



SHELL LUBRICANTS PRESENTATION FOR:

FLEET MAINTENANCE COUNCIL

October 17, 2017
Milwaukee, WI

Introduction/Safety

■ Safety

- No planned fire drills today
- Exit is

■ Introduction

- Doug Peterson – Transport Business Development Manager
- Background
 - 30 years with Shell
 - Previous roles – DPM (current ICAM position) – 12 years
 - Various sales roles on the consumer side
 - Last five years – transport/heavy-duty FBAM – Covering six states
- New Role
 - Transport Business Development Manager – Midwest
 - Developing and Building transport sales within the distributor channel

Agenda

- Introduction/Safety
- Motor Oils
 - Trends in the industry
 - CK-4/FA-4
 - NG Engine Oils – update
- Break
- Coolants
 - The trend toward nitrite-free coolants
 - Selling against “Universal” coolants
- Greases
 - Overview of the grease category
 - Opportunities with greases

- Closing - questions

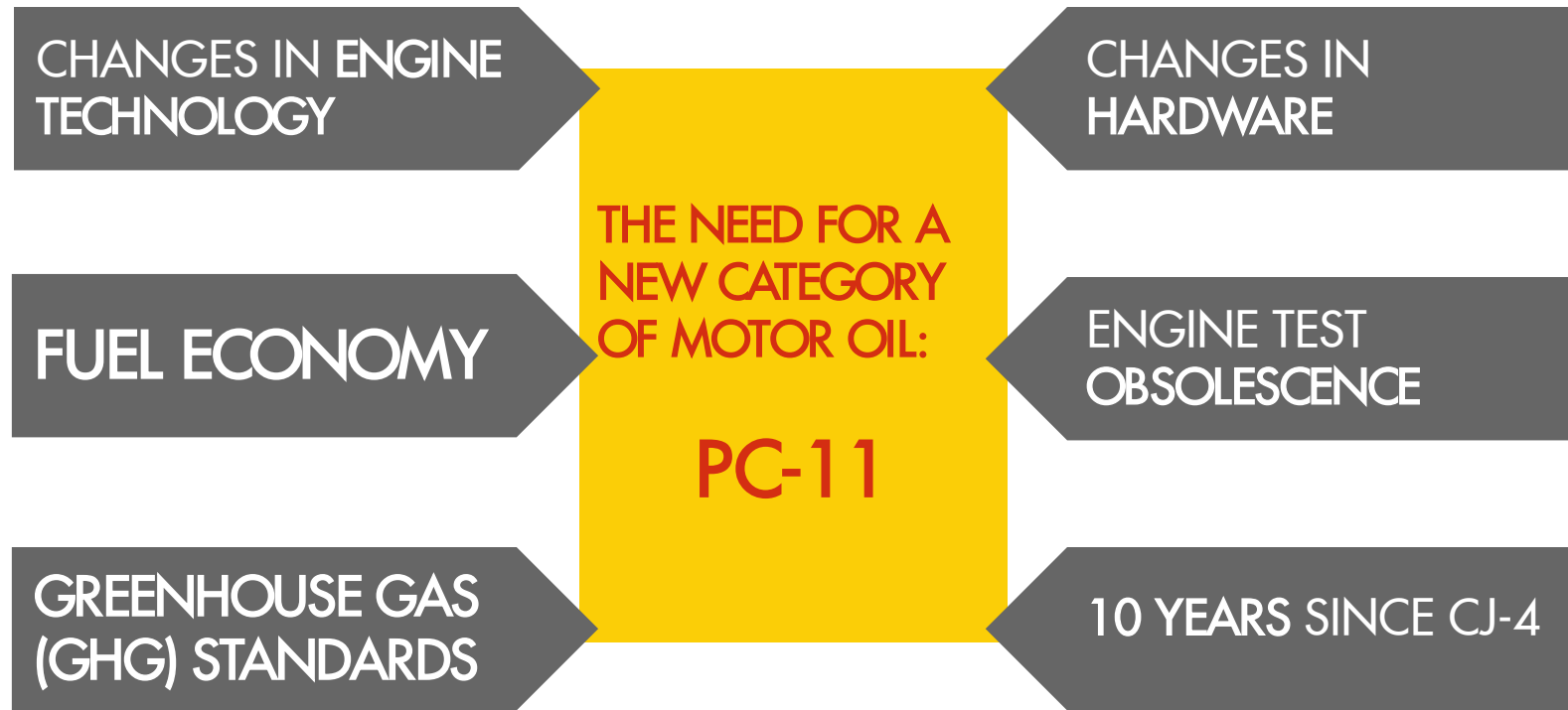
1.0

MOTOR OILS

The Trends

- Service intervals (A and B) continue to get longer
 - Increased focus on fuel efficiency
 - OEM's are factory fill with 10w30 and 10w30 synthetic blend oils
 - PC-11 Category to go into effect
 - + Market understands the benefits of synthetics
- = more and more customers are looking to move to 10w30 oils or lighter

WHAT'S DRIVING PC-11?





IF ALL ON-HIGHWAY TRUCKS ACHIEVED A **1% FUEL ECONOMY IMPROVEMENT** THE U.S. COULD REDUCE FUEL CONSUMPTION BY

1 MILLION GALLONS PER DAY

SAVING FLEETS AND OWNER OPERATORS AN ESTIMATED **\$2.7 MILLION PER DAY**





IF ALL ON-HIGHWAY TRUCKS ACHIEVED A
1% FUEL ECONOMY IMPROVEMENT
THE U.S. WOULD SEE AN ANNUAL
REDUCTION OF

**8.23 BILLION
POUNDS OF CO2**

OR THE SAME AS REMOVING **23,000
TRUCKS** FROM THE ROAD



BURNING
1 GAL OF
DIESEL FUEL

PRODUCES
→

22.38
POUNDS OF
CO2



HIGHER OIL STANDARDS

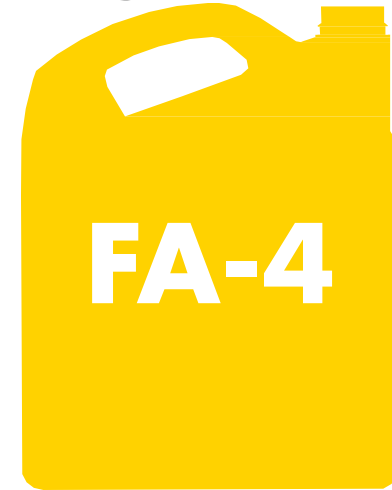
- PC-11 Oils will have significant performance improvements over CJ-4 oils in 3 categories:
 - Oxidation stability
 - Aeration benefits
 - Shear stability
- These new improvements will be measured by 3 new tests:
 - Volvo T-13 Test
 - Caterpillar Aeration Test
 - Shear Stability Test
- 7 other performance tests will carryover from CJ-4

2 CATEGORIES

PC-11A



PC-11B



What's the same between the two categories?

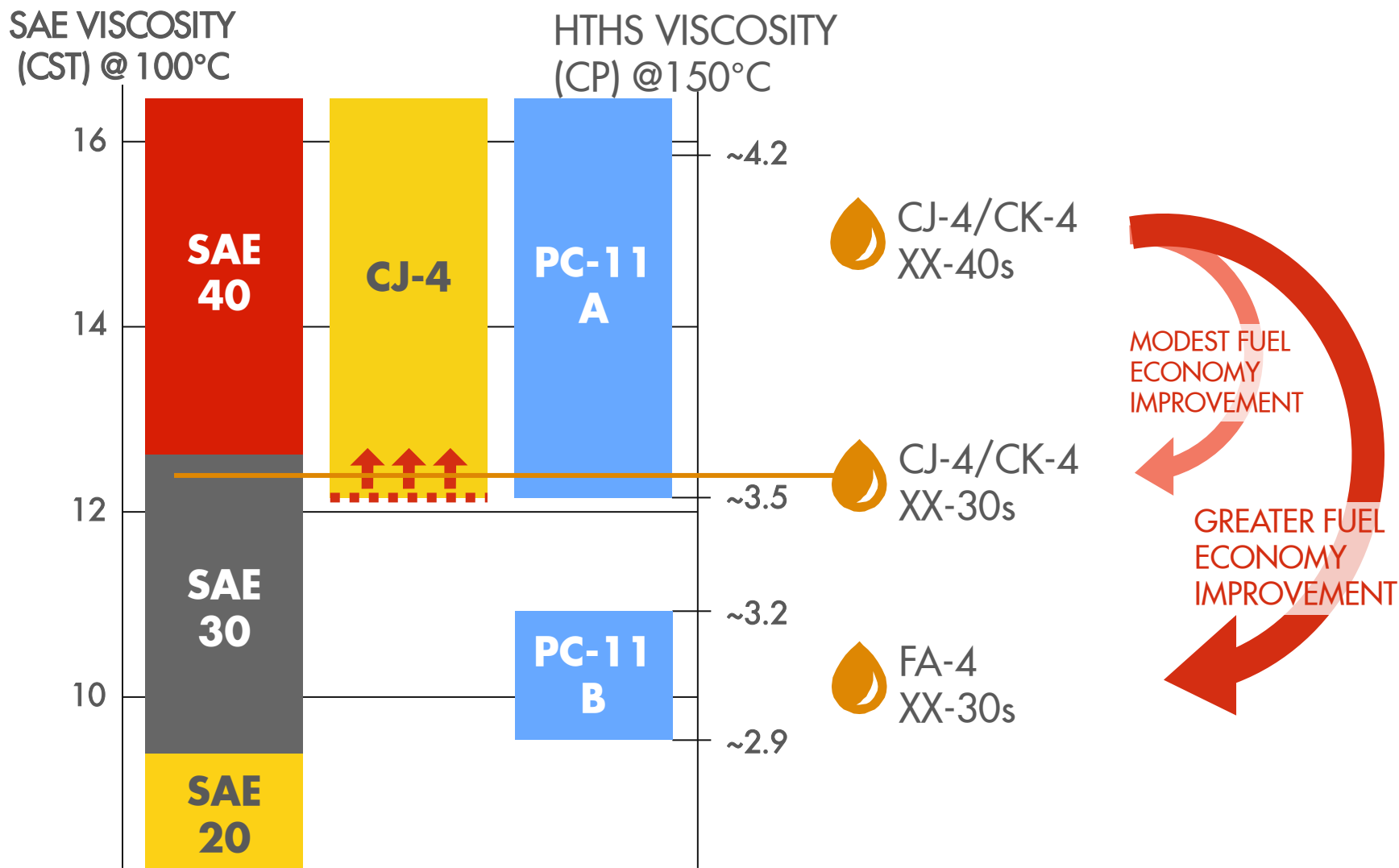
Improved oxidation resistance, shear stability, and aeration control over CJ-4

What's different between the two categories?

