

MADENİ YAĞ DÜNYASI LUBRICANT WORLD

International Edition

www.lubricant-world.com

ISSUE: 39

SEP-OCT 2022

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SN 2548-074X

**EXPERIENCE, EXPERTISE AND
SUPERIOR QUALITY IN AVIATION OILS:**

ExxonMobil

PANORAMA WORLDWIDE

NYCO strengthens aviation market presence with new partnerships

PRODUCT REVIEW

Certified turbodiesel engine oil for the Turkish defence industry

COLUMN

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Editorial



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We will meet the representatives of the aviation, space, and defence industries at the Istanbul Airshow, SAHA Expo, Asia Connect: MRO, and Eurasia Airshow with comprehensive content that will draw the interest of the industry.

The aviation, space, and defence industries are undergoing a period of dramatic dynamism, with many exciting developments in R&D and innovation. Türkiye has been following these developments closely by making huge investments in aviation industry as well as promoting domestic production.

We hear echoes of this dynamism in the lubricant industry; every day we encounter new products developed for cutting-edge aircraft technologies, formulas with enhanced performance, and innovative solutions to meet the demands of the sector.

Drawing attention with its diversified product range and rising consumption trend within the lubricant industry, aviation lubricants deserve a special focus as an element of cooperation and competition among leading companies in the sector. As Lubricant World, we have decided to publish an aviation-themed issue and take an in-depth look at aviation lubricants along with the media partnerships with important consecutive aviation events.

The oil demand of Türkiye's first indigenous and national turbodiesel aviation engine TEI-PD170, which is used in ANKA and AKSUNGUR UAV platforms, is satisfied by Koçak Group. In light of the insights, we acquired from TEI and Koçak Group officials, we draw attention to Türkiye's first domestic and national

turbodiesel engine oil, Speedol Aero Ultra Diesel S170. The product is a great example of the impact of domestic and national technologies on the motivation for value-added production.

This issue also features an interview with Mr. Gence Yavaş, Aviation Lubes Area Manager at ExxonMobil, the company that has been in the sky since aviation pioneers the Wright Brothers. The interview includes the company's insightful journey and inspiring history in Türkiye, its experience in the field of aviation and its future goals.

In our article section, Dr. Jinxia Li, Senior Development Engineer at NYNAS tells us about the latest academic findings regarding the use of tribology to optimize grease formulation. In this issue we also share important news regarding the sector, and the event agenda.

As Lubricant World, we will continue to closely follow the sector in Türkiye and worldwide, provide content that enhances the professional and technical knowledge of our stakeholders, and maintain the sectoral memory with our website, social media accounts and presence on digital platforms.

Fatih Çavuşoğlu
Editor

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Type of Publication

Periodical
Published Bimontly



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Sustainable lubricants and recycled base oil





Azelis finalizes the acquisition of Ak-taş

Oil additives business line of Ak-taş will continue its activities within Azelis TR maintaining its staff and current product portfolio as of October 4, 2022.

Azelis, a leading global innovation service provider in the specialty chemicals and food ingredients industry, reinforces its industrial chemicals footprint in EMEA by acquiring the specialty lubricant distribution assets of Ak-taş.

The acquisition, which covers the oil additive business of Ak-taş and base oil distribution business of its subsidiary WhiteChem, further strengthens Azelis' lateral value chain (LVC) in the L&MWF (Lubricant & Metal Working Fluids) market segment, following the acquisition of Umongo in South Africa earlier this year. Oil additives business line of Ak-taş will continue its activities within Azelis TR maintaining its staff and current product portfolio as of October 4, 2022.

Azelis EMEA CEO and President Anna Bertona noted that with this acquisition, they took an important step to develop the L&MWF market in EMEA. Underlining that as a company, they have a clear strategy to further grow their presence in this segment, Bertona said, "With this acquisition we have all key building blocks at our disposal."

Chairman of Ak-taş Muharrem Aktaş concluded that they opened a new and safe road for the additive and base oil distribution business. "We are confident that with Azelis we have found the right partner to continue growing the business based on these key ingredients for success," said Aktaş in his statement.



NYCO strengthens aviation market presence with new partnerships

NYCO is a French company, expert in the development and manufacture of high-performance lubricants and synthetic ester bases for Aeronautics, Defence and Industry.

A key partner for Armed Forces, Airlines, OEMs, MROs and Aero derivative Gas Turbines users around the world, NYCO offers a comprehensive products range approved against the most demanding civil and military specifications. The international network of subsidiaries, distributors and agents has enabled NYCO to expand its presence in more than 100 countries around the world with more than 80% of the revenues generated through exports.

As a result of many years of engineering work and R&D, NYCO has announced three important collaborations in the last month. First of all, NYCO's range of aerospace lubricants has been qualified by Brazilian aerospace manufacturer Embraer and has been approved for use on the following commercial platforms: E-Jets, E-Jets E2 and ERJ145.

NYCO has also been selected by Airbus to provide multiple lubricants including, but not only, turbine

oils and greases, from its large Aeronautics & Defence product range. NYCO products are now available to all Airbus worldwide sites (Airbus Commercial, Airbus Helicopters and Airbus Defence and Space) to support Airbus needs.

Finally, NYCO renewed its partnership agreement with easyJet for the supply of TURBONYCOIL® 600 turbine oil. EasyJet, which is currently flying with NYCO's engine oil on more than 300 aircraft, will continue to use TURBONYCOIL® 600 in its CFM56-5B and LEAP-1A engines.

