

Graphenoil

16310 Hollister St.

Houston, TX 77066

www.graphenoil.com

Oil Timeline

1866

Continuous Oil Refining Company, now known as Valvoline, starts to develop the first Motor Oils.



1966

Motul introduces into the market the first Semi-Synthetic Motor Oils.

MOTUL



Oil Timeline

continued

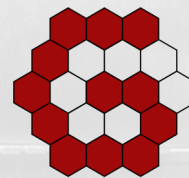
1971

Motul introduces into the market, the first Full-Synthetic Motor Oils.

MOTUL

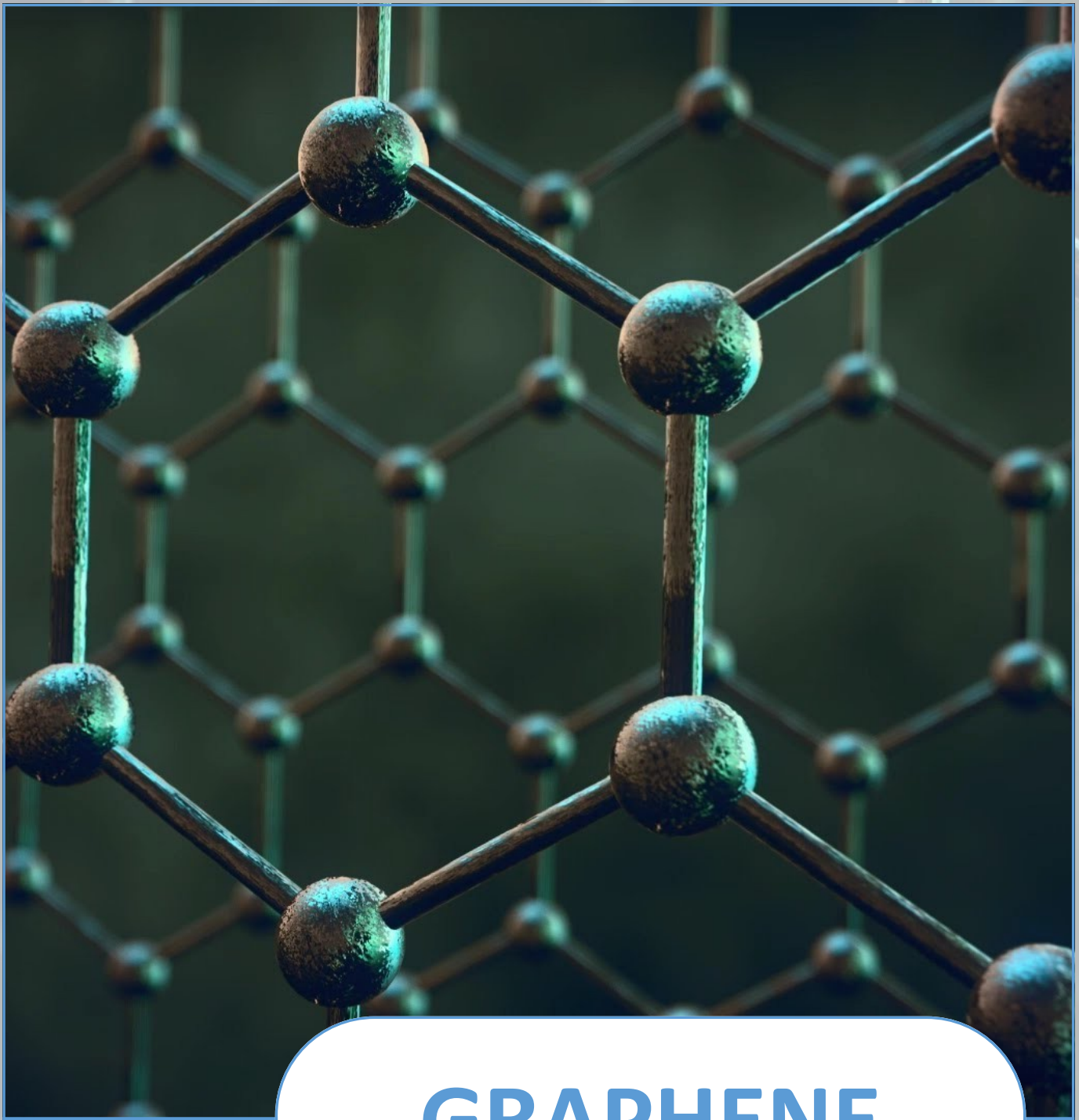
2018

Graphenoil develops Full-Synthetic Graphene Motor Oils.



