

# Medium consistency technology



# Rely on the pioneers in medium consistency (MC<sup>®</sup>) technology

Sulzer medium consistency pumps' success is founded on expertise. Our know-how and competitiveness is based on close cooperation with the world's leading pulp and paper producers, machinery suppliers and engineering companies. Our customers have access to the broadest pump product range for pulp and paper industry (PPI) applications featuring the latest advanced technology.

In many cases, Sulzer has been the first manufacturer to bring new innovations to the market. Sulzer is your choice for every pumping and mixing application for the lifetime of your mill.

Sulzer's MCE™ pumping systems for medium consistency stock have proven to be the most reliable and highest efficiency solutions for bleaching processes in chemical, mechanical and deinked pulp, and in other medium consistency stock applications.

Long-term expertise and innovative design and proven performance have established our pumping systems as the industry-leading solutions that also feature the best efficiency and lowest energy consumption on the market.

Sulzer utilizes application-related, fiber and energy saving patented Fluider™ technology when selecting pumping solutions for pulp and paper mills.

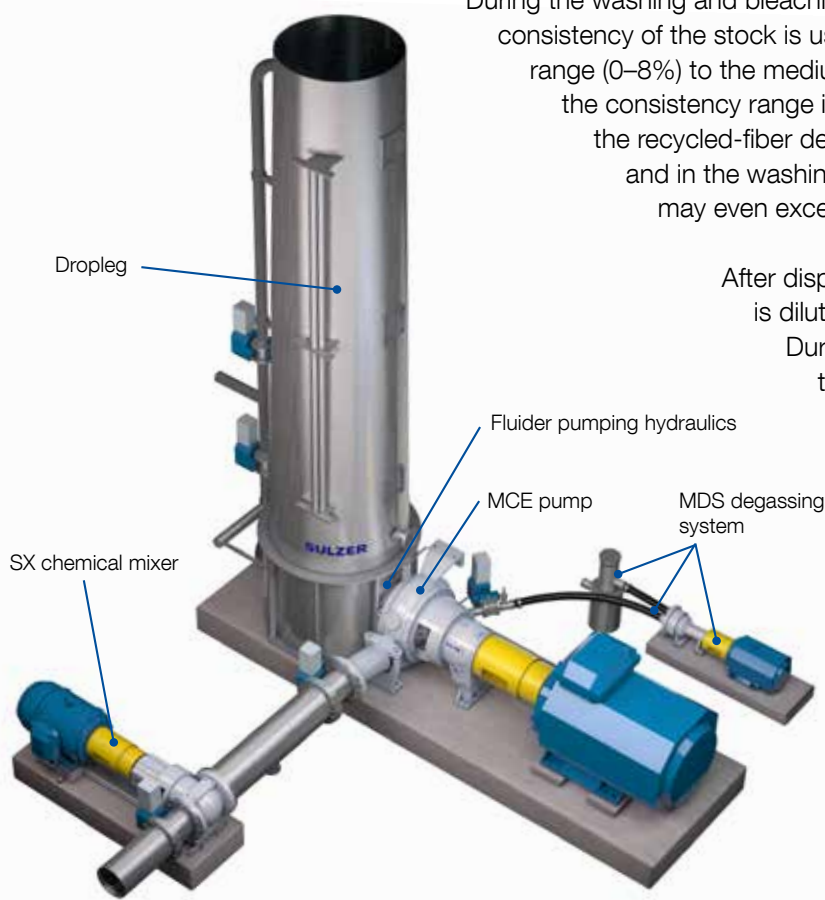
Processes in pulp and paper mills involve the pumping of stock. Stock with a high content of dry solids has to be treated with heavy turbulence before it can be pumped. In order to achieve maximum efficiency, it is first necessary to effectively remove any air that might be present in the pulp suspension.

During the washing and bleaching stages of the production process, the consistency of the stock is usually raised from the low-consistency range (0–8%) to the medium consistency range (8–18%). Typically, the consistency range is 4–16%, depending on the process. In the recycled-fiber deinking and mechanical pulping processes and in the washing stages of chemical pulping, consistency may even exceed 30%.

After dispersion, bleaching, and washing, the stock is diluted to a suitable consistency for pumping.

During the bleaching of chemical pulp and the preceding stages, the pressure at the inlet side of the pump may be high, and the temperature can reach +130°C.