All these achievements prove once again that NYCO products are accepted all over the world in terms of technical performance and reliability. NYCO is committed to keep supporting its partners with the innovative solutions based on a very ambitious sustainable road map.



Great interest of lubricant sector for trade shows in Germany

The industry exhibitions held in Germany in August and September received enormous interest from the participants and broke visitor records as if to compensate for the pandemic restrictions.

The trade shows enabled companies to establish new connections and paved the way for new business ventures focusing on technology transfer and innovation. As Lubricant World, we had the chance to exhibit our magazines and contact new subscribers by participating in the events as a media partner.

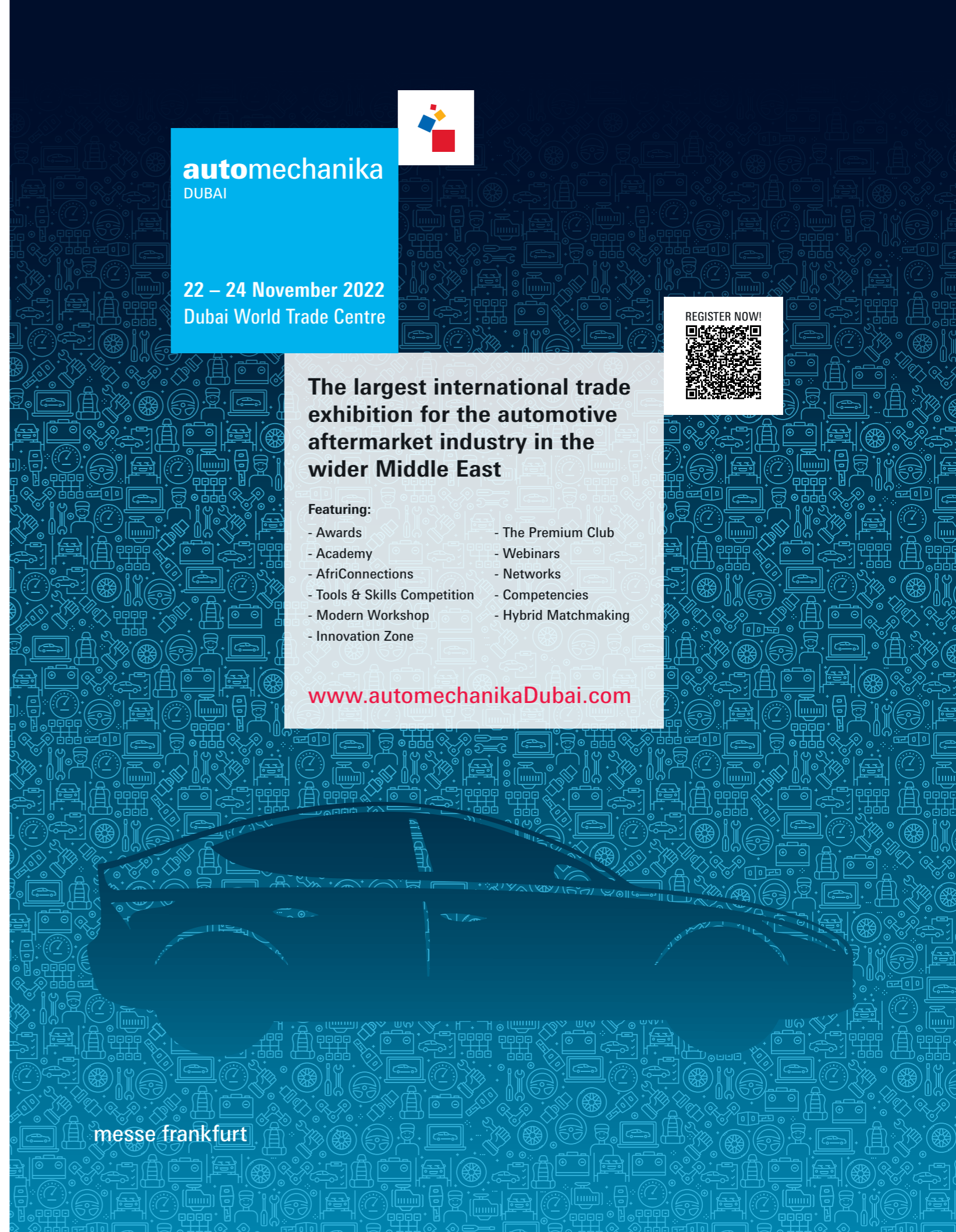
Held on August 30-31 in Stuttgart, UNITI Mineral Oil Technology Congress was highly appreciated for its academically comprehensive program. Industry leaders and experts had inspirational discussions in the sessions that covered key topics of the lubricant industry.

Held on September 6-8 in Essen, Lubricant Expo threw together producers and consumers in the lubricant industry, as well as the representatives of the chemical and machinery industries. Over 100 exhibitors and more than 2000 buyers, engineers

and executives attended the exhibition. The hands-on activities in the exhibition area were very fruitful for the participants.

Automechanika Frankfurt was the most enthusiastic of the events held in Germany. Automechanika Frankfurt, the largest exhibition in the automotive industry with a deep-rooted history dating back to the 1970s, made an impressive and thrilling return to the industry after the pandemic restrictions and was flooded with visitors.

During the exhibition, 2804 companies from 70 countries showcased their products and services across 19 hall levels and the outdoor exhibition area. Visited by 78 thousand people from 175 countries, the exhibition was praised by the participants with a 92% satisfaction rate. The exhibition, which drew great interest with its workshops, hands-on activities, and chat programs, also set a record in terms of establishing new business contacts.