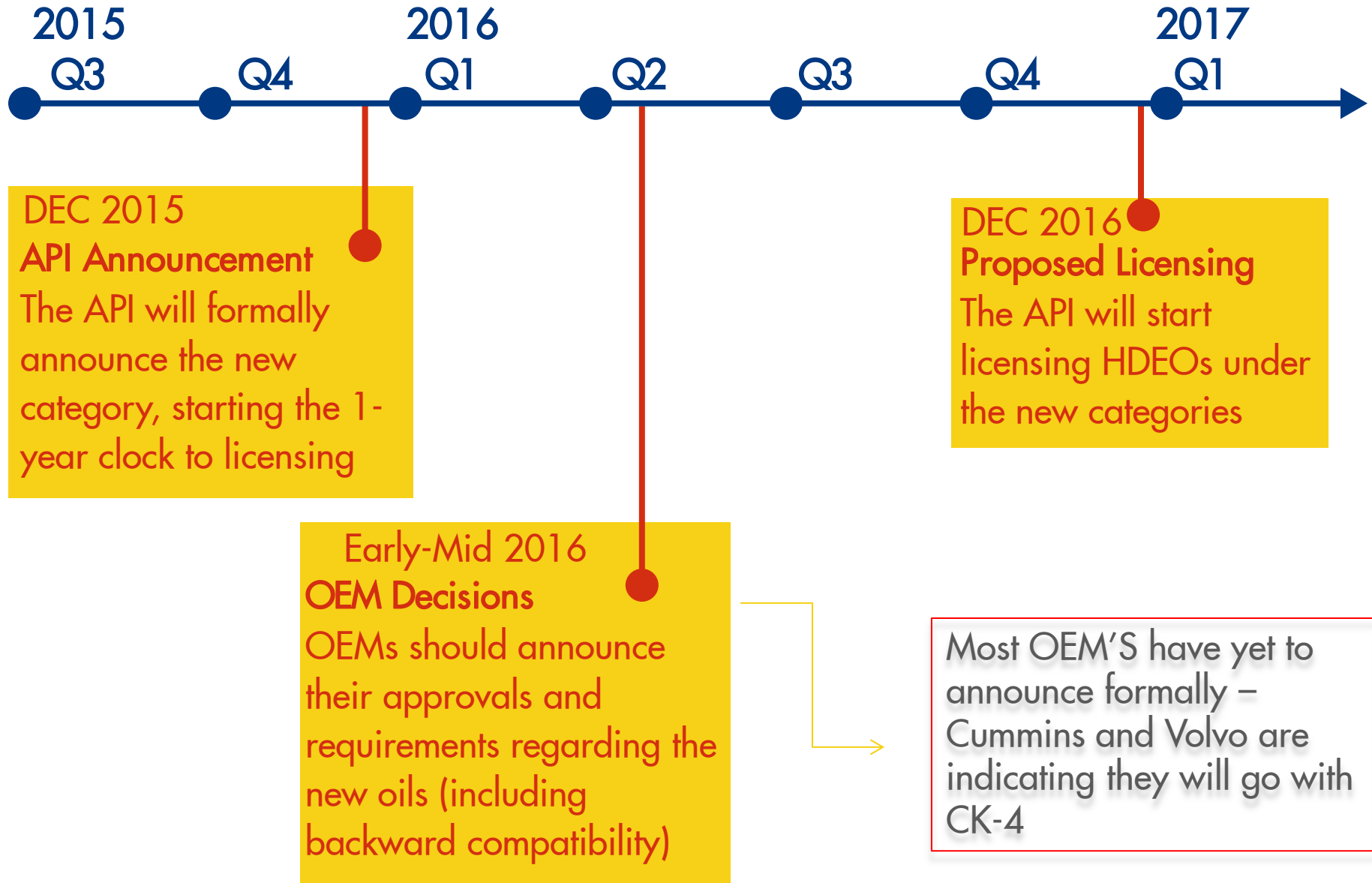
Lower limit of HTHS viscosity of 3.5 cP @ 150° C

Limits of HTHS viscosity between 3.2 and 2.9 cP @ 150° C

FUEL ECONOMY IMPROVEMENTS WITH LOWER HTHS (HIGH TEMP. HIGH SHEAR)



CALENDAR – API & OEMS

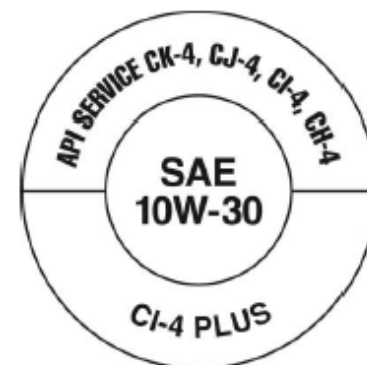


IMPLICATIONS FOR MY BUSINESS

- For the most part the engine oil you buy today (CJ-4) will be a 1:1 change to the CK-4 version. (However, there will be new material codes (SKUs) for the new oils)
 - For example Rotella T5 10W-30 (CJ-4) will simply become Rotella T5 10W-30 (CK-4)
 - CK-4 oil will offer better performance than CJ-4 oil in regard to oxidation stability and shear stability
 - You can benefit from the principle of low-viscosity oil increasing fuel economy today with Rotella T5 10W-30
- Once API and OEM decisions have been made and announced, Shell will help you determine the best course of action for your fleet regarding products, viscosity grades, maintenance implications, etc...

API Donut Requirements

- **No Change for the API Donut for CK-4.**
- **API Donut for FA-4 will require a number of changes.**
 - The top of the donut will be split
 - FA-4 and the word API Service
- The Letter in the upper left section of the donut must be reversed color.



WHY SHELL IS YOUR PARTNER TO NAVIGATE PC-11

- Shell is in the best position to help your fleet navigate through the new category implementation for various reasons:

Top API Involvement



Dan Arcy, Global OEM Technical Manager

Dan was elected chair of the API team responsible for PC-11 after decades of involvement with API. He is also responsible for technical relationships with major equipment manufacturers in the US market.

Deep OEM Relationships

We have a dedicated technology team that interfaces frequently with all the major OEMs. We collaborate in extensive product testing and development with all the OEMs in order to be a partner in the future of the trucking industry.

Industry- Leading Technology Development

Shell has not only been developing PC-11 oils in the lab, but we've already accumulated more than 25 million miles of real world testing with PC-11 prototypes and low HTHS-viscosity engine oils. Our results have been positive in areas such as wear protection— see more in the PC-11 technical document.

TOOLS TO HELP YOU

PC-11 Website

WHAT IS **PC-11?**
BY SHELL ROTELLA®

■ visit: www.whatisp-11.com





Technology Deep Dive



THE MOST TECHNICALLY ADVANCED ROTELLA EVER

- Started CK-4/FA-4 technology development programs in 2Q 2013
- New engine tests (unknown at time)
- New specifications (unknown at time)
- New additive technology, new base oils
- Starting from a high bar with existing API CJ-4 portfolio

- **Desired:** Products designed to exceed the minimum requirements of the future API CK-4 and FA-4 categories
- **Desired:** Products which demonstrate improved performance versus the legacy products

THE BEST ROTELLA EVER – HOW DID WE DO IT?

- Conducted hundreds of engine tests and thousands of bench tests on prototype developmental formulations to understand the additive capabilities and synergies/antagonisms, before we even started our qualification testing
- Initiated field testing on prototype formulations in 2013 to maximize the mileage in real world test conditions
 - Testing in on-road, off-road, diesel pick-up, gasoline engines
 - 40 million miles on prototype formulations (on-road testing)
 - 50,000+ hours off-road testing (CK-4/CJ-4 reference)
- Engaging OEMs throughout the development process and supplying prototype oils for their engine testing
- Benchmarking our current products in these new engine and bench tests

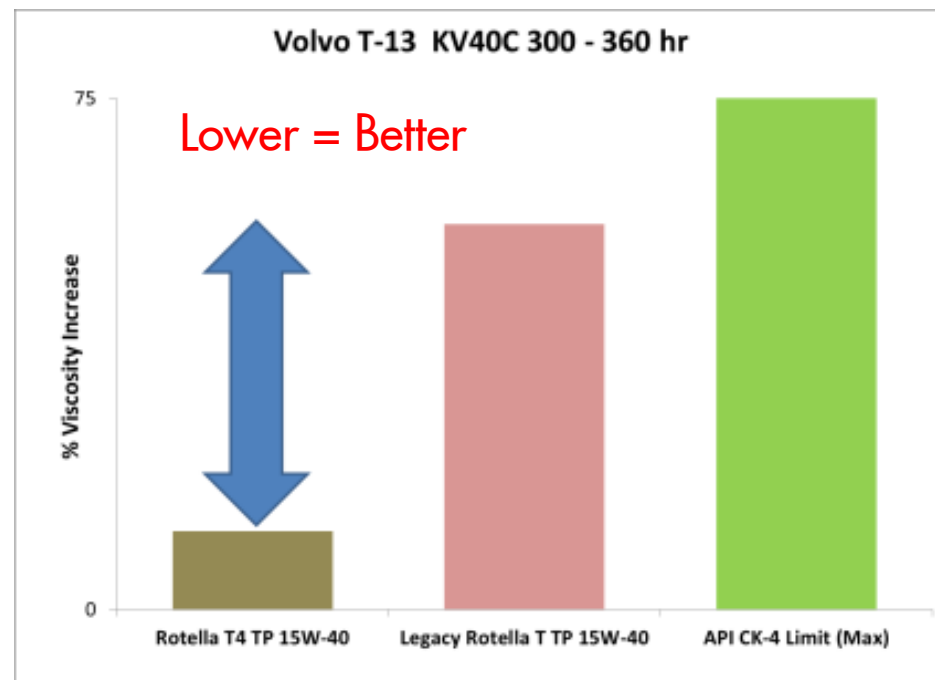
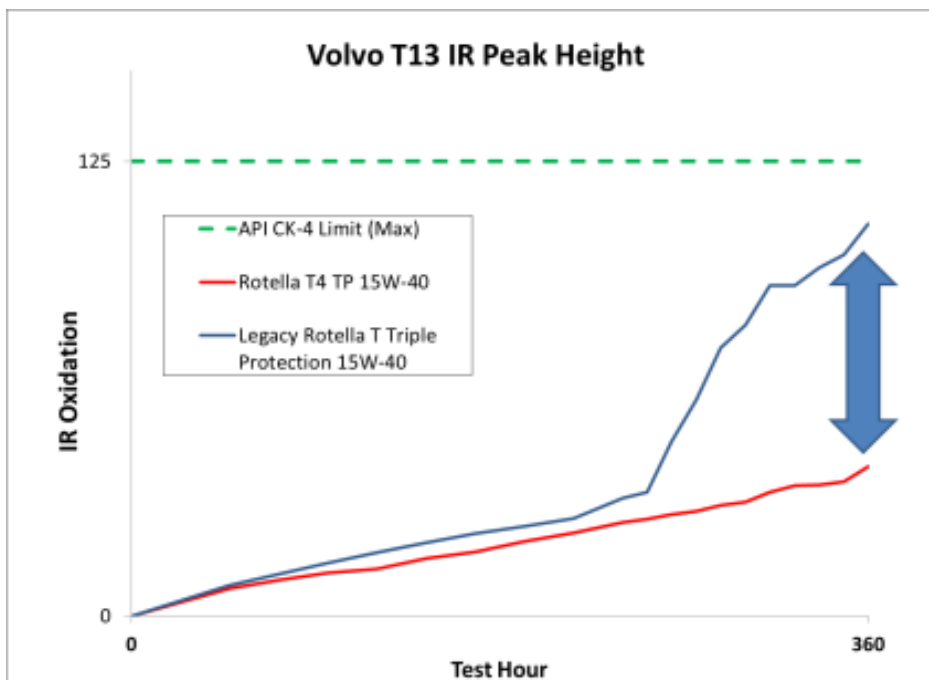
ROTELLA T4 TRIPLE PROTECTION 15W-40

- Rotella T4 Triple Protection 15W-40 meets all the current specifications that are on the legacy Rotella T TP 15W-40. It also includes:
 - API CK-4 (as of Dec 2016)
 - Allison TES 439 (for off-highway)
- Rotella T4 Triple Protection 15W-40 will also meet the following specifications (currently draft) once they are formally released:
 - Cummins CES 20086
 - Detroit Diesel 93K222
 - Volvo VDS-4.5

