Efficient Solution to Pressure Drop Issues

Description

The particle length distribution of a catalyst has a direct impact on the pressure drop characteristics of the reactor into which it is loaded. Catalyst size issues, such as short average length or a high percentage of short particles, can cripple a reactor's performance. Evonik's Length Grading technology can effectively and economically address such concerns, resulting in improved catalyst performance and longer reactor run lengths.

Precise Separation Maximizes Process Yield

When conventional screening is used to increase the average length of a catalyst, significant losses are likely to occur. Screening can only remove dust, fines, and particles that are smaller than the catalyst diameter. Once a screen aperture exceeds a catalyst's diameter, yield loss becomes more prominent. In contrast, Evonik's Length Grading process ensures highly efficient separation at any length, with an optimal yield.

Proven Technology

In the following example, a 1.3mm diameter CoMo hydrotreating catalyst was length graded. The starting material was short, a regenerated catalyst having been in prior service, with an average length of 2.78mm. The customer required that this material have an average length of at least 3.40mm due to pressure drop concerns in their unit.

Pilot scale tests showed that separation needed to occur at 2.60mm in order to yield a product with an acceptable average length.

Particle Length Influence on Two-Phase Pressure Drop



Pilot data using 1.3mm diameter catalyst shows that length grading can reduce pressure drop by 20% or more.



When commercial processing was complete, product material was measured at 3.58mm average length, exceeding the customer's expectations. The graphs (below) and table (at right) provide details on the yield and resultant particle length distributions.

Evonik Resale Catalysts— Length Graded for Optimal Performance

Evonik offers an extensive selection of regenerated catalysts suitable for most hydroprocessing applications. These catalysts can be length graded to meet specific requirements.

Length graded large diameter catalysts (e.g. 2.5mm) can help improve severe pressure drop limited conditions.

In pressure drop sensitive situations where additional activity is desired, length graded small diameter catalyst (e.g. 1.3mm) can often replace non-length graded large diameter catalyst with minimal impact on pressure drop.

Length graded Evonik resale catalysts can help users better manage pressure drop issues and extend run lengths.

Material Length Histogram Prior to Length Grading



Length Grading – 1.3mm CoMo Catalyst

	Feed	Short Fraction	Long Fraction
Wt%	—	32%	68%
Average Length, mm	2.78	1.86	3.58



Products of Separation by Length Grading



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