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13th edition of Istanbul Airshow

Istanbul Airshow opened up the unique opportunity to reach the Eurasian aviation and airport markets at its 13th edition.

Istanbul Airshow, which has been held at Istanbul Ataturk Airport since 1996, opened its doors for the 13th time between October 6-8, 2022. The event combined International Civil Aviation & Airports Exhibition and Aviation Industry Supply Chain Platform, which brought together aviation professionals from all over the world.

Turkey sets a perfect benchmark for the aviation and airport markets and thus, plays an important pioneering role for the both industries in Eurasia and the Middle East. Inspired by this essential role assumed by Turkey, AIREX and now Istanbul Airshow has been designed with a view to establish a business platform uniquely concentrated in the civil aspects of the aviation industry, primarily; to serve, contribute to and meet the challenges offered by the Eurasian and the Middle Eastern markets.

Participants had an opportunity to witness the very first flight of jet trainer & light attack aircraft HÜRJET

and heavy attack & reconnaissance helicopter ATAK II, developed by Turkish Aerospace Industries.

Besides the airshows the event was a great display area for aircrafts and business jets. A wide participation from Airbus has been made, which presented innovative aviation solutions along with the display of the Airbus A220 aircraft and ACH130 helicopter. The agreement between the first low-cost airline of Oman SalamAir and Brazilian Embraer has been reached for 6 definite and 6 optional orders of Profit Hunter E195-E2 aircraft, which was also displayed at the show.

As Lubricants World magazine, we also participated in this traditional meeting of the aviation industry, where lubricant consumption is quite intense. We had a pleasure of introducing our magazine to the industry professionals and reaching out to new subscribers.

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Using tribology to optimise grease formulation

Dr. Jinxia Li
Senior Development Engineer, Technical Development and Market Support
Nynas Naphthenics

Studies conducted at Nynas' specialist grease lab and Optimol Instruments in Germany show how tribological tests can be used to optimise the formulation of lithium and lithium complex greases, providing more cost-effective lubrication products.

"We wanted to investigate how the formulation of lithium and lithium complex greases can be optimised using tribological tests, and also to study the influence of different naphthenic oils and additives", says Nynas Senior Development Engineer Dr. Jinxia Li.

The results suggest that by running various tribological tests the formulation of grease can be optimised further, resulting in more cost-efficient solutions. However, the results also reveal how important it is to carefully select relevant test methods when simulating conditions of applications in the field. Jinxia Li and her colleagues discovered that different test methods can provide different data, which may lead formulators to draw the wrong conclusions.

A step-by-step investigation was devised to study the behaviour of lubricating grease in different

tribological contacts. An intensely discussed topic for many decades, it is also known that a vast number of material related parameters have significant impact on the tribological behaviour of grease. The type and amount of thickener, the type and viscosity of the oil, and the type and concentration of additives are also directly related to the cost of the formulation.

Lithium and lithium complex thickeners were chosen for the study as more than 75 percent of the global grease production is based on these two thickener systems. Three naphthenic base oils of different viscosities (150, 375 and 600 mm²/s) were used in the experiments as well as two additive packages, both consisting of antioxidant, anti-wear, and extreme pressure components, one of them with an extra dose of extreme pressure additive.

Properties	Grease A	Grease B	Grease C	Grease D	Grease E	Grease F
Base Oil (naphthenic)	Nynas® BT 150	Nynas® T 400	Nynas® T 600	Nynas® BT 150	Nynas® T 400	Nynas® T 600
Thickener Type	Li	Li	Li	Li X	Li X	Li X
Thickener Content [wt. %]	7,45	5,02	4,57	10,55	9,70	8,55
Dropping Point [°C]	197	200	198	> 280	> 280	> 280
Penetration after 60 str. [mm-1]	258	274	276	265	281	269
Diff after 105 strokes [mm-1]	+42	+26	+30	+40	+41	+50
Cu-Corrosion [değer]	1b	1b	1b	1b	1b	1b
Flow Pressure@-20[mbar]	320	370	645	345	320	720

Table 1. Some of the characteristics of the neat greases used in the study.

Sample No.	Specifications	Wear scar (mm) ASTM D 2266	Weld load (kg f) ASTM D 2596
1	Grease A	1.58	160
2	Grease A + Additive Package I	0.53	620
3	Grease B + Additive Package I	0.63	620
4	Grease C + Additive Package I	0.69	620
5	Grease C + Additive Package II	0.52	800
6	Grease D	1.51	200

Table 2. Results of load carrying capacity and wear tests measured by a four-ball machine.

Six greases, three conventional lithium (Li) greases and three lithium complex (LiX) greases were produced in a pilot plant at atmospheric pressure, see Table 1.

The use of naphthenic base oils kept the thickener content low. However, a direct correlation between the viscosity of these naphthenic base oils and the thickener content was found - the higher the viscosity the lower the thickener content.



"Our aim was to evaluate the impact of the characteristics of the base oils, thickener type and additive concentration tribologically by using various SRV methods as well as four-ball methods," explains Jinxia Li.

