

# MADENİ YAĞ DÜNYASI LUBRICANT WORLD

International Edition

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Madeni Yağ Dünyası



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**Ustaya Özel**  
En iyi yağ, en özel ustayla buluştu.

## A unique platform for mechanics "Made for Mechanics" launched by Total

Lubrication in environmentally  
sensitive areas: Making the  
right choice with esters

Superb behavior  
in aluminum  
complex grease

Castrol's PATH360 strategy  
aims to help deliver  
a more sustainable future



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## Editor's Letter



The leading actors in the global lubricant market are taking the competition to a different point. The companies, which work towards the goal of reducing carbon emissions and not having any impact on the climate, make a difference with the products and services they develop in this direction. Portfolios that consist of products with higher performance, longer life and environmentally friendly materials and production processes are preferred in the sector, especially by major consumers.

Turkish lubricant market is going through changes in the same direction. Companies that accelerate their R&D works for quality and environmentally sensitive products stand out in the competition. With the pandemic, companies that launch online platforms to offer services and products are trying to keep up with this season of change.

Total Turkey Pazarlama developed a digital platform for maintenance and repair mechanics. This platform, called "Made for Mechanics", offers various convenience and benefits to the mechanics. Fırat Dokur, Marketing and Technology Director of Total Turkey Pazarlama, stated that they provide special campaigns and qualified services to mechanics with this platform, which can be accessed via mobile application and website.

Arnaud Radigue, NYCO Technical and Sales Manager, stating that synthetic esters are one of the best options for environmentally sensitive applications such as offshore, ships, forestry and dams. He shared detailed information about the technical structure and performance of esters.

Mehdi Fathi-Najafi, Nynas Grease Specialist and Senior Technical Advisor, said that aluminum complex grease production has started to be preferred more due to the problems related to lithium hydroxide supply. He shared the results of their comparative study they conducted with 4 different base oils, including NYNAS® T 600.

Inside you will also find short industry news and latest developments. Enjoy reading.



