

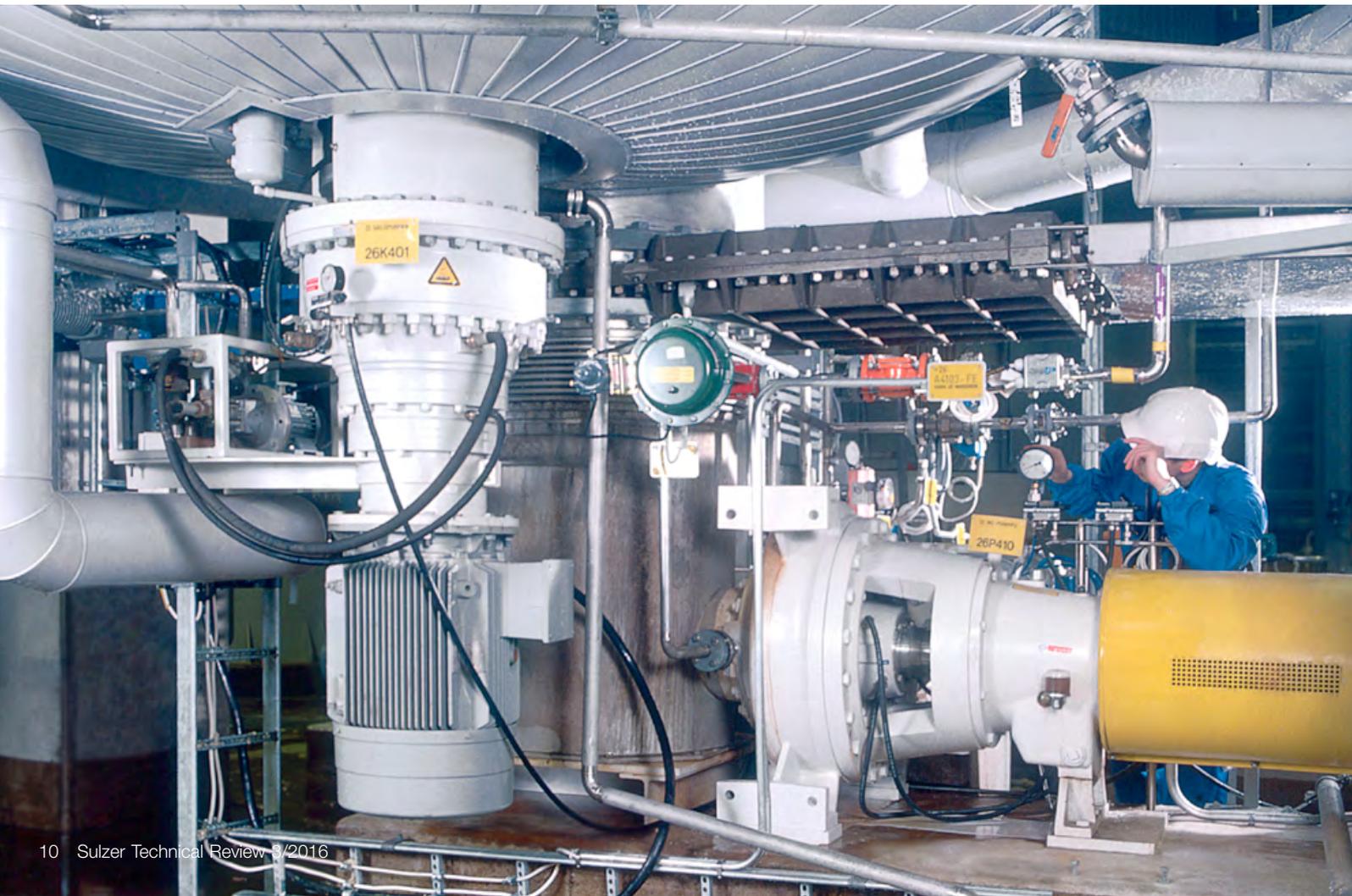
# Advanced Medium-Consistency Technology for Pulp Production

Modern pulp and paper mills rely on highly productive medium-consistency (MC) pumps and mixers. Sulzer developed the world's biggest, high-performance MCE™ pumps with low energy consumption. The latest innovation, the SX chemical and steam mixer, provides excellent mixing with low energy and chemical consumption for pulp bleaching applications.