Graphenoil





GRAPHENE

Single layer of carbon atoms with each atom bound to three neighbors in a honeycomb structure.

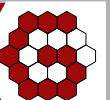
ISO/TS 80004-13:2017 3.1.2.1

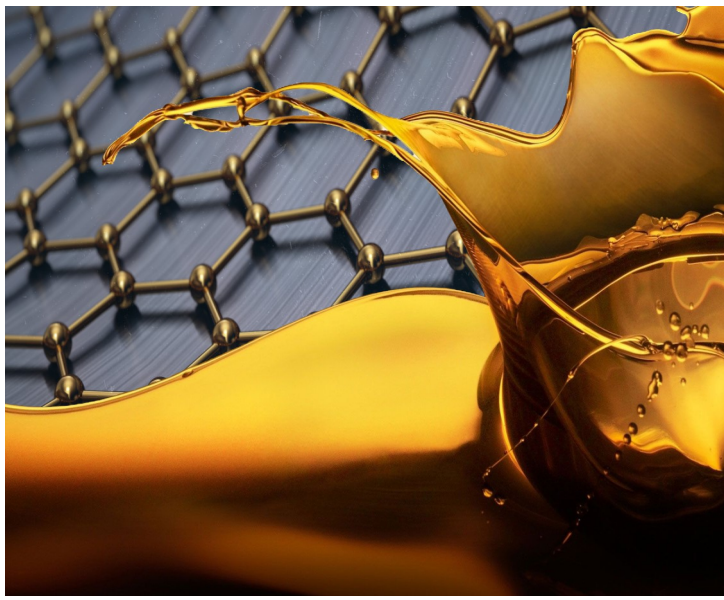


GRAPHENE

Graphene, the “Wonder Material,” makes for a perfect oil ingredient, due to the physical nature and properties it possesses.

- First 2D Material
- Thinnest and Lightest Material
- Strongest Material
- Highest Tensile
- Most Impermeable Material
- Highest Thermal Conductivity
- Best Light Absorbent
- Highest Lubricity

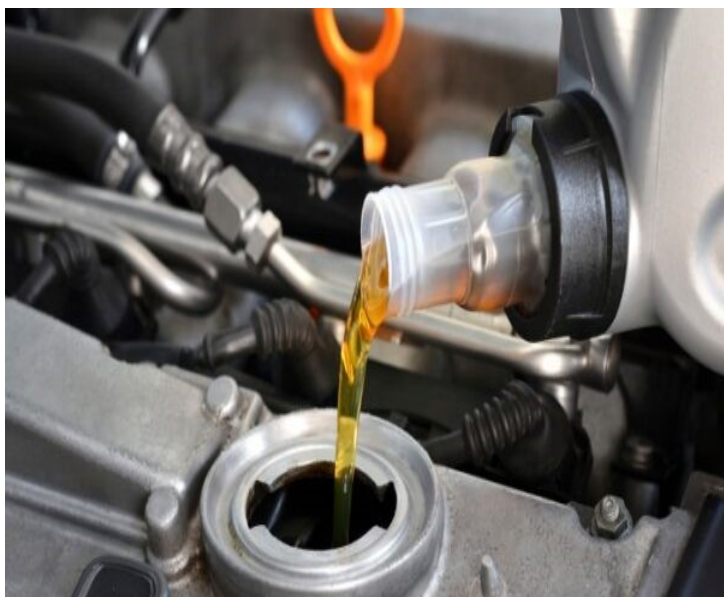




Lubrication Modifiers

Engine Treatment Concentrates

Graphenoil Lubrication Modifier: a Graphene Engine Treatment concentrate. For use in your favorite motor oil brand, or Graphenoil Motor Oils.



Motor Oils

Full Synthetic Graphene Oils

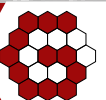
Full Synthetic Motor Oils (without Graphene), designed to be used with Graphenoil Lubrication Modifier for ultimate performance.



Specialty Lubricants

Small Batch and Custom Blends

All Purpose Lubricants along with specialty products, unique oils and applications. R&D is the driving force behind our innovative products.



Lubrication Modifiers

Graphenoil Lubrication Modifier: a Graphene Engine Treatment concentrate. For use in your favorite motor oil brand, or Graphenoil Motor Oils.

- Full Synthetic
- ASTM Tested
- Graphene Formulation



Motor Oils

Full Synthetic Motor Oils (without Graphene), designed to be used with Graphenoil Lubrication Modifier for ultimate performance.