	Rotella T4 TP 15W-40	Legacy Rotella TP 15W-40
API CJ-4	x	x
API CK-4	x	
ACEA E9	x	x
JASO DH-2	x	x
Cummins 20081	x	x
Volvo VDS-4	x	x
DDC 93K218	x	x
Caterpillar ECF-2/ECF-3	x	x
MB 228.31	x	x
MAN 3575	x	x
MTU Type 2.1	x	x
Deutz DQC-III 10 LA	x	x
JASO MA/MA2	x	x
Allison TES 439	x	

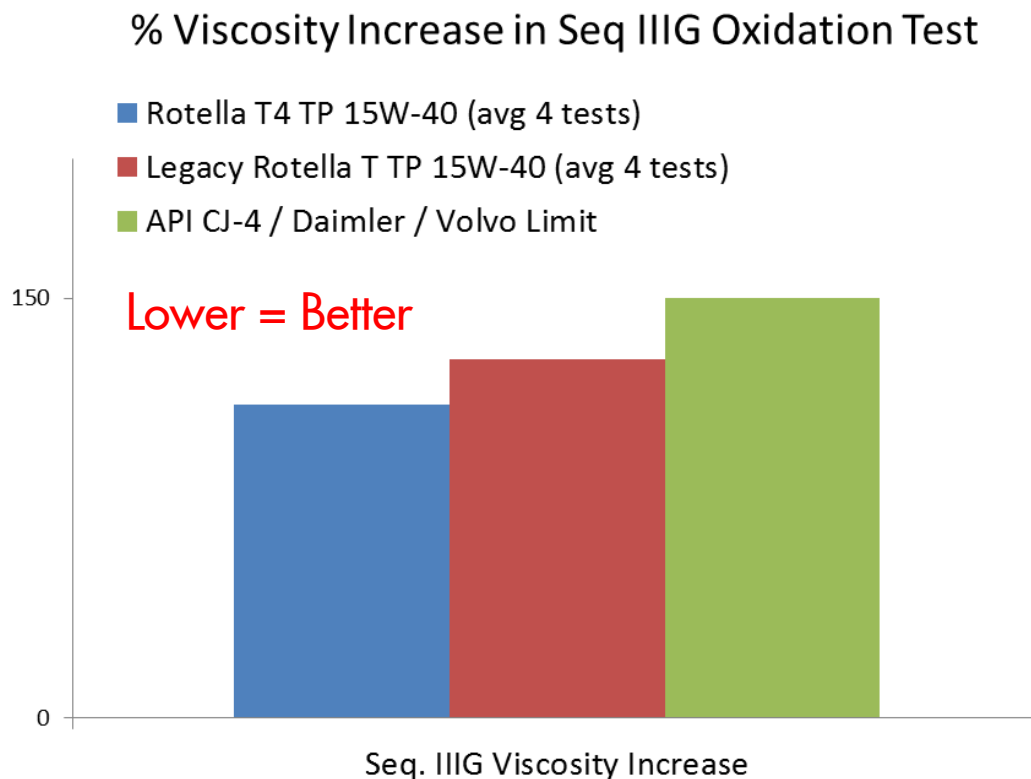
ROTELLA T4 TRIPLE PROTECTION 15W-40

- Key feature of new Rotella T4 TP 15W-40 is oxidation protection, driven by new Volvo T-13 engine test
 - Clear differentiation from CK-4 limit & legacy product



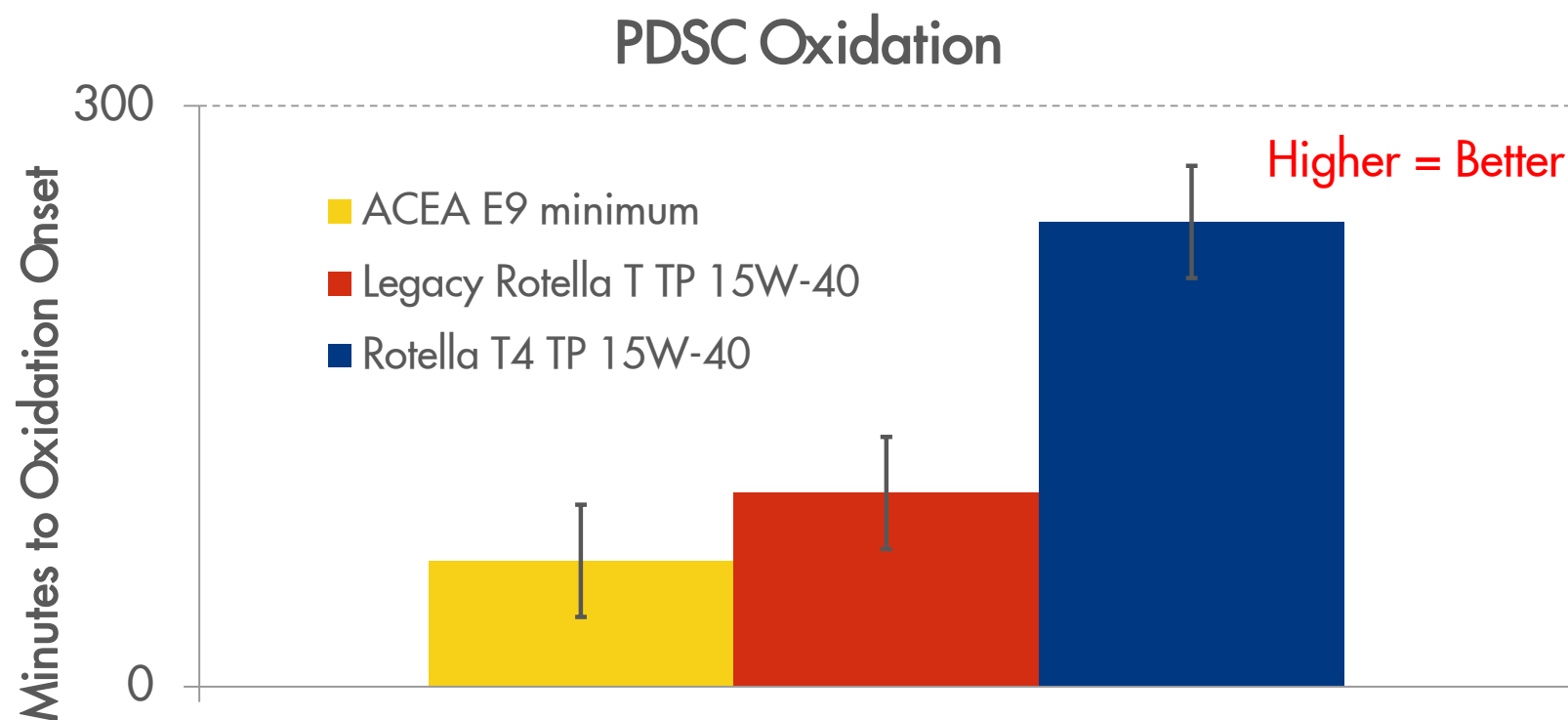
ROTELLA T4 TRIPLE PROTECTION 15W-40

- In API CJ-4 oxidation test, Sequence III G, Rotella T4 TP 15W-40 also shows excellent performance relative to the CJ-4/OEM limit and legacy product



ROTELLA T4 TRIPLE PROTECTION 15W-40

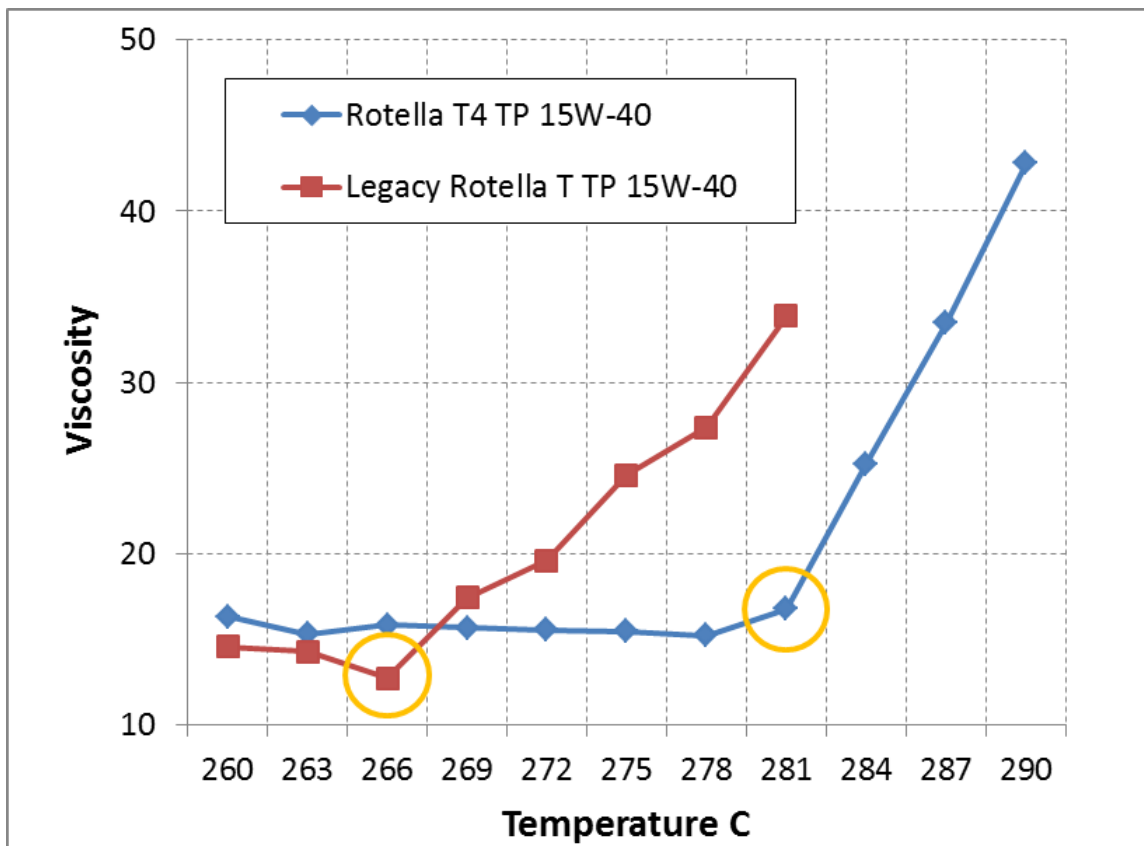
- Differentiated protection is also demonstrated in bench oxidation tests (PDSC CEC-L-085)



ROTELLA T4 TRIPLE PROTECTION 15W-40

- Differentiated oxidation protection evident at higher temperatures

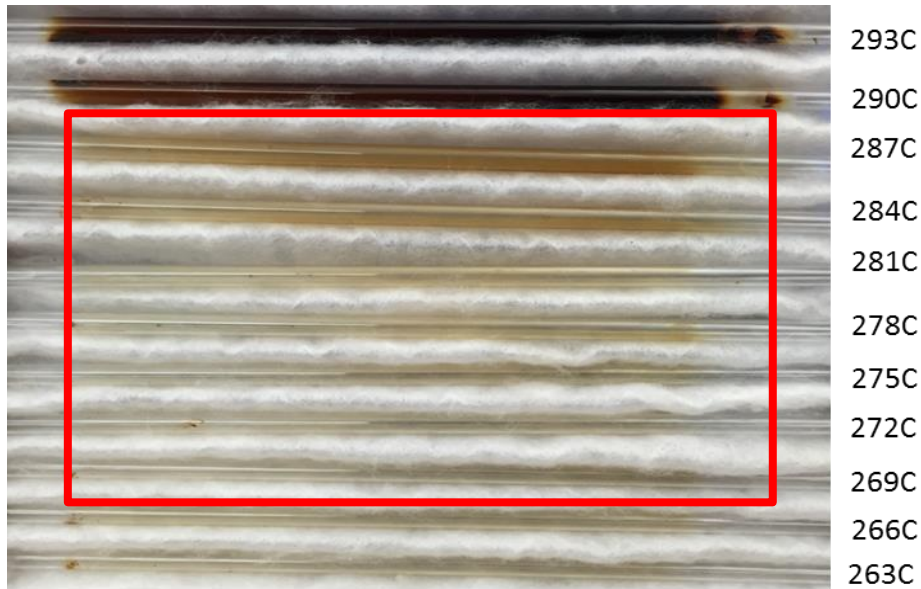
(Shell Clean Machine Proprietary Test Method)