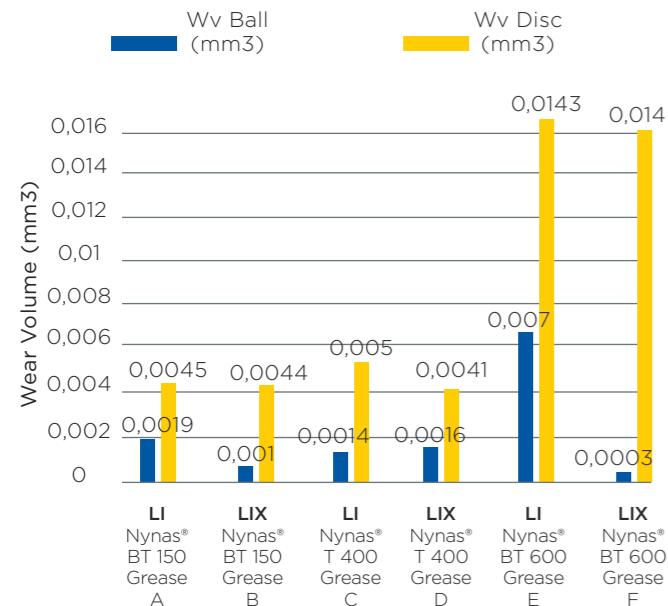


Figure 1. Wear volumes of the non-additivated greases after running SRV® tests.

Figure 1 shows the wear values of three non-additivated greases with different base oil viscosity and the corresponding ones with lithium and lithium complex thickener from SRV tests. These results confirm that the greases with the highest base oil viscosity (NYNAS T 600) contribute to the highest disc wear volume, while the wear on the ball remains the lowest.

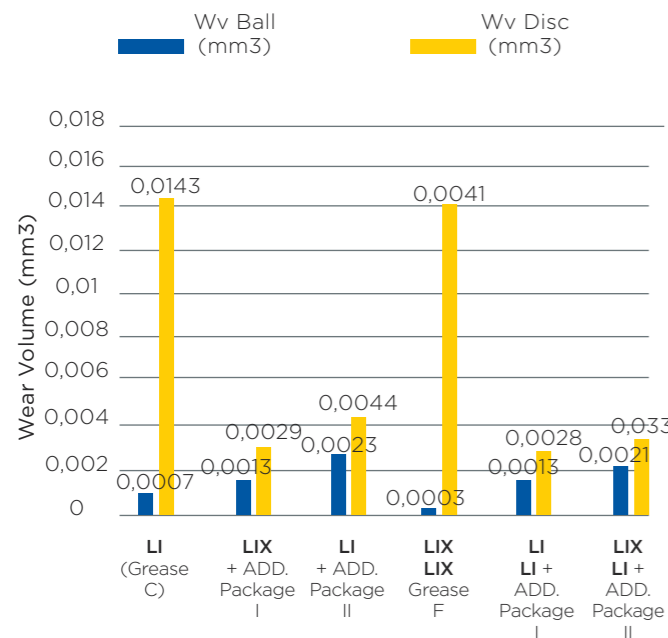


Figure 2. Wear volumes of different greases based on BO 600 after running SRV® tests.

In the SRV tests, wear values increased for both disc and ball with extra extreme pressure additive regardless of the thickener type for greases based on the naphthenic oil of the highest viscosity, see Figure 2. The four-ball tests showed positive impact both on the wear scar diameter and weld load carrying capacity for the lithium grease (C). For the lithium complex grease (F), only the load carrying capacity showed a positive effect, see Table 2.

“From Nynas’ point of view, the most important finding of this study is the fact that the thickener content of a grease seems to affect the tribological performance which in turn is dominated by the characteristics of the base oil, for instance, its polarity, degree of solvency and viscosity,” says Jinxia Li.



The test method matters

The tribological properties of all formulated greases were studied by using various ASTM methods in the new generation tribometer SRV®5 and a traditional four-ball set-up. These tribological investigations proved crucial for optimising the grease formulations for specific tribological contacts.

However, they also highlight that the choice of test method matters, exemplified by the differences observed between the two thickener systems in the additivated greases, where the additive package containing an extra dose of extreme pressure additive performed differently in the two test rigs.

* Read more in LUBE magazine: No.136 page 1



New high viscosity base oil.

NYNAS® T 600 is the latest addition to our base oil portfolio. Clear and bright, NYNAS T 600 is a highly refined naphthenic oil with a viscosity of approximately 600 cSt at 40°C, and further extends the range of solutions which Nynas offers the grease and lubricant industry. NYNAS T 600 naphthenic base oil can also be used in combination with paraffinic oils to increase viscosity, improve low temperature performance, and enhance additive solubility as a result of its excellent solvency.

For more information visit www.nynas.com or contact your local Nynas sales office.

APPLICATIONS

NYNAS T600 is suitable for all applications where high viscosity and appearance are critical. The new base oil performs very well in lubricating greases, where it improves process economies with a reduction of Lithium soap up to 50%. The base oil is also suitable for use in several industrial lubricant formulations, such as gear oil, metal rolling and forming.

FEATURES

In addition to its high viscosity, NYNAS T 600 offers several advantages over paraffinic oils, including excellent low-temperature properties and unrivalled solvency power.

AVAILABILITY

Committed to providing consistent and high-quality naphthenic oils worldwide, Nynas is making NYNAS T 600 available on a global scale through its outstanding supply and distribution network.



In the sky since the Wright Brothers
**Experience, expertise and
superior quality in aviation oils:**
ExxonMobil

One of the largest publicly traded companies in the world ExxonMobil has been maintaining its industry leadership in almost every aspect of the energy and chemical manufacturing businesses for more than a century now.

Operating facilities and marketing products in most of the world's countries while exploring for oil and natural gas on six continents, ExxonMobil has a strong presence in the lubricants business in Turkey.



The company manufactures and markets a wide range of Mobil-branded finished lubricants, such as Mobil 1, Mobil Delvac and Mobil SHC.