- API Pending
- ASTM Tested
- Full Synthetic



Specialty Lubricants

All Purpose Lubricants along with specialty products, unique oils and applications. R&D is the driving force behind our innovative products.

- All Purpose Lubricants
- Hydraulic Oils and Other Specialty Products
- Greases and Automotive Lubricants



OUR PRODUCTS

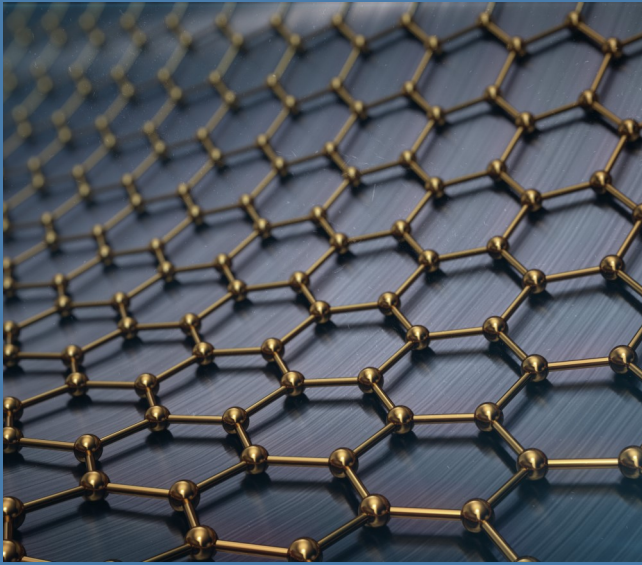
MODIFIERS, OILS, AND LUBRICANTS

- *Lubrication Modifiers*
- *Motor Oils*
 - *5W-20*
 - *5W-30*
 - *10W-30*
 - *15W-40*
 - *20W-50*
- *Specialty Lubricants*
 - *All Purpose Lubricant*
 - *Valve Oil*
 - *Automatic Transmission Treatment*
 - *Gearbox Treatment*
 - *Engine Flush*
 - *Power Steering Treatment*
 - *GraphenGrease™ (in development)*
 - *Hydraulic Fluids (in development)*



THE TECH

GRAPHENE + MOLECULAR STRUCTURE



GRAPHENE

The properties and makeup of Graphene allows Graphenoil to reduce friction which increases engine performance. Graphene also increases the flash point of the oil, an indication of how easy a chemical burns. Due to the higher flashpoint, Graphenoil is less flammable and hazardous than convention oils.

Only the best materials are selected for use in Graphenoil. Our oils and lubricants use the highest purity including Full Synthetic ingredients. This is a value added benefit, that is unavailable in convention motor oils and lubricants.

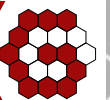


FULL SYNTHETIC

- Better performance & lubrication at temp. extremes.
- Higher viscosity index (VI). Creating a more stable oil.
- Better chemical and shear stability which increases VI.
- Less evaporation and loss.
- Higher resistance to oxidation, breakdown, & oil sludge.
- Extended oil change intervals.
- Extended engine life.
- Protection from ash and other breakdown composites.
- More horsepower due to less friction and drag.
- Improved fuel economy.
- 47% higher performance than convention oil.

(Source: AAA)

Graphenoil



THE TECH

TBN + ASTM



TBN BOOSTER

Graphenoil Lubrication Modifiers also includes a TBN (Total Base Number) Booster. Total Base Number measures the amount of Potassium Hydroxide (KOH) contained in the oil sample. A higher TBN results in an increased operating period before the oil needs replacement.

ASTM D2896 is a standard testing method, which measures TBN. Graphenoil Lubrication Modifier (Engine Treatment Concentrate) starts at a TBN of 24.5 mg KOH/g whereas typical motor oils start between a TBN of 7-10 mg KOH/g.

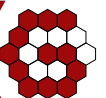


ASTM TESTED

Lab tested for quality, clarification, classification, and comparability. Our oils, lubricants, and treatments have undergone many ASTM lab tests including: D7688, D2896, D4172, and more. Results and more information upon request.

Graphenoil Lubrication Modifier will increase the TBN in your favorite oil, as seen in ASTM D2896. Untreated, Mobil-1 5W-20 Motor Oil starts at a TBN of 8.1 mg KOH/g. When treated with Graphenoil Lubrication modifier (24.5 mg KOH/g), Mobil-1 5W-20 increased to a TBN of 11.7 mg KOH/g, a staggering 44.4% increase.

