Mobil DTE 20
Premium Hydraulic Oil

Competitive Assessment vs Competitor C Products

Mobil Premium Hydraulic Competitive Assessment

Contents

Mobil Premium Hydraulic Competitive Assessment

Introduction

- This competitive assessment has been prepared for ExxonMobil Sales teams to support the global Mobil Premium Hydraulic Oil campaign.

- The assessment demonstrates the strength of Mobil DTE 20 series against a key competitive product line in an in-service test environment

  Key Point

  ExxonMobil, through years of ongoing R&D effort, has developed enhanced tests to assess ExxonMobil and competitive products, and develop new product technology

  Why?

  Many classical oil industry tests do not sufficiently predict product performance under in-service conditions

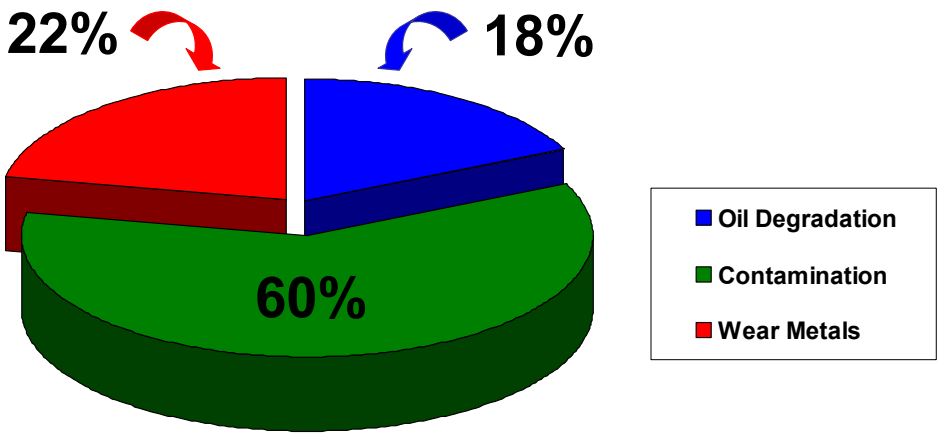
  Key Point

  These in-house tests are designed to replicate in-service oil performance and are used in addition to standard test methods such as ASTM, DIN, and ISO

- The presentation supports the Mobil benefits selling strategy where the focus of Mobil DTE 20 is its performance in delivering customer benefits vs its product features

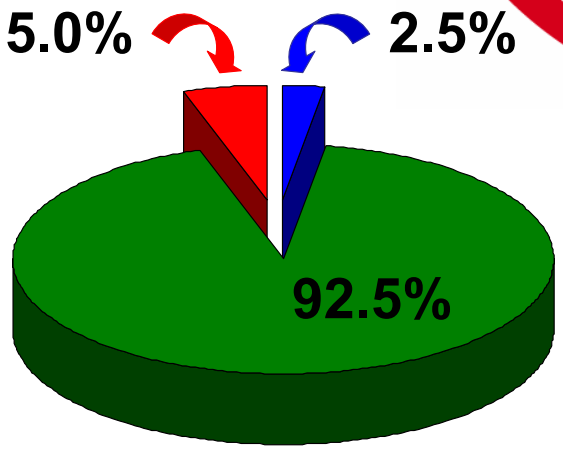
What does a comparison of Used Oil Data tell us?

Competitor C Used Hydraulic Oil Alerts



Based on Published Competitor C Used Hydraulic Oil Data

ExxonMobil Used Hydraulic Oil Alerts



Based on ExxonMobil Used Hydraulic Oil Data

- Competitor C research shows that their hydraulic oils are removed from service due to oil related failures (wear, oil degradation) 40 percent of the time

- ExxonMobil oils are removed from service due to product related issues 7.5 percent of the time

Based on used hydraulic oil data, Competitor C oils are removed from service due to oil related failures at a higher rate than ExxonMobil experience

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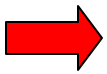
What's in Product C and C+ oils?

