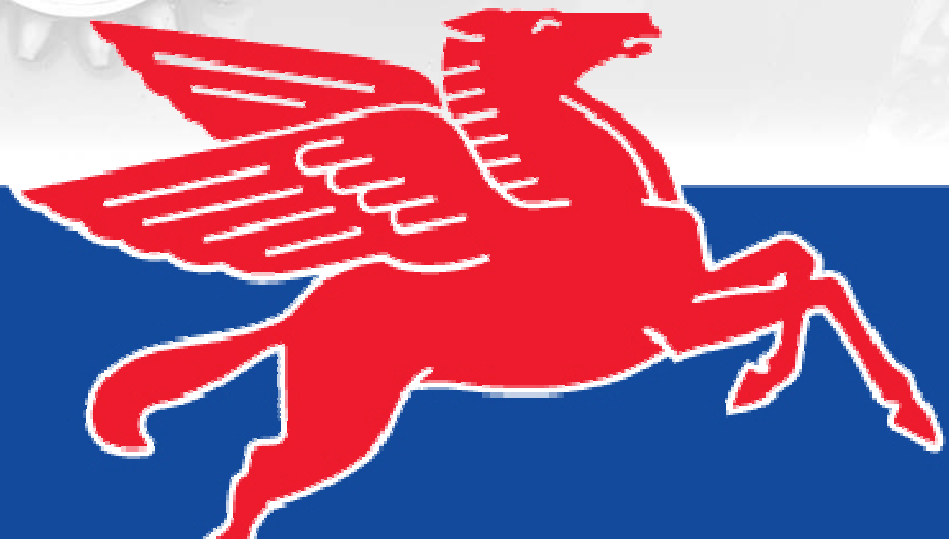


# Mobil SHC

Where Industrial productivity Begins

How You Can Improve Productivity  
with Mobil SHC Series of High  
Performance of Lubricating Oils



**Mobil** Industrial  
Lubricants

## Introduction:

We understand that you are interested in discussing how Mobil SHC series of high performance lubricating oils could help you improve productivity in your operation.

Since 1914, ExxonMobil has been working with the leading OEMs around the world to develop and deliver lubricants to meet the most demanding requirements.

We pride ourselves in delivering leading edge technology and application expertise in the area of industrial lubricants. Mobil SHC is recognized around the world as a leader in high performance industrial circulating and gear oils



# Why use Mobil SHC lubricants when conventional oils appear to work OK?

## Competitiveness



All around the world, customers tell us that they're looking for the same thing – How to be more competitive...

We help companies like yours to be more competitive through the use of Mobil SHC lubricants

Let's discuss how Mobil SHC lubricants help reduce the total cost of ownership or life cycle cost for your equipment – increasing your competitiveness whether your competitors are across town, across the country, or across the ocean.

Why use Mobil SHC lubricants when conventional oils appear to work OK?

**Competitiveness**



**Mobil** Industrial Lubricants



**Mobil** Industrial Lubricants

# Mobil SHC can help improve productivity

§ Mobil SHC lubricants support increased productivity and lower total cost of ownership through:

▫ **Extended Oil Life**

- Reduced labor cost to change oil
- Reduced used oil disposal costs
- Increased uptime for equipment

▫ **Extended Equipment Life**

- Reduced Wear
- Fewer unplanned shutdowns

▫ **Reduced Energy Consumption**



Are you interested in increasing productivity?  
Let me show you how Mobil SHC can help you do this.

They have been proven again and again to.....

- **Extend oil life** up to 6x longer than conventional oils, which will reduce labor costs, disposal costs and downtime
  - Low volatility reduces consumption
  - Good high-temperature oxidation and thermal stability reduces deposit formation
- **Extend equipment life** through reduced wear and less unscheduled downtime.
  - Excellent viscometric properties and shear stability provide improved wear protection
  - Good low-temperature characteristics or cold-temperature flow properties

## Mobil SHC improves productivity

- Mobil SHC lubricants support increased productivity and lower total cost of ownership through:
  - ☑ **Extended Oil Life**
    - Reduced labor cost to change oil
    - Reduced used oil disposal costs
    - Increased uptime for equipment
  - ☑ **Extended Equipment Life**
    - Reduced Wear
    - Fewer unplanned shutdowns
  - ☑ **Reduced Energy Consumption**