ROTELLA T4 TRIPLE PROTECTION 15W-40

- Excessive oxidation can contribute to increased deposits in the engine. Rotella T4 TP 15W-40 demonstrates improved deposit protection compared to legacy Rotella T TP 15W-40 (Shell Clean Machine Proprietary Test Method)

Rotella T4 TP 15W-40

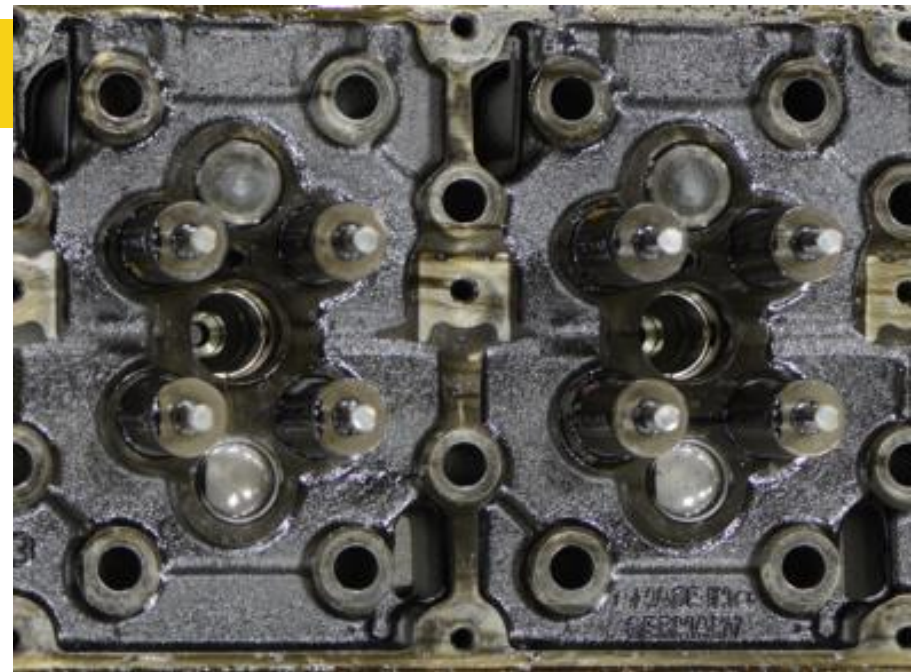


Legacy Rotella T TP 15W-40



ROTELLA T4 15W40

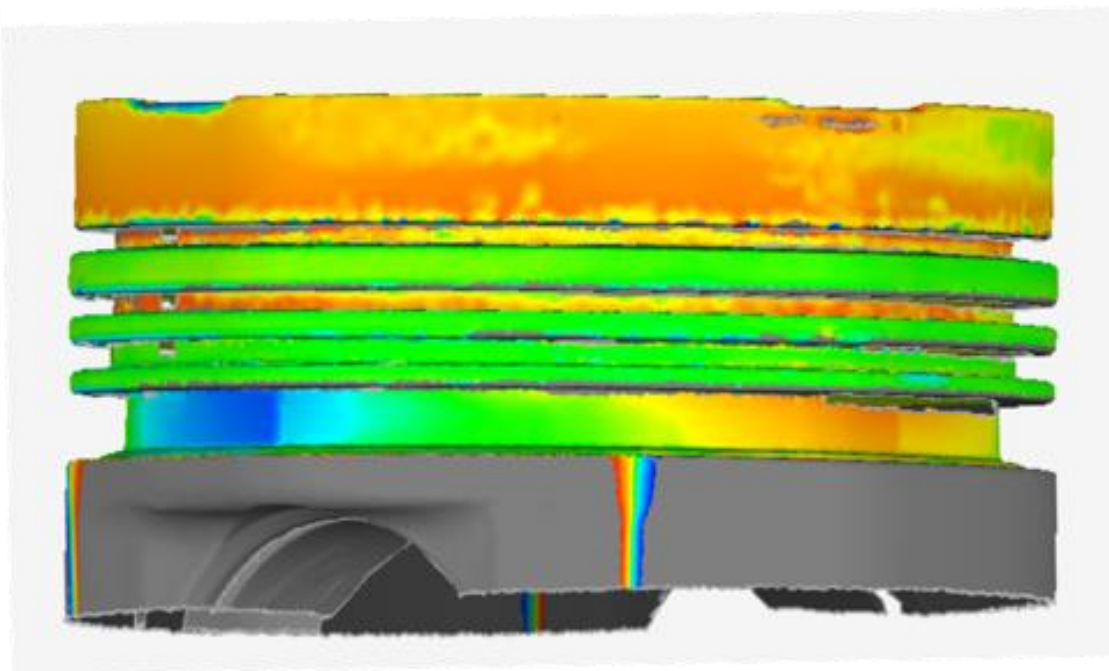
- Rotella T4 TP 15W-40 demonstrates excellent engine cleanliness in the field



Field Test Engine	Rotella T4 TP 15W-40			
<i>(10 = clean)</i>	Rocker Arm Cover	Rocker Arms	Valve Deck	Oil Pan
Cummins ISX – 389,619 miles	9.70	9.75	9.62	9.71
Cummins ISX – 413,454 miles	9.68	9.75	9.78	9.71
DDC DD15 – 590,826 miles	9.75	9.75	9.75	9.75
Paccar MX – 613,458 miles	9.62	9.75	9.64	9.67

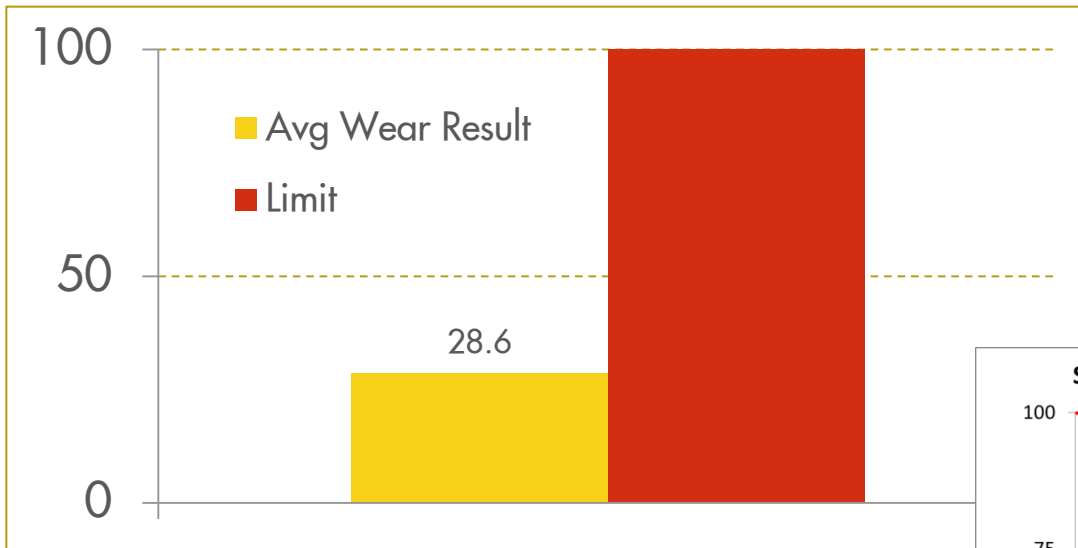
ROTELLA T4 TRIPLE PROTECTION 15W-40

- Inspection of pistons from a Paccar MX engine with 613,458 miles running Rotella T4 TP 15W-40 reveals very low levels of land and groove deposits, verified through piston ratings, and through novel 3-D imagery

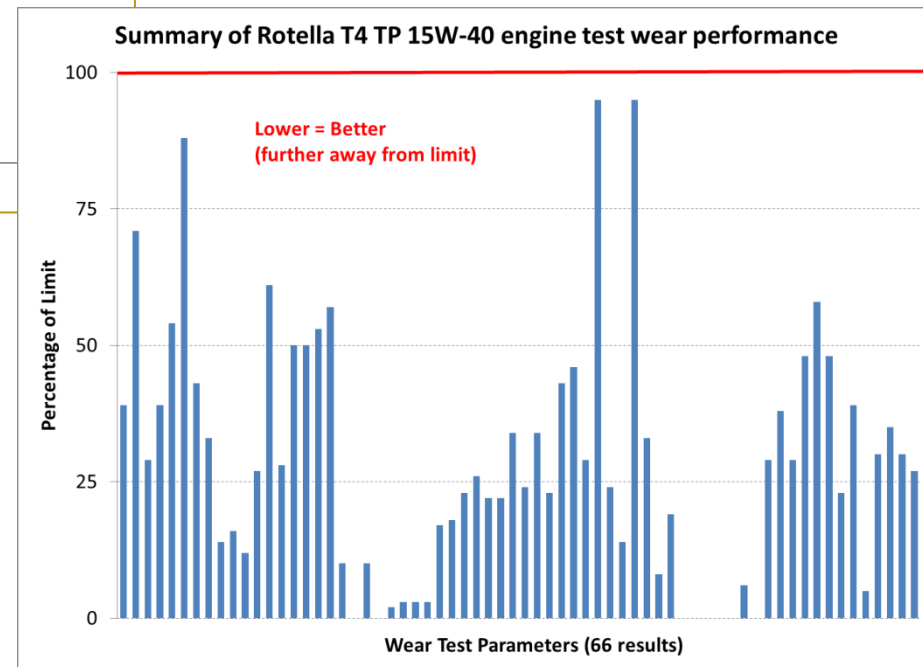


ROTELLA T4 TRIPLE PROTECTION 15W-40

- Wear protection of Rotella T4 TP 15W-40 has been extensively tested in industry standard tests



- 18 separate passing engine tests
- 66 total wear parameters
- Avg. result = **28.6% of the limit**