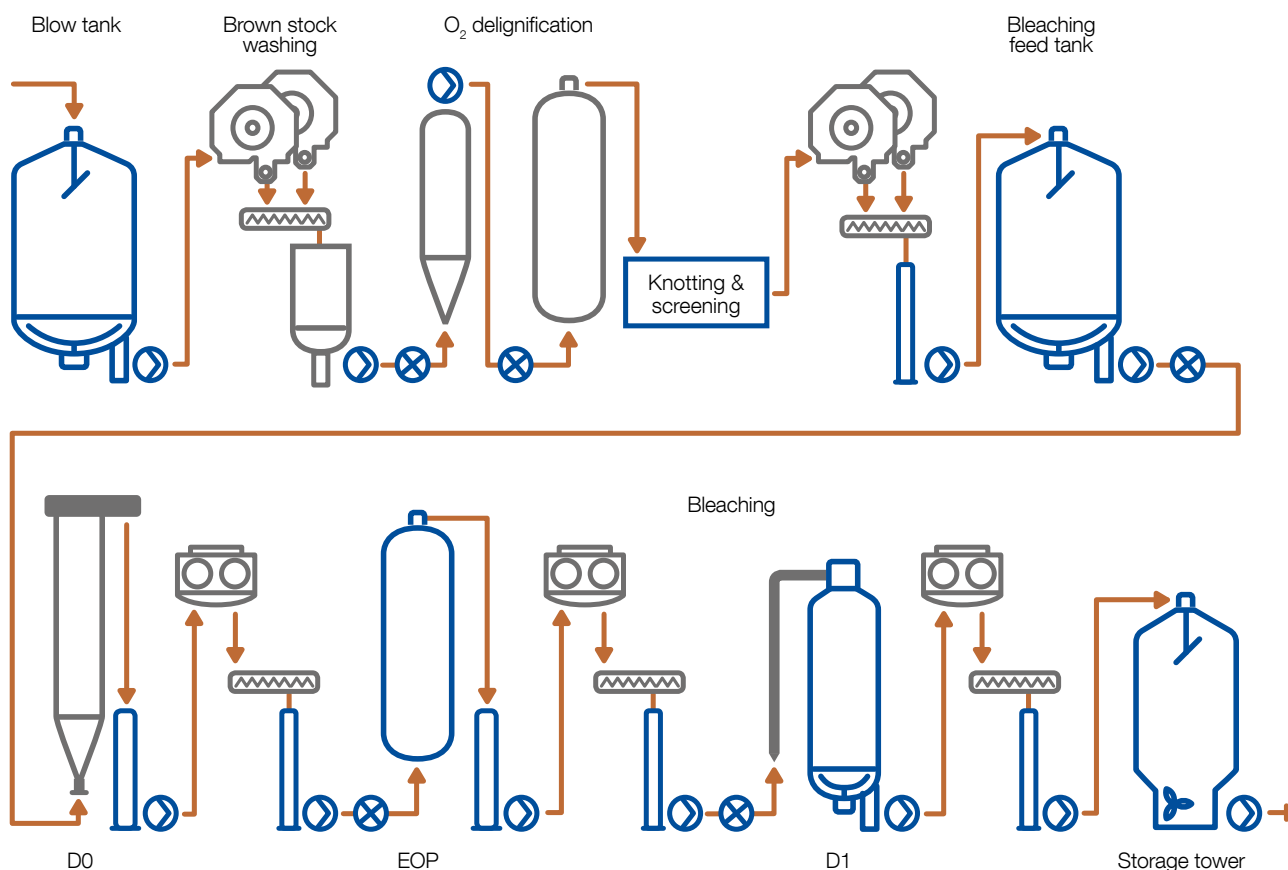
Bleaching liquid and other process chemicals are simultaneously mixed into the stock during this stage.



**MCE pump and SX chemical mixer arrangement for the 8 to 18% consistency range.**

# Pumps to cover the full range of consistencies and full range of applications

Sulzer's product portfolio comprises applications for every level of consistency – with AHLSTAR stock pumps covering the lower range. At the upper end of the range, highly efficient MCE pumping systems are used to handle the highest consistency fluids that can be pumped using centrifugal pumps. The LCE™ and KCE™ pumping systems produced by Sulzer were the first high-efficiency pumping solutions designed specifically for the intermediate- (Semi-MC™) consistency range (6–10%) to be launched on the market. Prior to the introduction of these products, manufacturers had to use adapted low-consistency stock pumps or pumping systems designed for medium-consistency stock. Sulzer therefore developed and delivered energy-saving and fiber-protecting pumping solutions to cater specially for intermediate consistencies. The power requirements of these systems are considerably lower than those of conventional products. The new solutions – mostly comprising a pumping system with a single drive unit – also feature simpler designs than previous systems.