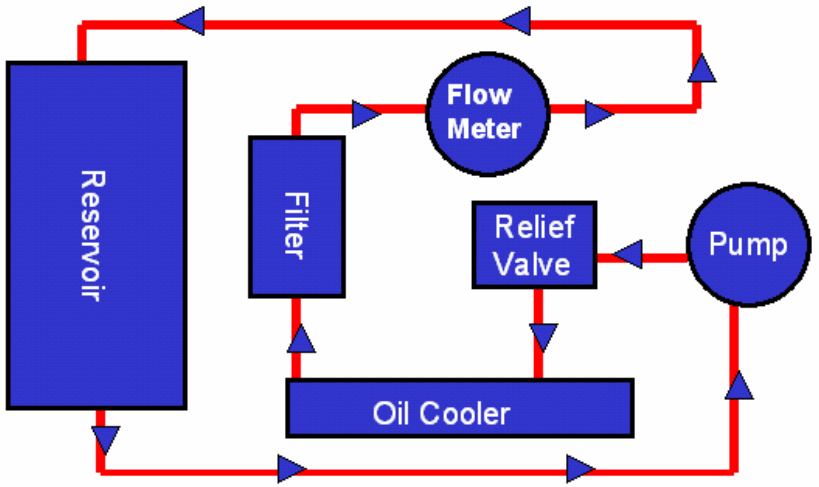
- All Product C oil sampled from around the world appear to contain the same additive system with Group I base oils
- Product C+ appears to have the same additive system as Product C but uses a Group II base stock
- Chemical analysis of Product C and C+ do not show any unusual formulation chemistry
- Both Product C and C+ use very low ZDDP antiwear treat (zinc ~265 ppm; phosphorus ~250 ppm)



Zn and P rates are about half those of Mobil DTE 20

Mobil - Lubricant Testing in an Actual Hydraulic System

The Mobil Hydraulic Fluid Durability Test (MHFD)



Measures

- **Keep Clean Performance**
  - impedes deposit build-up
  - keeps system components cleaner longer, for improved operation
- **Contamination Control**
  - maintains system performance longer in the presence of water, dirt and other contaminants
- **Oil Life**
  - reduced oil use and waste leading to lower total cost of ownership

The MHFD is a comprehensive hydraulic oil performance test that:

- Replicates real world conditions making it more relevant than typical glassware tests
- Is used exclusively by ExxonMobil to help develop high-performing hydraulic oils and assess competitive products
- Is recognized by global equipment builders and is used to support the extensive Mobil Equipment Builder/OEM premium product endorsement program

Mobil DTE 20 has over 250 preferential EB/OEM endorsements

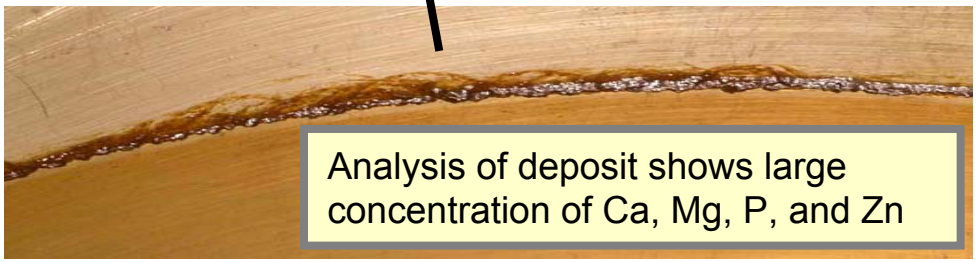
Keep Clean - MHFD Oil Reservoir Condition during test

Product C and C+ both generate sludge!

➡ Could lead to problems with filtration and sticking of system valves

Product C

Product C+



Analysis of deposit shows large concentration of Ca, Mg, P, and Zn

Mobil DTE 25

Benefit:
Performance of Keep Clean technology is evident in oil reservoir

Power of the DTE 25 Balanced Formulation

➡ Even at ~2x the Zn treat and a longer test duration, DTE 25 generates no sludge or varnish