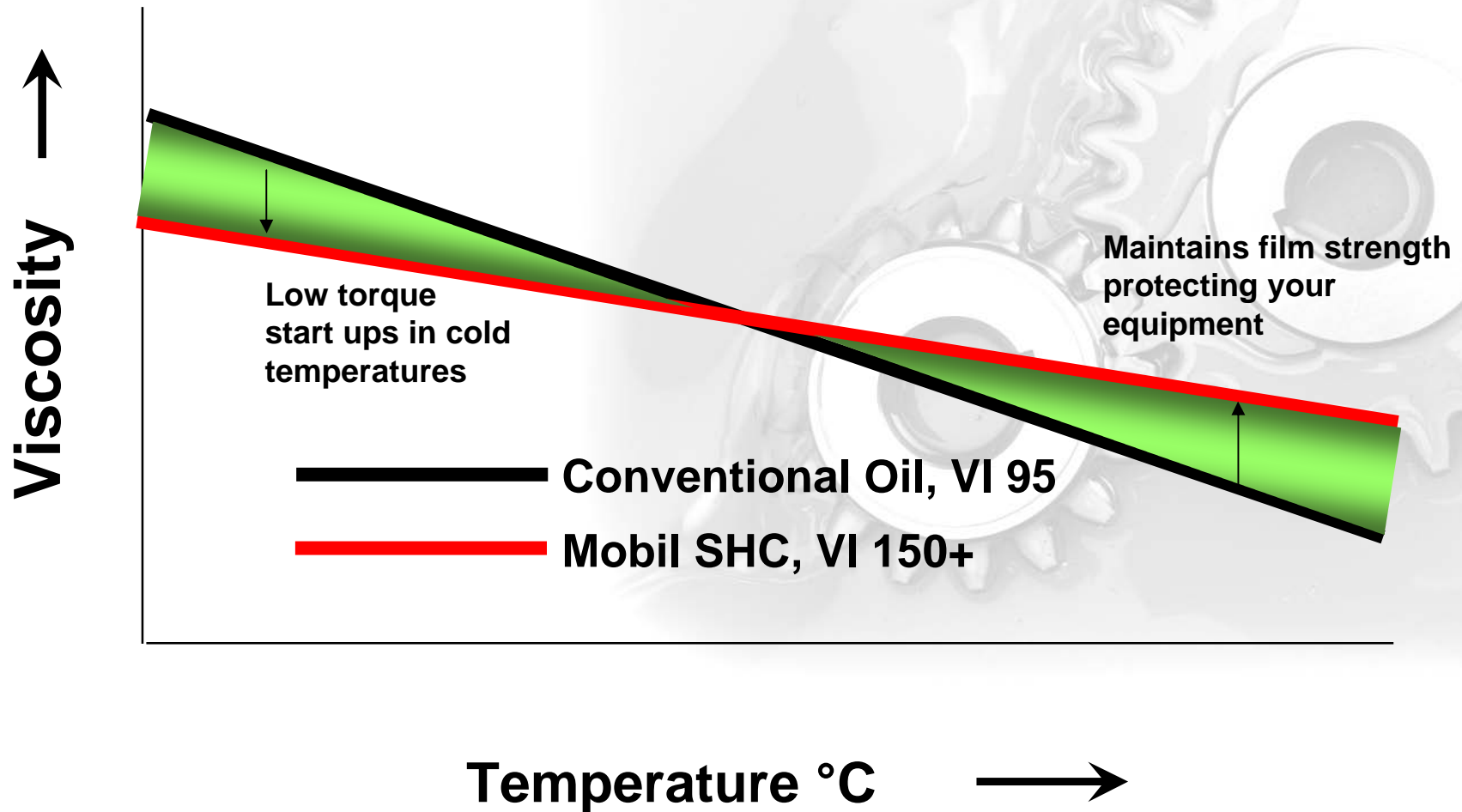
Mobil Industrial Lubricants

- **Reduce energy consumption**
  - Traction properties of Mobil SHCs make reduced energy consumption possible by reducing internal fluid friction under EHL conditions.



Mobil Industrial Lubricants

# Productivity at Extreme Temperatures



Mobil SHC have an inherently superior viscosity index compared to conventional oils which means they maintain their viscosity as temperature increases. In other words, as temperature increases, the Mobil SHC does not thin as rapidly as a conventional oil thereby maintaining its film strength providing the needed wear protection.

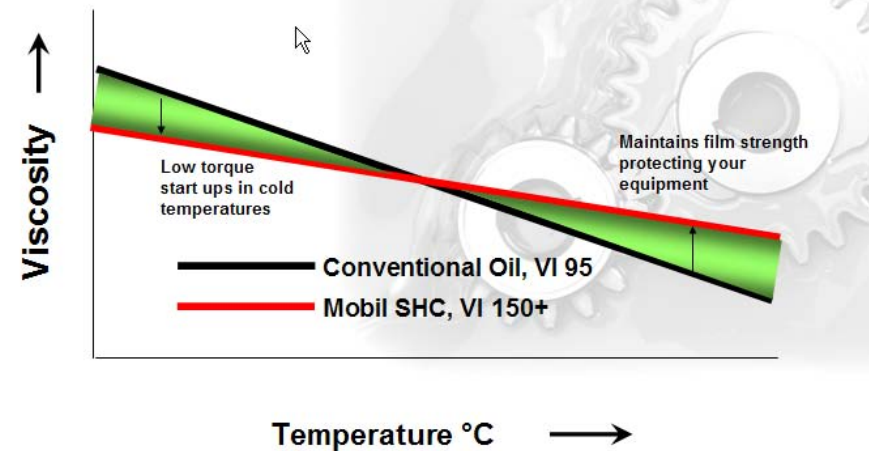
#### Low Temperature:

At low temps, the high viscosity index will give you better cold temperature flow properties. Oil starvation will cause severe wear rates; the improved low temperature flow properties reduce this risk.

#### High Temperature:

The higher viscosity index of the Mobil SHC results in a higher viscosity or better film thickness compared to the conventional oil at higher temperatures.

### Productivity at Extreme Temperatures



Note:

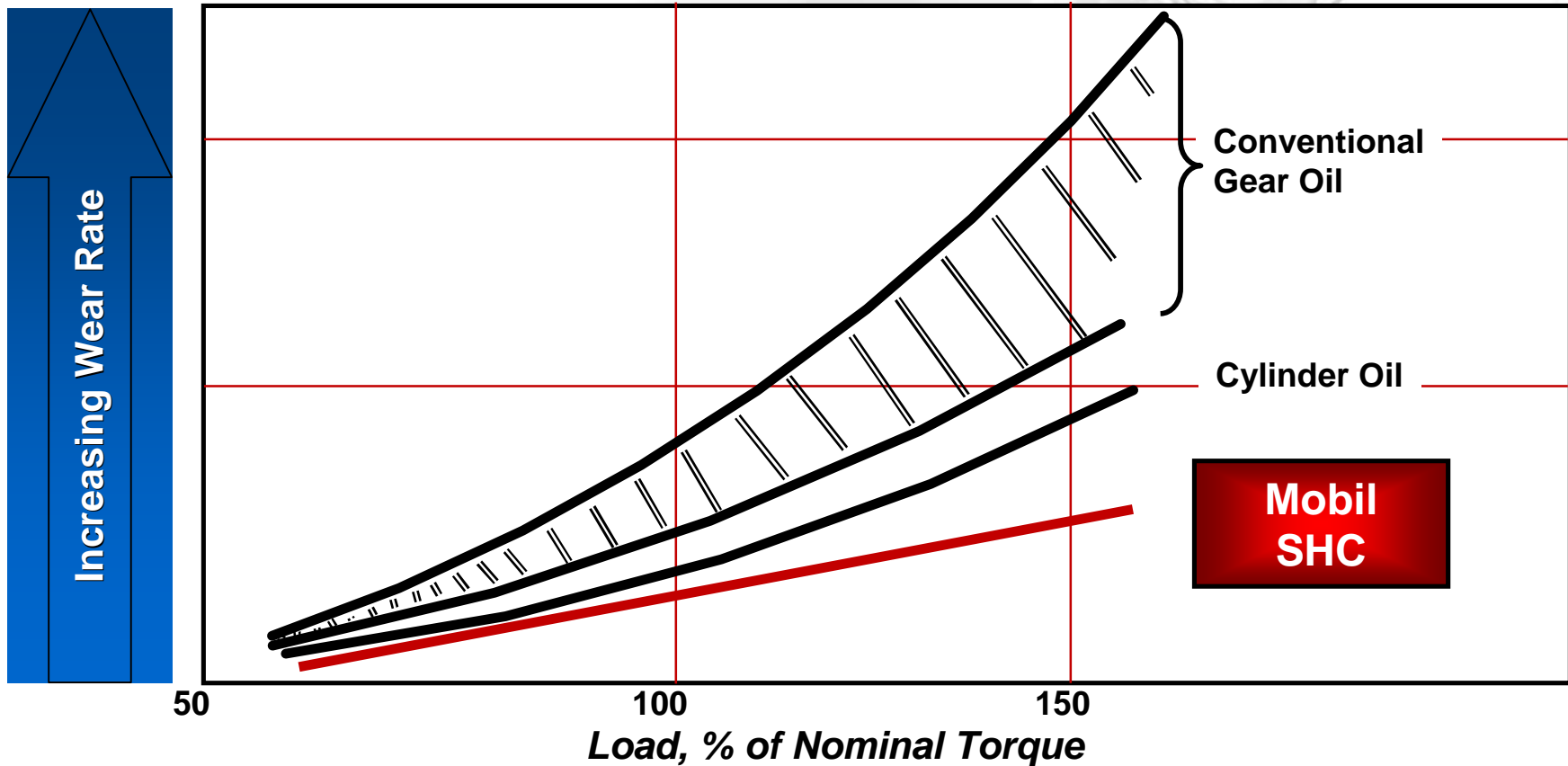
Viscosity Index (VI) is a number reflecting the relationship between temperature and viscosity for an oil. As VI goes up, there is less viscosity change with temperature, and as VI goes down, viscosity changes more with temperature.