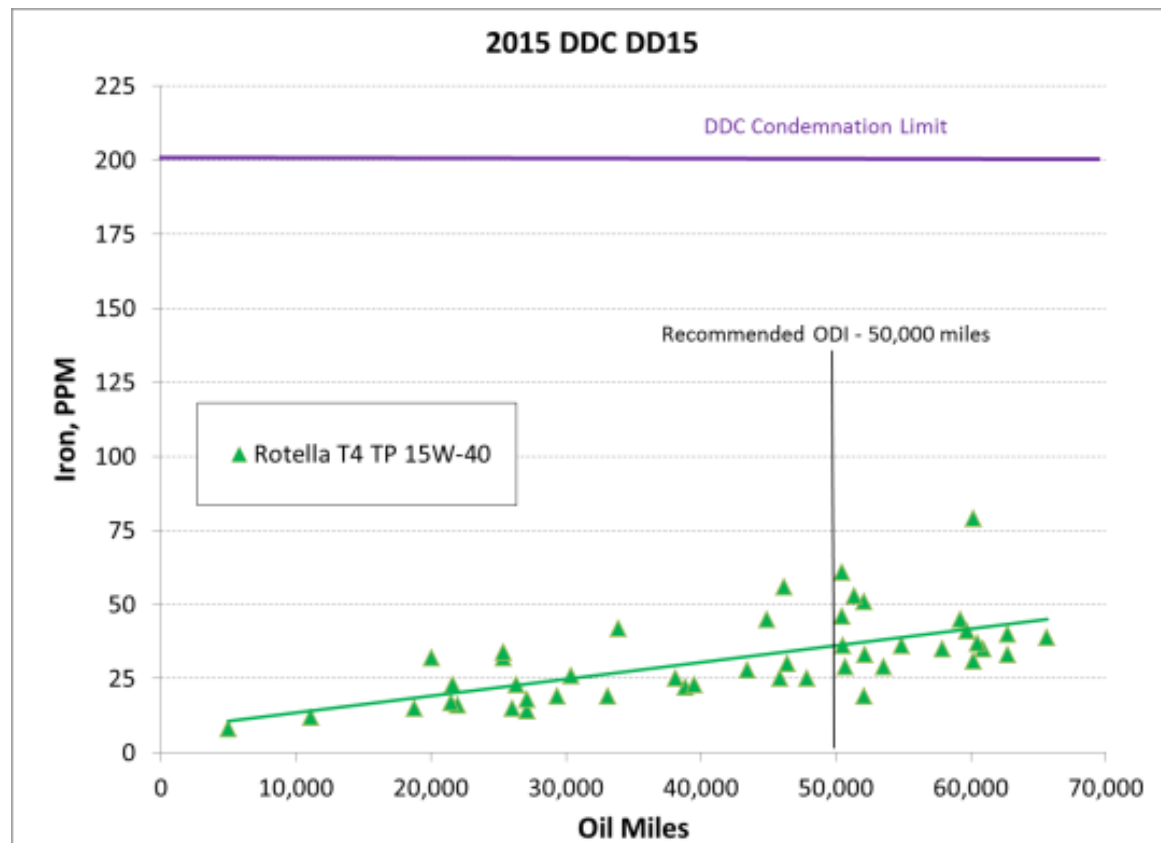
ROTELLA T4 TRIPLE PROTECTION 15W-40

- Rotella T4 Triple Protection 15W-40 demonstrates excellent wear protection in the field
- Connecting rod bearings from 2013 DD15 at 590,826 miles (new bearing shown for reference)



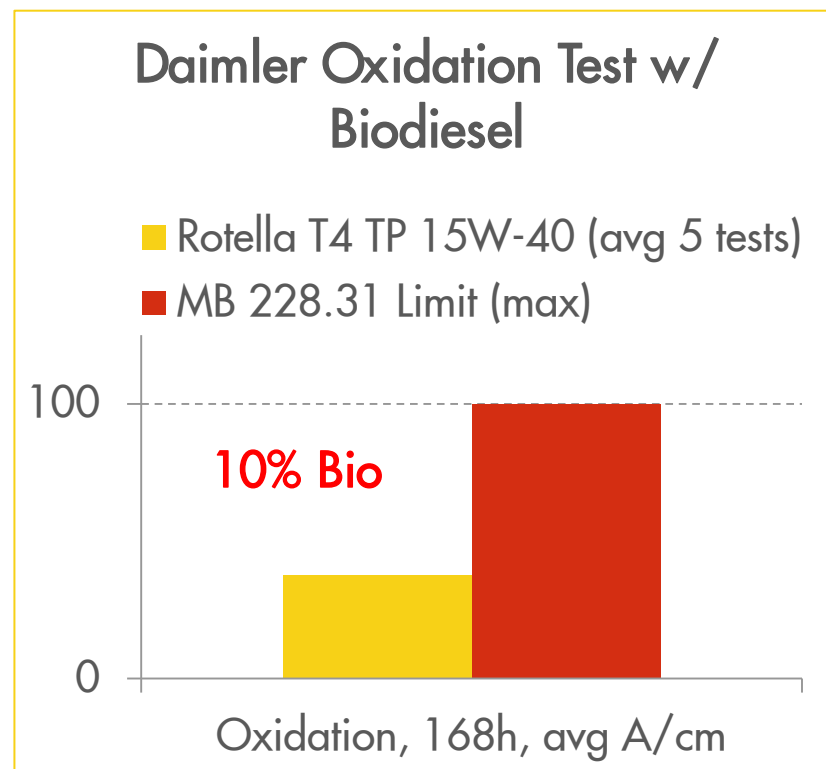
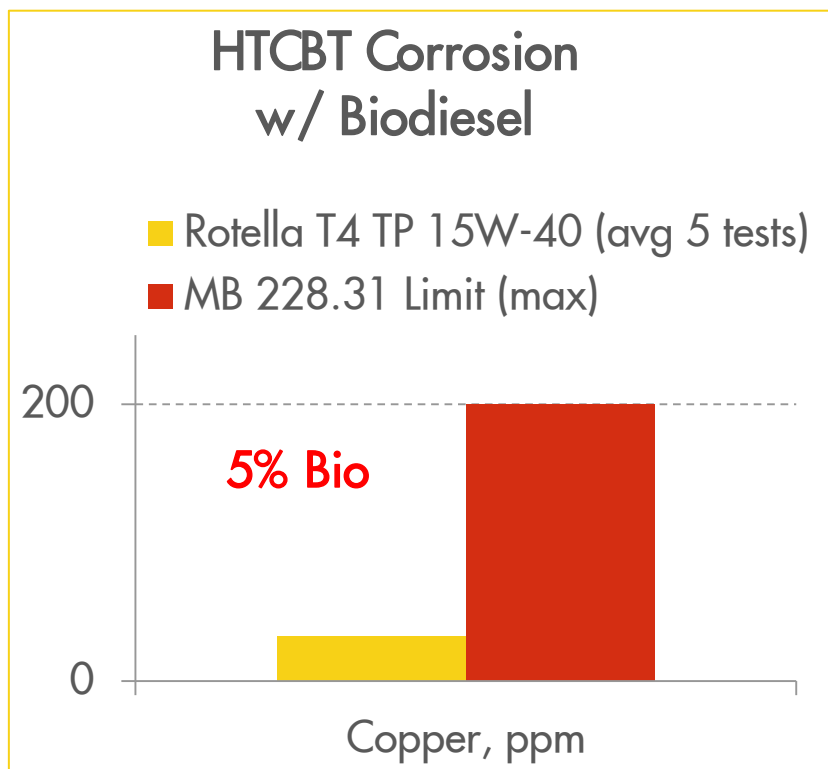
ROTELLA T4 TRIPLE PROTECTION 15W-40

- Rotella T4 Triple Protection 15W-40 demonstrates excellent wear protection in the field



ROTELLA T4 TRIPLE PROTECTION 15W-40

- Rotella T4 Triple Protection 15W-40 provides excellent corrosion and oxidation protection in the presence of biodiesel



ROTELLA T4 TRIPLE PROTECTION 15W-40

- Summary:
 - API CK-4 capable (licensable in December)
 - Differentiated improvement in oxidation protection vs legacy
 - Better oxidation protection contributes to better deposit control at higher temperatures vs legacy
 - Demonstrated wear performance through extensive engine testing and field testing
 - Biodiesel protection

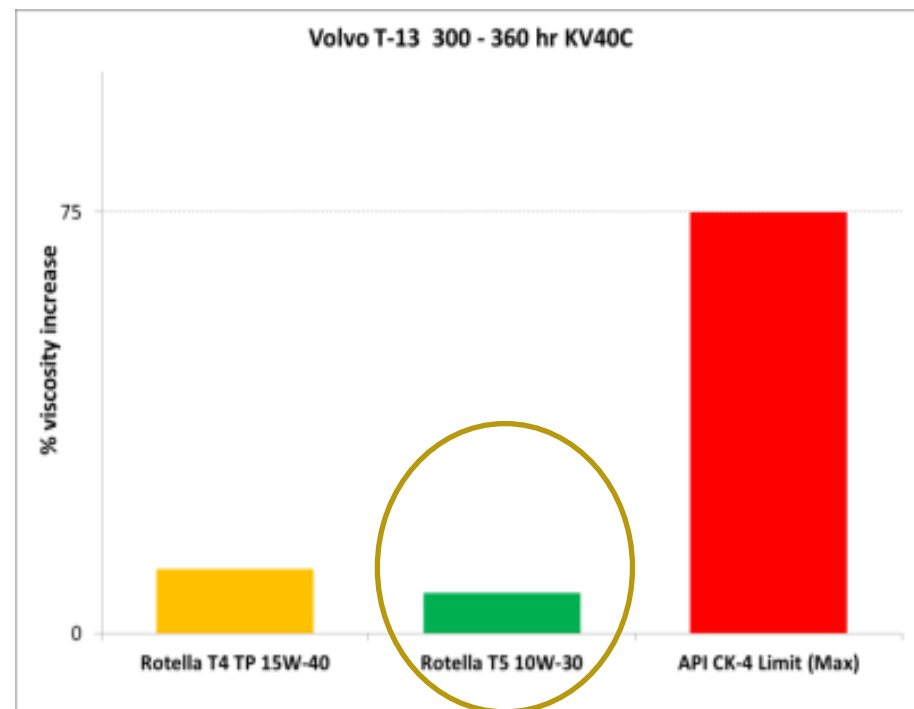
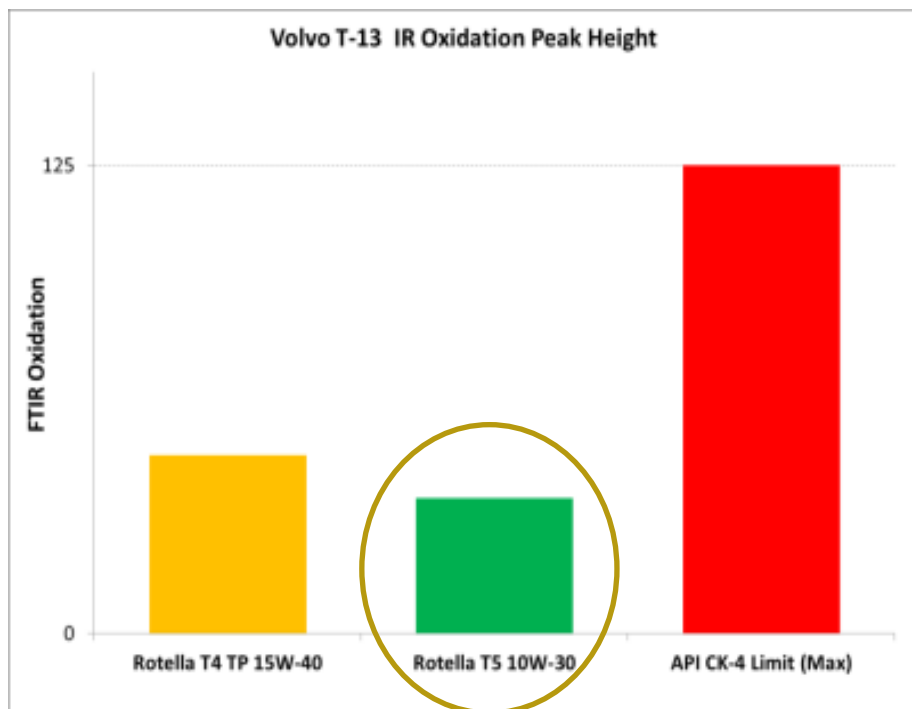
ROTELLA T5 SYNTHETIC BLEND 10W-30