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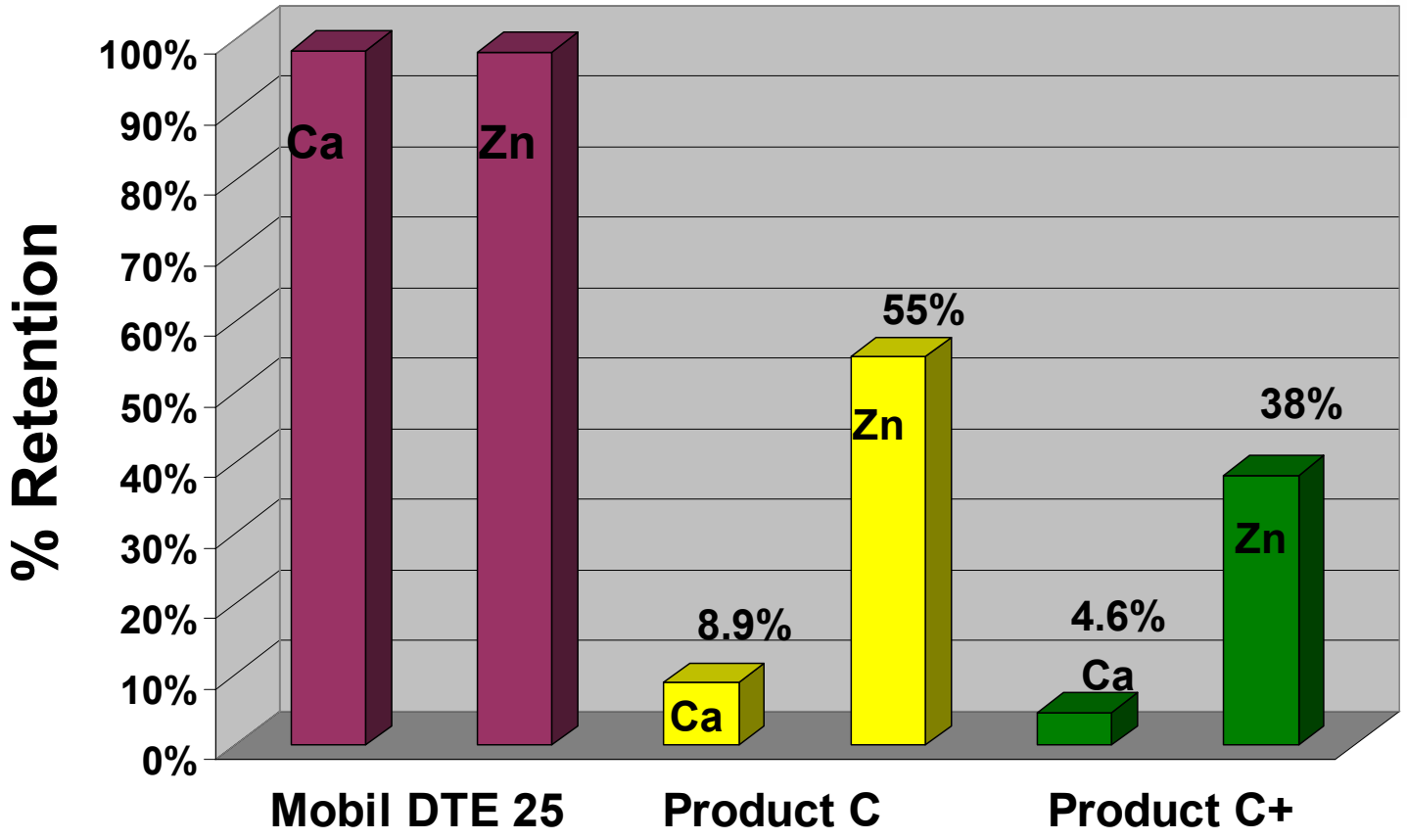
Keep Clean - Where is the Sludge Coming From?

Additive Metal Remaining in Oil after 750 Hrs on MHFD Hydraulic Rig



The sludge, which could lead to filter blockage and valve sticking, is likely related to additive metal fall-out in the oil

Contamination Control - Does Water Affect Filterability?