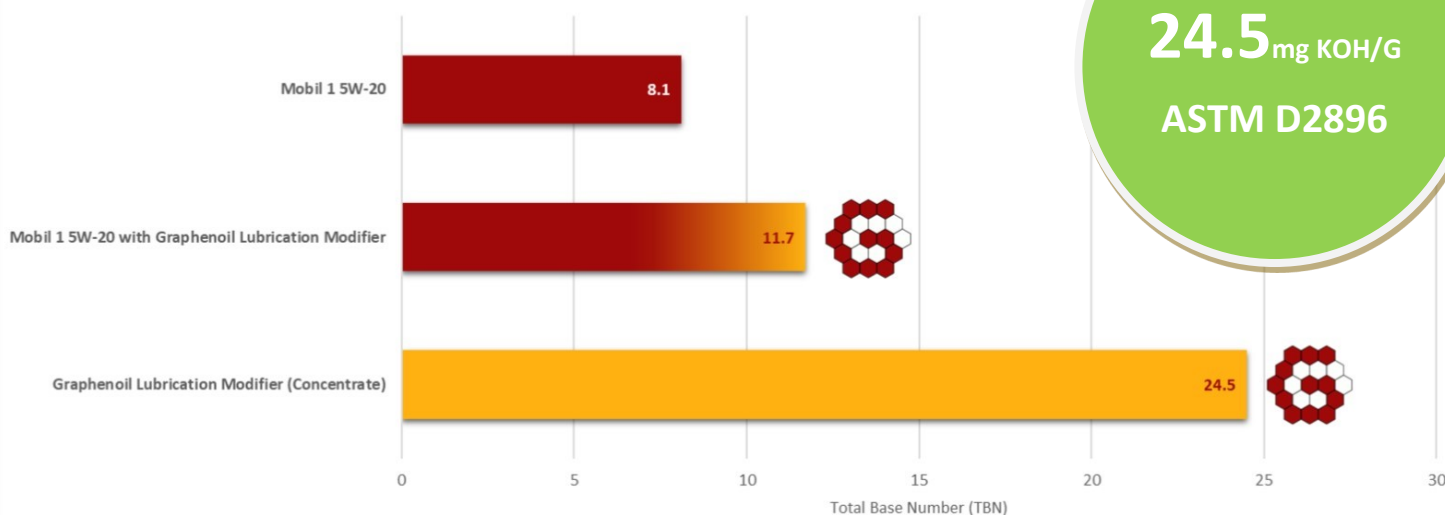
Graphenoil



THE TESTS

ASTM TEST RESULTS

ASTM D2896 | Total Base Number



24.5 mg KOH/G
ASTM D2896

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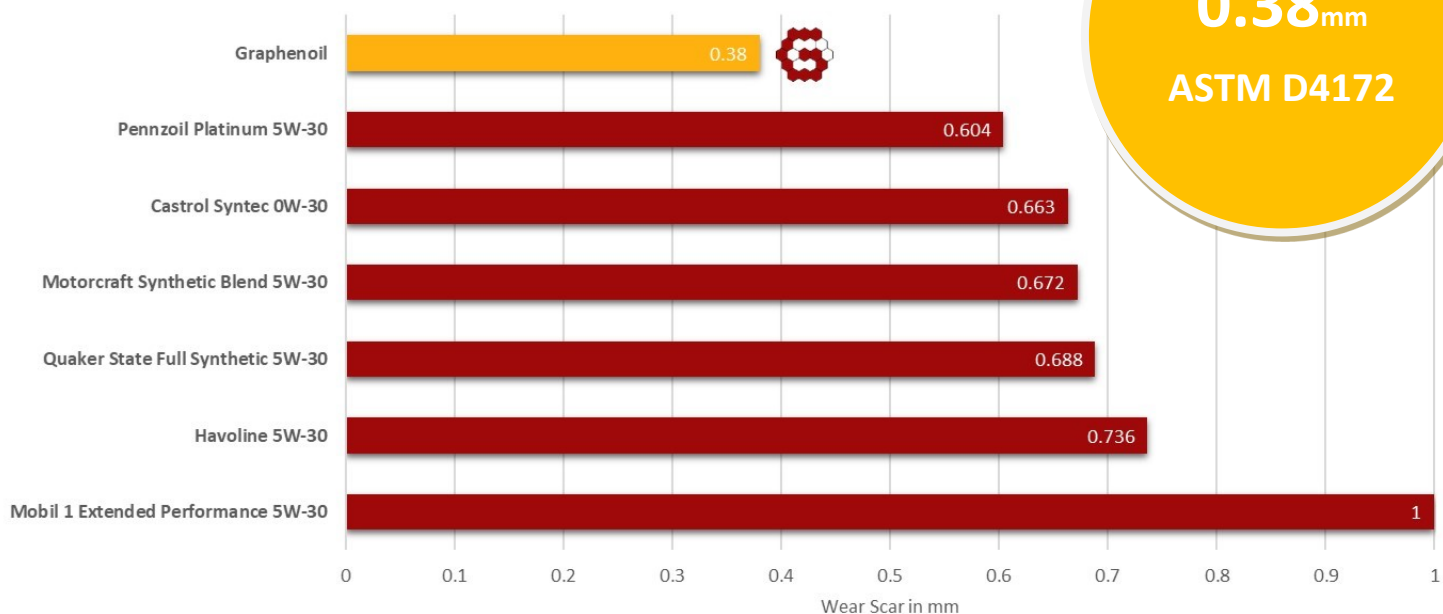
Graphenoil