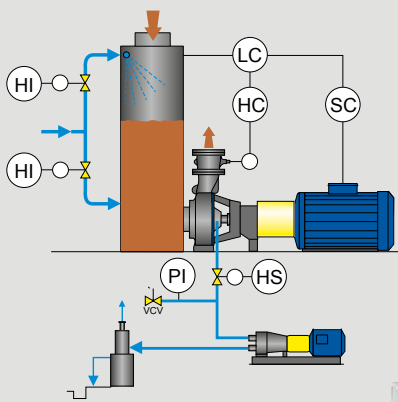
A typical O<sub>2</sub> delignification and bleaching process in a chemical pulp mill. Sulzer produces equipment that fulfills all pumping and mixing requirements and enhances process efficiency by facilitating stable and reliable operation through reactors and towers.

# Patented MCE technology reaches 75+% efficiency level

Our first MC pumps were brought into the market in the 1980's, followed by the 2nd generation in the early 1990's. The patented 3rd generation MCE pumps are now running in several pulp and paper mills around the world, and most of the high capacity, single line bleaching processes are equipped with Sulzer MC pumps. Highest capacities for the pumps can be up to 9,000 admt/d.

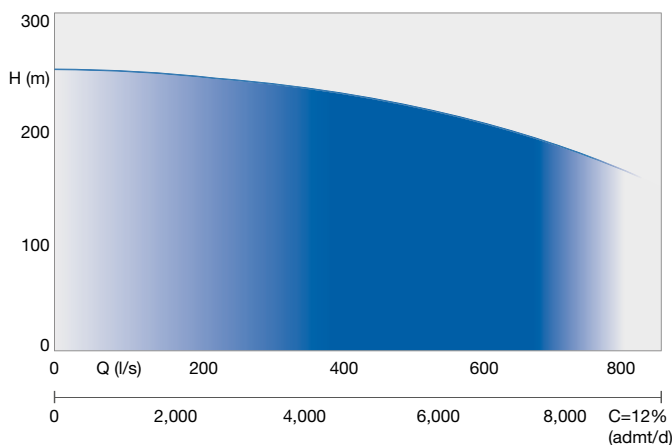
Sulzer uses its patented Fluider technology and specially-designed impellers for pumps designed for intermediate and medium-consistency applications. Fluider technology, which uses twisted blades with changing pitch, is patented by Sulzer under certain claims in many countries (including Brazil, China, United States, Russia and many European countries) with priority dates as early as late 1990's, thus having a wide coverage of IPR protection.

Pumping systems with Fluider technology are most commonly used after washers, thickeners, filters, and reaction towers to pump the stock to the next process stage or to a washer. The pumping systems can also make sure that bleaching liquid or process chemicals are mixed into the stock efficiently. The main advantages of this technology include high levels of efficiency – thus reducing power consumption – and its ability to maintain an exact turbulence level, which prevents the over-treatment of the fiber. MCE medium-consistency pumps usually have integrated gas separation and either a built in or an external degassing system powered by a high-capacity vacuum pump. The Fluider impeller offers a third option that makes it possible to degas the fluid without a vacuum pump – a solution that does not require additional components or extra controls or drives. Another distinct feature of the Fluider impeller is its ability to work efficiently irrespective of the stock level in the dropleg. The dropleg is a barrel-like tank at the low-pressure side of the pump that ensures proper inflow conditions for the pump.



## Typical MC pumping arrangements

The stock level in the dropleg is measured and controlled, thus providing constant operating conditions for the pump.

