



Fig. 1: With the PLURALIS family of fillings, the specific edge load is reduced considerably.

Save energy with new refiners and refiner fillings

Changeover to PLURALIS pays for itself

Cost reduction is a top priority in the paper industry. Three examples show how optimizing refiner fillings can improve energy balance and stock quality – and hence operating costs. The savings can be substantial: In one case, the mill lowered its annual costs by 193,000 euros (approximately US \$257,000).

Fiber refining is assuming an important role in paper manufacturing: It is a key technology in stock preparation, with far-reaching effects on

the properties of the paper produced. The high-energy input that refining requires, however, has a negative effect on operating costs.

Optimization and development of refining machines, and state-of-the-art components, have a long tradition at Voith Paper.

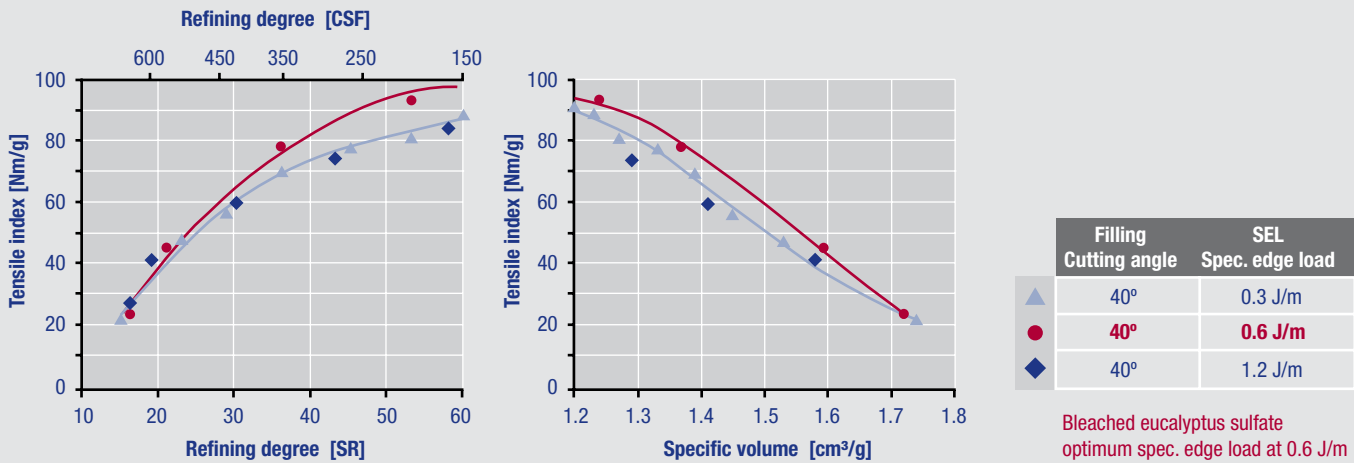


Fig. 2: There is an optimum specific edge load (SEL) for each fiber.

To ensure optimum, energy-saving operation, Voith Paper has developed a wide range of refiner fillings. Our new PLURALIS fillings represent the latest addition to that range.

Each fiber has an optimum specific edge load (SEL) for its refining treatment. For example, the optimum value for eucalyptus is 0.6 J/m (Fig. 2). Loads above or below the optimum SEL deliver lesser strength values. Hence, the SEL should be set at a level appropriate to the design of the refining unit. The refiner filling serves as an actuating element here. In practice, the SEL is often too high for the fiber used. Lowering the specific

edge load requires refiner fillings that exhibit high cutting-edge lengths because the effective refining power of the refiner usually must remain constant (see Fig. 3). To meet these requirements, Voith Paper developed the PLURALIS family of fillings, tested them with customers, and placed them on the market. These cast fillings make it possible to lower the specific edge load to a very economical level.

Reduction in edge load

The Varel paper and cardboard mill, for example, used PLURALIS refiner fillings to replace standard refining fillings. In the production of high-quality cardboard grades, PLURALIS resulted in a considerable improvement in formation and a decisive improvement in quality. A reduction in specific edge load enabled high-quality fibers to be refined more intensively, resulting in improved formation of the outer layers and in lower costs. For high-quality recycled paper grades, the new refining unit fillings enabled significant lowering of the basis weight of the outer layers without compromising their

technological properties. Introducing PLURALIS also saved energy by eliminating the need to run two refiners in series in order to achieve refining level specifications. The introduction of PLURALIS has also prevented overloading damage to refiner fillings, sharply reducing downtimes for the fillings. The Varel papermaker, satisfied with these results, plans to use this technology in other refining.

