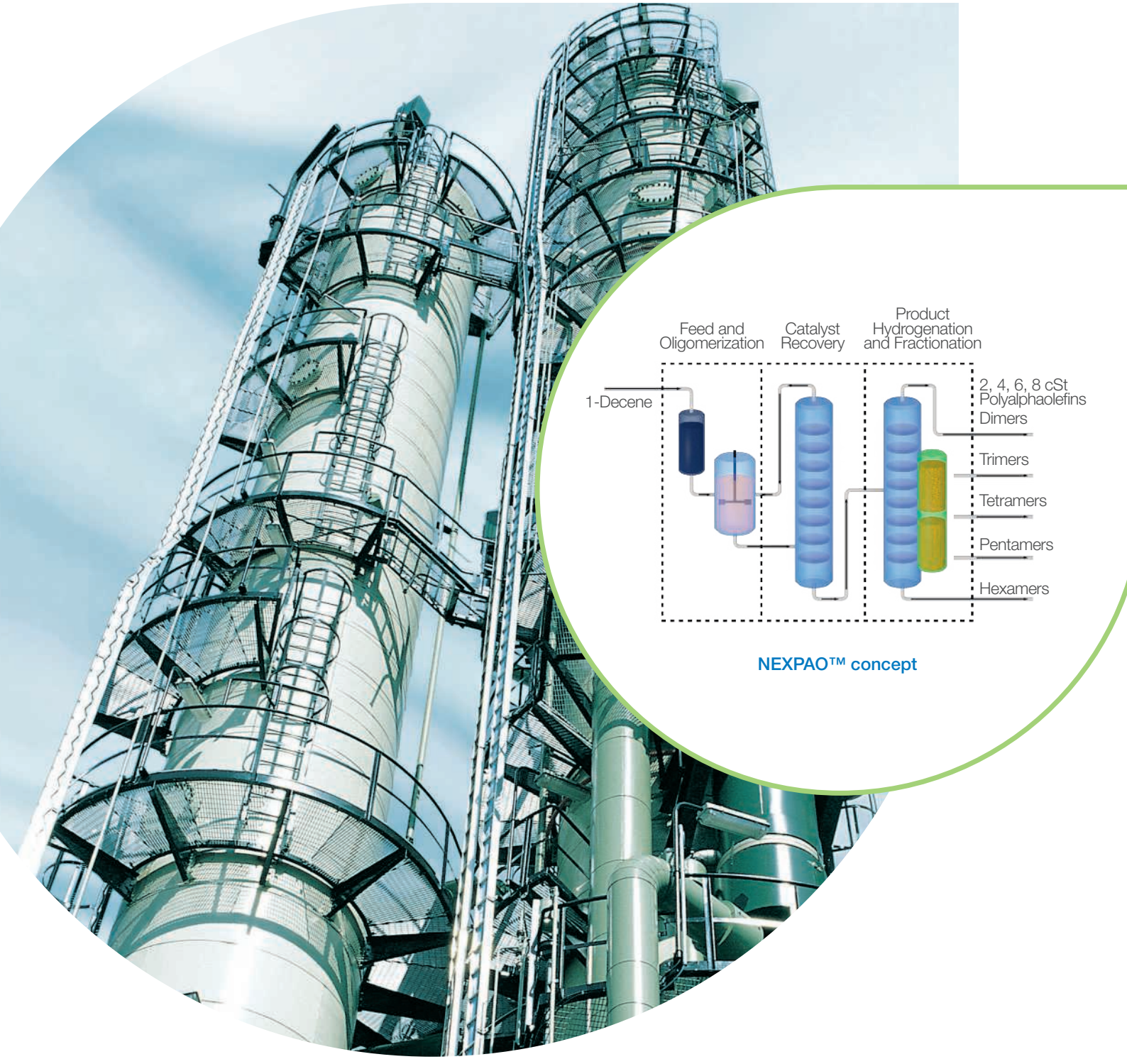
NEXPAO™

Technology for Top Quality Synthetic Base Oil



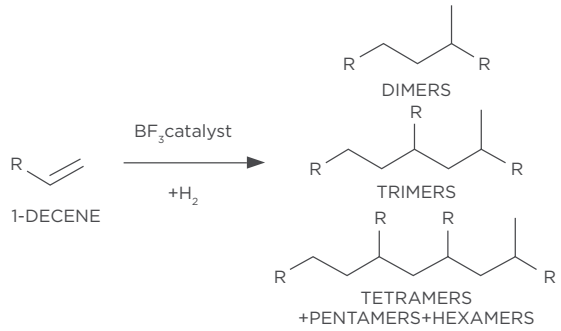
NEXPAO™ concept

NESTE

NEXPAO™

High Performance Base Oils for Demanding Applications – From Food Grade to Formula 1 Race

All lubricant manufacturers face today the challenge of evermore stricter specifications, longer oil drain intervals and improved fuel economy. On top of that are environmental concerns in automotive applications and stringent requirements in food or cosmetics industries. With a high-grade synthetic base oil these concerns can be answered with a solution of constant quality and true base for top class lubricants.



Process Description

The NEXPAO™ process is a polyalphaolefin oligomerization process optimized on producing low-viscosity PAOs between 2–8 cSt from 1-decene feed. The technology is based on the use of BF_3 (Boron trifluoride) as catalyst and the innovation of BF_3 separation and its reuse as catalyst.

The process can be divided into three main sections: **1)** Feed and Oligomerization, **2)** Catalyst Recovery and **3)** Product Hydrogenation and Fractionation.

The feed 1-decene is dried and fed into the oligomerization reactor with BF_3 and a protic co-catalyst which form an active liquid catalyst complex, insoluble in decene and products. This catalyst system is unique for two reasons. It produces an oligomer distribution that is markedly peaked at trimer and causes excess skeletal branching, resulting in products that have exceptionally good low- and high-temperature properties.

After the oligomerization reaction phase, the catalyst is recovered from the crude PAO by distillation and recycled to the reactor together with the unreacted 1-decene feed.

