New improved dust protection catalyst for sulphuric acid plants

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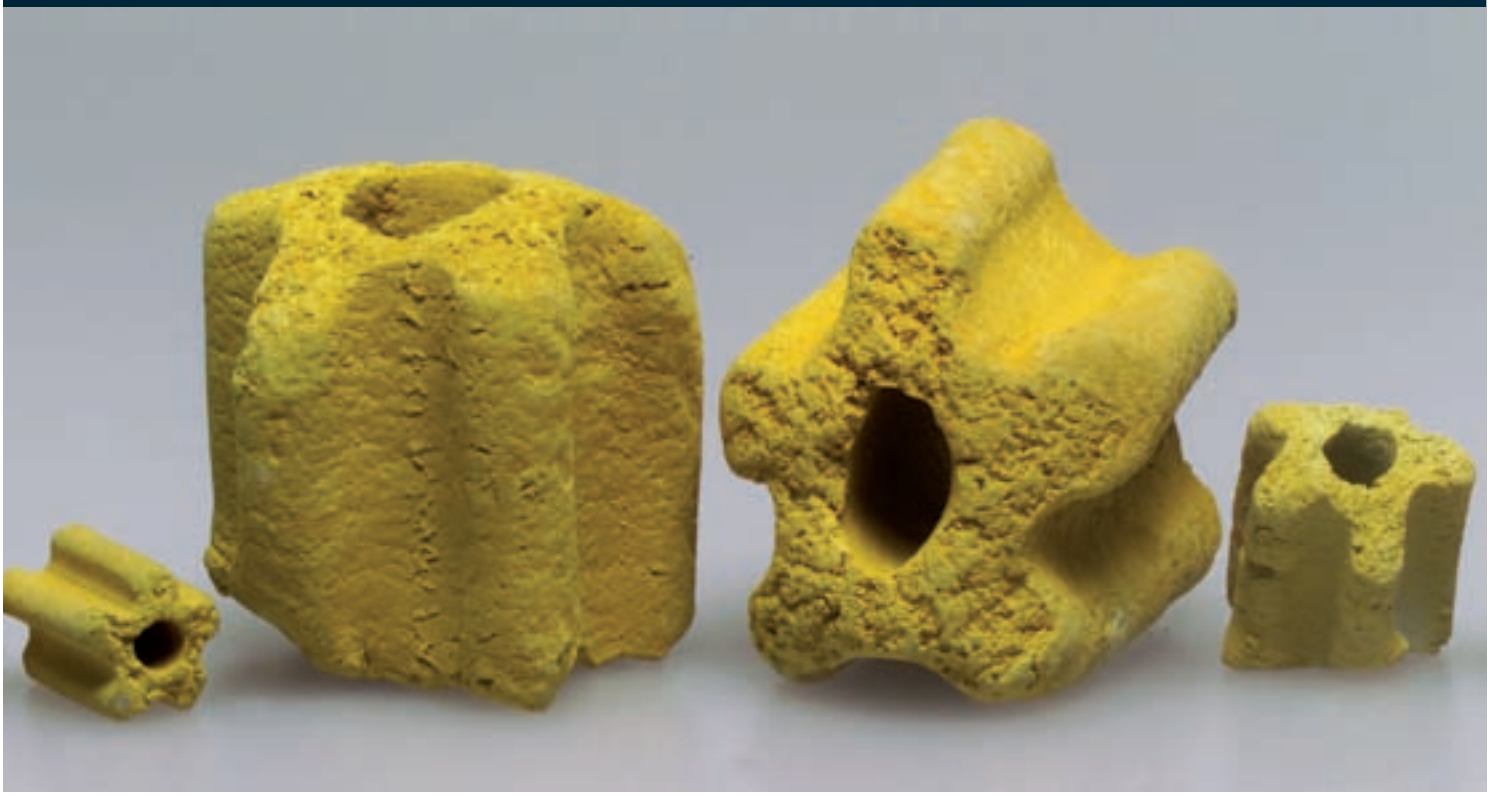