# Reduce wear and improve productivity

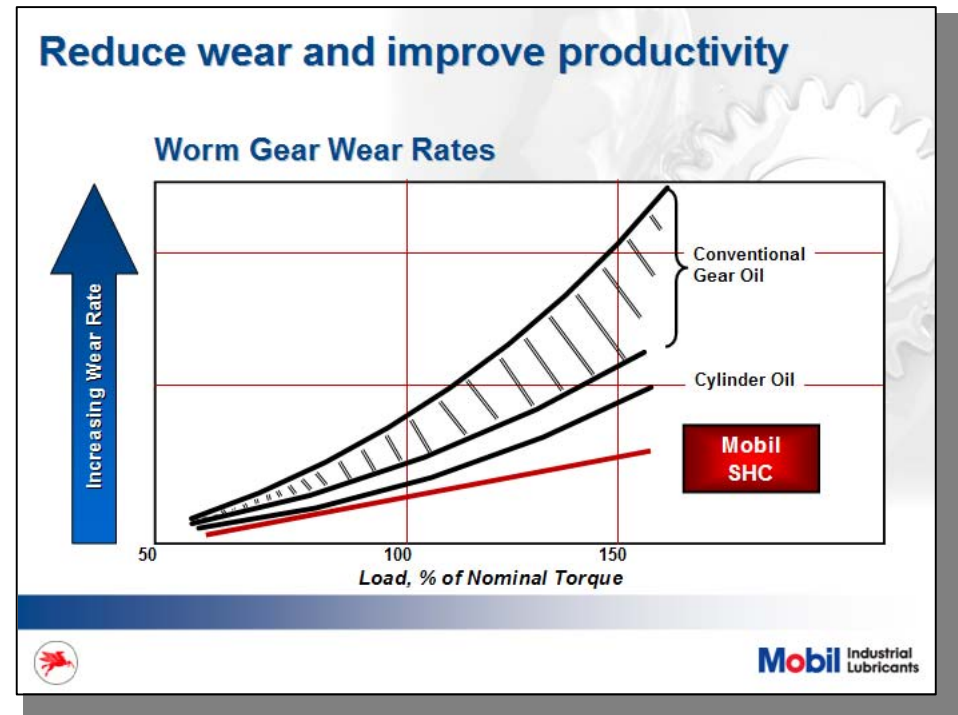
## Worm Gear Wear Rates



This graph shows how Mobil SHC reduces wear rates in a worm gear application when compared to a conventional and cylinder oil (often recommended for worm gears).

Cylinder oils have improved wear rates because of the additional lubricity agents i.e. fatty acids

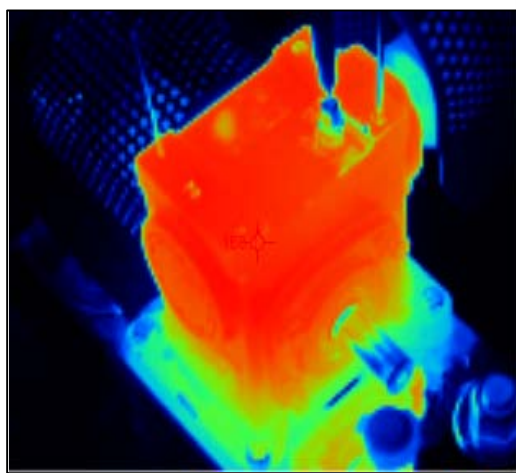
Mobil SHC offers increased wear protection vs. conventional oils particularly as torque increases.



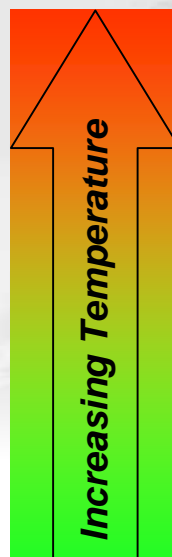
# “Reduce the Heat” with Mobil SHC

## Thermographs of Gearboxes

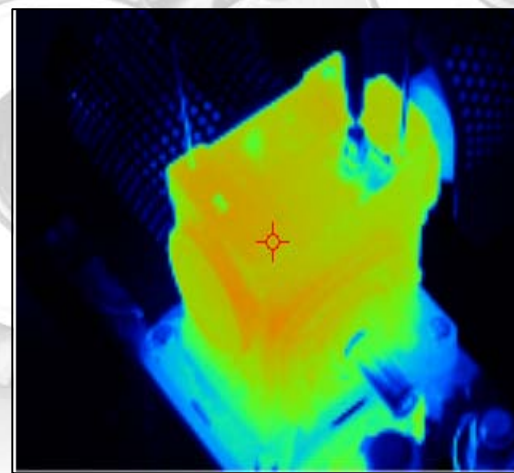
Conventional Gear Oil



Sump Temp = 180°F  
Efficiency = 74%



Mobil SHC



Sump Temp = 167°F  
Efficiency = 76%



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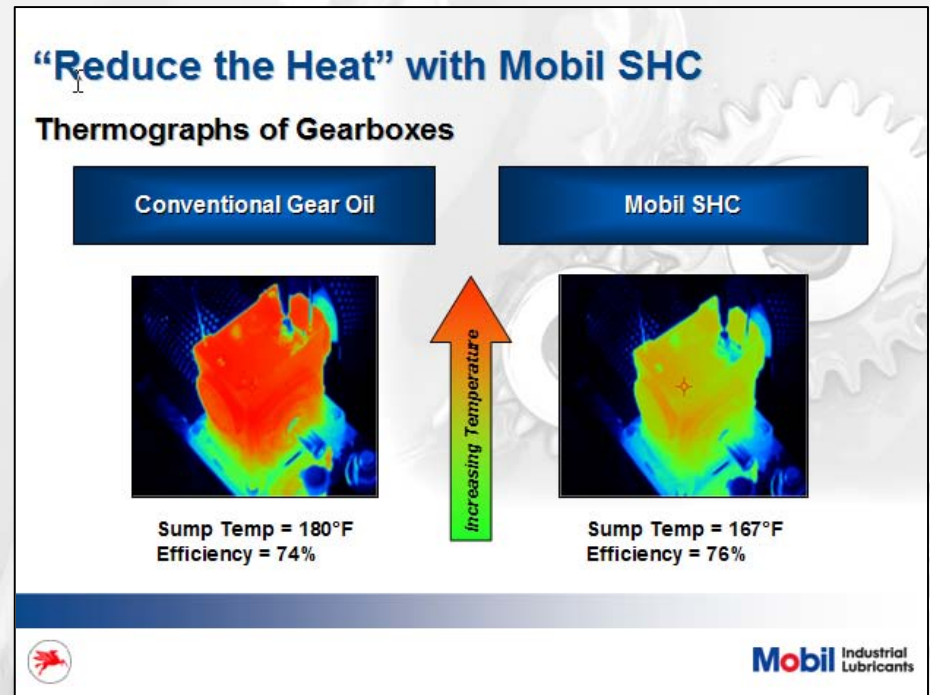
These pictures are thermographs taken during the operation of two different ISO 460 test fluids in the worm drive gear box.

