

# Application of CENTINEL Technology for Deep and Ultra Deep Distillate HDS

## DC-2118 (CoMo) and DN-3110 (NiMo) Catalysts

The major challenges facing refiners worldwide to reduce sulphur in transportation fuels provide equal challenges for catalyst and technology suppliers, such as Criterion Catalyst and Technology Company, to introduce step-out changes in catalyst performance, particularly in the Distillate Deep/Ultra Deep HDS arena.

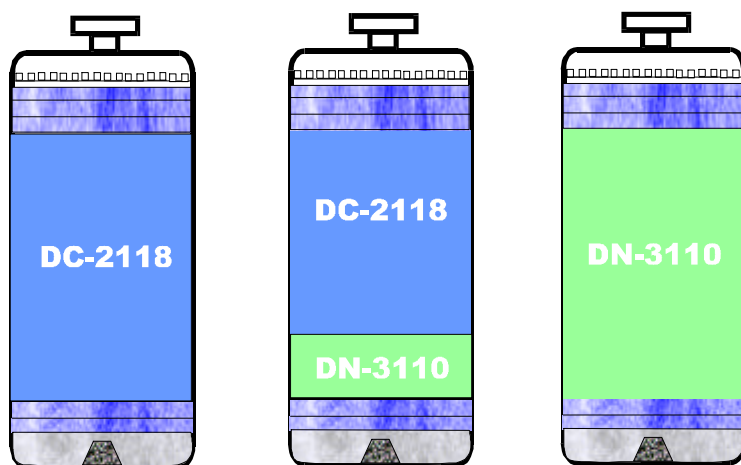
Criterion's response to this ever-changing distillate market has been to increase the speed of new CoMo and NiMo catalyst development through both conventional and innovative manufacturing technologies such as CENTURY<sup>®</sup> and CENTINEL. In the last 2 years, Criterion has commercialised 4 new CoMo catalysts and 2 new NiMo catalyst for distillate HDS applications. The continued need for step-out performance for succeeding catalyst generations requires exceptional creativity to provide the most economical "drop-in" solutions for meeting new fuel specifications. CENTINEL Technology is Criterion's newest innovation. Let's take a closer look at the application and benefits of DC-2118 CoMo and DN-3110 NiMo distillate HDS catalysts.

## Distillate HDS Application of CENTINEL DC-2118 and DN-3110 Catalysts

The figure below represents the application of these catalysts for maximising cycle length as a function of increasing hydrogen partial pressure for the processing of a SR/Cracked Feedstock blend to sulphur levels of 500 to <10 ppmw.

**CENTINEL**  
TECHNOLOGY

**Tailored Loading  
of CENTINEL  
Catalysts for  
Maximum Cycle  
Length**



**PRESSURE**

At the low end of the pressure scale (25 bar, 375 psig) where activity constraints are greatest, maximum use of DC-2118 CoMo catalyst is recommended to meet the sulphur targets at the lowest WABT's while minimising hydrogen consumption.

At intermediate hydrogen partial pressures (30-50 bar, 435-725 psig), CoMo/NiMo stacking can be used to accommodate unit objectives of additional product quality upgrading. By loading the DN-3110 (NiMo) catalyst in the hotter bottom section of the reactor, more effective polyaromatic saturation and cetane upgrading is achieved across the cycle compared to a 100% CoMo loading.

At higher hydrogen partial pressures (>50 bar, 725 psig), NiMo catalysts approach or exceed CoMo catalysts in deep HDS performance. When hydrogen is available, switching to a full load of DN-3110 NiMo catalysts leads to:



- Additional product quality upgrading (density, cetane, T95 shift, polyaromatics saturation).
- Greater ability to process more refractory feeds and improve unit margin further.
- Flexibility to operate the distillate hydrotreater in blocked VGO operation

## SUMMARY OF ECONOMIC BENEFITS

CENTINEL DC-2118 and DN-3110 represent the highest activity/highest stability distillate catalysts on the market today coupled with attractive performance/fill cost ratios. CENTINEL Technology, features optimum metals dispersion that is preserved during the creation of the sulphided active sites. This maximises overall hydrotreating (HDS/HDN/HDA) performance. With DC-2118 and DN-3110, the refiner can experience:

- 1** Simplified hydrotreater start-up
- 2** Longer cycle lengths (fewer shutdowns) at the same hydrotreating severity.
- 3** Greater unit margin through processing of more refractory feeds at higher throughputs (higher sulphur, higher FBP, higher % cracked stocks).
- 4** Greater unit margin by operating to lower product sulphur to allow more flexibility in distillate blending.
- 5** Greater flexibility to operate in blocked mode and process VGO for improved FCC yields and reduced FCC gasoline sulphur.



**HOUSTON - Corporate HQ**  
16825 Northchase; Ste 1000  
Houston, Texas; USA 77060  
Tel: (1) 281-874-2600  
Fax: (1) 281-874-2641

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

**SINGAPORE**  
298 Tiong Bahru Road  
#07-03 Central Plaza  
Singapore 168730  
Tel: (65) 276-3627  
Fax: (65) 276-7455

**LUXEMBOURG**  
Route de Longwy, 420  
L-4832 Rodange,  
Luxembourg  
G.D. of Luxembourg  
Tel: (352) 502-454  
Fax: (352) 502-996

**UNITED KINGDOM**  
1650 Parkway  
The Solent Business Park  
Whiteley Fareham  
Hampshire PO15 7AH  
England  
Tel: (44) 1 489 881881  
Fax: (44) 1 489 881882

Visit Our Website: [www.criterioncatalysts.com](http://www.criterioncatalysts.com)