Mitsubishi Heavy Industries Group Company, is an Italian firm based in Brescia and a global leader in the design, manufacture and maintenance of Organic Rankine Cycle (ORC) systems, highly suitable for distributed generation. The company was founded in 1980 and became part of Mitsubishi Heavy Industries Group in 2013.