

## **The future belongs to wood pellets**

IBV: Low-emission drying as decisive advantage for an efficient production

Since their introduction in the German market about 10 years ago, the success of wood pellets has been remarkable. Roughly 720,000 t of pellets were produced during the first half of 2010 in Germany alone. Industry calculations predict that by 2015 already 500,000 pellet heating systems will be installed in private residencies, and by 2020 even in excess of one million. Additional growth drivers are large power plants with an annual pellet consumption of up to 1.2 million t. More and more coal-fired power plants rely on wood pellets for power generation to reach the legally specified limit values for CO<sub>2</sub> emissions. Unlike other fossil fuels, the use of wood pellets is largely CO<sub>2</sub>-neutral and thus climate friendly. One of the leading European pellet manufacturers with its own sawmill and power plant is the Industrie du Bois Vielsam & Cie. s.a. (IBV) in Belgium. For its annual pellet production of 150,000 t, the company relies on low-emission, low-temperature belt dryers with process belts from GKD – Gebr. Kufferath AG.

### **Conversion of sawmill by-products into energy**

The IBV Group - which is in the wood processing business - consists of three independent companies at three locations, two in Belgium and one in Germany. The purchase of a small sawmill in 1999 marked the birth of the Belgium IBV. After only one year, with the help of a new sawing line, the cutting capacity for logs had more than doubled from approx. 300,000 solid cubic metres of softwood to 650,000 solid cubic metres. In 2006, the

sawmill expanded its product range to include the manufacture of dried and planed lumber products. To cover the energy demand required for an efficient and environmentally-friendly drying, IBV converted the entire production process in Vielsalm to a CO<sub>2</sub>-neutral supply with power and heat. This was made possible by building its own biomass thermal power plant that converts sawmill by-products into energy and functions on the principle of cogeneration. The power plant produces 20 MW power, 30 percent of which is used to cover the entire power requirement of the company. The remaining 70 percent of the green energy are fed into the public power grid. At the same time, the power plant produces 45 MW heat which is used to dry all of the lumber by-products. The waste heat is used for the supply of the lumber drying kiln as well as for pellet production. Currently, plans to triple the Group's performance within the next three years are moving ahead at full speed. The construction of a new site in France will begin shortly. The start-up of a large sawmill for 500,000 metres of softwood, a biomass thermal power plant with 52 MW thermal capacity and a pellet plant with an annual production volume of 250,000 t is scheduled there for 2013. Christian Gebele, Divisional Director of Energy at WTT - which is IBV's own energy company - is again in charge of planning.

### **Two low-temperature dryers to dry wood chips**

On the 32 hectare site in Vielsalm, Belgium, the complex planned by him in 2006 - consisting of power plant and pellet plant - occupies about 6 hectares. Every day 85 truck loads of logs and 60 truck loads of biomass arrive at the facility that operates nonstop 24 hours, 365 days per year. The delivered logs are sorted according to customer specifications, recorded three-dimensionally via computer and measured. In the sawmill the logs are cut to order. The by-products produced during this process - sawdust and wood chips - are shredded with a rotor chopper and hammer mills to

particles of a size less than 10 mm. The wood chips produced are transported to the corresponding drying plants via an extensive pipe system. IBV uses two 205 m<sup>2</sup> low-temperature belt dryers type KUVO from Swiss Combi/W. Kunz dryTec AG. Even though the stacked dryers can operate independent of each other, they work in parallel. The chips to be dried are spread onto the endless permeable GKD mesh belt Conducto<sup>®</sup> 5065 over the entire area via dosing screws. In the process, levelling rolls ensure a uniform filling height of 80 mm. Heat exchangers installed above the belt are supplied with thermal energy from the thermal power plant and heated to 80°C. Suction fans installed under the belt use low pressure to draw the warm air through the product layer and the belt. In doing so, the air is saturated with moisture, but also loaded with dust.

#### **Conducto<sup>®</sup> mesh belt for drying and dust filtration**

The special mesh construction makes the dryer belt highly permeable despite the small mesh openings, but also ensures reliable dust retention. Thanks to its efficient retention rate, no additional external air purification measures are required to be in compliance with the emission limit values in force in Belgium. At the end of the belt, the dust is removed together with the chip material. The dry top layer is peeled off and removed. The remaining layer, which contains residual moisture, is transferred via a discharge screw and conveyed to a second distribution screw. It spreads the pre-dried layer again uniformly as the top layer onto the layer cake. The warm drying air that passes through the cake a second time extracts the residual moisture from the top layer and peels off the resulting dry layer again. A fan discharges the moist air to the outside. Depending on available heat quantity and residual moisture level achieved, the dryer adjusts the belt speed automatically. The moisture content of the chips at dryer input is 58 percent, during the process it drops to 8 percent at dryer output. The

moisture content measured at that point serves as control parameter for the transport speed. During the drying process the chip cake loses half its weight. 18t of steam are transported to the outside per hour. Any chip residue on the belt is removed by a rotating brush. In addition, the dryer belt is cleaned by a high-pressure water blaster in regular intervals.

