



## New drum pulper concept – continuous, compact, flexible, efficient and innovative



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Stock Preparation

**A key role in recovered paper stock preparation is played by pulpers, which mechanically break down the recovered paper under simultaneous addition of water. The pulping system significantly influences both the cost-effective designing of the entire stock preparation line, as well as finished stock quality. All pulping systems aim to slush down the paper completely, without damaging fibres and without breaking down non-paper components. Minimum investment and operating costs as well as minimum energy consumption are further important requirements.**

Existing systems, whether using continuous or batch pulpers or conventional drum pulpers, can only meet these needs to varying degrees. The new Voith Sulzer drum pulper, however, combines all the main advantages of pulpers and conventional drum pulpers in a completely new, patented pulping principle. Successfully proven in extensive testing with a trial

drum pulper, the first order for this convincing new concept was placed with Voith Sulzer in less than one year from the original idea.

### The new principle

The new Voith Sulzer drum pulper mainly consists of a drum rotating around a D-shaped stationary “displacement core”. The drum and displacement core wall together form a semi-annular displacement channel in which the furnish is carried upwards from the “collection zone” at the bottom of the pulper (Fig. 2). Shear forces in the displacement channel generate intensive fibre to fibre friction, ensuring intensive kneading and slushing down of the furnish. The furnish then drops over the top edge of the displacement core and back down into the “collection zone”. Here, the large available volume provides a sufficiently long dwell-time. This secures complete wetting down and swelling of the furnish, – essential conditions for favourably influencing the pulping process.

*Fig. 1: The recovered paper pulping system at paper mill Niederauer Mühle, Kreuzau/Germany: On the left the new drum pulper (3.5 m dia., 10 m long, 330 kW motor load, 18% pulping consistency, capacity 240 t/24h liquid packaging board). On the right, the drum screen.*

*Fig. 2: The Voith Sulzer displacement drum pulper principle.*

*V Velocity drop*

*F1 35% filling level (light yellow)*

*F2 60% filling level (light and dark yellow)*

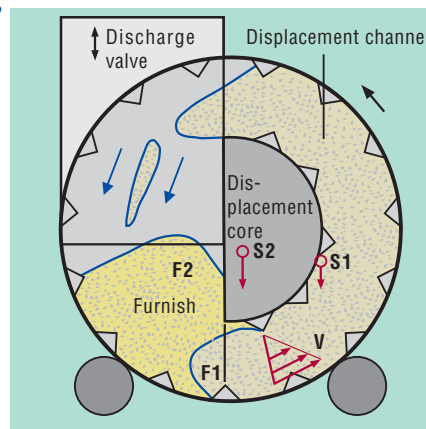
*S1 Centre of gravity for F1*

*S2 Centre of gravity for F2*

This continuously repeated wetting, softening and kneading process along the length of the drum ensures gentle, yet efficient pulping of the recovered paper, without breaking down non-paper components.

### The special features

- The displacement principle ensures operation of the Voith Sulzer drum pulper with a significantly higher furnish input than with conventional drum pulpers (Fig. 3). This can be up to 60% of total drum volume (Fig. 2, light and dark yellow area F2). The high filling level, combined with efficient application of pulping energy, means displacement drum pulpers are considerably shorter in length, and thus more compact, than conventional drums.
- The displacement channel provides efficient upward transport of the furnish at lower peripheral speeds than conventional drum pulpers (Fig. 3). Lower upward feed quantities in the channel are compensated by a more intensive furnish friction, i.e. higher pulping energy.
- Unlike in conventional drum pulpers, no rotary flows are generated in the displacement drum pulper so that operating efficiency is not negatively affected by stringing of non-paper components.
- By varying the amount of furnish (Fig. 2, F1 and F2), dwelltime in the drum can be adjusted to suit the particular furnish whilst maintaining the same throughput rate. The filling level is easily adjusted via a discharge valve on the pulper discharge side.

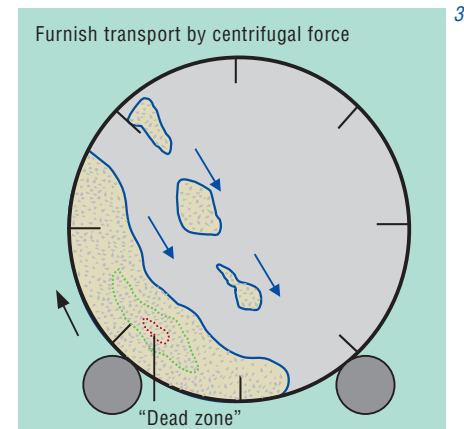


- Pulper power consumption remains virtually constant, independent of filling level.
- Thanks to intensive pulping, even difficult furnishes such as liquid packaging board or recovered brown grades present no problem. This was so convincingly demonstrated with the trial version that paper mill Niederauer Mühle, Kreuzau/Germany ordered a complete Voith Sulzer Paper Technology drum pulping and screening system for handling 240 t/24 h of liquid packaging board even before the test trials were finished.

### Pulping of liquid packaging board at Niederauer Mühle

The pulping system consists of a 10 m long drum pulper, followed by a 12 m long drum screen. For efficient wetting down of the liquid packaging board, which is laminated on both sides with plastic foil, the board is first shredded and then pulped at 18% consistency in the drum pulper.

*Fig. 3: Conventional drum pulper principle.*



The pulp is then diluted ahead of the drum screen to ensure optimum separation of fibres from other components in the drum screen. Liquid packaging board consists of about 33% plastic foil together with fibres similar to virgin pulp and having a high CSF. The screening function therefore represents a considerable challenge. Nevertheless, the commissioning of this first Voith Sulzer drum pulping and screening system in August 1999 proved to be problem-free.

Even with wide variations in furnish input and consistency, the pulping results are constantly good. The drum screening is highly effective, with residual fibre content in the drum screen rejects remaining well below expected levels. As a result, the subsequent fibre recovery system, installed as standard in conventional drum pulping systems of the competition, has now been shut down. This impressive result confirms the process advantages of separate pulper and screen drums, an innovative concept allowing for optimum adjustment to suit the individual operating conditions.