Sandvik – a world leader in sulphur solidification and handling systems
A total capability

From start to finish

At Sandvik Process Systems we can engineer total sulphur solidification and handling systems to the strictest production and environmental parameters, with a typical turnkey project covering everything from pumping liquid sulphur from the storage tank, to loading equipment for the end product.

At the heart of every system we deliver is the solidification unit, consisting of a feeding device and cooler. All our systems make use of indirect cooling, with the heat of the molten product being transferred through the steel belt by means of cooling water sprayed on the underside of the belt.

As well as being tough and durable, the thin steel belt also has negligible heat resistance, so cooling can be precisely controlled to achieve the desired crystallization speed. Heat exchangers remove heat and cooling water is recycled, which means that the process and the efficiency of the plant can be controlled accurately. In this way, both capacity and speed can be increased, highlighting Sandvik’s commitment to helping customers achieve the highest standards of production.
Sophisticated process control assures production efficiency as well as precise management control. Our turnkey capabilities encompass all ancillary equipment such as water cooling, piping and pumping systems, preconditioning, handling, storage and packaging units. Sandvik Process Systems is approved to DIN EN ISO 9001:2000 – the international recognition of highest quality standards and practices.
The process... the product...

The perfect solution to your particular needs

For many companies today, the efficient solidification of sulphur is essential from an operational, handling and environmental point of view, so specifying the most appropriate system is vital in terms of maximizing productivity and safety. Furthermore, the ability to store sulphur in a convenient solid form can also provide a valuable hedge against short term market fluctuations.

At Sandvik Process Systems, we have more than 25 years’ experience in delivering total turnkey solidification solutions to customers throughout the world. These systems are designed to meet specific requirements in terms of capacity, flexibility and form of end product.

Sandvik Process Systems has supplied more sulphur solidification systems than any other manufacturer in the market and the most widely specified of these is the Rotoform® system.
Recent years have seen more and more sulphur solidified in the form of pastilles, the ideal shape for subsequent storage, handling and reprocessing.

We have been at the forefront of this revolution, combining the qualities of the Sandvik steel belt – excellent thermal properties, flexibility and durability – with the performance of the Sandvik Rotoform process, now widely accepted as the industry standard for high quality pastille production.
Since the early 1980s, some 300+ Rotoform units have been commissioned and installed around the world for the pastillation of sulphur, and this proven success is the result of the unique combination of benefits provided by this technology.

**Quality of formed sulphur**
- Free flowing pastilles of uniform size and quality: ideal for subsequent handling, storage and transport.
- Premium spec. quality according to SUDIC (Sulphur Development Institute of Canada) test.

**Super-efficient process**
- Indirect heat transfer: no contact between product and cooling medium.
- Controlled crystallization: well defined cooling time.
- Environmentally friendly: emissions within the limits of international laws and cooling water recycled.
- Maximum flexibility: rapid changeover to partial operation without affecting quality.
- Quick start-up of plant.

**Versatile, reliable equipment**
- Efficient modular system: ability to increase capacity simply by grouping several identical units together.
- Reliable operation with minimal service requirements: suitable for remote areas.
- Reliable development and back-up through test and pilot plants.
- Worldwide service network available at short notice.
The Sandvik Rotoformer®

Typical data for the Rotoform 3000 process

<table>
<thead>
<tr>
<th>Product</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pastille shape</td>
<td>hemispherical, uniform</td>
</tr>
<tr>
<td>Pastille diameter</td>
<td>2-4 mm</td>
</tr>
<tr>
<td>Bulk density</td>
<td>&gt;1.150 kg/m³ loose</td>
</tr>
<tr>
<td></td>
<td>&gt;1.320 kg/m³ packed</td>
</tr>
<tr>
<td>Dust (&lt;0.3 mm) as produced</td>
<td>&lt; 0.2%</td>
</tr>
<tr>
<td>Friability stress level (acc. to SUDIC)</td>
<td>&lt; 2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>max 6 t/h</td>
</tr>
<tr>
<td>Capacity range</td>
<td>70-100%</td>
</tr>
<tr>
<td>Belt area</td>
<td>7.5 m x 1.5 m</td>
</tr>
<tr>
<td>Floorspace requirement</td>
<td>approx. 11.0 m x 2.0 m</td>
</tr>
</tbody>
</table>

The Rotoform system has undergone continual improvement over the years, leading to the development of an entire family of specialist systems. Of these, two are specifically designed to deliver premium quality sulphur pastilles with a consistent, hemispherical shape: the Rotoform 3000 featured here, and the Rotoform HS (see over).
The Rotoform HS is a revolutionary new solution for pastillation of liquids, developed by Sandvik Process Systems, the expert in melt granulation.