As the color moves from green to red, it depicts an increase in operating temperature of the gearbox. As the pictures demonstrate, the Mobil SHC fluid with the balanced EP and wear protection runs about 13°F cooler than the conventional oil with the strong EP protection and is about 2% more efficient.

When the temperature is reduced in the gear box you have additional benefits such as improved film thickness and longer seal life.

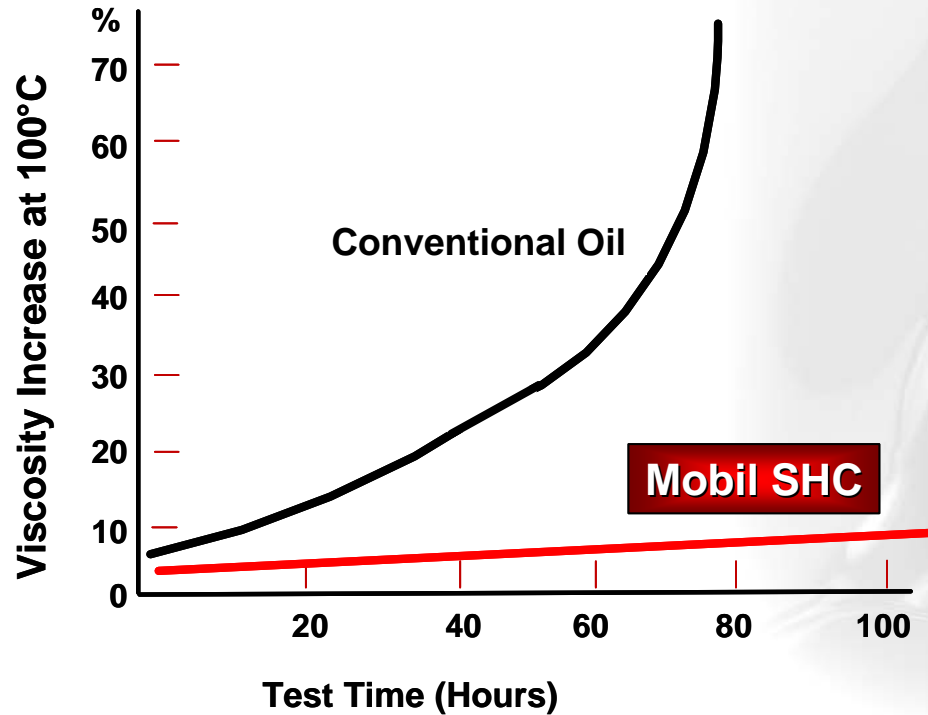
This operating temperature difference translates into extended operating life for the balanced Mobil SHC oil.