Drawing attention to its heritage in aviation industry, ExxonMobil takes pride in being in the skies since 1903, when the Wright brothers made their first flight.





Gence Yavaş
ExxonMobil Aviation
Lubes Area Manager

Lubricant World had an inspiring talk with ExxonMobil Aviation Lubes Area Manager Gence Yavaş about the company's history in Turkey, its expertise in aviation and future goals.

Could you tell us about the history of ExxonMobil and its contribution to the industry?

ExxonMobil, one of the world's largest publicly traded energy providers and chemical manufacturers, has been operating for nearly 150 years. The company develops and applies next-generation technologies to help safely and responsibly meet the world's growing needs for energy and high-quality chemical products with a workforce of around 75,000 employees worldwide.

In ExxonMobil we contribute to global sustainability goals while managing the impact of our operations on local economies, communities and the environment. All of our operations are conducted in accordance with the ExxonMobil's proprietary Operations Integrity Management System (OIMS) framework.

Along with the sponsorships with motorsports such as Formula 1 and NASCAR, which require a high level of performance and engine protection, we demonstrate the high quality of our high-performance oil solutions with our Porsche and Bentley collaborations.

What about the history of ExxonMobil in Turkey?

Mobil, which has been investing and operating in most countries for over 100 years, entered the Turkish market in the early 1900s, during the Ottoman Empire. The company has witnessed The Turkish War of Independence and the establishment of the Republic of Turkey, as well as endured the First and Second World Wars.

Mobil, being present in Turkey for over 110 years, has contributed to both business and social life of the country. Not to mention that the company trained young people, opened schools and was called the 'academy' of the energy sector. As Mobil Oil Türk A.Ş., we are proud to have been operating in Turkey for 117 years now. By offering advanced products for the automotive, industrial and marine industries, we help our customers protect their equipment even under the toughest conditions, and contribute to the energy efficiency and productivity increase of businesses.

What areas of activity does ExxonMobil focus on today?

ExxonMobil is creating sustainable solutions that improve quality of life and meet society's evolving needs. We do that through the exploration and extraction of energy resources, processing and distribution of energy resources, petrochemical production and commercialization of our extensive low-carbon technology portfolio. In Turkey our operations consist of manufacturing and marketing of finished Lubricants.

ExxonMobil has been a technology leader and trusted partner for aviators and engineers around the world. The company's innovations and expertise continue to push the boundaries of flight, both in the air and into outer space.



What is the connection between aviation history and your company?

ExxonMobil Aviation has been a part of aviation history since 1903, when the Wright brothers chose Mobil oil branded lubricants for their historic first flight. The company has been a technology leader and trusted partner for aviators and engineers around the world ever since, and its innovations and expertise continue to push the boundaries of flight, both in the air and into outer space.

What about your company's importance in the aviation industry?

Price is often the top priority when it comes to selecting a lubricant supplier, but there are many other critical factors that should go into the decision-making process. In the aviation industry specifically, there is value to selecting a supplier that is innovative, goes beyond spec, and ensures the integrity of its products.

ExxonMobil is committed to providing best-in-class technical expertise, engineering support and inspection





services designed to help reduce maintenance downtime, provide potential cost savings, and proactively detect problems in oil and hydraulic systems.

What is your product portfolio?

ExxonMobil Aviation offers a unique, nose-to-tail solution that provides high-quality fuels, jet oils, hydraulic fluids, greases and other aviation lubricants help your aircraft run smoothly and efficiently. Our offerings include Mobil Jet™ oils, Mobil™ HyJet™ hydraulic fluids, and greases that are designed to protect against wear and corrosion, endure adverse weather conditions and provide excellent performance in extreme temperatures. For a complete list of our product offerings, visit our website.

What are the new trends in aviation lubricants?

There are emerging trends in aviation that will offer unprecedented challenges for lubrication technology, such as the advent of hybrid gas and electric engines, followed by fully electric-powered commercial aircraft, as well the possibility of aircraft powered by hydrogen

fuel cells. As aircraft fleets grow and transform in the coming years, aviation lubricants will play an even greater role in removing heat, carrying particulate debris to oil filters, protecting engine parts, preventing deposit formation, and reducing friction and wear across a wider range of temperatures. Collaboration between suppliers and OEMs will be more important than ever to ensure success.

What are your future targets in the industry?

With our depth of expertise and proven products, ExxonMobil Aviation is excited to continue driving the industry forward with innovative products and to maintain the trust of its partners, as it has done for more than a century.



ExxonMobil Aviation offers a unique, nose-to-tail solution that provides high-quality fuels, jet oils, hydraulic fluids, greases and other aviation lubricants help your aircraft run smoothly and efficiently.



Mobil Jet™ Oil 254



Product spotlight ExxonMobil



Certified turbodiesel engine oil for the Turkish defence industry

Koçak Speedol, Turkish lubricant and grease manufacturer makes a mark with the first domestic turbodiesel engine oil approved by TEI, Speedol Aero Ultra Diesel S170. With its competent R&D team, accredited laboratory, and high-tech machine park, the company strengthens the local defence and aviation industry by domestic production of the major import item.

Türkiye continues to make domestic and international investments in aviation and defence, and this leap is reflected throughout the industry. While the airplanes, helicopters, and unmanned aerial vehicle projects of Turkish Aerospace Industries (TUSAŞ) are a source of pride for Türkiye, they also present companies from various industries with chances for growth and development.