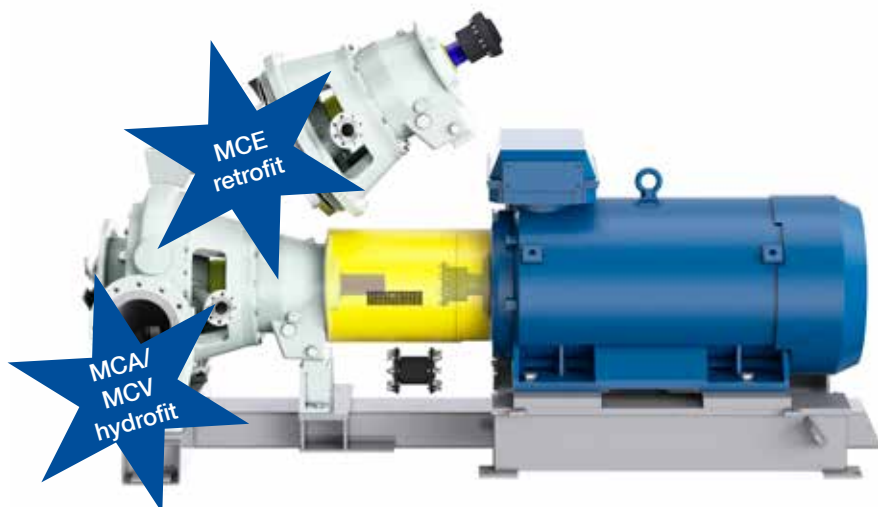




# Energy savings and process upgrades

Fluidex technology is used successfully in production rate and process upgrades through the installation of a retrofit unit or the replacement of an existing earlier generation MC pump. Piping changes and drive unit changes are not necessary in most cases.

Increased bleaching efficiency and lower energy or chemical consumption has given very short reported payback times.



## Benefits of the MCE RETROFIT and HYDROFIT performance improvements

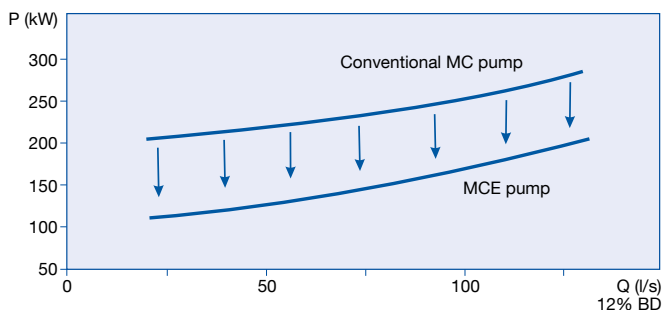
- Higher production rates with the same existing basic MC pumping system
- Cost savings because no need to change to bigger MC pump size
- Higher pump efficiency and remarkable energy savings are possible
- Higher pumping heads provide possibilities for process upgrades e.g. increased bleaching efficiency with higher pumping consistencies and higher reactor pressures
- Remarkable chemical and steam savings when running the MC equipment with higher consistency
- Lower operation costs as less dilution water is needed
- Increased storage tower capacity with higher storage consistency
- Possible to eliminate belt or gear drive units that require a lot of maintenance
- Extended lifetime of equipment and drive units are possible

## MCE RETROFIT upgrades for the existing 1st generation Sulzer MC pumps

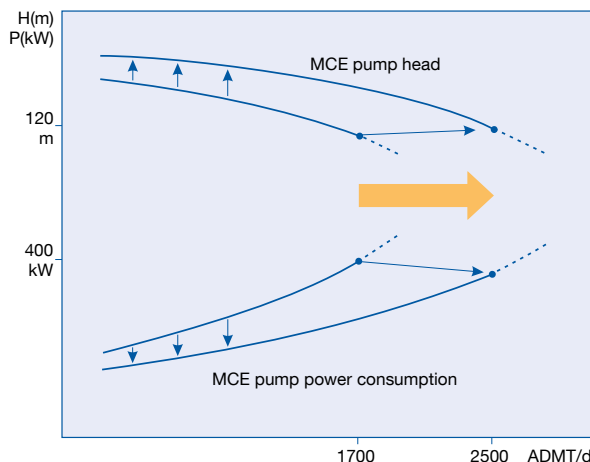
- New more efficient Fluidex impeller
- New casing cover
- New bearing unit adapter
- New shaft seal alternatives with cheaper single or double mechanical seal
- New vacuum pump parts for the internal degassing

## MCE HYDROFIT upgrades for the existing 2nd generation Sulzer MC pumps

- New MCE pump casing
- New more efficient Fluidex impeller
- New O-rings and gaskets



Remarkable power consumption savings with the same pumping head.