Energy in = Work out + heat



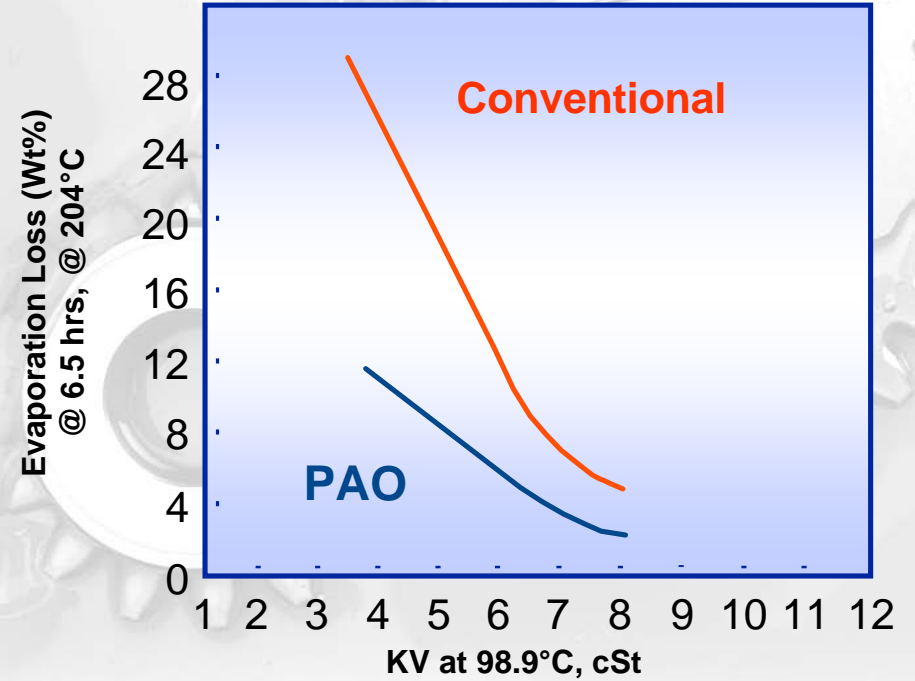
# Extend Your Oil Life

## Oil Thickening (Oxidation)



Maintaining viscosity extends oil life

## Oil Loss (Volatility)



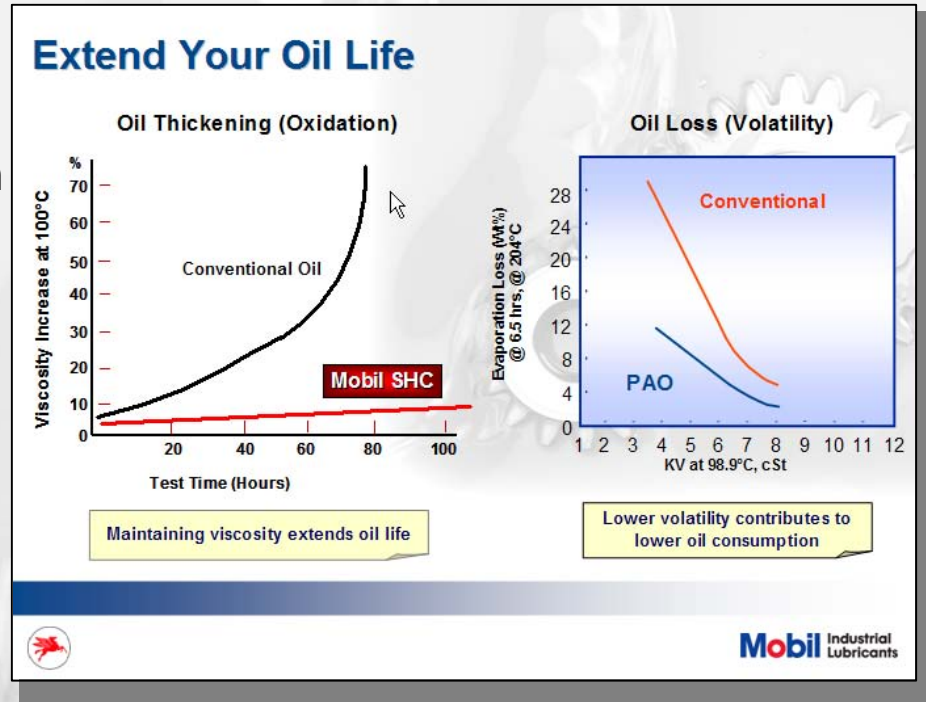
Lower volatility contributes to lower oil consumption



Mobil SHC has superb high temperature capability compared to conventional oils in terms of oxidation resistance and thermal stability.

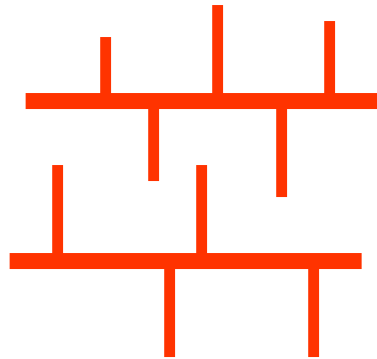
As lubricants oxidize under high temperatures, viscosity increases naturally---which is a leading indicator of lubricant failure. In less than 40 hours, a conventional oil crosses the 20% viscosity increase line as compared to the Mobil SHC which maintains viscosity out past 100 hours.

Lower volatility for Poly Alpha Olefins (PAO) leads to lower oil consumption reducing your labor costs



# Good Traction (Friction) Properties

## Traction Coefficients



- Under conditions of an EHL contact energy is required to shear the lubricant film
- Traction coefficient is a measure of this energy
- Traction coefficient depends on molecular shape
- Some Mobil SHCs have significantly lower traction coefficients than conventional oils



Traction coefficient or or internal friction is dependent on molecular structure.

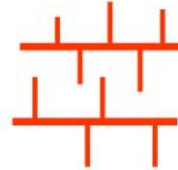
The basestocks used in Mobil SHC have inherently lower internal friction than that of conventional lubricants.

The way this works is...molecules with lower traction characteristics slide past one another more easily, generating less heat in the contact zone.

We have already discussed how less heat = benefits.

## Good Traction (Friction) Properties

### Traction Coefficients



- Under conditions of an EHL contact energy is required to shear the lubricant film

- Traction coefficient is a measure of this energy

- Traction coefficient depends on molecular shape



- Some Mobil SHCs have significantly lower traction coefficients than conventional oils



Mobil Industrial Lubricants

### Definition of Terms:

EHL – Elasto Hydrodynamic Lubrication

A type of lubrication that occurs under extreme pressure and causes the surface under pressure to expand.

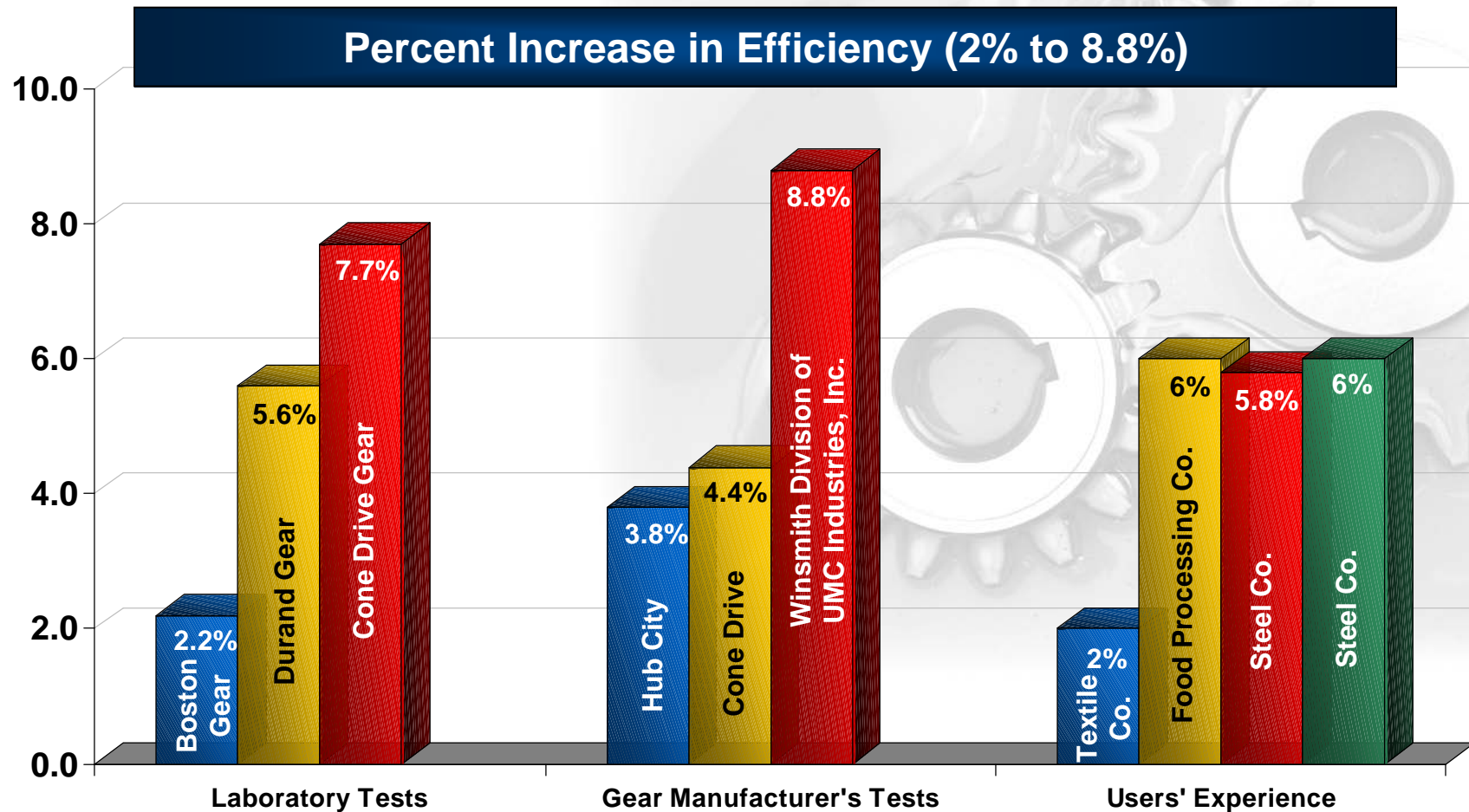


Mobil Industrial Lubricants



# Good Traction (Friction) Properties

Reduced Energy Consumption (Mobil SHC vs. conventional)

