Sulzer Chemtech is the process engineering division of the international Sulzer Corporation with headquarters in Winterthur, Switzerland. Activities include equipment and (application) know-how in separation and mixing technology. Products include structured packing and trays for separation columns, fractional crystallisation systems, equipment for mixing and reaction processes and catalyst supports.

**Excellence in Refining Technology**

**Leading in research and development**

With proven design procedures and innovative engineering solutions, Sulzer Chemtech can meet the refinery’s objectives. Sulzer Chemtech has the personnel, experience and engineering capability to model and analyse mass and heat transfer problems in distillation, absorption, extraction, mixing and reaction and fractional crystallisation. Apart from pilot tests, computational fluid dynamics (CFD) for optimising and fine tuning of the geometry are used for the development of new products.

**Pilot plant**

Customer-specific applications can be tested in our pilot plant. Resulting data can be used for a reliable design of the production plant. To achieve the design criteria for distillation applications on moving barges and platforms, pilot tests with a swinging laboratory column were done to simulate offshore conditions.

**Components, engineering and systems**

For more than 30 years Sulzer Chemtech has provided innovative mass transfer technology to the oil, gas and petrochemical industry. A wide variety of separation and mixing methods and process equipment allows us to design optimal systems.

- Process simulation
- Feasibility studies
- Basic design
- Detailed engineering
- Hardware
- Installation
- Commissioning
- Start up assistance

**Crude oil distillation**
- FCC vacuum towers and gas plants
- Lube oil distillation
- Liquid-liquid extraction
- Coking and visbreaking
- 1-Butene separation plants
- Fractional crystallisation etc.

*Numeric simulation of the cross-sectional concentration distribution in the SMI mixer.*
Sulzer Chemtech has experience in designing column internals for moving platforms. The design is based upon the successful combination of laboratory tests with a moving column and industrial applications.

**Industrial applications includes:**

- Separators (oil, gas, water)
- Gas drying
- Gas sweetening
- Multi cyclone separators
- Crude oil stabiliser
- Sea water deaeration

Sulzer Chemtech can provide following services:

- Feasibility studies
- Process design and basic engineering packages
- Hardware supply, i.e. Mellapak and internals
Crude Distillation Unit

Atmospheric Tower

Pollution Regulations
Better fractionation between LGO and HGO will increase the LGO (city diesel) yield and improve the quality.

Increased HGO yield
Better fractionation and less entrainment, with Mellapak in the wash section, will increase the HGO yield. This will also relieve the vacuum tower.

Increased Capacity
Debottlenecking a pump around section often results in 20% or more capacity. Structured packing normally does not require more space to achieve the required heat transfer.

Example
A revamped wash section with an investment of about US$ 0.5 Mio. for hardware and installation work will result in a pay back time of approx. 4 months.

Static Mixer

Tankfarm
Crude sampling homogeniser
Crude blender

Desalter
Produce the water dispersion for crude desalting.
• No moving parts.
• Danger of leakage and maintenance are eliminated.

Overhead Lines
Remove salts from gases in overhead lines.
• Preventing salt deposits in piping, cooler or column top section.

Static Mixer

Tankfarm
Crude sampling homogeniser
Crude blender

Desalter
Produce the water dispersion for crude desalting.
• No moving parts.
• Danger of leakage and maintenance are eliminated.

Overhead Lines
Remove salts from gases in overhead lines.
• Preventing salt deposits in piping, cooler or column top section.
Crude Distillation Unit

Vacuum Tower for Cracker Feed Preparation

Additional Diesel Side Cut
An additional fractionation section between LVGO and HVGO will recover diesel from the LVGO.

Wash Section
In deepcut operation flash zone temperatures greater than 400°C are required. The preferred solution for this mode operation is a combined bed with Mellapak in the upper and Mellagrid in the lower part. This together with the Sulzer patented VEP gravity distributor has been used in more than 30 wash sections.

Flash Zone
A special vane feed inlet device improves the phase separation of the liquid from the gas. This means less entrainment into the wash section.
Today the lube oil market is challenged by new product requirements. The refinery must cope with the new situation. This has a direct influence on the lube oil tower and the aromatic extraction of lube cuts. Sulzer Chemtech has a large experience with more than 50 reference columns world-wide.

Aromatic Extraction

Sulzer Chemtech can offer a reliable technology for the extraction of aromatics from lube oils.

We have experience with Furfurol, Phenol and NMP as solvents.

Extraction columns equipped with the Sulzer extraction packing SMVP offers:

- Increased capacity for debottlenecking of existing columns.
- Moderate contacting of the phases for reduced entrainment.
- High flexibility.
- No moving parts and therefore low maintenance costs.

