



CATALYSTS FOR IMPROVED LUBRICATING OIL

Catalyst performance is paramount in producing high-value lubricants. Refiners trust catalysts from Criterion Catalysts & Technologies (Criterion) to deliver high yields of top-quality base oils. Consequently, our products are to be found in lubricant plants across the world.

Lubricant base oils are manufactured from vacuum gas oils and high-quality deasphalted oils. These feedstocks are improved through several processing steps, including “lube hydrocracking” dewaxing/isomerisation, hydrofinishing and hydrotreating. Criterion has a proven record of delivering high yields and enhanced quality lubricant base oils through its range of high-performance catalysts for use in these key processes.

LUBE HYDROCRACKING

Lube hydrocracking improves the yield and quality of lubricating oils by increasing their viscosity index, reducing their aromatic content and removing sulphur and nitrogen. Different combinations of our LH catalysts, which are based on CENTINEL, CENTINEL Gold and CENTERA technologies, are used to meet the needs of our lube hydrocracking customers. Refiners are increasingly following this processing step before further enhancement in catalytic dewaxing/isomerisation and high-severity saturation units.

CATALYTIC DEWAXING/ ISOMERISATION AND SATURATION

Catalytic dewaxing/isomerisation produces high yields of superior-quality base oils. Gas to liquids (GTL) processes create very pure unbranched hydrocarbon chains with virtually no aromatic content or unwanted heteroatoms. These waxes require isomerisation for conversion into lubricant base oils. Catalytic dewaxing using commercial Criterion catalysts is our most

LUBRICANTS FROM DUAL-PURPOSE HYDROCRACKERS

Operators of fuel-focused hydrocrackers use Shell/Zeolyst International’s versatile hydrocracking technology to optimise the yields and properties of the unconverted oil. This stream can then be sent for dewaxing and finishing using Criterion catalysts to produce high-quality lubricants.

recent technology application and lies at the heart of lubricants production in the world’s largest GTL plant – the Shell Pearl GTL facility in Ras Laffan, Qatar.

Saturation catalysts give catalytically dewaxed/isomerised products excellent final properties. Noble metal catalyst C-654 has been used for over a decade to produce highly saturated lubricants, including the final production step for medicinal white oils. C-684, our latest noble metal saturation catalyst, offers additional activity and stability in the presence of increased levels of sulphur and hydrogen sulphide.

CRITERION CATALYSTS LIE AT THE HEART OF LUBRICANTS PRODUCTION IN THE WORLD’S LARGEST GTL PLANT.

OUR NEW FAMILY OF CATALYSTS BASED ON CENTERA TECHNOLOGY IS SETTING NEW **PERFORMANCE STANDARDS.**

HYDROFINISHING AND HYDROTREATING

Hydrofinishing catalysts have been improving the appearance and properties of lubricating oils for almost 50 years. They enhance the colour, remove impurities such as sulphur and improve stability and additive response. At Criterion, we have a long history of producing highly effective hydrofinishing catalysts, which are based on the proven performance of our NiMo ASCENT DN-3551 catalyst and our CENTINEL family of catalysts.

For more severe **hydrotreating**, CENTINEL Gold technology has a strong record of providing excellent performance, and now, our new family of catalysts based on CENTERA technology is setting new performance levels.

TECHNOLOGY LEADERSHIP

Criterion has an impressive history of catalyst innovations; we introduced our high-performance lubricant catalysts C-424 and C-454 more than 25 years ago. Since then, we have constantly pushed lubricant catalyst technologies to increase yields and enhance base oil quality.

| LUBRICANT OIL CATALYSTS | |
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| LUBE HYDROCRACKING | |
| LH-21, LH-22, LH-23 and LH-24 | Based on CENTINEL and CENTINEL Gold technologies Used in different combinations in purpose-built lubricant hydrocrackers to increase viscosity index, reduce the aromatic content and remove sulphur and nitrogen |
| CATALYTIC DEWAXING/ISOMERISATION AND SATURATION | |
| SLD-821 | Most recently applied in the world's largest GTL plant – the Shell Pearl GTL facility, Qatar |
| SLD-800 | A base metal wax conversion catalyst with enhanced selectivity and resistance to sulfur and nitrogen poisoning Most recently applied to improve the cloud and haze properties of naphthenic lubricants Effective for other low-wax feedstocks |
| C-654 and C-684 | Noble metal catalysts for virtually complete saturation of high-quality lubricant base oils The latest noble metal saturation catalyst offers further enhanced activity and stability in the presence of sulphur and hydrogen sulphide Used for the manufacture of food-grade and technical-grade white oils |
| HYDROFINISHING AND HYDROTREATING | |
| DN-3551 | NiMo hydrofinishing catalyst based on ASCENT technology Including the manufacture of food-grade waxes |
| LH-23, LH-24 and DN-3330 | NiMo hydrofinishing catalysts based on CENTINEL and CENTINEL GOLD technology |
| DN-3620 | A new family of hydrotreating catalysts based on CENTERA technology that use nanotechnology to enhance performance |

CONTACT US

For more information about how we can help you to enhance operational performance, meet increasingly stringent environmental regulations and increase revenues, visit us at www.criterioncatalysts.com.

Criterion Catalysts & Technologies LP is a wholly owned affiliate of CRI/Criterion Inc. It supplies total packages of catalysts, services and solutions for refineries and is a leading provider of hydroprocessing, reforming, and specialty catalysts.

Criterion Catalysts & Technologies LP (CRITERION) is a wholly owned affiliate of CRI/Criterion Inc. and an affiliate of the Shell Global Solutions network of companies.

CRITERION and its affiliates are dedicated to providing a broad customer base with effective and cost-efficient catalysts and technologies available in focus areas that include the entire range of hydroprocessing applications.

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