- Rotella T5 10W-30 meets all the current specifications that are on the legacy Rotella T5 10W-30. It also includes:
 - API CK-4 (as of Dec 2016)
- Rotella T5 10W-30 will also meet the following specifications (currently draft) once they are formally released:
 - Cummins CES 20086
 - Detroit Diesel 93K222
 - Volvo VDS-4.5
- Rotella T5 10W-30 uses Shell Pure Plus base oil

	Rotella T5 10W-30	Legacy Rotella T5 10W-30
API CJ-4	x	x
API CK-4	x	
ACEA E9	x	x
JASO DH-2	x	x
Cummins 20081	x	x
Volvo VDS-4	x	x
DDC 93K218	x	x
Caterpillar ECF-2/ECF-3	x	x
MB 228.31	x	x
MAN 3575	x	x
MTU Type 2.1	x	x
Deutz DQC-III 10 LA	x	x

ROTELLA T5 SYNTHETIC BLEND 10W-30

- Similar to the Rotella T4 TP 15W-40, the key feature of Rotella T5 10W-30 is oxidation protection.
- Performance in the Volvo T-13 easily exceeds API CK-4 limits



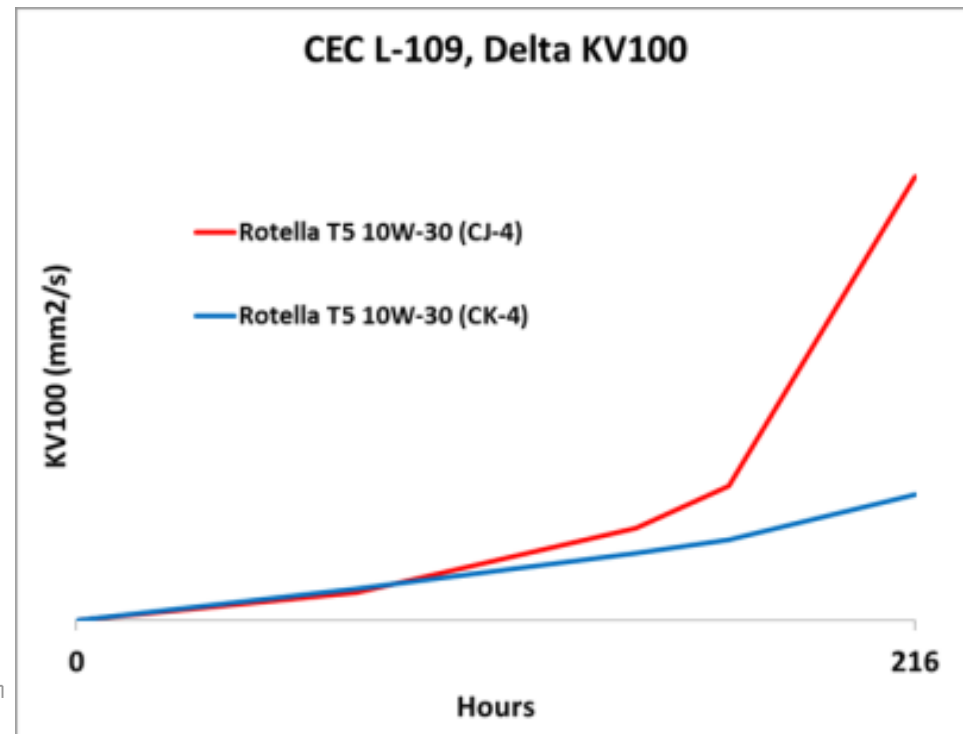
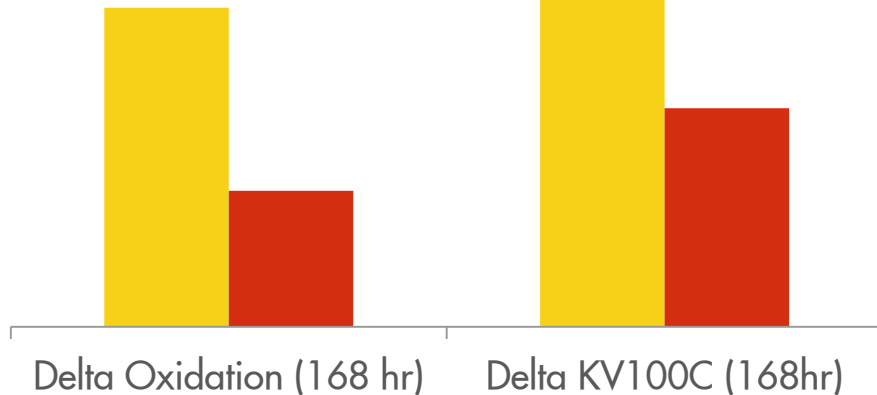
ROTELLA T5 SYNTHETIC BLEND 10W-30

- Differentiated protection is also demonstrated in bench oxidation tests (CEC-L-109 Oxidation Test)

■ Daimler 228.31 maximum

■ Rotella T5 10W-30

Lower = Better



ROTELLA T5 SYNTHETIC BLEND 10W-30

- Rotella T5 10W-30 demonstrates improved deposit protection compared to legacy Rotella T5 10W-30 (Shell Clean Machine Proprietary Test Method)

Legacy Rotella T5 10W-30



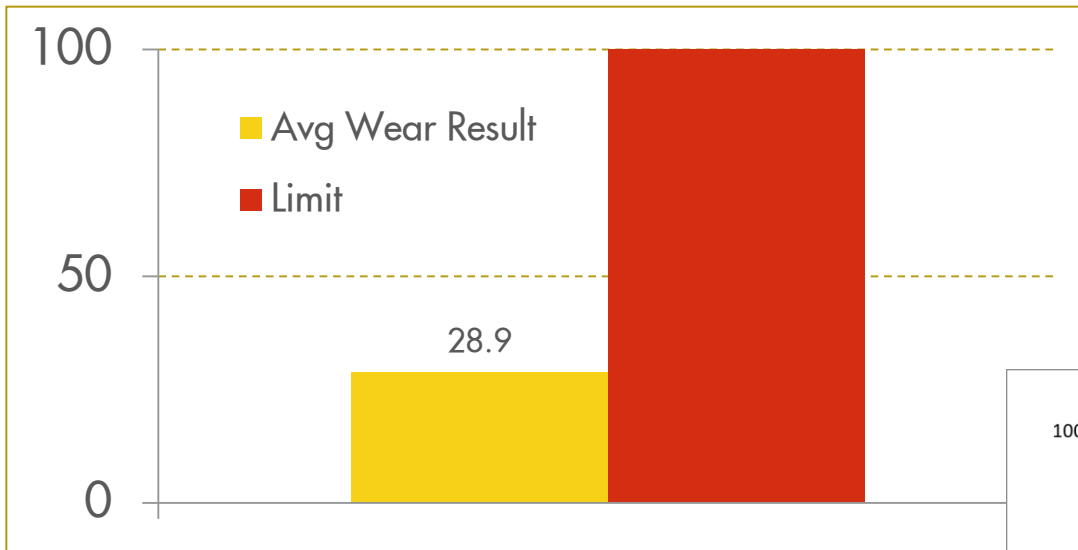
Rotella T5 10W-30

293C
290C
287C
284C
281C
278C
275C
272C
269C
266C
263C



ROTELLA T5 SYNTHETIC BLEND 10W-30

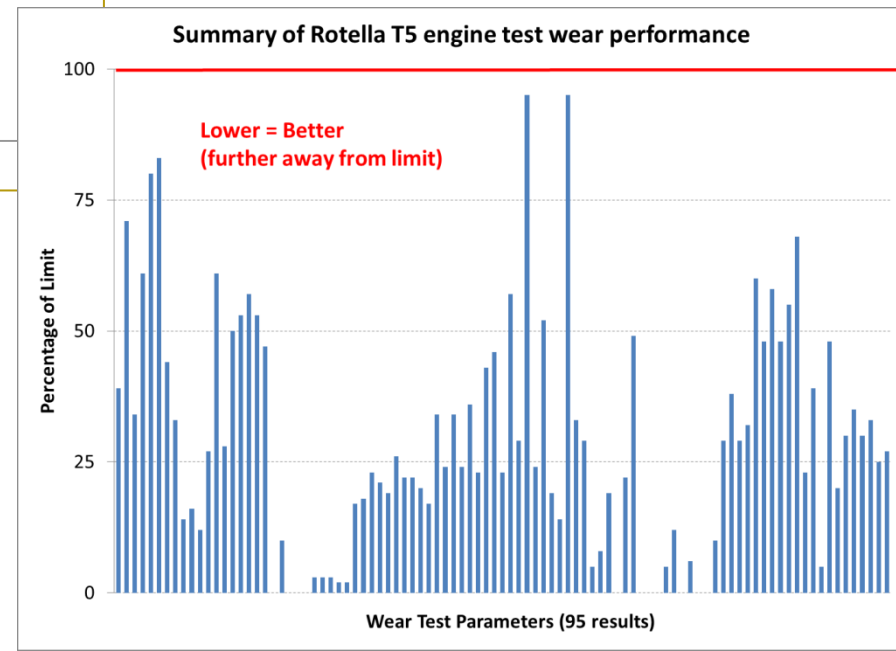
- Wear protection of Rotella T5 10W-30 has been extensively tested in industry standard tests



- 21 separate passing engine tests
- 95 total wear parameters
- Avg. result = **28.9% of the limit**

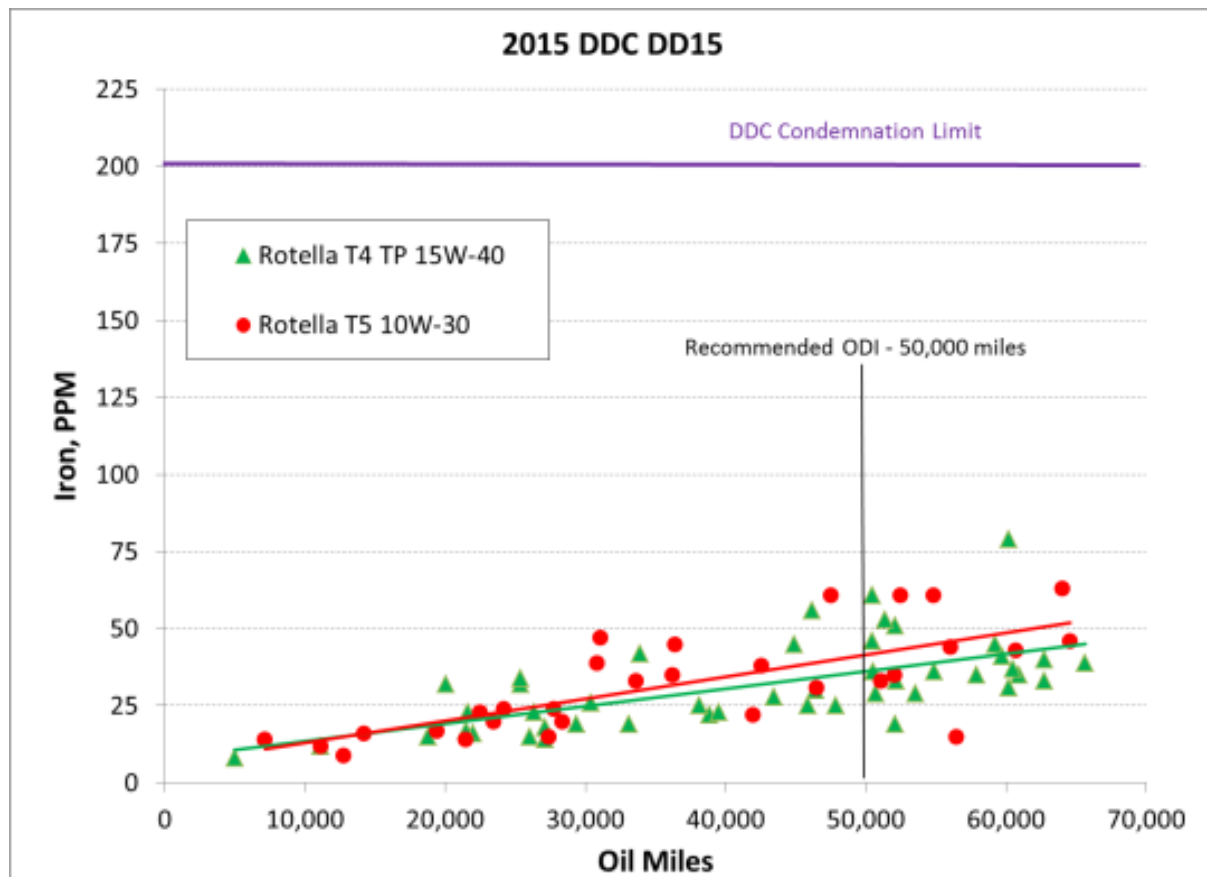
Recall Rotella T4 TP 15W-40 –
28.6% of limit