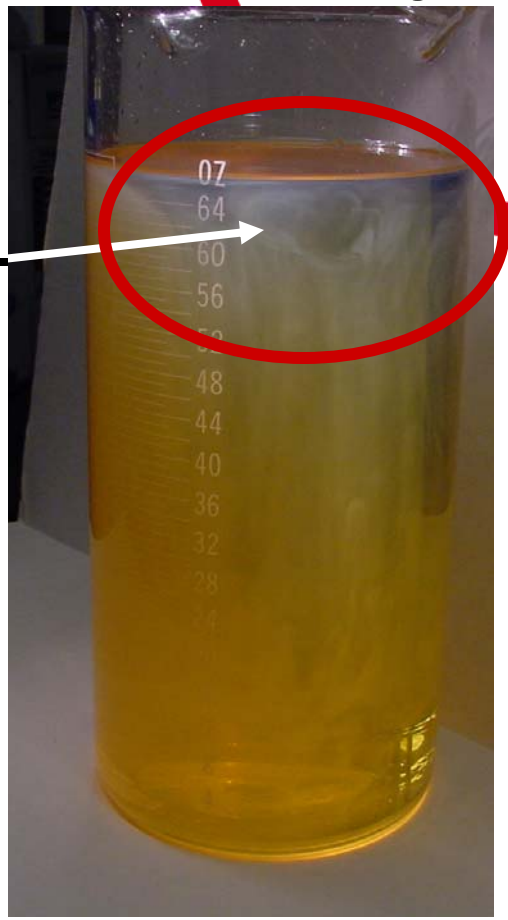
Product C

Test 1

Test	Procedure	Result	Comments
Wet Pall Filter test	- 1% water - preheat 70°C (158°F) - pass through a 3 micron filter	Pass pressure	White solid falling out of oil is cause for concern

Test 2

Test	Procedure	Result	Comments
Modified Wet Pall Filter test	- Water addition - preheat oil - pass through a < 3 micron filter	**Fail pressure**	White solid likely removed by finer filtration causing filter blockage



Test 2 more closely resembles hydraulic systems using fine filtration.

Product C technology may have a negative interaction with water

➡ Could lead to filter blocking, especially in fine filtration systems

Note: Mobil DTE 25 and Product C+ pass both tests and leave no visible precipitate

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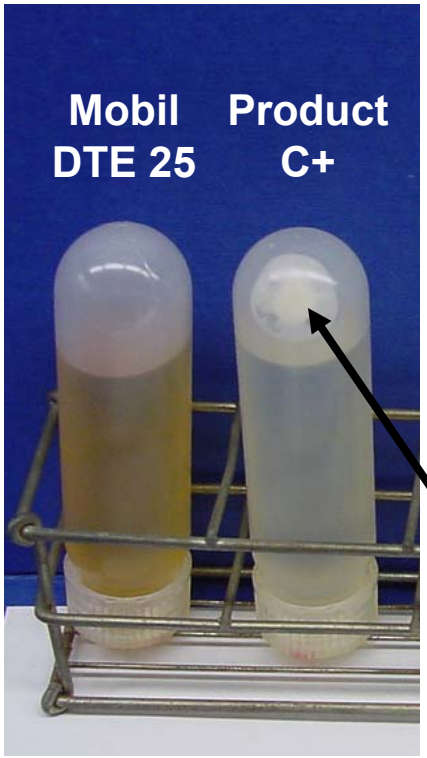
Contamination Control - What About Excessive Water?

The ExxonMobil proprietary Water Tolerance Test is designed to evaluate the effect of excessive water contamination on the additives in a lubricant.



Product C+ Results

Test	Procedure	Result
Proprietary Water Tolerance Test	- homogenized with 1% water - held at 60°C(140°F) for several days - run ultra centrifuge	**Fail** **UC rating = 8**

Test result based on amount of solid in tube at end of test.

Note:

1. Significant precipitate at end of UC tube for Product C+
2. Mobil DTE 25 has UC rating of 1 - the best possible rating
3. Product C+ has a UC rating of 8 - the worst possible rating