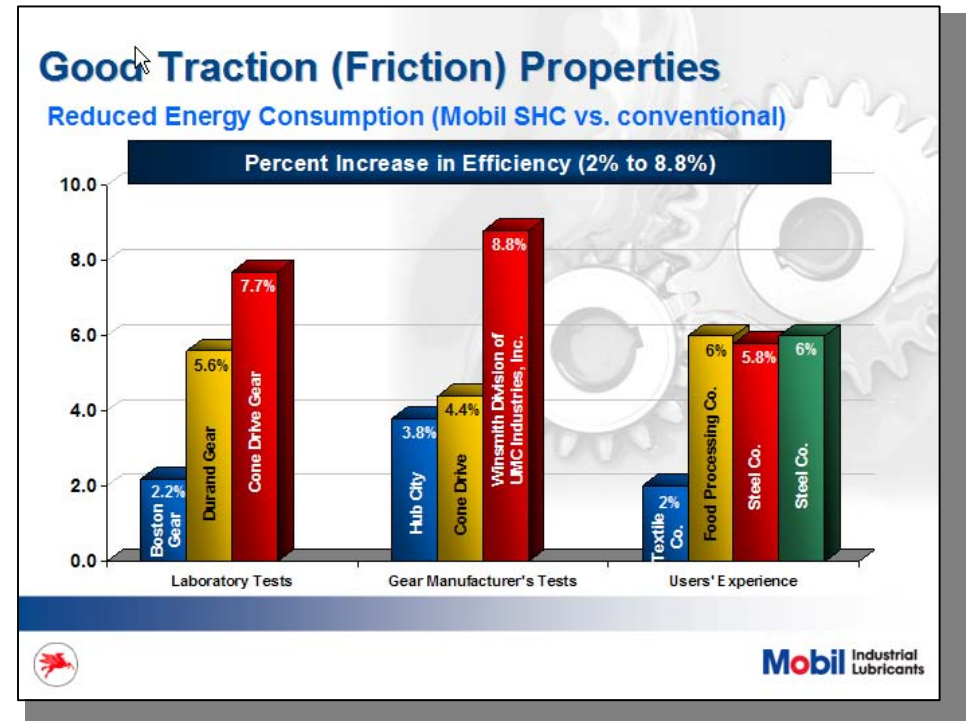


*Note: Results vary due to many factors including gear design, metallurgy and different operating environments*

**Mobil** Industrial Lubricants

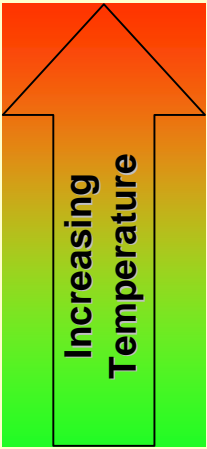
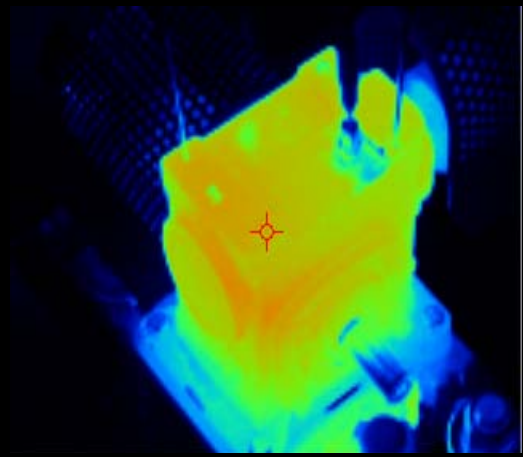
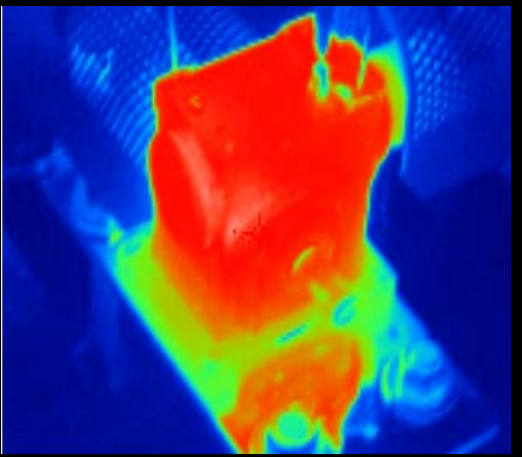
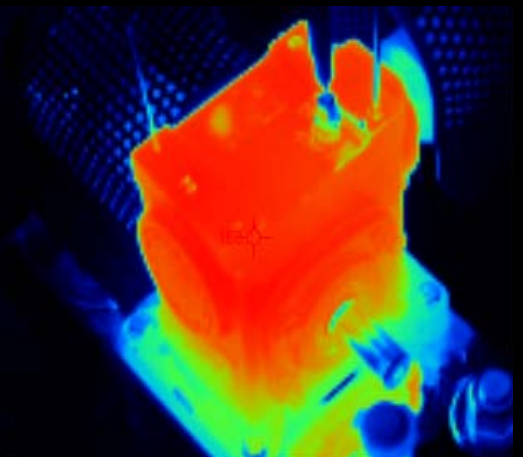
OEM testing and field experience (testimonials) have shown up to 8% reduction in energy consumption

*Note: Results vary due to many factors including gear design, metallurgy and different operating environments*



# Lower your Energy Consumption

*Mobil SHC is the "COOLEST"*

	Mobil SHC 600	Competitive Synthetic Oil	Conventional Oil
			
<b>Sump Temp</b>	<b>167°F</b>	<b>182°F</b>	<b>180°F</b>
<b>Efficiency</b>	<b>76%</b>	<b>74%</b>	<b>74%</b>

Note: ExxonMobil Proprietary test method

**The competitive synthetic oil runs 2°F hotter than the conventional oil product and nearly 15°F hotter than Mobil SHC 600**



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Not only did we test our Mobil SHC against a conventional oil, but we also compared against a competitor. The results may surprise some in that we found that the Mobil SHC 600 outperforms the other synthetic oil as well.