10 to 25 percent less energy

At the M-real Zanders paper mill in Bergisch Gladbach, obsolete steep-angle refiners were replaced. They had proven to be uneconomical, very high maintenance, and lacking adequate capacity for a planned production increase. Instead, Voith Paper installed a new short-fiber refining unit with four TwinFlo TF1E double disk refiners. The PLURALIS refiner fillings represented the technological heart of the improvements. Through them, the specific edge load was lowered as much as necessary for the eucalyptus fiber predominantly in use. The preliminary pilot plant trials performed in

$$SEL = \frac{P_{eff}}{CEL} \text{ [J/m]}$$

P_{eff} = Effective power of refining machine [kW]

CEL = Cutting edge length of refining unit filling [km/s]

Fig. 3: Formula for calculation of SEL.

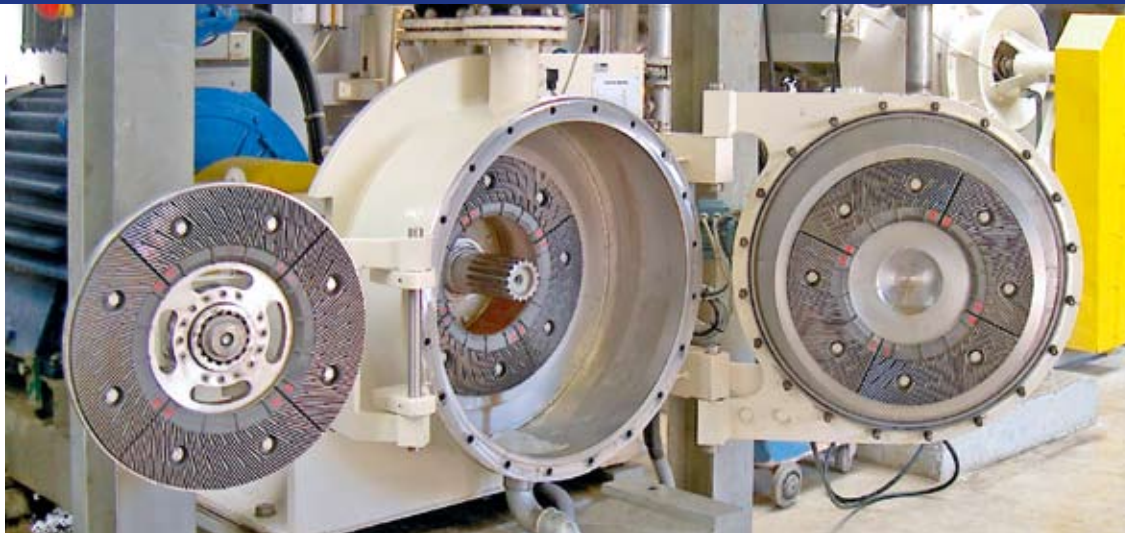


Fig. 4: At M-real Zanders in Bergisch Gladbach, this TwinFlo double disk refiner, in combination with a PLURALIS refiner filling, forms the ideal solution for eucalyptus fiber.

Ravensburg in advance of the investment were confirmed in practice. “Through the rebuild, we have achieved energy savings of 10% to 25%,” reports Oliver Kalmes, Production, Papermaking, and Finishing of Cast-Coated Paper Manager at M-real Zanders. The rebuild enabled manufacture of denser paper without sacrificing its technological properties; with some grades, long-fiber content was lowered without losing the paper’s good strength properties.

their capacity transferred to an existing refining line with two Beloit double disk refiners. On its own initiative, the customer converted the double disk refiners from MonoFlo to DuoFlo to increase hydraulic capacity. Additionally, the mill needed to transfer the total refining energy that two double disk refiners required — without greatly increasing the SEL for the fiber mix. Voith Paper achieved this goal by equipping the Beloit DD3000 refiner with PLURALIS

they enable optimal high capacity operation with existing refiners. Now StoraEnso in Uetersen has converted another refining line to PLURALIS.

These three projects show that appropriately chosen PLURALIS fillings can help to lower operating costs significantly. The result is more economical product manufacturing and improved product quality. In all three projects, the basis for success was the good partnership with the customer.

“Through the rebuild, we have achieved energy savings of 10% to 25%.”

Oliver Kalmes, M-real Zanders

Because of these modern double disk refiners, the mill’s maintenance and filling costs are lower today.

**Annual savings:
193,000 euros (US \$257,000)**

At StoraEnso in Uetersen, an old refining line with five shallow angle refiners was to be eliminated and

refiner fillings, which can supply the required cutting edge length.

The result was convincing: According to the papermaker, the sum of all these measures led to annual savings of 193,000 euros (approximately US \$257,000). Investment costs were comparatively low. PLURALIS refiner fillings cut costs decisively because

On Focus: PLURALIS

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ProQuality	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section: stock preparation

Width: all

Paper grade: all

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