THE TESTS

ASTM TEST RESULTS

ASTM D-4172 | Four-Ball Wear Test



0.38_{mm}

ASTM D4172

Wear scar properties and coefficient of friction of a lubricating grease can also be determined using the 4 Ball Wear configuration. The purpose of this test is to determine the wear preventive characteristics of a lubricant.

The better the lubricant is at preventing wear, the smaller the wear scar will be on the three stationary balls. Graphenoil has a .38mm wear scar. Traditional oils are around .5-.6mm.

The coefficient of thermal expansion (CTE) is a material property that is indicative of the extent to which a material expands upon heating.

Knowledge of the coefficient of thermal expansion of a liquid is essential to compute the required size of a container to accommodate a volume of liquid over the full temperature range to which it will be subjected. It is also used to compute the volume of void space that would exist in an inelastic device filled with the liquid after the liquid has cooled to a lower temperature.

Graphenoil has a linear thermal expansion opposed to irregular, therefore making your oil volume more stable.

4.95⁰⁴ °C⁻¹

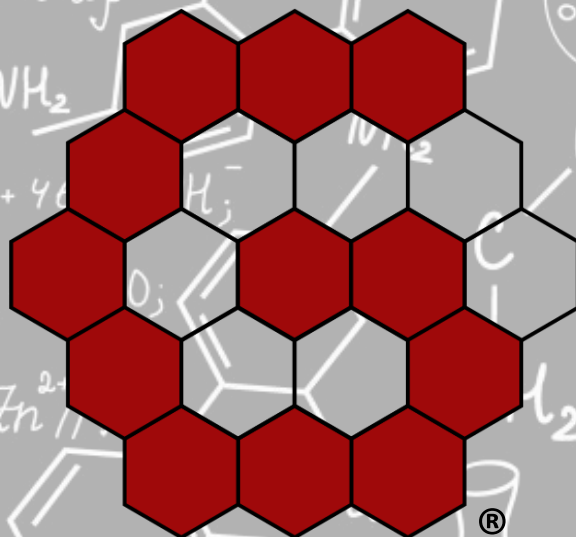
ASTM D1903

Graphenoil



CONTACT US

FOLLOW US ONLINE



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www.graphenoil.com

Graphenoil



Savant Laboratory Report

Four Ball Wear ASTM D4172 Procedure B

Sample ID:	19021047
Savant ID:	S20190220-009
Machine:	4 Ball Wear #215-8-86

TEST PARAMETERS

Speed (rpm):	1200 (+/- 60)	Ball Material:	AISI-E52100
Temperature (°C):	75 (+/- 1.7)	Hardness (HRc):	64-66
Load (kgf):	40 (+/- 0.2)	Grade:	25EP
Duration (min):	60 (+/- 1.0)	ANSI Spec B:	3.12

SCAR MEASUREMENTS (mm)

AXIS	BALL 1	BALL 2	BALL 3	AVERAGE SCAR
X	0.475	0.478	0.475	
Y	0.424	0.444	0.417	0.452

INTERPRETATION

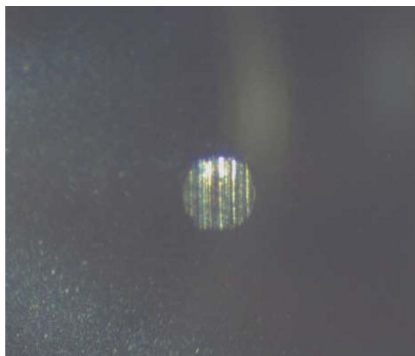
Average Scar Diameter, mm

The average size of the scar diameters worn on the three lower clamped balls, used for comparison of lubricants.