Product C+ shows a significant precipitate

May have performance issues in the presence of excess water contamination

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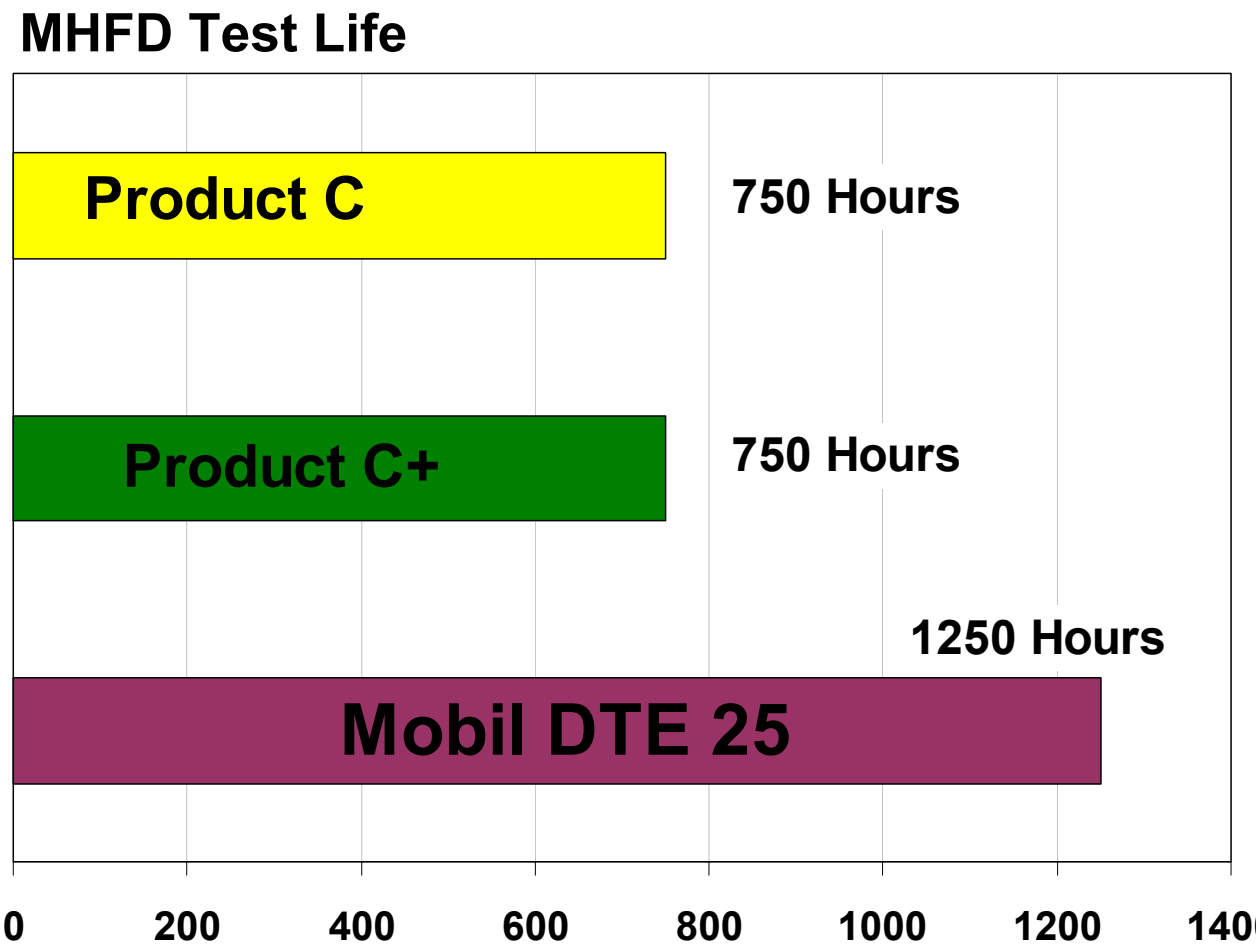
Oil Life - How Do the Products Measure-up?



