

Vacuum systems for tall-oil applications



Tall oil is a viscous oily liquid and considered one of the most important by-products of wood pulp manufacturing. Through a fractioning process crude tall oil can be turned into valuable fatty and resin acids. Vacuums play a key role in this procedure. An application in Finland currently proves that technology from Hanover-based Körting is ideally suited for this purpose.



The three jet ejectors directly connected with one another create a low vacuum of 0.1 mbar on the test rig at Körting Hannover AG

Crude tall oil is gained when the pulp in debarked wood is boiled and the wood releases the substances extracted. The yield is about 30 to 40 kg per tonne of wood pulp. However, crude tall oil itself has only a limited number of uses. Industrially important are primarily fatty and resin acids which can be gained from the crude tall oil. The crude tall oil is distilled to produce these. The distillation process is a challenging one because the products have a high boiling point and are also inclined to decompose and polymerise. Furthermore the inherent acids, sulphur compounds and the associated corrosive effects are very demanding on the materials the machinery is made of.

Processing only possible in a vacuum

From the very beginning, the objective was to gain fatty and resin acids for further industrial applications. To achieve this goal, a 5-stage vacuum system from

Körting Hannover AG was used. During the distillation process, in the first stage the fatty-acid components are gently boiled and separated at a pressure of 50 mbar. In the next stage, at a pressure of 1 mbar, the non-condensable substances are drawn off through a venting system. In the third stage, the heavily boiling resin acids are processed in a vacuum of 0.1 mbar. At this low level of pressure, even at low temperatures vaporisation occurs without destroying the resin acids' hydrocarbon compounds. The low pressure of 0.1 mbar is achieved solely by the three jet ejectors directly connected with one another. Other upstream vacuum pumps based on diffusion or molecular principles are not required.

Jet ejectors are ideal

Jet ejectors are a perfect solution for implementing these types of tall oil plants. Mechanical vacuum

pumps would be unsuitable in this case. One reason lies in the size of the tall oil plant and another in the characteristics of the products and substances used. Crude tall oil in particular has a thick, viscous consistency. Under these tough operational conditions, it wouldn't be possible to operate a mechanical vacuum system reliably and without any malfunctions occurring. Jet ejectors on the other hand have no problems with these types of substances. The Körting mixing condenser is also not susceptible to soiling. The parameters don't just ensure the tall oil plant is highly productive, they also increase reliability and service life. Apart from Körting's 5-stage vacuum system, no other vacuum pumps are required to operate the plant. The jet ejectors were put through their paces on the test rig at the Hanover plant before they were supplied to the customer. Körting's engineers verified that performance specified in this low pressure range had been achieved before commissioning. Our Finnish customer has already confirmed that the tall oil plant is operating reliably today and expectations have been met in every respect.

Tall oil and its versatile by-products

The fatty acids recovered from crude tall oil can be used for the same purposes as fatty acids from other sources. As an alternative to tallow fatty acids from animal-based products, they're used in soap, as feed-stock for paints, or turned into polyamide and epoxy resins in the adhesives industry. The tall-oil resins are particularly versatile. In the rubber industry they're important as emulsifiers in the production of synthetic rubber. In terms of chemistry used in construction, they improve the characteristics of concrete. They are added to wood treatment oils to impregnate wood. And they can even be found in small quantities in chewing gum. Furthermore, in paper production they improve the ability to write and print on paper.



At a glance

Device	5-stage vacuum system for tall-oil applications
Material	CrNi steel
Suction pressure	between 0.1 mbar and 50 mbar
Components	Three Körting jet ejectors directly connected with one another, mixing condenser, 2-stage jet ejector-venting unit



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