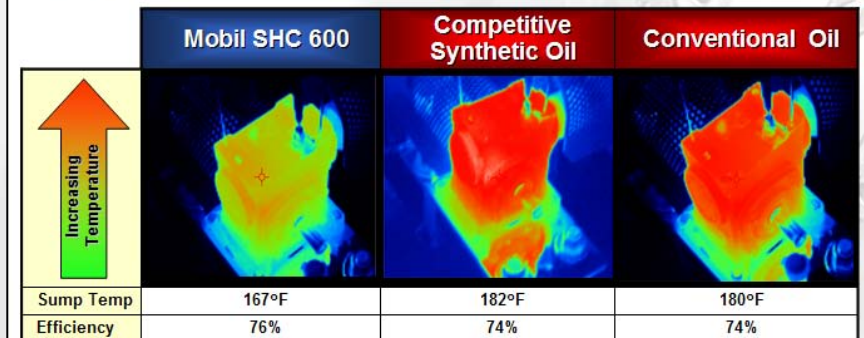
Now, you may be asking why Mobil SHC outperforms a competitive synthetic. In order to maximize the overall performance of Mobil SHC, we take a balanced approach to the product formulation.

Next slide: Balanced Formulation Approach.

*Note: For more, refer to “all synthetics are not the same” (Mobil SHC 600 in Gears” tech deck) available in DNet and on “Thunder Stick”*

## Lower your Energy Consumption

Mobil SHC is the “COOLEST”



The competitive synthetic oil runs 2°F hotter than the conventional oil product and nearly 15°F hotter than Mobil SHC 600



Mobil Industrial Lubricants

### Notes:

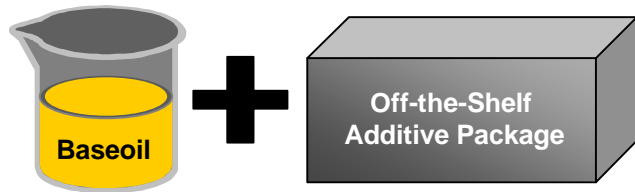
- Group II oils are limited to ~120 cSt and Group III to ~40 cSt
- Group II and Group III base oils require “thickening” agents to meet the viscosity requirements of many industrial applications
- Selection of Mobil SHC lubricants should focus on product performance, application requirements, and field experience



Mobil Industrial Lubricants

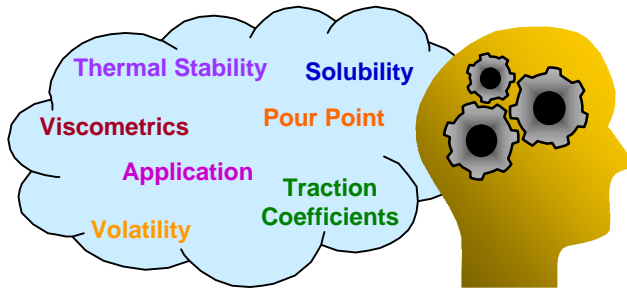
# Mobil SHC - Balanced Formulation Approach

## 1. A Common Approach

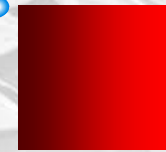
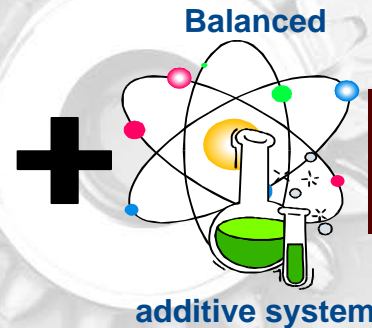
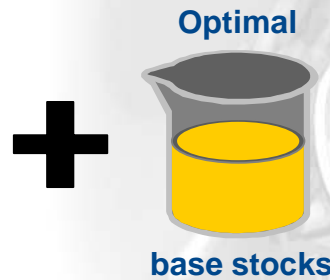


Lubricant Product with reasonable performance

## 2. Mobil SHC Approach



Many years of experience in formulation and application



Major investment in extensive testing using industry standard glassware, proprietary rig, and field tests

**MOBIL SHC**  
Scientifically Engineered  
Mobil SHC Performance Oils



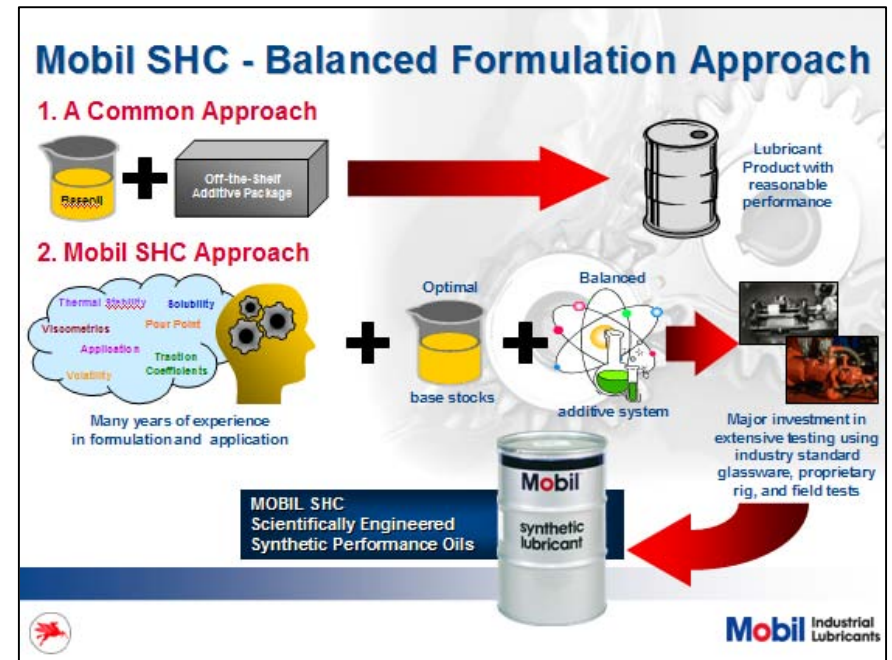
**Mobil** Industrial Lubricants

The traditional approach for lubricant manufacturing is blending conventional basestock with an off-the-shelf additive package to create a product that will meet industry specifications.