(C) 2015 SC



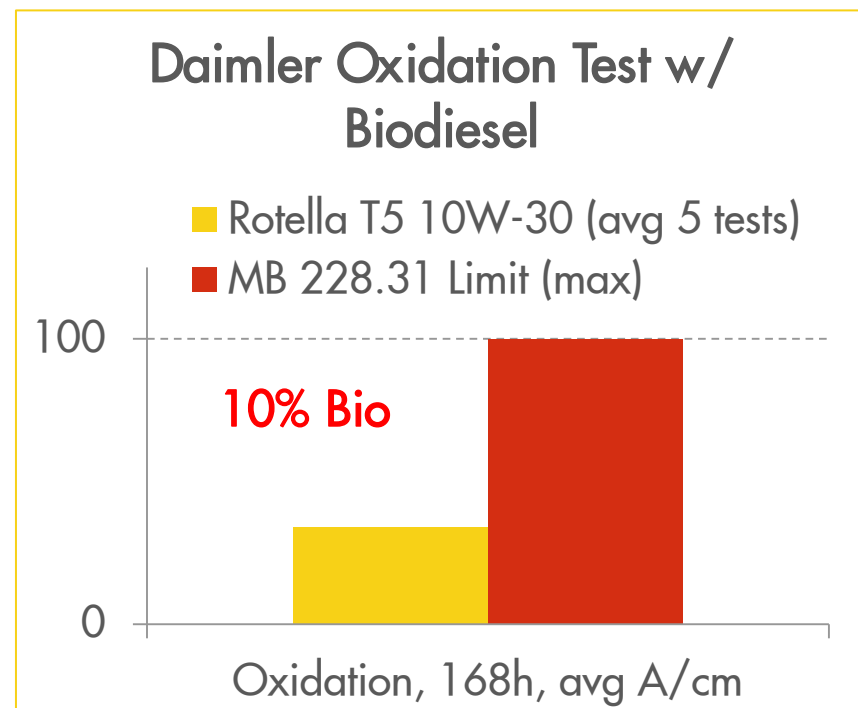
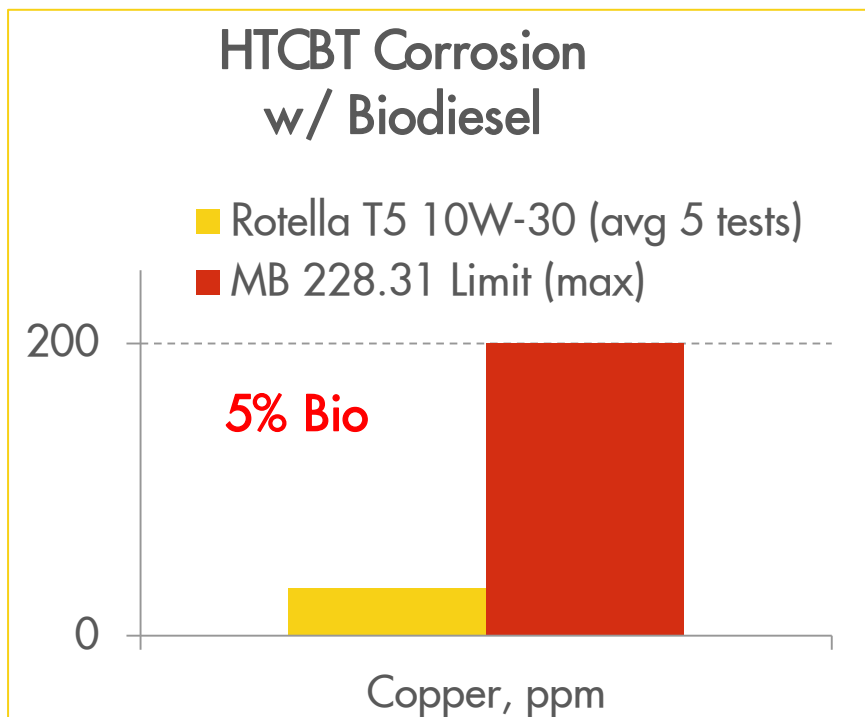
ROTELLA T5 SYNTHETIC BLEND 10W-30

- Rotella T5 10W-30 demonstrates excellent wear protection in the field, and comparable wear protection to Rotella T4 TP 15W-40



ROTELLA T5 SYNTHETIC BLEND 10W-30

- Rotella T5 10W-30 provides excellent corrosion and oxidation protection in the presence of biodiesel



ROTELLA T5 SYNTHETIC BLEND 10W-30

- As seen previously, Shell has a rigorous test program to demonstrate fuel economy improvement for our products
- Rotella T5 10W-30 has been shown to provide a 1.6% fuel economy improvement vs 15W-40 at an independent 3rd party test site



ROTELLA T5 SYNTHETIC BLEND 10W-30

■ Summary:

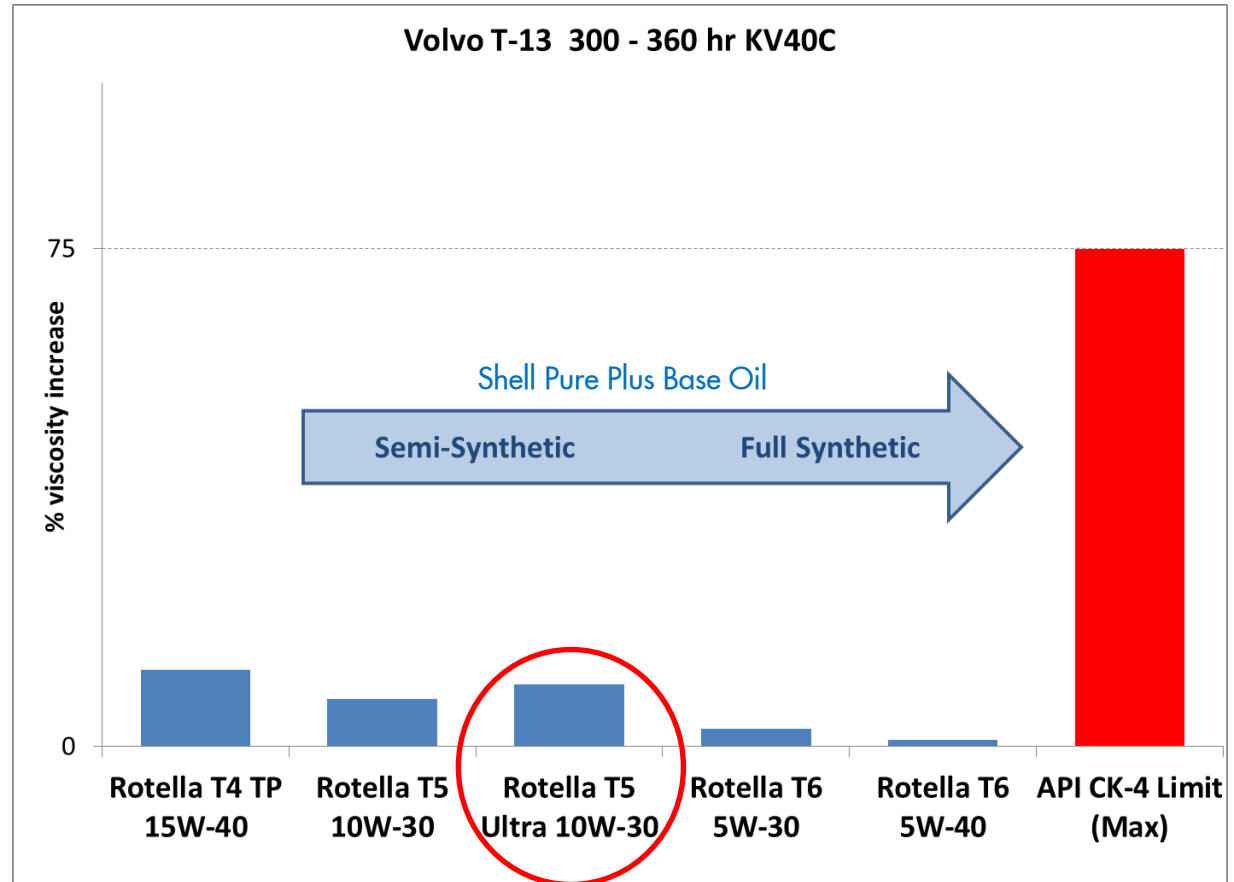
- API CK-4 capable (licensable in December)
- Semi-Synthetic, contains Shell Pure Plus base oil
- Differentiated improvement in oxidation protection vs legacy
- Better oxidation protection contributes to better deposit control at higher temperatures vs legacy
- Demonstrated wear performance through extensive engine testing and field testing
- No compromise in wear protection vs 15W-40
- Biodiesel protection
- Proven fuel economy benefit vs 15W-40

WHAT'S TO COME.....IN DECEMBER

- Synthetic Blend and Full Synthetic products using Shell Pure Plus base oil which meet API CK-4 or FA-4, that share similar DNA with Rotella T4 TP 15W-40 and Rotella T5 10W-30, and provide tangible benefits:
 - Excellent oxidation and deposit control
 - Demonstrated wear protection
 - Biodiesel capability
 - Low temperature flow
 - Improved fuel economy (vs 15W-40)
 - Extreme temperature protection
 - Low volatility