The pulp and paper industry faces big challenges. It must recycle paper materials, lower energy consumption, and reduce chemicals to make its processes more cost efficient, energy efficient, and sustainable. Sulzer's innovations support the pulp and paper industry in achieving these goals. Pulp is a suspension of fiber, air,

and water. Medium-consistency pulp has to undergo several pumping and mixing processes. It contains both free and bound air, mainly between the fibers. Exposure to the various chemicals used in pulp and paper production presents a daily endurance test for the materials of the pump and other components.

1 MC discharge scraper and MCE pump with patented Fluider™ technology and degassing unit.



### Patented turbulence generation

The new MCE pumps provide a higher performance level and extremely high uniformity over a wide temperature and pressure range. Sulzer designed a unique, patented Fluider™ impeller, which creates effective turbulences inside the MCE pump. The Fluider technology, which Sulzer has patented in many countries, uses twisted blades with changing pitch. The Fluider impeller maintains an exact turbulence level, which prevents overtreatment of the fibers in the pulp.

### Degassing already included

The pulp consistency (up to 18% dry solid mass per total suspension) usually consists of a lot of air. The air-gas content typically increases with the pulp consistency. For example, pulp with a consistency of 10% dry solid mass contains about 15% of air-gas content. A pulp with a consistency of 15% may contain up to 35% air-gas content. The new technology, which uses the patented Fluider impeller, improves the degassing efficiency. The installation of an MCE pump with an internal or external degassing system guarantees high MC pump performance — regardless of the prevailing pumping conditions and applications.

### Optimal specification of pump materials

Sulzer pumps are known to be robust and long-lasting. Process specialists analyze the process stages in pulp and paper production and recommend the best-suited pump material to customers. Stainless duplex steels A-890 grade 3A, A-890 grade 5A, 654SMO, or even titanium can be selected as the corrosion-resistant material for the wetted parts of MCE pumps.

### Higher production and less power consumption

The MCE pump series covers an extremely wide capacity range from 10–9000 air dry metric tons per day (ADMT/d) and pump heads up to 240 meters.

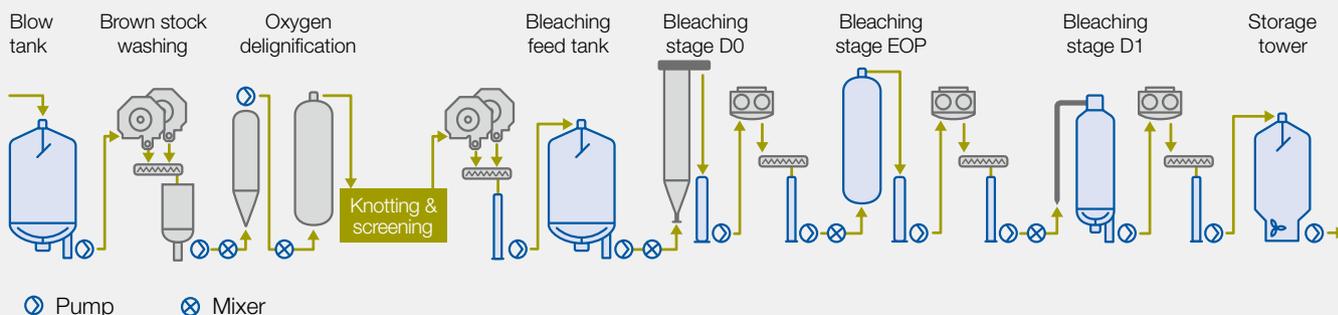
## Details about pulp production

The pulp and paper industry uses cellulosic fibers from wood chips, annual plants, recycled paper, and packages. The main ingredients of wood are cellulose, hemi-cellulose, and lignin (a glue-like substance). The processed cellulosic fibers, which usually have a length of 1–4 mm, are bleached to reach the required brightness specifications of the fiber pulp.



2 Medium consistency pulp contains fiber, water, and air.

### Delignification and bleaching of pulp



3 Process stages in delignification and bleaching.

This allows very flexible use and ensures high pump reliability, even with changing process conditions from the previous production stages. Reliable mill operation and remarkable power savings are the main benefits of using the new MCE technology. Between 40–50% savings in power consumption have been achieved over that of MC pumps (see Fig. 4). Alternatively, customers can increase their daily production rate without increasing the power consumption by using MCE pumps instead of MC pumps (see Fig. 5).