Unmatched high dust tolerance with Topsøe's 25 mm Daisy-shaped catalyst

Haldor Topsøe has developed a new improved dust protection catalyst in the size of a 25 mm daisy in the proven VK catalyst formulation. This new super daisy shows significant advantages compared to existing catalyst sizes and shapes:

- 30-35% longer production campaigns compared to 20 mm rings or a doubling when compared to 12 mm daisy
- reduced number of time-consuming and expensive shutdowns for catalyst screening
- significant savings in blower energy

Since the introduction of the first dust protection catalyst in the 1970's, the traditional 20 mm rings have provided invaluable savings for sulphuric acid plants suffering from pressure drop build-up and currently the 20 mm rings are installed in more than 60 sulphuric acid plants worldwide. A new second generation of dust protection catalyst has been developed to meet the desire to prolong production campaigns, even beyond the possibilities offered with the 20 mm rings.

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Catalyst size	Relative S_A	Void fraction ε	Relative penetration depth
6 mm cylinder	130	0.35-0.40	53
10 mm ring	100	0.48-0.52	91
12 mm daisy	100	0.54-0.56	100
20 mm ring	53	0.48-0.52	170
25 mm daisy	52	0.54-0.56	190

The dust capture for various catalyst sizes and shapes is determined by the specific surface area S_A and the void fraction ε . The penetration depth is proportional to ε / S_A

Optimised size and shape

The sensitivity to plugging and pressure drop build-up in a catalyst bed depends on the catalyst bed void and how the dust is distributed. The penetration depth increases with the size of the catalyst particles because the specific surface area is lower.

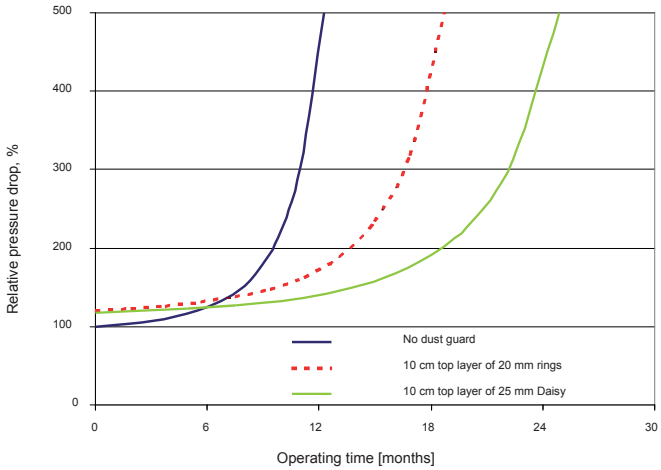
The experienced rapid increase of pressure drop across a layer of 6 mm cylindrical catalyst operating at a high dust concentration is due to the high specific surface area and low initial void of the 6 mm pellets. The delaying of pressure drop increase observed for 10 mm rings and more pronounced for the 12 mm daisy is primarily caused by their higher initial void fraction. For larger pellets such as the 20 mm ring, the dust penetrates deeper into the bed thus postponing pressure drop build-up even further.

Outstanding dust protection

Topsøe's new 25 mm daisy catalyst combines in an excellent way the effect of a larger void fraction for higher dust capacity and the effect of a lower specific surface area for improved dust distribution.

Installation of a 10-15 cm (4-6 inches) top layer in the 1st bed results in 30-35% longer production campaigns compared to the 20 mm rings or a doubling when compared to the 12 mm daisy. Consequently, the number of time-consuming and expensive shutdowns for catalyst screenings is reduced and at the same time significant savings in blower energy result from the lower pressure drop.

The 25 mm super daisy has the same catalytic activity and mechanical strength as the traditional 20 mm ring, however the initial pressure drop is 25-30% lower.



Pressure drop development across various catalyst loadings in a dust laden feed gas. Installation of a 10-15 cm (4-6 inches) top layer of the 25 mm daisy results in 30-35% longer production campaigns compared to the 20 mm rings or a doubling when compared to the 12 mm daisy.

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