### **Emission values ten times below the limit**

For IBV, the decisive factor for the use of low-temperature dryers with the Conducto<sup>®</sup> mesh belt was their sophisticated technical concept and excellent reputation. "When using the mesh belts, no additional dust treatment is required", says Christian Gebele when explaining the advantages of the system. "We are almost ten times below the limit value of the permissible dust exposure." In Belgium, a dust load of 20 mg per standard cubic metre is permitted (in Germany even 30 mg/standard cubic metre). The measured value of the belt dryer system at IBV is 2.7 mg per standard cubic metre. The Conducto<sup>®</sup> 5065 mesh belts were supplied with the system. "The belts have been in non-stop operation since 2008", reports Christian Gebele. "They are absolutely reliable and show no signs of wear." Since the dryer is located outside, the belts are subject to extreme weather conditions. The robustness of the mesh construction is especially tested in the winter months during minus temperatures. Temperature ranges from –10°C outside temperature to 80 °C drying temperatures are not unusual. The endless mesh belts withstand these as well as high mechanical stress. This also applies to the outer edges of the belts that are subject to particular stress. Despite the large weaving width, Conducto<sup>®</sup> dryer belts have complete cross-stability. The stretch proof, highly accurate and abrasion-resistant belts at IBV, each 6 m wide and 70 m long, meet the high expectations in a sustainable fashion. Bronze wires woven in running direction throughout the mesh prevent electrostatic charging according to

the ATEX directive. The good retention characteristics of the mesh construction prevent chip particles from pushing through, reduce the cleaning requirement, thus ensuring a trouble free production. Thanks to their robustness and durability, GKD dryer belts will remain the medium of choice for efficient drying of wood chips for Christian Gebele. For this reason, four of these dryers and mesh belts are intended for the new facility in France. Initial planning for the start-up of two additional chip dryers has also commenced for Belgium. The objective is to run eight of the low-temperature dryers over the medium term.

#### **Climate-friendly alternative with high savings potential**

After buffering, the dried chips are ground once more. The resulting particles with a size less than 3 mm are axially injected into the pellet press at high pressure and radially pressed through the matrices. IBV pellets are certified for the private consumer market as quality pellets according to DIN Plus. However, the majority of the 150,000 t annual production – equalling an output of 20 t or 30 m<sup>3</sup> per hour – is currently supplied to the Belgium industry for power production. As climate-friendly and economic alternative to fossil fuels, wood pellets are becoming increasingly important. Their use is CO<sub>2</sub>-neutral, i.e. the carbon dioxide (CO<sub>2</sub>) released during combustion is the same amount as absorbed by the tree over its life. As regionally renewable, permanently available fuel they allow independence from heating oil and natural gas which are limited fossil resources. Currently (status: October 2010), the price of wood pellets in Germany is one third less than gas and oil; this fact will continue to accelerate their industrial use as energy source. This trend can be seen throughout Europe. The wood processing industry is preparing for this with increasingly larger and efficient production facilities. Low emission, low temperature dryers play a decisive role in the efficient industrial production of high-quality wood pellets. Mesh

dryer belts of the type Conducto<sup>®</sup> 5065 combine high permeability at small mesh opening with high thermal and mechanical stress. The use of pellets eliminates further treatment to meet limit values for dust exposure. Christian Gebele, Divisional Director of Energy, remains convinced about this technology in the future as well: "I am very satisfied with the efficiency of dust removal, the robustness and weather resistance of the GKD dryer belts. We will use these belts also in our future plants."

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#### **GKD – Gebr. Kufferath AG**

The owner-run technical weaver GKD – Gebr. Kufferath AG is the global market leader for metal and plastic woven solutions. Under the umbrella of GKD – WORLD WIDE WEAVE the company combines four independent business units: SOLID WEAVE (industrial meshes), WEAVE IN MOTION (process belt meshes), CREATIVE WEAVE (architectural meshes) and CompactFiltration (compact filter systems). With its eight plants – including the headquarters in Germany and other facilities in the US, Great Britain, France, South Africa, China, India and Chile – as well as its branches in Spain, Dubai, Qatar and worldwide representatives, GKD is never far from its customers.

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