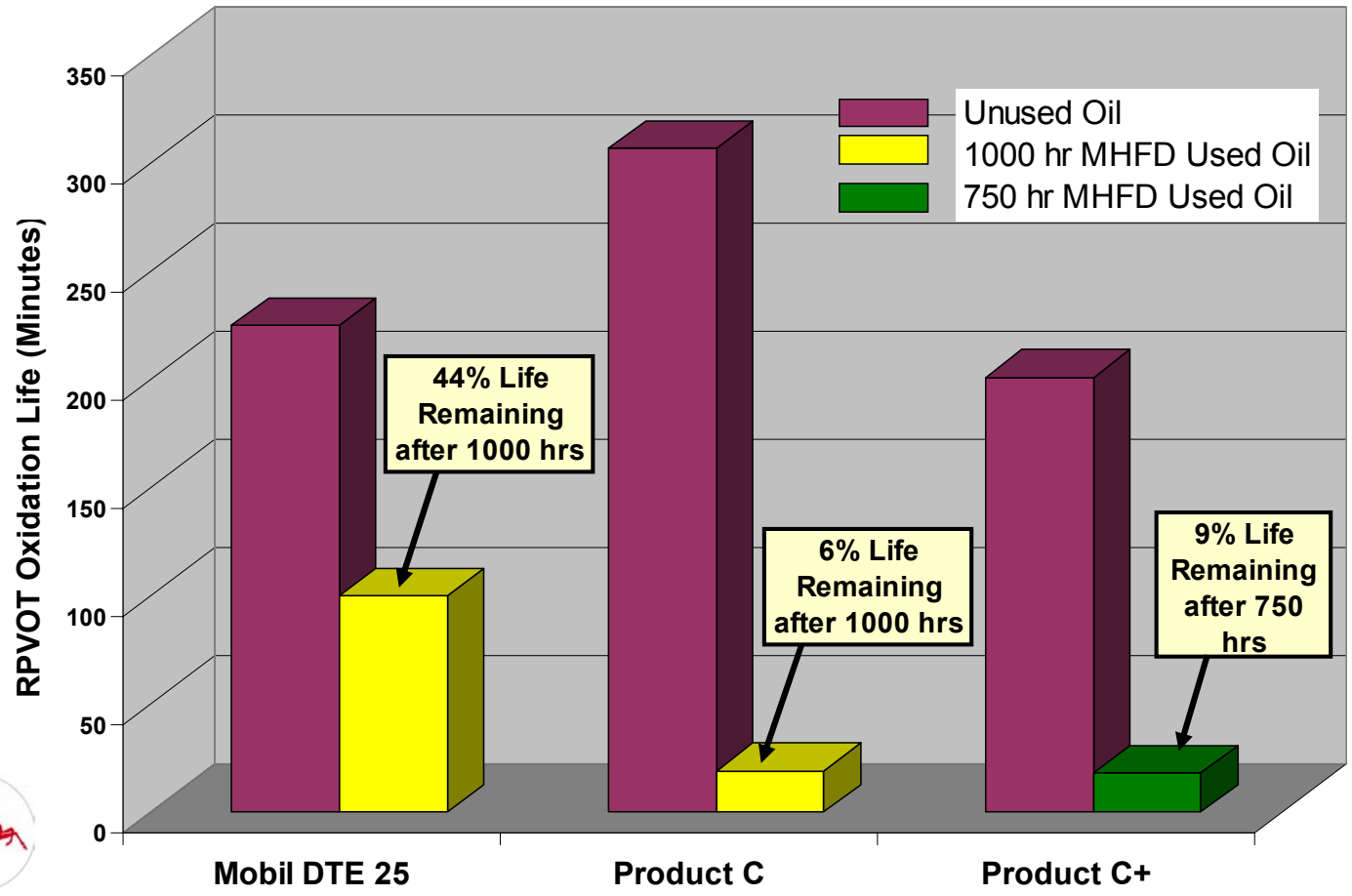
Test life based on deposits and varnish formation in system

Product C and C+ both come up short in test life

After the rigors of the MHFD, how much Oxidation Life Remains?

Based on RPVOT Data

- Mobil DTE 25 still has significant remaining life, even after 1,000 hrs in service
- Product C shows very little remaining life after 1,000 hrs in service
- Product C+ shows very little remaining life after only 750 hrs in service



Oil Life - Does Oil Color Matter?

Mobil DTE 25
NEW

Mobil DTE 25
5 Years

Oxidation - 0
Iron - 0
Copper - 0
Viscosity - in grade

Oxidation - 0
Iron - 0
Copper - 8
Viscosity - in grade

CASE STUDY

Issue: After five years in service, the hydraulic oil had darkened considerably

Customer believed they may need to change-out their Mobil DTE 25.

System: Taylor Winfield auto welder
150 gallon hydraulic oil reservoir
Operating temp range:
38°C (100°F) to 43°C(110 °F)
Operating pressure:
1,000 psi
Other than a small amount of top-off, the system had not been touched in a long time

ExxonMobil Lubrication Engineer recommendation:
Run an oil analysis on the system

Result:

After five years, the oil has darkened BUT Mobil DTE 25 is suitable for continued service.

Wear Protection - How Does it Work?

- Antiwear additives work by continuously replenishing a protective antiwear film under wear conditions
  - the additive slowly gets depleted when the oil is in service
- Product C and C+ use very low treat rates of the antiwear additive ZDDP
  - zinc ~265 ppm; phosphorus ~250 ppm
- Zinc and Phosphorus rates for Product C and C+ are about half those of the Mobil DTE 20 series products

A lower amount of antiwear additive will reduce the length of time in service that an oil will continue to give sufficient wear protection.