Lube Oil Tower

<table>
<thead>
<tr>
<th>Advantages of Mellapak</th>
<th>Benefits for the customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low pressure drop</td>
<td>Increased capacity</td>
</tr>
<tr>
<td>Good separation efficiency</td>
<td>High distillate yields</td>
</tr>
<tr>
<td>High flexibility</td>
<td>Improved distillate quality</td>
</tr>
<tr>
<td>Selected packing types</td>
<td>Additional new lube cuts</td>
</tr>
<tr>
<td>Compact internals</td>
<td></td>
</tr>
</tbody>
</table>
Coking and Thermal Cracking Processes

The “bottom of the barrel” has become more important to refineries because heavier crudes are being processed and the market for vacuum residues is decreasing.

Sulzer Chemtech can offer solutions that increase plant capacity, reduce the risk of fouling and extend the run time.

Our products are successfully installed in:

• Delayed Coker Fractionators
• Flexicoker Fractionators
• Visbreaker Fractionators
• Vapour quench cooler with static mixers

Special Liquid Distributor

Plugging resistant and with a high turn down ratio.

Mellagrid

Sulzer Mellagrid was specifically developed to combine the efficiency of Mellapak with the mechanical resistance of grid. Advantages are:

• Not sensitive to coking or fouling due to its geometrical structure and smooth surface.

• Much better demisting and separation efficiency than traditional grid.

• The structure and element height allow for easy cleaning. It can be removed, unscrewed and cleaned with water jet.

• Mechanically robust structure.
FCC Main Fractionator

The advantages using structured packing in the FCC Main Fractionator are:

- Reduced pressure drop (typically from approx. 350 mbar to about 60 mbar).
- Increased capacity.
- Improved separation between side products.

Slurry Section

The use of Sulzer Mellagrid together with a slurry distributor increases column throughput and heat transfer performance while reducing risk of fouling.

Due to the geometrical structure of Mellagrid entrainment of catalyst particles is reduced.

Installation of structured packing.
Complete Systems

Propylene Plant

Sulzer Chemtech can offer the process and basic engineering, tower internals, reboilers and the turbocompressor for a grass root propylene plant with vapour recompression.

Example

- Production of 125,000 tons per year polymer grade propylene.
- Use Sulzer Chemtech vapour recompression technology.
- Use high efficiency structured packing Mellapak to reduce tower dimensions and compressor power.

1-Butene Technology

Sulzer Chemtech is able to supply a process for the separation of 1-butene. A number of variations are possible depending on the customer requirements. Years of experience and continuous development have resulted in the capability of supplying tailor made designs, assuring the most economic 1-butene production. Sulzer Chemtech’s structured packing, heat coupling or heat pump systems have been proved in commercial service.

Fractionation Trays

Over the last 40 years the product knowledge has developed to a leading mass transfer technology with a wide application area. The High Performance Trays are based on the unique V-Grid technology and innovative downcomer design.

Example

- Deethanisers
- Depropanisers
- C2- and C3-Splitters
- Debutanisers
- Deisobutanisers
- Dehexanisers
- Xylene Splitters
Desulphurization

**LPG Sweetening with Amines**

Sulzer Chemtech has experience with amine sweetening in both liquid-liquid and gas-liquid systems.

**Liquid-liquid Extraction**

Extraction packing SMVP in amine treating of LPG offers:

- Capacity increase of existing columns.
- High flexibility.
- Low amine entrainment.
- Low maintenance costs.
- Small investment for the revamp of existing columns.

**Amine Contactors**

Sulzer Chemtech has extensive experience with the absorption of H₂S and CO₂ with various amines. More than 100 columns are in operation world-wide.

Furthermore selective absorption can be used in sour gas systems contaminated with CO₂.

The advantages using Sulzer Chemtech column internals are:

- High selectivity through short residence time.
- Small solvent quantities.
- Low regeneration costs.
- Low pressure drop.
- Low investment costs.

**Off (Tail) Gas Treating**

The use of Mellapak in the Quench and H₂S absorption column results in a small pressure drop and therefore in important energy saving.

**Hydrodesulphurization**

Static mixers from Sulzer Chemtech are used to remove salts from the reactor effluent and fractionator over-head to avoid fouling of the coolers. Reactor effluent scrubber also clean the recycled hydrogen.
**Alkylation**

**Acid Wash Mixer**
Removes the alkyl-sulphates from the effluent stream for returning them to the reactor.

**Caustic Wash Mixer**
Removes the acid traces from the reactor effluents to protect the separation columns and other downstream equipment from corrosion.
Only advanced process solutions together with high quality components can secure the competitive advantage of refineries in today’s highly competitive environment.