One of the best examples of this development is Koçak Speedol, Turkish lubricant and grease manufacturer. Adding value to the lubricant sector through its competent R&D team, accredited

laboratory, and high-tech machine park, Koçak Speedol creates a difference in the defence and aviation industries.

The company produces Speedol Aero Ultra Diesel S170, the first domestic turbodiesel engine oil approved by TEI (TUSAŞ Engine Industries, INC). The product which fulfills the engine oil needs of TUSAŞ ANKA, the unmanned aerial vehicle (UAV) developed in accordance with the needs of the Turkish Armed Forces, meets the demand in the major import item through domestic production. Products under the Speedol brand are listed first among engine and transmission oils in the Aircraft Maintenance Manual (AMM) of the turbodiesel engine.



Speedol Aero Ultra Diesel S170 is the first TEI-approved Turkish national turbodiesel engine oil.

Approved Product

Speedol Aero Ultra Diesel S170 became the first TEI-approved turbodiesel engine oil. TRtest also certified that the product meets ACEA, SAE, and ASTM standards in accordance with TEI-PD170 engine specifications. Thus, the synthetic aviation oil Speedol Aero Ultra Diesel S170 became the first domestic and national engine oil in its category to be awarded the TRtest Product Conformity Certificate.



The TRtest Product Conformity Certificate was awarded to Speedol Aero Ultra Diesel S170 after passing the engine and laboratory test phases of the Turbodiesel Aviation Engine TEI-PD170.

Competent R&D Team

Koçak Group R&D and Technical Project Manager Ceyhan Çağlar Çapanoğlu expressed her joy at the company's achievement in the 100th anniversary of the Speedol brand.

Çapanoğlu praised the R&D team and all Koçak Group managers who contributed to the project and stated that she is proud that the transmission fluid group Speedol Aero Trans S170 developed for TEI-PD170, Türkiye's first national turbodiesel engine, and the engine oil named Speedol Turbo Diesel SP170 developed by TEI's demand alternatively and authentically, were approved by TEI and mass production has begun.

Çapanoğlu stated that they will expand their substitute product portfolio in the defence and aviation industries in special product groups such as lubricants, greases, deicing and defrosting fluids.



Koçak Group R&D and Technical Project Manager Ceyhan Çağlar Çapanoğlu



95% Domestic

Within the scope of the Operative UAV Engine Development Project, the first run-up of the TEI-PD170 engine took place on January 30, 2017.

The TEI-PD170 engine, whose design is completely national and indigenous, was delivered to TAI (Turkish Aerospace Industries, Inc.) on November 3, 2017, following maturation tests. TEI-PD170, which proceeded to the mass production stage at the end of 8000 hours of calibration and testing activities, successfully performed its first flight with the ANKA platform on 27 December 2018, and its first flight with the AKSUNGUR platform on 4 October 2021.

Compared to the altitude performances of the competitor imported engines from abroad, the TEI-PD170 engine produces 34% more power at the duty altitude, providing an undisputed superiority in the critical altitude/power ratio.

The engine is considered the most superior engine in its class with its special twin-turbo design and minimum specific fuel consumption.

With the Full Authority Digital Engine Control (FADEC) and the software thereof, that are manufactured and developed within the bounds of TEI's possibilities, the TEI-PD170 engine has been developed on the basis of the civil aviation standards and has 45.000 ft. service ceiling.

The engine has Engine Control System compatible with MIL-STD-461F, MIL-STD-704F, MIL-STD-810G, calibrated and upgradeable TEI design software and hardware, power increase capacity up to 220+ HP. The production and equipment of the engine, whose design is completely indigenous and national, is over 95% domestic.

The Excitement for Domestic Production

Informing about the strong production facilities exporting to more than 40 countries and the high-tech machine park, Speedol - Koçak General Manager, Yusuf Koçak addressed the activities of the accredited laboratory and R&D center providing services within the company. Noting that they operate under the motto "Quality provides trust", Koçak said, "With more than 20 engineers, we offer solutions that fulfill the needs of our government and nation."



The first domestic and national engine and transmission oils approved by TEI-TUSAS for TURKEY's first domestic and national Turbodiesel Aviation Engine TEI-PD170.



TRTEST-ÜUB-2021/0058



It is so nice to fly in the blue sky



*"The airplane has unveiled for us
the true face of the earth."*

Antoine de Saint-Exupery

As humanity, we wondered about the sky, ever since we could remember. We have made many great discoveries by observing the Sun, the Moon, and Stars. When our interest in the sky was combined with our passion to fly, we met one of the greatest technological innovations in history: airplanes...

Since the early 1900s, aviation has advanced along with the defence industry. Flight technologies advanced significantly during World Wars I and II because the governments budgeted heavily for military aviation.

However, it was the discovery of civil aviation that truly changed the world and liberated humanity to the utmost. The use of aircraft in the mail, shipment, and, finally, human transportation altered our perception of space and time radically.

We even crossed continents and mountains like birds, and reached beyond the limits of our minds, to the Moon. Today, we have robots exploring the surface of Mars and searching for life beyond the Solar System.

Would you like to learn more about a museum exhibiting humanity's exciting flight adventures with all their milestones? If you are ready, let us travel to the United States and see the Smithsonian National Air and Space Museum's extensive collection.



Smithsonian National Air and Space Museum

The Smithsonian National Air and Space Museum has the most extensive and significant collection in its field. The museum, which opened in 1976 in Washington DC, has a long history dating back to the 1800s.

Every year, more than 8 million people visit the Smithsonian which has a second location in Chantilly VA. The museum also houses an Astrophysical Observatory, which is regarded as an important training and research center in the fields of aviation and space.