Today, pulp is bleached in several different ways – for example, through elemental chlorine-free (ECF) bleaching or totally chlorine-free (TCF) bleaching. The MCE pumps provide an extremely high performance: up to 9000 ADMT/d and up to the market record 77% efficiency. This makes it possible to build fiber lines for high production rates with a minimum amount of equipment and without parallel process stages.

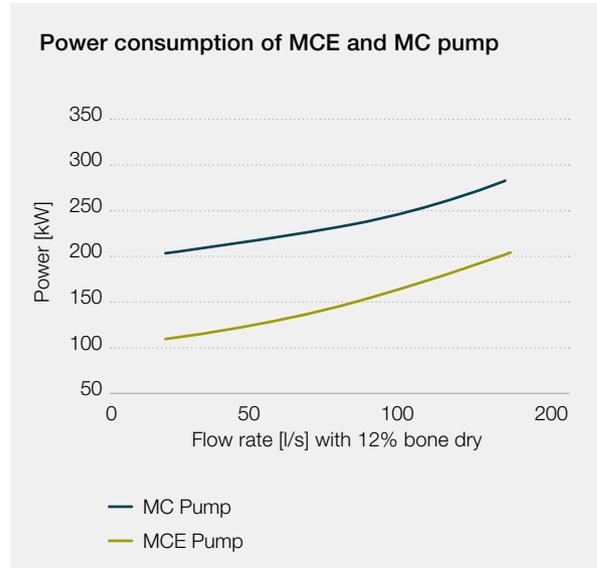
**Upgrade solutions for MC pumps**

It is possible to upgrade existing MC pumps cost-efficiently to improve process economy and increase production rates. With foresight, Sulzer designed two retrofit sets for older pumps. The MCE RETROFIT and MCA/MCV HYDROFIT solutions require only minor changes to existing pumps (see Fig. 6). In most of the cases, customers do not need to change piping or drive units.

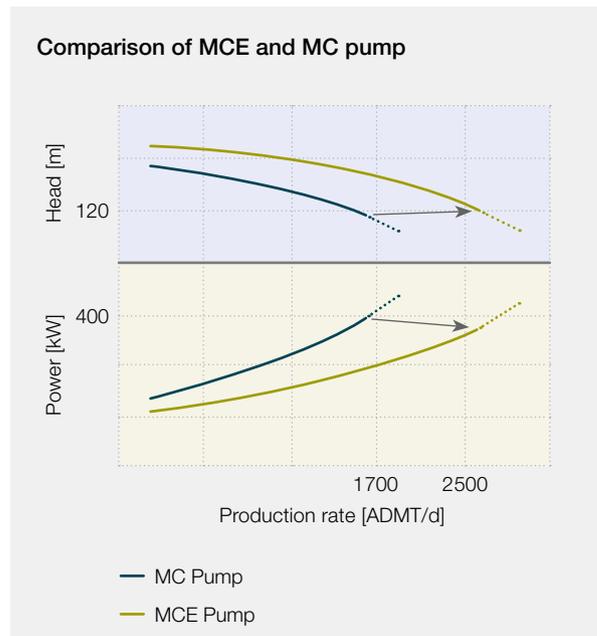
Customers who have already retrofitted their pumps report not only higher pump efficiency. They have also realized remarkable savings in the consumption of chemicals, water, and steam.

**Maintaining the temperature**

In pulp and paper mills, pumps are commonly used to transfer pulp stock from washers and thickeners to the next process stage. The pulp falls into a pumping vessel, called the medium-consistency drop leg (MDL). MCE pumps, because of their low inlet-head



4 Reduced power consumption with MCE pumps with the same pumping head.



5 Higher production and less power consumption with MCE pumps.

| <b>MCE RETROFIT</b>  | <b>MCA/MCV HYDROFIT</b>   |
|--|---|
| Retrofit set for upgrading MC pumps  | Retrofit set for MCA/MCV pumps  |
| Exchange unit with new, patented Fluider™ impeller, casing cover, bearing unit adapter, shaft seal, and vacuum pump parts for internal degassing | New hydraulic parts, such as the new MCE pump volute casing, the new patented Fluider™ impeller, O-rings, and gaskets |
| Reuse of existing pump volute casing, coupling, and motor  | Reuse of bearing, coupling, and motor, depending on condition   |