The crude PAO from Catalyst Recovery Section is saturated by continuous hydrogenation and fractionated in the product distillation column to end products, tailored to fully meet the most demanding market requirements.

Benefits

The Optimum Technology

- Optimal for processing 1-decene to top quality synthetic base oil.
- Fully proven technology with excellent safety record.
- Easily expandable for greater market demands.
- Energy efficient and highly selective oligomerization, involving low reactor temperatures and pressure. Only one heater is required.
- Easily controllable product distribution.

Process Economics and Operations

- Conventional catalysts are available from several sources for both oligomerization and saturation steps.
- Attractive Capex and Opex due to mild operation conditions and conventional materials.
- Low hydrogen consumption, normally no need for separate hydrogen unit.
- Maintenance costs are low.
- Excellent plant availability and track record.

Differentiating Product Benefits

- PAO 2, 4, 6, and 8 grades can be manufactured.
- Product portfolio applicable for high end uses in various automotive motor oils for passenger cars and heavy duty vehicles, cosmetics, food grade applications, automatic and manual transmission fluids, shock absorber oils, hydraulic fluids, grease manufacturing etc.
- The product is fully synthetic with extremely low volatility (excellent NOACK value).
- Superior stability (thermal and oxidative) product with excellent additive response, safe to store and transport.
- Viscosity index ultra-high with simultaneous outstanding low-temperature properties.
- All grades are sulfur free (important for tail gas after-treatment systems).

Neste Oyj
Engineering Solutions
P.O.Box 310, FI-06101 Porvoo, Finland
Visiting address: Teknologiantie 36, Kilpilahti
Phone +358 (0)10 458 11 / Email: nex@neste.com
www.neste.com/engineeringsolutions

NESTE