Ball 1



Ball 2



Ball 3



Zoom: 4X

Savant Laboratory Report

Four Ball Wear ASTM D4172 Procedure B

Sample ID:	19021048
Savant ID:	S20190220-010
Machine:	4 Ball Wear #215-8-86

TEST PARAMETERS

Speed (rpm):	1200 (+/- 60)	Ball Material:	AISI-E52100
Temperature (°C):	75 (+/- 1.7)	Hardness (HRc):	64-66
Load (kgf):	40 (+/- 0.2)	Grade:	25EP
Duration (min):	60 (+/- 1.0)	ANSI Spec B:	3.12

SCAR MEASUREMENTS (mm)

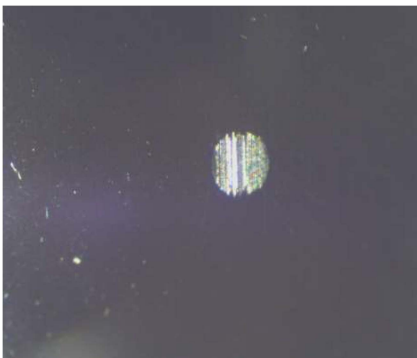
AXIS	BALL 1	BALL 2	BALL 3	AVERAGE SCAR
X	0.383	0.383	0.376	0.380
Y	0.387	0.373	0.376	

INTERPRETATION

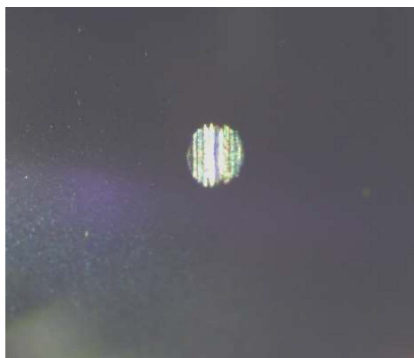
Average Scar Diameter, mm

The average size of the scar diameters worn on the three lower clamped balls, used for comparison of lubricants.

Ball 1



Ball 2



Ball 3



Zoom: 4X

Savant Laboratory Report

Four Ball Wear ASTM D4172 Procedure B

Sample ID:	19021049
Savant ID:	S20190220-011
Machine:	4 Ball Wear #215-8-86

TEST PARAMETERS

Speed (rpm):	1200 (+/- 60)	Ball Material:	AISI-E52100
Temperature (°C):	75 (+/- 1.7)	Hardness (HRc):	64-66
Load (kgf):	40 (+/- 0.2)	Grade:	25EP
Duration (min):	60 (+/- 1.0)	ANSI Spec B:	3.12

SCAR MEASUREMENTS (mm)

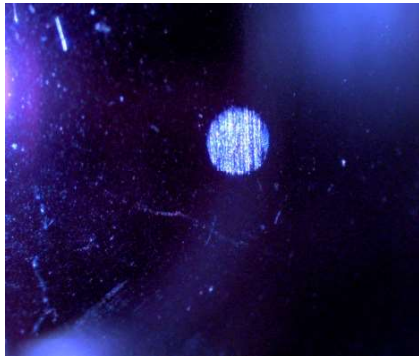
AXIS	BALL 1	BALL 2	BALL 3	AVERAGE SCAR
X	0.408	0.414	0.408	0.408
Y	0.405	0.408	0.403	

INTERPRETATION

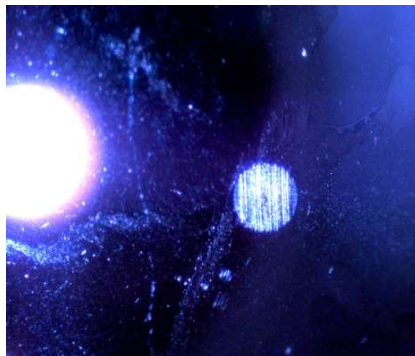
Average Scar Diameter, mm

The average size of the scar diameters worn on the three lower clamped balls, used for comparison of lubricants.

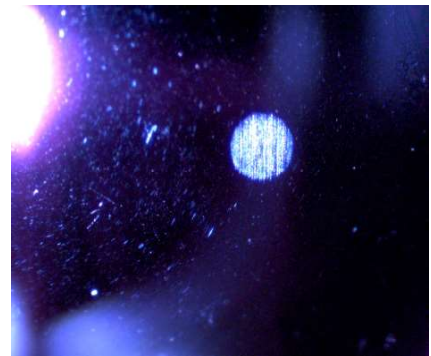
Ball 1



Ball 2



Ball 3



Zoom: 4X

Comments and Observations

Tina Dasbach Ph.D.