One of the most attractive pieces in the museum is the spaceship designed for the popular 1960s series Star Trek.

1903 Wright Flyer

Wilbur and Oliver Wright brothers' revolutionary invention that initiated aviation history is one of the most attractive items of the collection named "1903 Wright Flyer". Seeing the original invention, replicas of which are exhibited in museums all over the world, is indeed a thrilling experience. In this section of the museum, many important documents and objects remind us of and honor the first moments of flight history.



Curiosity's scale model, which successfully landed on Mars in 2012 and revealed the unknowns of the Red Planet, attracts visitors' attention.

"Columbia" Module

Neil Armstrong and his crew's journey to the Moon in 1969 was one of the most significant achievements in space history. The Columbia Module, which served as the living quarters for the Apollo 11 crew throughout their historic journey, was donated to the Smithsonian National Air and Space Museum after being exhibited in cities across the US under NASA sponsorship. The Module is the only piece of the spacecraft that traveled to the Moon and returned to the World.



The spacesuit of Neil Armstrong, the first person to set foot on the Moon, is among the objects exhibited at the museum.



Bell X-1, the first airplane to exceed the speed of sound



The Unique Plane Collection

The Smithsonian National Air and Space Museum has the world's largest and most diverse airplane collection. Here, the Bell X-1, which was the first airplane to surpass the speed of sound in 1946 takes the spotlight. Along with combat aircraft, the museum's inventory also includes commercial aircraft. The museum houses airplanes of all shapes and sizes, from aerobatic planes and cargo planes to private jets and even helicopters.



Türkiye hosts major aviation events

Aviation industry gathering at the crossroads of the world

Asia Connect: MRO

To be held on November 9-10 at the Haliç Congress Center in Istanbul, Asia Connect: MRO will bring together the professionals of the aircraft maintenance, repair, and overhaul market. The exhibition, in which aviation companies will showcase their technical equipment and competencies, will provide attendees with the latest trends and recent technologies to maintain airworthiness and increase the efficiency of their aircraft fleets.

During the conference program of the event, the current developments that deeply affect the aviation industry will be addressed. The air transportation industry, which faced unprecedented challenges during the pandemic, experienced an international crisis in which Russia's vast airspace was blocked just as it was beginning to recover. Such developments, which have resulted in alterations in route and fleet planning, have also led to new search terms in the procurement of goods and services. The sessions at the conference are expected to be helpful for decision-makers to set new strategies.

The world's aviation industry is gathering in Istanbul and Antalya. Sector leaders will exhibit their products and services at the consecutive exhibitions.

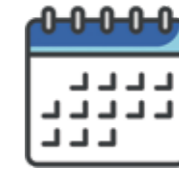
These events will enable civil aviation, defence industry, aerospace and MRO professionals to benefit from outstanding opportunities to build new business relations through B2B meetings.

Eurasia Airshow

The Eurasia Airshow, which will represent nearly 70 countries including Russia, Qatar, Iran, the UK, Ukraine and Poland, will be held at Antalya Airport ANFAŞ Expo Center between December 7-10.

The exhibition, which will be attended by global sector leaders such as Boeing, Rolls-Royce, Embraer, Qatar Airways and Thales, as well as leading Turkish brands such as Turkish Airlines, Turkish Aerospace Industries, Havelsan and Aselsan, is regarded as one of the largest aviation events targeting the European and Asian markets.

The Eurasia Airshow, which is expected to feature breathtaking flight performances by airlines and air forces, is also anticipated to be attended by manufacturers of satellite and space technology systems, radar, in-flight equipment, and airport equipment, as well as cargo service providers. This year Eurasia Airshow will be accompanied by the 6th Global Satellite & Space Show. The exhibition to be attended by hundreds of local and foreign companies will offer its participants the "Meet the Buyer" program in addition to the B2B system, and promises its visitors an exciting show focused on technology and innovation.



Event Calendar

With the year coming to an end, exhibitions and events regarding our sector increasingly go on in Türkiye and abroad.

As Lubricant World, we closely follow all these events and share the developments with our audience via our website and social media accounts.

SAHA EXPO Defense, Aviation and Space Industry Exposition
October 25-28, 2022 - Istanbul, Türkiye

ACI 2022 European Base Oil and Lubricants Summit
November 16-17, 2022 - Lisbon, Portugal

Automechanika Dubai
November 22-24 - Dubai, UAE

Turkchem International Chemical Industry Expo
November 24-26, 2022 - Istanbul, Türkiye

ICIS Pan American Base Oils and Lubricants Conference
November 24-26, 2022 - Istanbul, Türkiye



PROF. DR. FİLİZ KARAOSMANOĞLU

Faculty Member of ITU Chemical Engineering Department
President of Sustainable Production and Consumption Association
filiz@itu.edu.tr

Sustainable lubricants and recycled base oil

The independent Union of the European Lubricants Industry (UEIL), whose activities and online events I closely follow, continues to guide its members toward sustainability. Aiming to contribute to the European Green Deal's goal of becoming climate-neutral by 2050, the Union first established the Sustainability Committee within itself, and then in 2019 set up the Sustainability Task Force (STF). Leading the industry in terms of sustainability management, STF came to define 'sustainability' in the context of lubricants as: "Lubricants created by innovative businesses enabling the use of safe, resource saving technologies and processes which reduce the burden on the planet, local environments and benefit people and society." The Task Force identified three priority sustainability pillars: Environment, Health and Safety, Society and Economy. To deliver against these objectives, Environment Working Group with the responsibility of Carbon Footprint (CFP) and Energy Efficiency and Communications Working Group were formed. Organizations are encouraged to develop sustainability strategies, report on sustainability, and make these reports available to the public. The goals in the life cycle from source to end use are set, which require production with the least possible negative impact on biodiversity loss, pollution, and climate change, and consumption with the best waste management.

