Welcome to an Evonik Oil Additives Commercial Marketing Forum (CMF) Presentation at STLE 2016
Exhibitor presentation:
Synthetic industrial gear oils – aligning base fluid choice for attractive marketing attributes
NUFLUX™ Technology

High Viscosity Base Fluids

Formulation Concepts

Services and Support
VISCObASE® 11-522 an important component in NUFLUX™ Technology

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<thead>
<tr>
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<th>Method</th>
<th>Unit</th>
<th>11-522</th>
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<tbody>
<tr>
<td>Kin. Viscosity 40°C</td>
<td>ASTM D445</td>
<td>mm²/s</td>
<td>12,000</td>
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<tr>
<td>Kin. Viscosity 100°C</td>
<td>ASTM D445</td>
<td>mm²/s</td>
<td>480</td>
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<tr>
<td>Viscosity Index</td>
<td>ASTM D2270</td>
<td></td>
<td>189</td>
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</tbody>
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Solvency:
- HIGH
  - PAG
- MEDIUM
  - VISCObASE 11-522
- LOW
  - PAO4
  - PAO100
High performance gear oils based on NUFLUX™ Technology

1. Neste’s NEXBASE® low-viscosity Group III
2. Evonik’s VISCObase® high viscosity base fluid
3. Afton’s HiTEC® performance additive to protect from wear and fatigue and oil aging

No compatibilizer needed
Less complexity
Economic formulation approach
Secure global supply
ISO VG 320, 460 and 680 based on NUFLUX™ Technology are approved for Flender gear units meeting the requirements of full synthetic industrial gear oils like PAO.

Commercial re-blends are possible.
Approved by Hansen Industrial Transmissions

ISO VG 320, 460 and 680 based on NUFLUX™ Technology are approved for Hansen industrial gear unit series:

HP1, HP2, HPP, P4 and M4ACC

Commercial re-blend approvals are possible.
NUFLUX™ technology passed industrial standards and OEM specifications

- DIN 51517-3,
- ANSI/AGMA 9005-E02
- IEC 61400-4

Approved by
- Winergy (Field Trial)
- Moventas (Field Trial)
- FAG Schäffler
Extensive bench test program conducted

- **Bearings**
  - Wear and fatigue - FE8, L11

- **Gears**
  - Micropitting - FZG FVA 54/7 at 60°C & 90°C
  - Scuffing – FZG single & double speed

- **Physical-Chemical Characteristics**
  - Oil aging and oxidation
  - Foam & filterability
  - Demulsibility
  - Seal and coating compatibility
High and Low temperature performance

Improved low temperature performance

Increased protection

Kinematic Viscosity, Centistokes

Temperature, Degrees, Celsius

NUFLUX Technology

Mineral oil formulation
Improved efficiency is possible with NUFLUX™ Technology

It is possible to use an at least one ISO grade lower synthetic IGO, e.g. ISO 220 without risking equipment damage.

Gaining mechanical efficiency because of reduced churning losses
Lower operating temperatures observed for ISO 320

Lower temperatures observed during FZG load carrying capacity tests

- NUFLUX™ Technology
- Mineral oil formulation
- PAO formulation
Examples of NUFLUX™ technology in wind turbines

Sixteen wind turbines in Germany (different WT & gearboxes with 2.0 MW)
Three 1.5 MW wind turbines (same OEM & gearbox types) in North America
Three 2.3 MW wind turbines (same OEM & gearbox types) in Europe
Excellent bench test performance confirmed in the field

Data courtesy of and provided by Fuchs Schmierstoffe GmbH

~ 5°C lower bearing temperatures were observed.

Less oil degradation and chemical attack expected with NUFLUX™ technology
Conclusions

- NUFLUX™ Technology consists of synthetic, high viscosity base fluids, formulation concepts, and support
- Formulations based on NUFLUX™ Technology have passed extensive bench test programs
- Approvals from leading industry OEMs
- Proof-of-performance conducted in the field

Find out more at our YouTube channel: “The Oil Additives specialists at Evonik”

Meet the Evonik Oil Additives Team at: Stand #201