Tina Dasbach, Ph.D.
Operations Manager



305 Nebraska
South Houston, TX 77587
713-944-8381

Customer Information
1724001
Tracey D Marquet
16310 Hollister St.
Houston TX 77066
Attn: Tracey Marquet

SAMPLE INFORMATION
Point ID 0028
Site Houston TX
Area Houston TX
Equipment 15% Graphenoil
Description 15% Graphenoil Full Synthetic 5W-30
Fluid Full Synthetic 5W-30 Engine Oil
Gallons In Use Cust.

EQUIPMENT INFORMATION
Cooling Source
Filter Size
Last Filter Change
Last Fluid Change
Bearing Types
Gear Types

Other

Sample Condition Evaluation		
EQUIPMENT	FLUID	OVERALL
NORMAL	NORMAL	NORMAL

Lab Comments for Most Recent Sample :

Four Ball Wear
ASTM D4172 Procedure B
Average Scar = 0.407

With 4 ball wear, lubricants are compared to one another based on the diameter of the wear scar created during the test. If the wear scar is smaller for one lubricant it is interpreted as having better anti-wear properties. There does appear to be a difference between the two lubricants, and the lubricant with additive performed better in the testing.

Sample Information		Wear Metals, ppm										Additive Metals, ppm					Contaminant Metals, ppm						
Sample No.	Sample Date	Hrs/Miles	Iron	Cop	Tin	Lead	Chrm	Nick	Alum	Titan	Silv	Calc	Mag	Znc	Phos	Bari	Molyb	Antm	Silic	Sodi	Boron	Pot	Vana
18120993	12-13-2018		0	0	0	0	0	0	0	0	0	1807	10	529	912	0	0	0	5	0	106	0	0
			50	25	20	25	15	10	15	10	10	-	-	-	-	-	-	-	50	150	400	25	10
			100	50	40	50	30	20	30	20	20	-	-	-	-	-	-	-	75	150	500	50	20
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Physical and Other Tests

Sample Information		Wear Metals, ppm										Additive Metals, ppm					Contaminant Metals, ppm											
Sample No.	Sample Date	Hrs/Miles	v40c	v100c	Flash	Base #	VI	Iron	Cop	Tin	Lead	Chrm	Nick	Alum	Titan	Silv	Calc	Mag	Znc	Phos	Bari	Molyb	Antm	Silic	Sodi	Boron	Pot	Vana
18120993	12-13-2018		75.1	12.2	400	9.4	160	0	0	0	0	0	0	0	0	0	1807	10	529	912	0	0	0	5	0	106	0	0
			-	9.3 - 12.5	375	4	-	50	25	20	25	15	10	15	10	10	-	-	-	-	-	-	-	50	150	400	25	10
			-	8.4 - 13.8	350	3	-	100	50	40	50	30	20	30	20	20	-	-	-	-	-	-	-	75	150	500	50	20
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Laboratory Comments

Four Ball Wear ASTM D4172 Procedure B Average Scar = 0.407 With 4 ball wear, lubricants are compared to one another based on the diameter of the wear scar created during the test. If the wear scar is smaller for one lubricant it is interpreted as having better anti-wear properties. There does appear to be a difference between the two lubricants, and the lubricant with additive performed better in the testing.

Sample No.	Sample Date
18120993	12-13-2018

Houston Technical Center
 141 North Pasadena Blvd
 Pasadena, Texas 77506 United States of America
 T: 713-477-8552
 F: 713-477-4726



INSPECTORATE

Certificate of Analysis

Vessel / Shore Tank: Submitted Samples from Innovative Aspects **Sample Submitted By:** Innovative Aspects LLC
Product: Motor Oil **Analysis Performed By:** Houston Technical Center
Client Reference: **Date Sampled:**
Terminal / Port / Office: **Date Received:**
Job ID: USPAS-18-01004 **Date Reported:** 12-Jul-2018
Submission ID: HTC-1801040
Comments :

Submitted Lubrication Modifier with Graphenoil 25% with Mobile-1 75% Submitted		
HTC-1801040-01-003		Submitted
Method	Test	Results
ASTM D7688	Lubricity, Major Axis , μm	218
	Lubricity, Minor Axis , μm	117
	Lubricity, Wear Scar Diameter , μm	168
	Wear Scar Area Description	None
	Test Temperature , $^{\circ}\text{C}$	60
	Film Thickness , %	99
	Friction Coefficient	0.096
ASTM D2896 Proc. B	Base Number , mg KOH/g	11.7