### Mellapak
Columns with structured packing Mellapak, pioneered by Sulzer, have following advantages:

- High performance
- High capacity
- Low pressure drop
- High flexibility

### MellapakPlus
The invention of Sulzer gauze packing resulted in a decisive breakthrough in mass transfer equipment. A further milestone was the development of the Sulzer Mellapak. Mellapak opened up new and unforeseen perspectives in all areas of thermal mass transfer. The new MellapakPlus is the latest development and offers the lowest pressure drop of all structured packings available on the market.

### Mellagrid
Mellagrid can be used in every area, where the mechanical strength of Mellapak could cause some concern or where plugging or coking are likely to occur.

### Column internals
The great success of our products has only been possible in conjunction with the continuing development of distributors and other internals.
Innovative Components

Fractionation Trays

A full range of fractionation trays especially suited for refinery applications.

Optimised for fast installation and easy maintenance.

Static mixers

Advanced static mixing and reaction technology is suitable to many refining process units.

- Blending liquids or gases.
- Dispersing liquids or contacting gases to equilibrium conditions.
- Washing or scrubbing hydrocarbons.
- Vaporise liquids or condense gases.

Shell Mass Transfer Technology

The complete Shell Mass Transfer Technology Package, previously used only by Shell companies, is now available from Sulzer Chemtech under the terms of the alliance between Shell Global Solutions BV and Sulzer Chemtech Ltd.

The technology covers high performance trays, associated internals and phase separation equipment.

The technology has been the Shell standard for years and it is backed by an abundance of operational and design experience. Sulzer Chemtech now offers these dependable high performance trays and separators to their customers.
Industrial Applications from A to Z

Mixers, Packings, Process design, Trays and Installation Service for many applications.

Alkylation – static mixer for product neutralisation
Amine Contactor
Aromatic extraction from Lube Oil
Atmospheric Crude Oil Tower – more than 80 columns world-wide with Mellapak

Benzene Tower
Bitumen tower
1-Butene – Distillation and heat pump technology

Coker Fractionator
Crude sampling mixer
C3-Splitter
C4-Splitter
C5-Splitter

Debutaniser
Deethaniser
Dehexaniser
Demethaniser
Depropaniser

Deepcut Vacuum Tower – Mellagrid, Mellapak and VEP distributor
Desalting Water-oil Mixer

Ethylene Water Quench

FCC Main Fractionator – Mellagrid in slurry section

Gasoline blending mixer

H₂S extraction from LPG
Kerosene Stripper

LNG-Stabiliser

Lube Oil Tower – Low pressure drop, high separation efficiency with Mellapak

Naphtha Splitter
Off-gas treating
Olefin separation

Para Xylene – Heat pump crystallisation
Preflash Tower
Primary Absorber

Quench Tower

Reformer Feed Gas Mixer

Secondary Absorber
Solvent Stripper
Sour Water Stripper
Stabiliser

Toluene Tower

Vacuum Tower for Cracker Feed – over 150 columns with Mellapak world-wide
Visbreaker Fractionator – Application for Mellagrid and Mellapak

Xylene Splitter
Services to Customers

Worldwide Sales and Manufacturing

Sulzer Chemtech has together with the Sulzer Corporation world-wide presence with offices in most countries. Furthermore Sulzer Chemtech has its own production facilities in Switzerland, the USA, India, China, Singapore and Mexico.

Field Service

Sulzer Chemtech has the project management and technical skills to assure successful installations for new columns and revamps in refineries, gas processing and petrochemical plants. Abilities range from site supervision to complete installation.

Emergency Services

In the event of a break down or other plant upsets, Sulzer Chemtech can supply packing, column internals and trays at short notice.
Sulzer Chemtech Ltd, a member of the Sulzer Corporation, with headquarters in Winterthur, Switzerland, is active in the field of process engineering and employs some 2500 persons worldwide. Sulzer Chemtech is represented in all important industrial countries and sets standards in the field of mass transfer and static mixing with its advanced and economical solutions.

The activity program comprises:

- Process components such as fractionation trays, structured and random packings, liquid and gas distributors, gas-liquid separators, and internals for separation columns
- Engineering services for separation and reaction technology such as conceptual process design, feasibilities studies, plant optimizations including process validation in the test center
- Recovery of virtually any solvents used by the pharmaceutical and chemical industry, or difficult separations requiring the combination of special techniques, such as thin film/short-path evaporation, distillation under high vacuum, liquid-liquid extraction, membrane technology or crystallization
- Complete separation process plants, in particular modular plants (skids)
- Tower field services performing tray and packing installation, tower and column maintenance, vessel welding, and plant turnaround projects
- Mixing and reaction technology with static mixers
- Cartridge-based metering, mixing and dispensing systems, and disposable mixers for reactive multi-component material