Recognising that many companies’ sulphur solidification requirements are increasing, we have developed the Rotoform HS, a high capacity system capable of processing sulphur at up to 12 t/h.

As with all Rotoform systems, the Rotoform HS depositor combines with a steel belt cooler to produce pastilles of a highly uniform shape, stability and quality, in an environmentally friendly manner, and is ideal for low viscosity, fast cooling products.

**High pastillation speed – reduced centripetal forces due to increased diameter**

\[
F_1, F_2 = \text{centripetal force}
\]

\[
s_1, s_2 = \text{circumferential speed}
\]

\[
V_1, V_2 = \text{belt speed}
\]

\[
r_1, r_2 = \text{depositor radius}
\]
pastillation of liquid melts

Rotoform HS
The difference between this and the standard Rotoform is that the Rotoform HS uses a much larger rotating shell, enabling droplets to be deposited on the steel belt without distortion at twice the previous speeds, typically up to 120 m/min. Combine this with a belt that’s twice as long (to allow the same amount of cooling time) and the capacity of the system is up to 2.5x that of a standard Rotoform.

The Rotoform HS provides improved safety – if anything is caught between dropformer and belt, the dropformer automatically raises to minimise the risk of damage or injury.

In addition, this high capacity version also offers a number of service enhancements:
• Swing-out bearing unit to allow much easier access.
• Reduction of wear parts through elimination of rotary seals.
• Dropformer now lifts into service position pneumatically.
• Easier servicing with fewer components to check and replace.

This ensures that all the inherent benefits of the Rotoform remain available, enabling users to produce pastilles of a highly uniform shape, stability and quality, in an environmentally friendly manner. In short, the Rotoform delivers the best of all worlds:
• High capacity production
• Proven Rotoform technology
• 8,000 hrs/year operation
• Sandvik support & service
• Rapid return on investment
Successful sulphur handling

The economic and environmental imperative

The impact of continuous population growth and attendant increases in energy consumption are having a profound effect on the sulphur processing industry: as fossil fuels are the main source of energy, the emission of sulphur dioxide is of increasing environmental concern.

More intense desulphurisation is one result, as is the use of natural gas, crude oil and coal with higher sulphur contents as the purer energy carriers are used up. Increasingly, sulphur is arriving on the market after passing through the Claus process, as well as from the desulphurisation of crude oil products.

The common denominator with all sulphur extraction is that it is obtained in liquid form, and needs transporting from the extraction point to the end user's plant.

This raises major logistical problems in terms of potential hazards, environmental issues and the need for complex infrastructure, but there is also an obvious solution: the solidification of sulphur into a solid, easy-to-handle form.

It's an area in which Sandvik Process Systems is an acknowledged world leader; with the resources and experience to deliver a full turnkey plant from initial engineering and fabrication, through supply and erection including civil works, to start-up and training.

Our solidification systems are used around the world to maximize efficiency, productivity and profitability, and at the same time they maintain the very highest standards of safety and environmental control.
The Sandvik sulphur solidification and handling system at the Caltex plant in Cape Town, South Africa is based around two Sandvik Rotoform units. This installation was completed in 2002 and is operating to the customer’s full satisfaction.

With the capacity to operate around the clock and process up to 12 tonnes per hour, this installation can handle up to 288 tonnes of sulphur a day.

As well as its high capacity and consistent product quality, the other major benefit of this extremely modern plant is its ability to satisfy the strict environmental regulations required in South Africa, a key factor behind the customer’s decision to choose Sandvik Rotoform.
Successful sulphur handling

If you'd like more detailed information on the 300+ sulphur systems we've already installed, just ask. We're ready to share our experience and know-how with you.

The Sandvik sulphur solidification system at Shantz forming plant takes liquid sulphur feed from the Caroline/Canada gas plant.

With 46 Rotoform installations and the capacity to produce up to 6,000 tonnes per day of sulphur pastilles, this is the largest installation of its kind in the world. Shell chose Sandvik for a number of factors including capacity, environmental implications such as dust and other effluents, product quality, maintenance requirements, safety and ease of operation.

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