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REFINERS CAPITALIZE ON

CENTINEL Performance

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CENTINEL TECHNOLOGY

Reduce

FCC Gasoline Sulphur • FCC Cycle Oil Production

What benefits are derived from using a more active catalyst in an FCC Pretreat unit?

Refiners are quickly learning value can be derived from CENTINEL catalysts. Six refiners, who are operating Criterion CENTINEL catalyst systems in their FCC Pretreat units, have already realized millions of dollars in improved FCC unit profitability via higher throughput, increased aromatic saturation, and improved sulphur removal efficiency. In keeping with Criterion's history of excellence in FCC Pretreat operations, CENTINEL catalysts have found their home.

FCC Pretreat unit operators understand very well that FCC profitability is directly tied with optimized performance of the upstream pretreater. Improved catalyst systems in the pretreater not only extend cycle life; they improve FCC yield selectivity and generate millions of dollars. CENTINEL has commercially proven to be this improved catalyst.

How are refiners taking advantage of the improved activity of CENTINEL?

Original development work identified improved desulphurisation, denitrogenation, and aromatic saturation activity of CENTINEL catalysts could increase gasoline and olefin production in the FCC, while reducing lower value cycle oil production and sulphur in the products produced from the FCC. These benefits, as well as others, have now been commercially confirmed.

In the field, refiners have observed that they can process more coker gas oil, increase unit feedrates, and remove more sulphur, nitrogen, and aromatics from FCC feed. These high value operating changes result in:

- Reduced SOx emissions from the FCC Regenerator
- Reduced FCC gasoline sulphur
- Increased FCC gasoline and olefin production
- Reduced FCC LCO and Slurry Oil production
- Increased FCC feedrates

The following cases demonstrate how 3 refiners have specifically benefitted from a CENTINEL application in their FCC pretreater.

North American Refiner - *FCC Pretreat - Case #1*

Changed from Industry Benchmark NiMo to CENTINEL DN-3110 NiMo

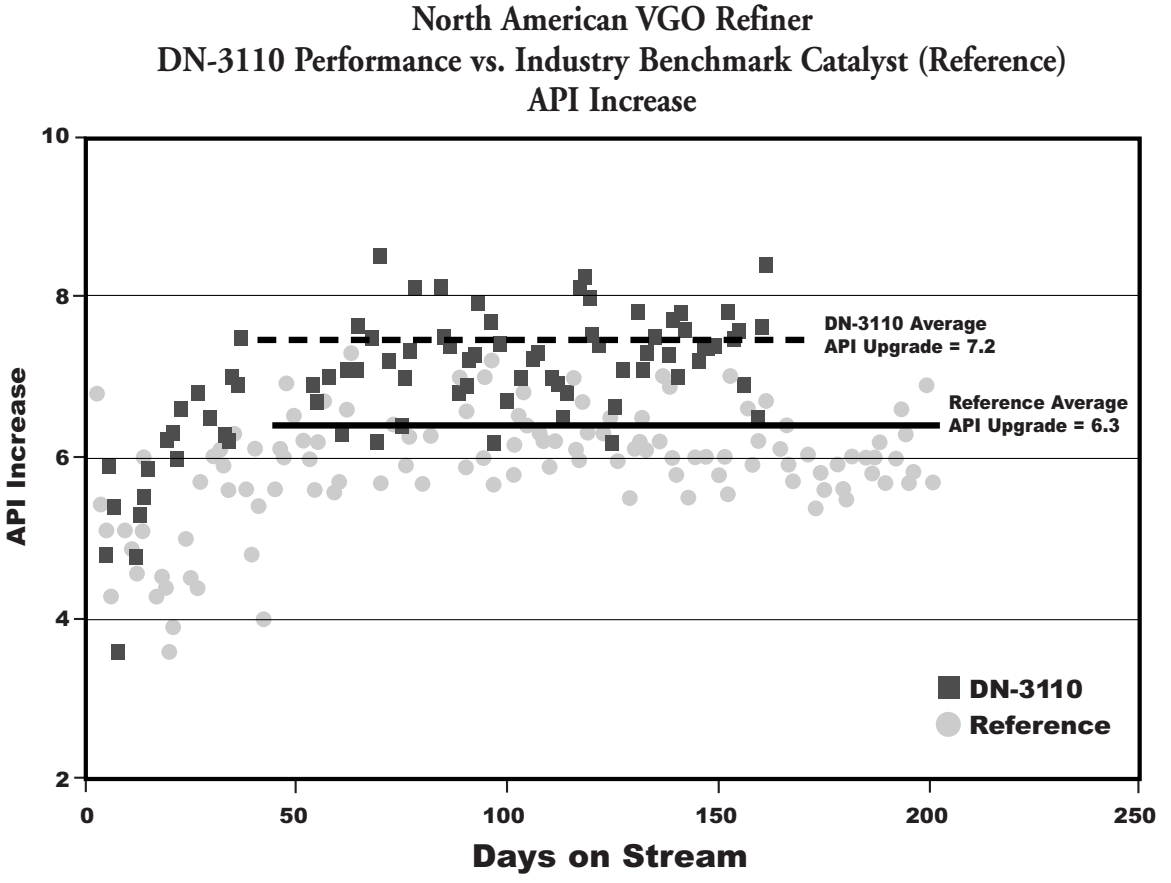
Like many refiners, this unit has experienced capacity creep of 15% over the last 3 years, while feed quality continued to degrade. A CENTINEL DN-3110 catalyst system was applied to reduce the expected negative performance impacts caused by higher capacity. The data below identifies that DN-3110 allows this refiner to operate at 15% higher feedrate, while not sacrificing API upgrade or denitrification, which are critical factors in maintaining FCC conversion.