Mobil DTE 20 series, are designed for long oil life

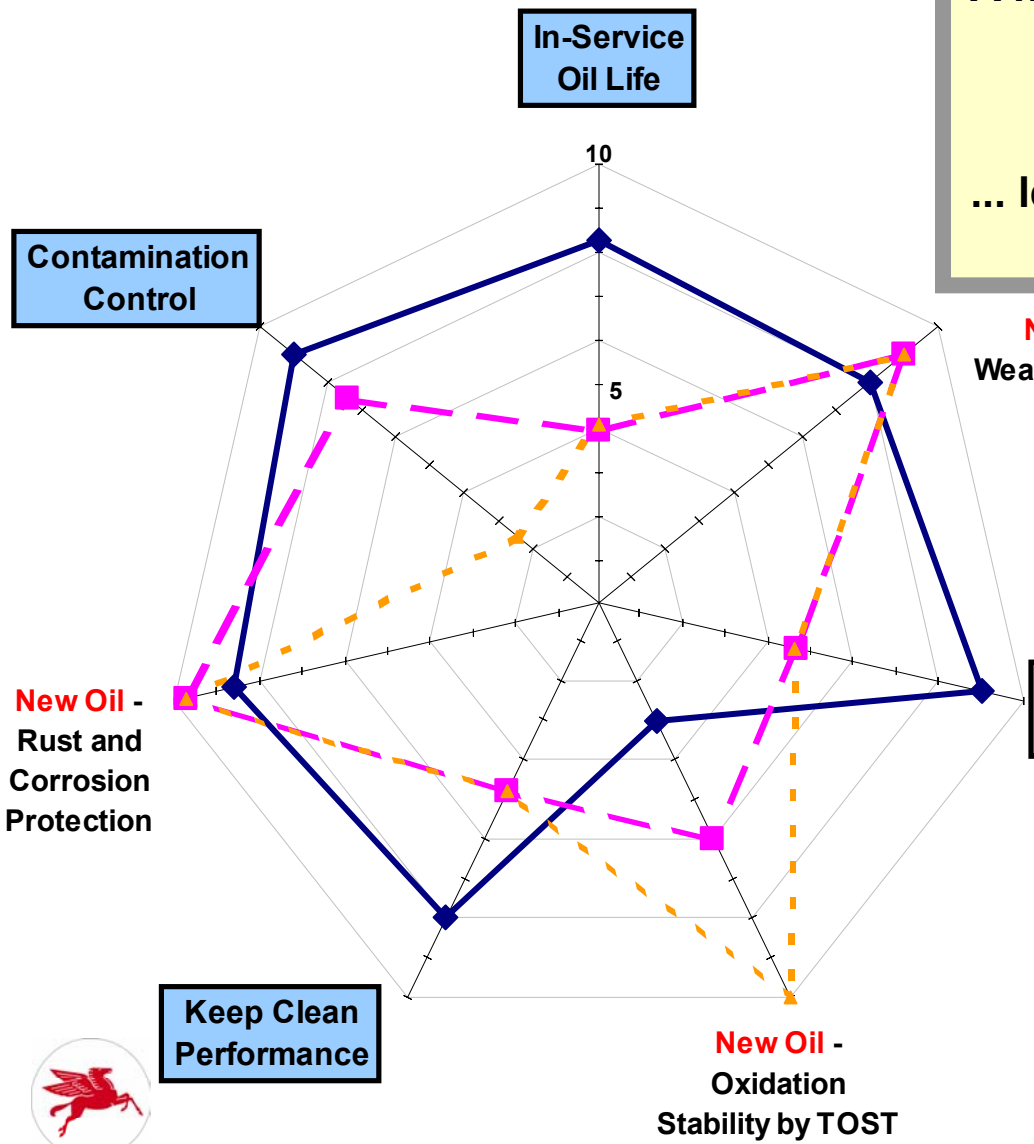
→ contains more antiwear additive to give protection over extended life

Mobil DTE 25 - Best Overall In-Service "Balanced" Performance

A higher performance oil with
- **Extended Wear Protection**
- **Keep Clean Performance**
- **Outstanding Contamination Control**

