

Catalyst & Technology News *August/September 2001*

Innovative Stacked-Bed Catalyst Technology for Hydrocracking Pretreat

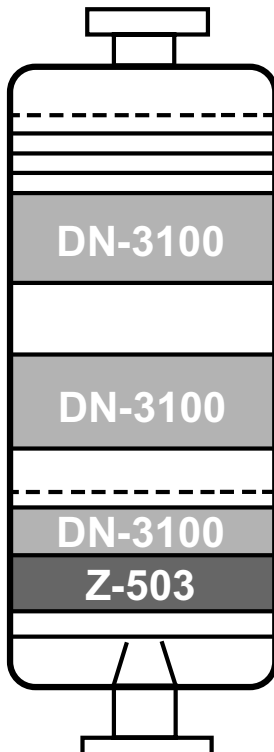
In hydrocracking operations, it is often the performance of the pretest reactor(s) that limits overall unit performance. Our portfolio of hydrocracker pretreat catalysts is continually being upgraded through a strong commitment to R&D and on-going applications testing. A recent innovation, currently in use in seven hydrocrackers, involves the use of stacked catalyst beds in the pretreater!

- DN-3100 is Criterion's latest NiMo HDN catalyst for hydrocracker pretreat applications. The breakthrough Centinel technology used in the making of this catalyst provides enhanced performance by greatly improving metals dispersion. This technology maintains high metals dispersion throughout the catalyst preparation and allows activated metal sulphides to form without sintering/agglomeration and loss of dispersion.
- Zeolyst™ Z-503 is a NiW ASA-containing hydrocracking catalyst. The use of Z-503 at the bottom of pretreat reactors provides enhanced acidity to improve overall HDN activity and stability relative to the use of HDN hydrotreating catalyst alone.
- The use of stacked-beds of DN-3100/Z-503 allows the refiner to process tougher feeds for longer cycles. The performance of the pretreater is both enhanced and more "robust", resulting in improved overall hydrocracker performance and profitability.

Z-503 Features & Benefits

Catalyst Description →	NiW on ASA Catalyst
Best Applied →	Stacked-Bed Combination with Ni-Mo Alumna HT Catalysts
	Where:
	– Very Low N-Slip is required (<5 ppm)
	– Feedstocks Contain Very Refractory Nitrogen
	– Moderate Level of Cracking in HCPT is Desirable
	– Ascending reactor temperature profile
Principle Features	Benefits
* High Saturation & Ring-Opening NiW ASA Catalyst	– Significantly Improve Overall HCPT HDN Performance
* Moderate Cracking Activity	* Supplements HC Catalysts Duty

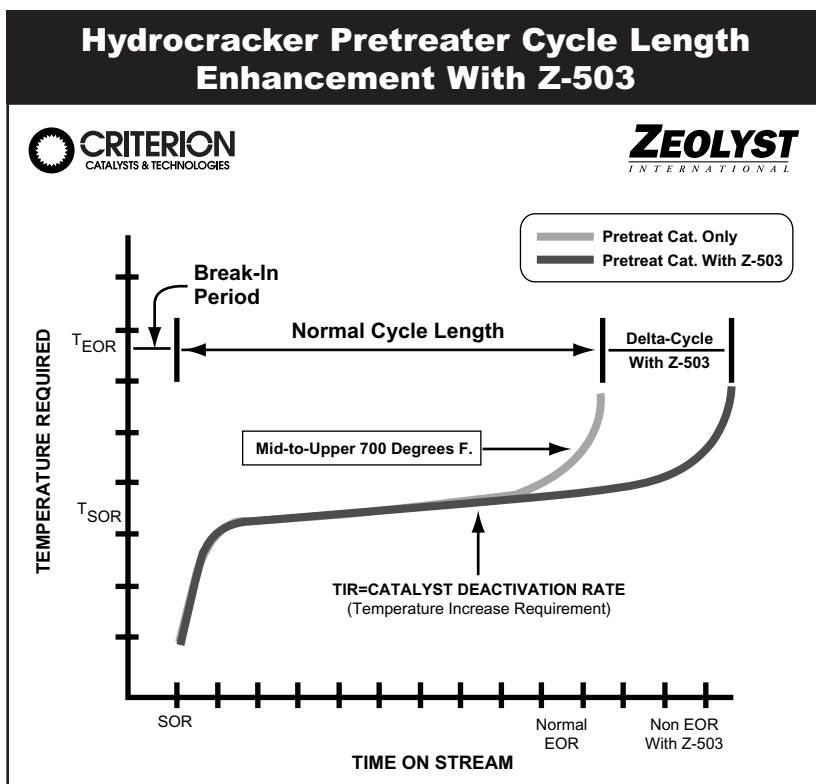
Our hydrocracking experts and technical service engineers will work with you to determine the best stacked-bed catalyst loading for your unit.