6 Available retrofit solutions for first generation MC pumps and second generation MCA/MCV pumps.

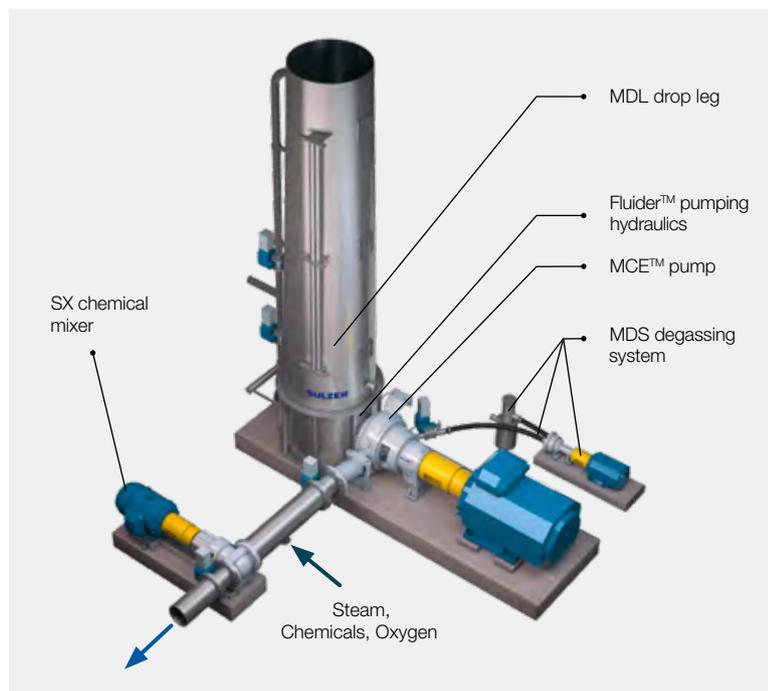
requirements, can transport the pulp even from a low-level vessel. Significant process cost savings are achieved because the pulp stock can be pumped from the MDL drop leg with a consistency of 12–16% at temperatures between +95 and +98°C. Because re-heating is no longer necessary, less steam is needed. The amount of chemicals can be reduced thanks to higher reaction temperatures. In several processes, like oxygen delignification and bleaching process stages (EOP and PO stages), the mill layout can be optimized with the space-saving MCE pumps.

The stock level in the MDL drop leg is measured by a radiometric, capacitive, or pressure transmitter. If a disturbance at the thickener or washer causes consistency variations in the incoming stock, an automatic control system will stabilize the pulp consistency for a stable pumping result.

### Mixing of chemicals and steam

Mixing chemicals and pulp stock are among the most important operations in pulp bleaching. Good mixing provides homogeneous bleaching conditions. It reduces the consumption of chemicals and energy, improves product quality, and reduces the environmental load. Proper chemical mixing is a key factor in the success of bleaching sequences.

The Sulzer SX chemical mixer can mix both gaseous and liquid bleaching chemicals into pulp. SX mixer is used for a consistency range from 3–20%, and the mixer sizes cover capacity ranges up to 5 500 ADMT/d. The installation of the SX chemical mixer is easy because it is small and lightweight, due to small installed motor sizes (see Fig. 7). Bleaching chemicals are very aggressive. Depending on the chemical in use or the bleaching stage arrangement, SX chemical mixers are manufactured from stainless steel, titanium, Hastelloy, or 654SMO.



7 MCE pump and SX chemical mixer arrangement for 8 to 20% consistency range.

### Tower discharge pumping

It is a challenge to ensure well-controlled pulp flow when working with a high consistency pulp. The MC tower discharge pumping system is used for large storage towers or bleaching towers. The MC discharge scraper ensures that the pulp from the entire bottom area of the tower is led into MTB feed chute. The scraper helps discharging the pulp evenly and simultaneously prevents channeling inside the tower (see Fig. 1, page 10). The scrapers are available as diluting or non-diluting models. The diluting MC discharge scraper keeps the consistency of the pulp high in the tower (20–35%). By adding water, the consistency is lowered for the pumping process.

### Consistent development for pulp and paper

Sulzer's top priority is to offer innovative, cost-efficient, and energy-saving equipment to the pulp and paper industry. As a result, Sulzer has more than 35 patents related to MC pumping, transfer and mixing.

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8 MCE pump with integrated degassing system.