For Inspectorate *Armando Cardenas*
 Armando Cardenas, Laboratory Director

Houston Technical Center
 141 North Pasadena Blvd
 Pasadena, Texas 77506 United States of America
 T: 713-477-8552
 F: 713-477-4726



INSPECTORATE

Certificate of Analysis

Vessel / Shore Tank:	Submitted Samples from Innovative Aspects	Sample Submitted By:	Innovative Aspects LLC
Product:	Motor Oil	Analysis Performed By:	Houston Technical Center
Client Reference:		Date Sampled:	15-Feb-2018
Terminal / Port / Office:		Date Received:	15-Feb-2018
Job ID:	USPAS-18-01004	Date Reported:	12-Jul-2018
Submission ID:	HTC-1801040		
Comments :			

Submitted Lubrication Modifier with Graphenoil Submitted		
HTC-1801040-01-004		Submitted
Method	Test	Results
ASTM D7688	Lubricity, Major Axis , μm	492
	Lubricity, Minor Axis , μm	450
	Lubricity, Wear Scar Diameter , μm	471
	Wear Scar Area Description	None
	Test Temperature , $^{\circ}\text{C}$	60
ASTM D2896 Proc. B	Base Number , mg KOH/g	24.5

For Inspectorate *Armando Cardenas*
 Armando Cardenas, Laboratory Director



Quality testing since 1968

Alcor Petrolab
an SPL company

CERTIFICATE OF ANALYSIS

IA Coatings
16310 Hollister St.
Houston, TX 77066
Attn: Tracey Marquart Jr.

Report Date: 9/6/2019
Laboratory Number: A190906018
Sample Type: Oil
Sample ID: Graphenoil Lubrication Modifier

<u>Tests Requested</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Specific Gravity			ASTM D4052
at 20°C	0.8435		
at 30°C	0.8393		
Coefficient of Thermal Expansion	4.95E-04	°C ⁻¹	ASTM D1903

Report Prepared by,

Richard Leviner Jr., Lab Supervisor

Reviewed and Approved by,

Stuart Ramsdale, Lab Manager



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Alcor Petrolab
an SPL company

CERTIFICATE OF ANALYSIS

IA Coatings
16310 Hollister St.
Houston, TX 77066
Attn: Tracey Marquart Jr.

Report Date: 9/6/2019
Laboratory Number: A190906019
Sample Type: Oil
Sample ID: Sunoco 5W30 Syn

<u>Tests Requested</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Specific Gravity			ASTM D4052
at 20°C	0.8559		
at 30°C	0.8518		
Coefficient of Thermal Expansion	4.79E-04	°C ⁻¹	ASTM D1903

Report Prepared by,

Richard Leviner Jr., Lab Supervisor

Reviewed and Approved by,

Stuart Ramsdale, Lab Manager



Quality testing since 1968

Alcor Petrolab
an SPL company

CERTIFICATE OF ANALYSIS

IA Coatings
16310 Hollister St.
Houston, TX 77066
Attn: Tracey Marquart Jr.

Report Date: 9/6/2019
Laboratory Number: A190906020
Sample Type: Oil
Sample ID: 85% Graphenoil anad 15%
Sunoco Mix

<u>Tests Requested</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Specific Gravity			ASTM D4052
at 20°C	0.8451		
at 30°C	0.8411		
Coefficient of Thermal Expansion	4.64E-04	°C ⁻¹	ASTM D1903

Report Prepared by,

Richard Leviner Jr., Lab Supervisor

Reviewed and Approved by,

Stuart Ramsdale, Lab Manager



Quality testing since 1968

Alcor Petrolab
an SPL company

CERTIFICATE OF ANALYSIS

IA Coatings
16310 Hollister St.
Houston, TX 77066
Attn: Tracey Marquart Jr.

Report Date: 9/6/2019
Laboratory Number: A190906033
Sample Type: Oil
Sample ID: 85% Sunoco and 15%
Graphenoil Mix

<u>Tests Requested</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Specific Gravity			ASTM D4052
at 20°C	0.8546		
at 30°C	0.8503		
Coefficient of Thermal Expansion	5.00E-04	°C ⁻¹	ASTM D1903

Report Prepared by,

Jaelyn Bazaldua, Lab Technician

Reviewed and Approved by,

Richard Leviner Jr., Lab Supervisor