Application of Z-503 in HCPT Stacked-Bed Service

Feedstock:	(VGO)	
Nitrogen	880	ppm w
Sulphur	0.47	%w
TBP 98%	1049	F
TBP 100%	1076	F
Ni	1	ppm w
V	1	ppm w
Operating Conditions:		
LHSV	1.1	1/1/hr
Inlet H ₂ PP	1350	psig
Performance:		
	DN-3100	DN-3100/Z-503
HDN Advantage at 740°F (395°C)	Base	13°F (7°C)
HDN Advantage at 760°F (405°C)	Base	22°F (12°C)
Cracking Advantage at 760°F (405°C)	Base	(37% vs 28% 370C + Conv.)
At constant conv.	Base	5°C

With traditional pretreater loadings of conventional HDN catalyst alone, the onset of rapid deactivation occurs at temperature in the mid-to-upper 700 degrees F., depending on hydrogen partial pressure. The use of stacked-bed DN-3100/Z-503 increases overall reactor activity and stability and results in longer cycle lengths with tougher feedstocks.



To date, seven different refiners have chosen to use stacked-beds of either DN-190/Z-503 or DN-3100/Z503 in their hydrocrackers pretreaters. One refiner will begin their second cycle with stacked-bed R-1 catalysts later this year.

HCPT Stacked-Bed Catalyst Users

Customer	Cat. Combination	Start-Up Date
East Coast Refiner A Two Cycles	DN-190/Z-503 DN-3100/Z-503	Q2/99 Q3/01
West Coast Refiner B	DN-190/Z-503	Q1/00
East Coast Refiner C	DN-190/Z503	Q4/00
Gulf Coast Refiner D	DN-3100/Z-503	Q4/00
West Coast Refiner E	DN-3100/Z-503	Feb/01
Mid-Continent Refiner F	DN-3100/Z-503	Mar/01
Gulf Coast Refiner G	DN-3100/Z-503	Apr/01

 **CRITERION** Worldwide Offices:
CATALYSTS & TECHNOLOGIES

HOUSTON:

16825 Northchase Dr; Suite 1000
Houston, Texas 77060-6029
Telephone: (281) 874-2600
Facsimile: (281) 874-2641

CANADA:

Suite 810, Centre 104
5241 Calgary Trail Southbound
Edmonton, Alberta T6H 5G8
Canada
Telephone: (1) 780-438-4188
Facsimile: (1) 780-438-3473

UNITED KINGDOM:

1650 Parkway
The Solent Business Park,
Whiteley, Fareham,
Hampshire, PO15 7AH
England
Telephone: (44) 1 489-881881
Facsimile: (44) 1 489-881882

SINGAPORE:

298 Tiong Bahru Road
#07-03 Central Plaza
Singapore 168730
Telephone: (65) 6276-3627
Facsimile: (65) 6276-7455

LUXEMBOURG:

Route de Longwy, 420
L-4832 Rodange, Luxembourg
G.D. of Luxembourg
Main Tel#: (352) 502-454
Catalyst Regeneration Services
Main Fax#: (352) 502-996

Visit us on the web: www.criterioncatalysts.com
e-mail address: publicaffairs@criterioncatalysts.com



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