In the life cycle of sustainable lubricants, used oil management is critical. Used oil which is no longer useful can be still used as a fuel in the production of cement, lime, and steel. Used oil can also be re-refined for use in the production of fuel and base oil. In addition, it is a valuable raw material as a hydrocarbon source similar to coal, crude oil, and natural gas. Base oil made from used oil (re-refined) has a privileged place in our sector due to its position in the circular economy. Lubricants formulated with a re-refined base oil and released to the market have a positive impact on the life cycle in the areas where they are used, creating significant benefits, primarily in the terms of Carbon Footprint.

The European Re-refining Industry Group (GEIR - French: Groupement Européen de l'Industrie de la Régénération) of UEIL is the umbrella organization for institutions that add value to used oil. GEIR convened its annual general meeting in Bilecik, *the City of Establishment and Liberation*, on September 8, 2022, as it does each year in a different country. The meeting was held at TAYRAŞ Base Oil Refinery, a group member, and was attended by 19 representatives from Germany, Belgium, the United Kingdom, Finland, France, Spain, Sweden, Italy, and Portugal, 6 of which attended online. The upcycling technology of TAYRAŞ was strongly appreciated by the participants. Marco Codognola, President



of GEIR said, "The fact that TAYRAŞ, a valuable investment with strong technology, is conducted in Türkiye proves that we are on the right path; we will grow and make our world cleaner and more livable place." Chairman and CEO of TAYRAŞ Mehmet Afşin said that "The managers of the European refineries with strong technologies gathered in TAYRAŞ. Our guests emphasized that our refinery is upcycling with the best available technology. Our investment is a source of pride for us."

Our strong legislation became another technical advantage. According to the Used Oil Regulation, which was amended on December 23, 2020, lubricant producers are required to collect 10% of the lubricants they release to the market in 2021, 15% in 2022, 20% in 2023, and 25% in 2024, and in subsequent years, at rates consistent with the Ministry's goals. While in lubricant production, it is mandatory to use base oil produced from used oil at a rate of 8% in 2022, 12% in 2023, 15% in 2024, and later years, at rates consistent with the Ministry's goals, excluding imported base oil. This compulsory usage rate is the acceleration of our sector.

According to the data obtained from TAYRAŞ General Manager Aydın Özbey, the recent table in Türkiye is as follows:

- Lubricant consumption (PETDER, 2020): 470,000 tons
- 2020 base oil consumption (at least 25%): 352,000 tons
- 2020 additive consumption (at most 25%): 117,000 tons
- Amount of use of re-refined base oil calculated in accordance with the regulation for 352,000 tons of base oil

2022: 28,200 ton
2023: 42,300 ton
2024: 52,875 ton

- Number of refining facilities: 7
- Operation capacity of refining facilities: 117.000 tons
- Calculated base oil production capacity of refining facilities: 76.200 tons
- The current established capacity is greater than what is required for mandatory blending
- The collectable used oil amount: 235.000 - 305.000 tons
- The collectable used oil amount is greater than the calculated base oil production capacity
- Revising the mandatory blending rates determined for 2022, 2023, 2024, and 2025 respectively as 4%, 6%, 8%, and 10% will be of national benefits.

In the light of the above information, we all need to work harder as the stakeholders of the used oil sector. Unfortunately, we are not yet successful enough in waste collection and sorting. Despite rising waste collection rates, the amount of waste entering recycling facilities and being processed remains low compared to our waste potential. The used oil collection issue is also very critical. Illegal and harmful usages that endanger human health and the environment (mixing with diesel oil, burning in greenhouses and workplace stoves) have an impact on economic profits and employment. This problem reduces the capacity usage rates of used oil re-refining facilities. It is a major loss. Used oil means domestic petroleum. The more used oil we collect and process, the more successful we will be in both internal consumption and re-refined base oil export. Our environment, climate, and economy will all profit. While our legislative power is strengthened by audits, the lubricant and used oil producers, authorized institutions and refining facilities, determined by our Used Oil Regulation should completely fulfill the obligations. In order for the established capacity to create complete value in our economy, increasing mandatory blending rates is a sectoral reality for our political power's appropriate opinion. Consequently, the ground will be set for new investments. Our beautiful country deserves everything.



Engine oil user guide



VISCOSITY GRADE:

is the main feature of an engine oil and is important for product selection

Signification of grades



xx refers to viscosity when cold (measured at different temperatures)

The lower the viscosity when cold, the more fluid the oil is at low temperatures and the more easily it can be pumped.

For example, a 0W-20 or 5W-30 oil will make start-ups easier and will protect engines during trips to cold regions. These high technology "fluid" oils will meet the requirements of recent engines.

yy refers to viscosity when hot (measured at 100 °C)

The higher the viscosity when hot, the more viscous the oil is.

For example, a 15W-40 or 20W-50 oil has been developed for use in hot countries, and their "viscous" nature makes them suitable for older engines.



POINTS TO REMEMBER

New-generation engine oils and those currently being developed by TOTAL are of increasingly fluid grades: 0W-20, 5W-20, 0W-30 and 0W-16.

How to read a product label for product selection?

Small packaging:



Large packaging:



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