	Previous Industry Benchmark NiMo	**CENTINEL DN-3110**
FeedRate MB/D	48.1	**55.5**
Operating Temperature F (WABT)	710	**713**
API Increase	5.5	**5.4**
% HDN	52.7	**53.5**
Feed API	16.9	**16.7**
Feed Nitrogen, ppm	3750	**3800**

North American Refiner - *FCC Pretreat - Case #2*

Changed from Industry Benchmark NiMo to CENTINEL DN-3110 NiMo

Pilot studies identified $4 million dollars per year FCC benefit through application of CENTINEL DN-3110 in this FCC pretreater. The pilot studies indicated improvements in FCC feed API upgrade, aromatic saturation, and denitrification were possible and FCC yield selectivity improvements could be expected compared to the previous catalyst. Under similar commercial operating conditions, unit performance data identify the expected improvements have been consistently achieved for over 6 months with the DN-3110 catalyst system. As a demonstration of the improved performance commercially observed, the following data show how DN-3110 has consistently exceeded the FCC feed API improvement previously demonstrated with the previous catalyst system.



North American Refiner - *FCC Pretreat - Case #3*

Changed from Industry Benchmark NiMo to a stacked bed CENTINEL system of DN-3110 NiMo and DC-2118 CoMo

This refiner was faced with the challenge of reducing SOx emissions and FCC gasoline sulphur, while targeting improved FCC conversion. Process engineers at the refinery and Criterion technical service engineers identified that the biggest impact would come from processing coker gas oil at increased desulphurisation severity than had historically been practiced. The coker gas oil had previously been fed directly to the FCC. The CENTINEL catalyst system selected comprised an optimised stacking of DN-3110 NiMo and DC-2118 CoMo. This system was expected to improve desulphurisation performance, while not sacrificing FCC feed quality improvements. Unit operation has met or exceeded expectations for 5 months to date.

How can your FCC unit profit from a
CENTINEL FCC Pretreat catalyst application?

Do you want to reduce sulphur in the FCC gasoline and LCO?

How about increasing throughput without loss of performance?

What about processing more difficult feeds?

The opportunities are numerous.

CENTINEL technology provides the opportunity.

For more detailed information, please contact Criterion.

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