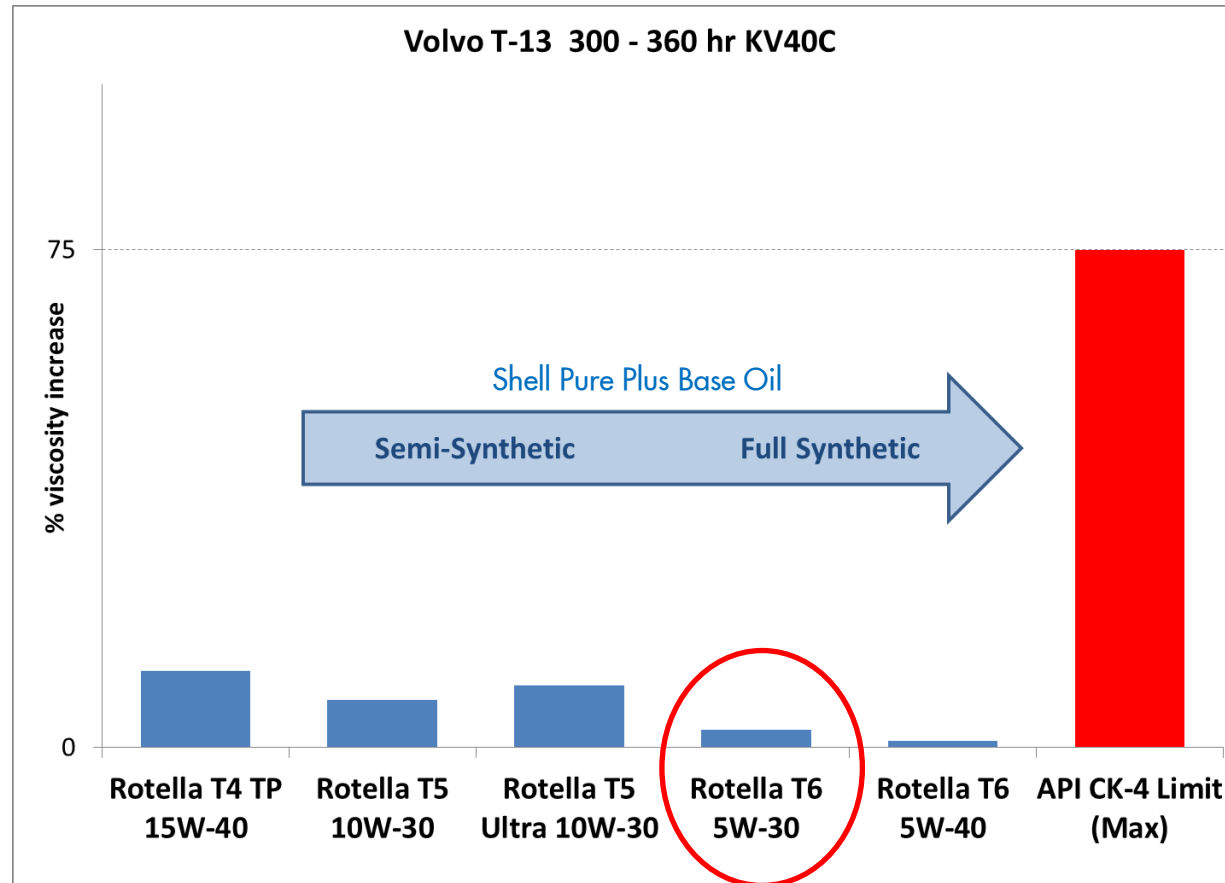
WHAT'S TO COME.....IN DECEMBER

- Rotella T5 Ultra 10W-30 meets API FA-4
- Designed for even better fuel economy
- Wear protection on par with CK-4 products



WHAT'S TO COME.....IN DECEMBER

- Rotella T6 Multi Vehicle 5W-30 meets API CK-4
- Designed for diesel engines requiring API CK-4 and gasoline engines requiring API SN
- Meets top tier European specifications:
 - ACEA E6
 - MB 228.51
- Improved fuel economy vs 15W-40

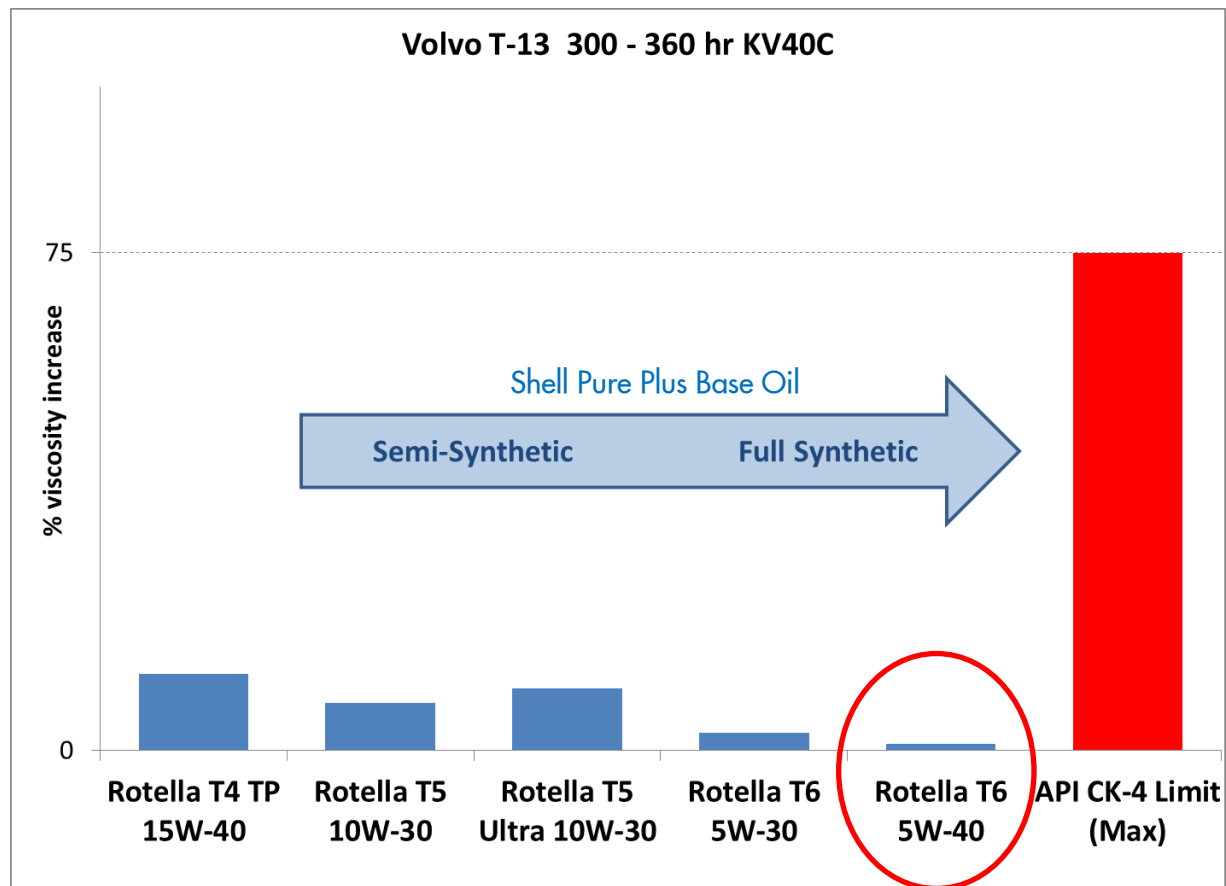


WHAT'S TO COME.....IN DECEMBER

- Rotella T6 5W-40 meets API CK-4
- Improved low temperature flow (compared to conventional 15W-40)
- Protection in extreme conditions



(C) 2015



CONFIDENTIAL

2017 AND BEYOND

- Technology development doesn't end with the launch of these new product
 - Significant effort toward benchmarking CK-4 and FA-4 products in 2017
 - Field testing “proof of performance” will continue in new model year engines
 - For reference, between 2006 – 2014, Shell conducted 36 inspections on CJ-4 commercial products
 - Already testing lower viscosity prototypes beyond API FA-4

2.0

Shell Rotella ELC NF

Nitrite-free, extended life coolant for heavy duty and medium duty engines

The Trends

Radiator and various engine components contain more **aluminum** than in years past

+ Higher operating temperatures

= The need for nitrite-free Extended Life Coolants (ELC) and the push by OEMs to go nitrite free



Shell Rotella ELC NF

NF = nitrite-free

Shell Rotella ELC NF

- Shell Rotella ELC NF is designed for all applications that call for Extended Life Coolants (ELC).
- Required for use in engines that call for nitrite-free coolants. More engine OEMs are requiring nitrite-free ELC. Today is the day to start getting ahead of the trend!
- Can be mixed interchangeably with any ELC, whether nitrite-free or not. (Full benefits are received in its pure form.)
- 600,000 miles of protection with no need for SCA's or ELC extender.
- Compatible with Dexcool and maintains Dexcool drain intervals

2.0

High performance greases for trucking

The Trends

Service intervals (A and B) continue to get longer

Increased focus on fuel efficiency

+ Market understands the benefits of synthetics

= Customers choose synthetic and high performance greases as the final leg in optimizing drive-train performance

- **Shell Gadus S5 V220 2**
 - a synthetic grease ideal for wheel bearings, chassis, and many grease applications
 - completely compatible with the other lithium complex greases used in the market
 - ideal for extended service intervals, for better protection in extreme temperatures (hot and cold), and for customers wanting a full-synthetic driveline.

Two other grease options now available

- Two other greases should be looked at:
Shell Gadus S3 V460XD 2 (moly)
Shell Gadus S3 V220C 2 (red multipurpose)

- **Shell Gadus S3 V460XD 2**
 - a mineral grease designed for fifth wheels, king pins, and other heavily loaded applications
 - contains 5% moly additives (solid additives) for extra load carrying capacity
 - not recommended for wheel bearings
 - recommended for all fifth wheels and king pins, especially customers complaining about pin life.

How much does grease really cost? (1 of 3)

- Grease is a very cost effective way to lubricate bearings, fifth wheels, and other components. These components carry the *entire weight load* of the truck so a high performance grease is well worth the cost.
- How much does it cost to grease a truck? (See next slide.)

How much does grease really cost? (2 of 3)

Cost analysis of grease

Grease service interval:		25,000 miles	
Amount of grease per service:		4 tubes	
Cost per tube - mineral	\$4	Cost per tube – synthetic	\$8.50
		Cost per tube – 5% moly	\$4.50
Total spend per service	\$16	Total spend per service (1 tube of moly grease, 3 tubes of synthetic)	\$30

Fuel cost for 25,000 miles = \$12,500 (\$3.25 per gallon at 6.5 mpg)

A “top shelf” grease PM only costs \$14 more than a regular grease PM.

An operator will spend \$12,500 in fuel over this interval. So it’s not too hard to justify \$14. (For example, with possible extended bearing life, possible improvement in fuel economy, can easily justify the cost.)

How much does grease really cost? (3 of 3)

We encourage you to plug in the numbers that apply to your market, and share with your customers.

Grease is a very cost effective improvement opportunity.

New Grease Resources

- **Shell Gadus Grease Wallet Card:** Quick and convenient card that includes a Shell grease guide and compatibility chart (*Purchase or download from the Toolkit*)
- **Shell Gadus Greases Brochure:** A helpful brochure that includes a Shell grease guide, a handy viscosity conversion chart, and an overview of our top “go to” grease products across Industrial and Transport as well as a dedicated Mining section. (*Purchase or download from the Toolkit*)

Gadus Explainer Videos:
MarketHub – B2B Videos,
bottom of the page

Toolkit Downloads

- ▶ **Why Shell With Distributor Video**
 - ▶ **Why Shell Without Distributor Video**
 - ▶ **Choosing the Right Grease Video**
 - ▶ **Mechanical Stability of Grease Video**
 - ▶ **Electric Motor Grease Video**
 - ▶ **Synthetic Grease for Wheel Bearings Video**
 - ▶ **Shell Turbo S4 Oils Video**
-

Shell resources available to you

Shell business development manager cell phone:

Doug Peterson (Transport BDM) 816-560-0563

Talk to Shell's customer support in Houston:

1-800-BEST-OIL Select option 3, then 1.

"Real live" people with field experience, who like talking shop.

MSDS and Data Sheets available at: www.epc.shell.com

Lubricants Virtual Web Site – "Ask Emma, Ask Ethan"

MarketHub – Sales Tools, Promotion details