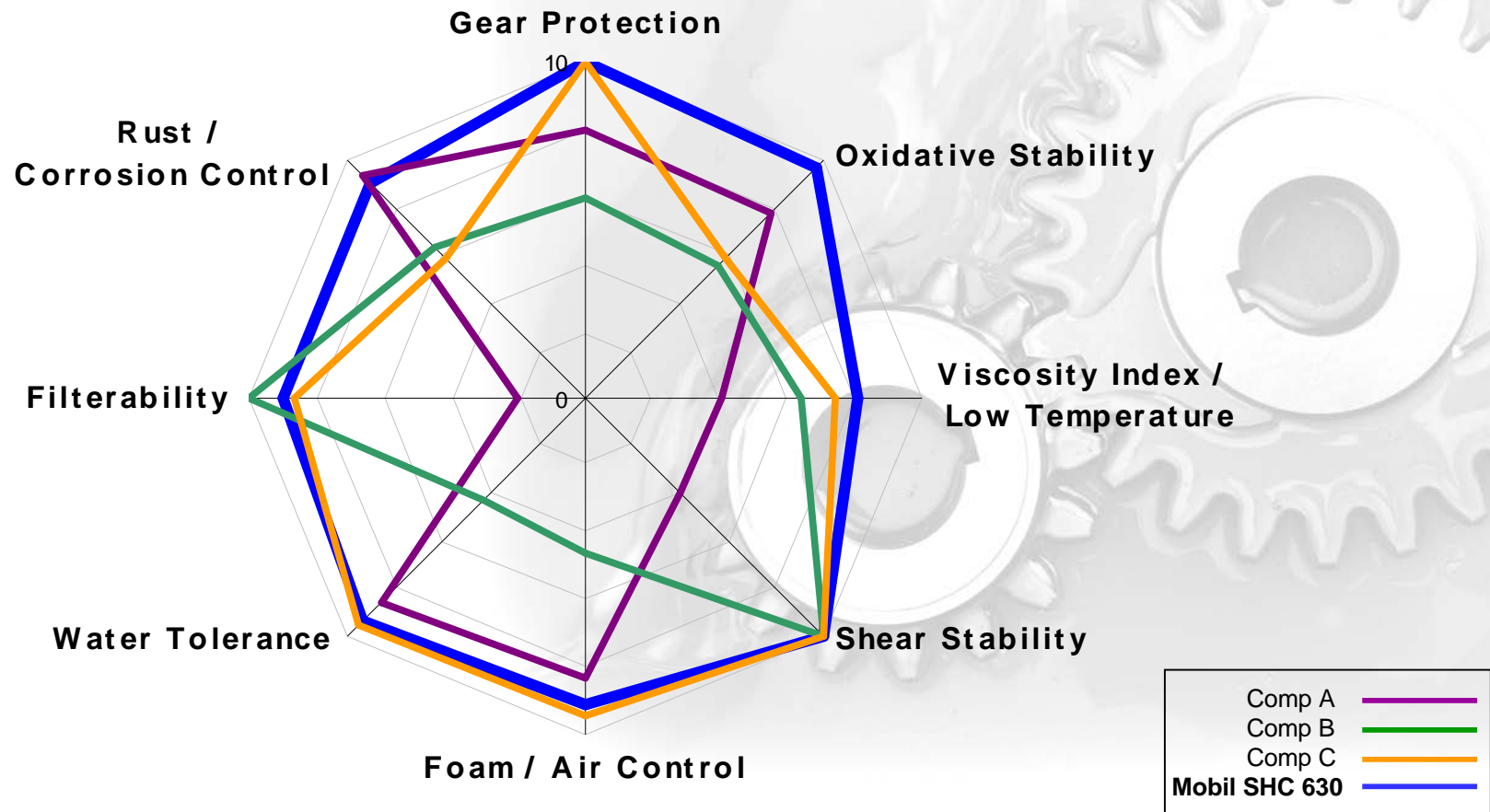
ExxonMobil uses a scientifically engineered approach building on many years of experience in formulation and applications. Our scientists select the optimal basestocks along with a balanced additive system.

We then take our products through extensive testing against industry standards using glassware, proprietary rig and field testing. Only after successful completion of this rigorous evaluation will we call it a Mobil SHC lubricant.

Mobil SHC lubricants are designed to both meet or exceed industry and OEM requirements.



# Mobil SHCs – Balanced Performance



**Mobil SHC 630 Delivers Balanced Performance**



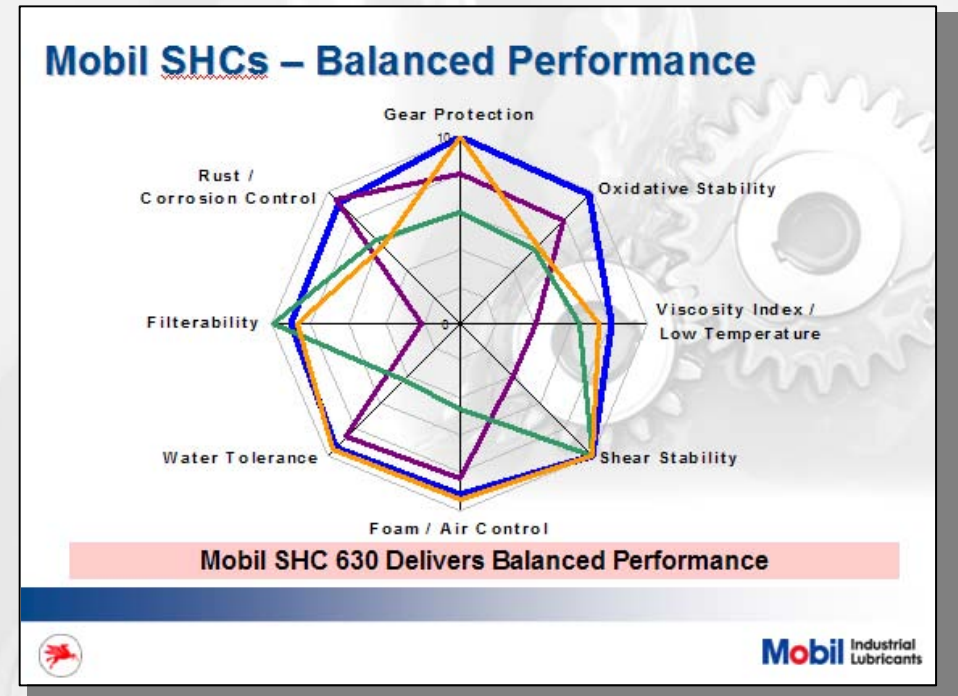
At ExxonMobil, we design all of our lubricants using what we call a “Balanced Formulation” approach.

Rather than focus on just one or two of the several performance characteristics, we formulated the Mobil SHC 600s maximizing performance in all key characteristics.

We have learned that if you focus on maximizing performance in just one area, it may negatively impact the others.

We compared our Mobil SHC 600 product line to a number of leading competitors.

This chart is known as a “spider chart”.



On each axis of the “spider web” key performance characteristics are rated on a relative scale.

On a balanced formulation basis, the Mobil SHC 600, depicted with the blue line, outperforms the competition.





# Summary of Benefits

**Where Industrial Productivity Begins**

**Total Cost  
Of  
Ownership**

**Extended  
Equipment  
Life**

**Extended  
Oil Life**

**Reduced  
Energy  
Consumption**



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Total Cost of Ownership includes not only the price but also the total cost of the lubricant (“from cradle to grave”).

If we can show the savings of using Mobil SHC 600 as outlined in the three categories, extended equipment life, extended oil life, and reduced energy consumption, would you be interested.....?