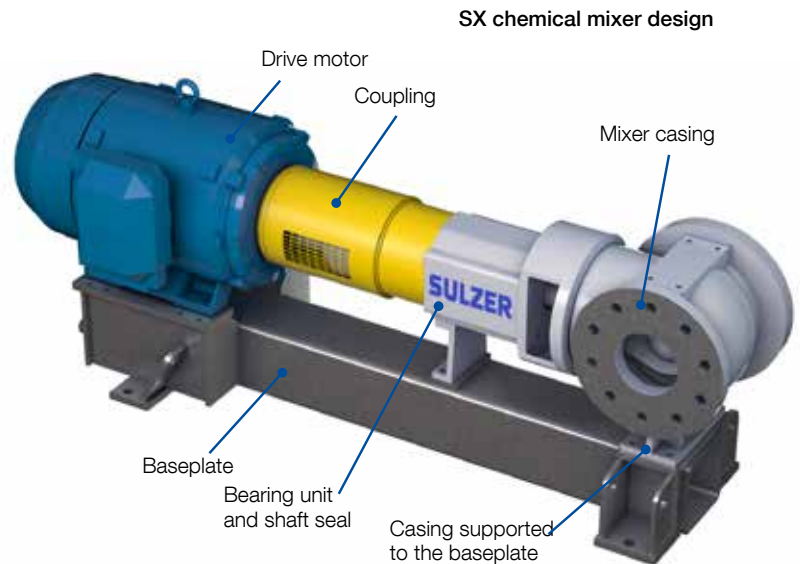


Production rate increase from 1,700 to 2,500 ADMT/d without increasing the power consumption.

# Efficient SX dynamic chemical mixers and other MC equipment

SX dynamic chemical mixer is designed for continuous operation in the industrial processes. It can be used for mixing different liquids or gases into clean, viscose liquids, fibrous or non-fibrous slurries and sludges in the process piping.

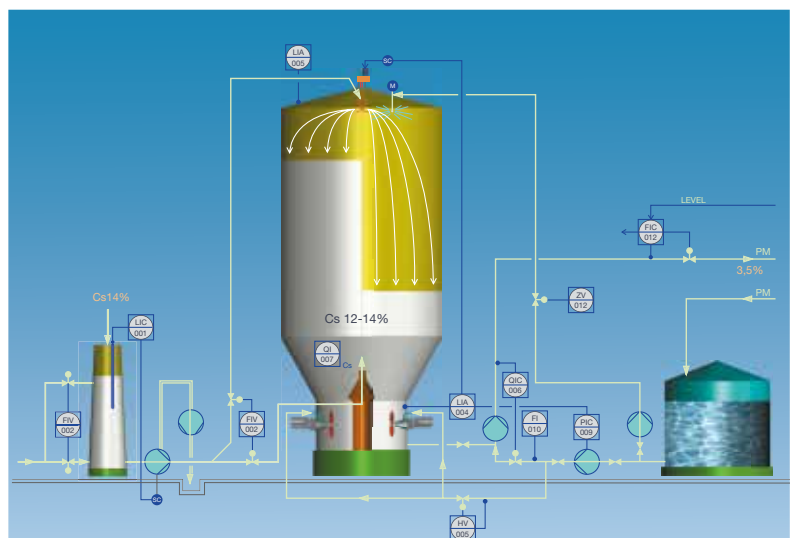
Sulzer MC equipment portfolio includes also the MC discharge scraper for tower bottom applications and MC discharger for various flow splitting arrangements. Efficient 'in-line' dilution systems for diluting the MC pulp with the static dilution mixer into lower consistency enables to improve the existing applications.



## Effective management of towers

The friction between stagnant and moving pulp in the storage towers can lead to uneven consistency distribution, resulting in consistency increases of stagnant pulp and the dilution of moving pulp. This difference in consistency leads to unequal retention times – with shorter times for moving pulp and longer times for stagnant pulp – which, in turn, lowers the quality of the product. Sulzer's SALOMIX™ mixing technology allows for effective bleaching and storage tower management and ensures the even filling and emptying of the towers. The top entry spreader (TES) distributes the stock evenly when the tower is being filled, and agitators in the agitation zone at the bottom of the tower ensure the uniform consistency of the stock that is pumped from the tower. Sulzer has equipped 10'000 m<sup>3</sup> volume towers in Brazil and in China with record diameter agitation zones.

**TES and agitators with dilcos at the bottom of the tower ensure continuous flow and equal retention times of the pulp. The patented Sulzer tower management solutions produce a quantifiable improvement in the quality of stock, e.g. its brightness.**



# Research and innovations

## Sulzer focuses on the continuous research and development of MC and other equipment

New bigger MC pump sizes and SX dynamic chemical mixer sizes have been developed recently. Special stock or pulp from the customer can be tested in Sulzer research center, if necessary. This way special equipment can be tested before delivery to the customer's mill. Various process pumps, specialty pumps and agitators are tested continuously in Sulzer research centers.

### Sulzer offers

- Process knowhow and proven equipment knowledge
- Wide process and application coverage
- Excellent equipment performance through continuous equipment development
- Wide range of installations in different processes carried out by many process suppliers
- Large reference list of installed base and mill contacts network
- Optimized selections, guidelines and project management
- Local presence close to the customers and end users
- High performance and high quality equipment



Continuous investment  
in development and  
full-scale testing facilities





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