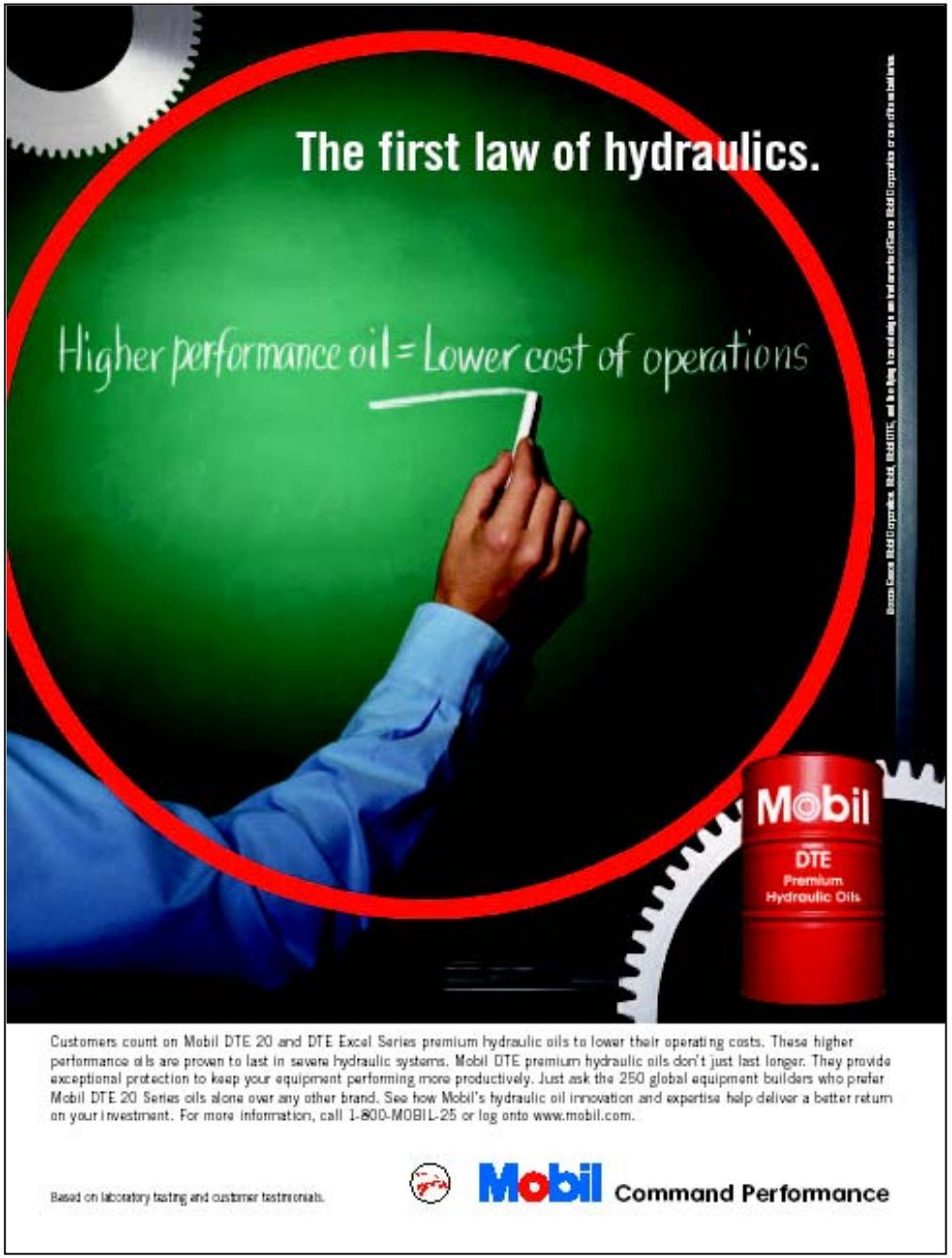
... leads to longer oil life

Mobil DTE 20 Series



Key customer benefits highlighted in blue boxes

Note: Unused oil testing does not necessarily predict product performance in service


The first law of hydraulics.
Higher performance oil = Lower cost of operations
Mobil
DTE
Premium
Hydraulic Oils
Customers count on Mobil DTE 20 and DTE Excel Series premium hydraulic oils to lower their operating costs. These higher performance oils are proven to last in severe hydraulic systems. Mobil DTE premium hydraulic oils don't just last longer. They provide exceptional protection to keep your equipment performing more productively. Just ask the 250 global equipment builders who prefer Mobil DTE 20 Series oils alone over any other brand. See how Mobil's hydraulic oil innovation and expertise help deliver a better return on your investment. For more information, call 1-800-MOBIL-25 or log onto www.mobil.com.
Based on laboratory testing and customer testimonials.
Mobil Command Performance

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