Turkey Edition

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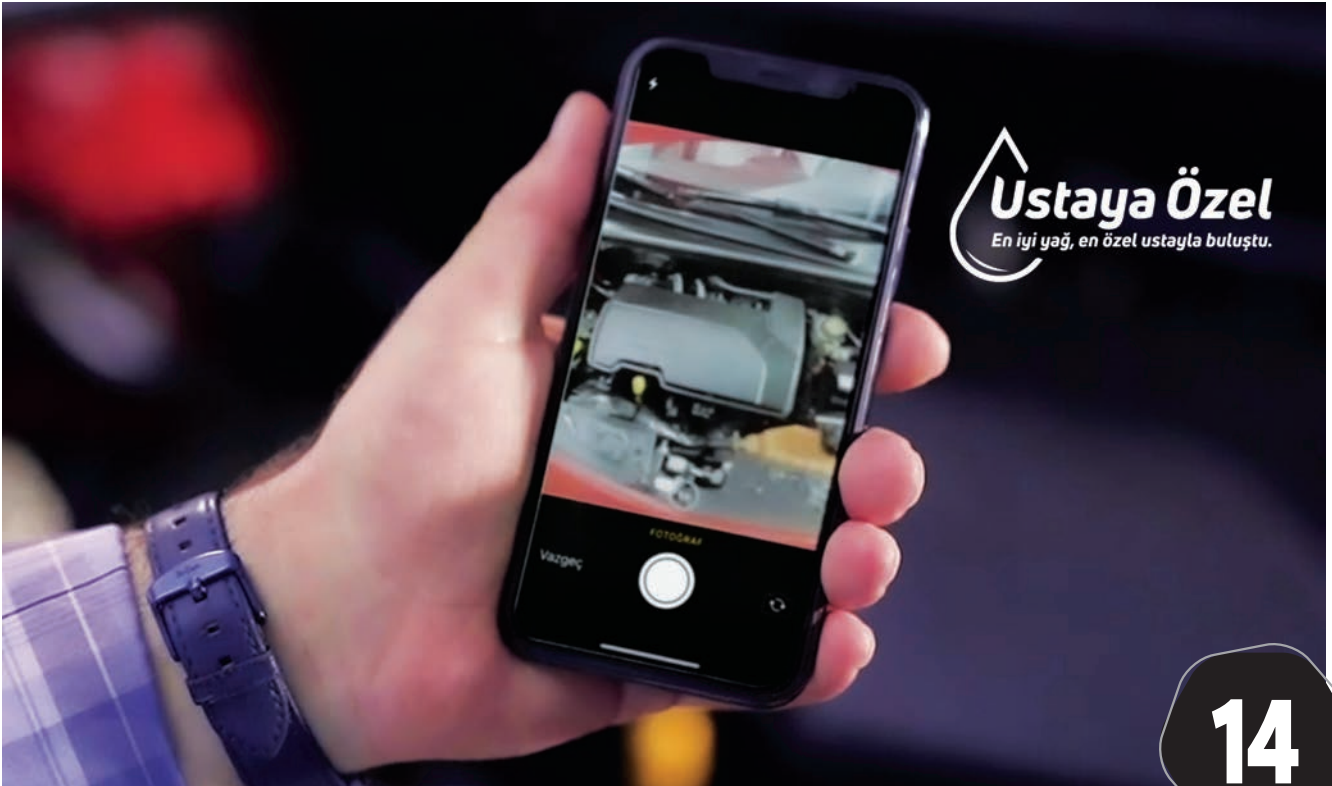
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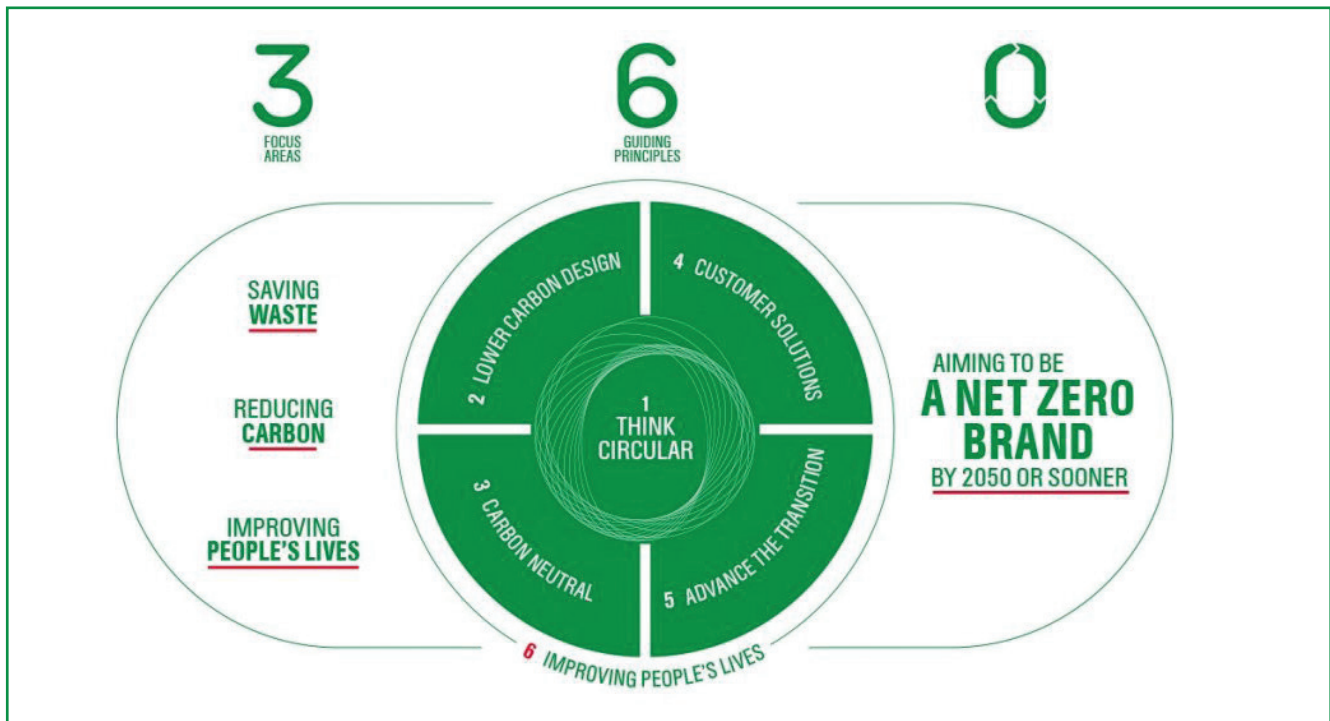
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**BASF presents  
roadmap to climate  
neutrality**



## Castrol's PATH360 strategy aims to help deliver a more sustainable future

To achieve the Paris climate goals, the world will need improvements in end use energy efficiency. In one estimate these improvements can provide almost 40 percent of greenhouse gas (GHG) emissions reductions required.<sup>1</sup> Today, around a quarter of the world's energy is lost to friction, corrosion and wear.<sup>2</sup>

Ever since Castrol was born, it has been dedicated to delivering products that help save energy by fighting friction, reducing corrosion and minimizing wear; delivering high-performance with increased efficiency.

Castrol's new PATH360 strategy embraces circular thinking - looking at the life-cycle of Castrol's existing and new products, to see how they can be improved, extended, reused or recycled, and supports new and growing sectors, like renewable energy and e-mobility with products and services.

Castrol PATH360's three focus areas and 2030 aims are:

- Saving waste - continuing to help customers save energy, waste and commercial customers' water as well as halving Castrol's plastic footprint<sup>3</sup>
- Reducing carbon - Castrol aims to halve the net carbon intensity per liter of its products<sup>4</sup>
- Working to improve people's lives around the world, including through carbon neutral programs and other activities through Castrol's carbon neutral program.

Castrol's senior vice president, Mandhir Singh, said: "Our approach is 360-degree, holistic, whole-system thinking. We are not starting from scratch with PATH360, it builds upon work we've been doing for years, pulling it all together into one integrated sustainability program. We know that many of our customers are looking for more sustainable offers and help with their sustainability goals, and this is what this program is designed to deliver."

<sup>1</sup>Energy Technologies Perspectives 2020 IEA page 73

<sup>2</sup><https://link.springer.com/article/10.1007/s40544-017-0183-5>

<sup>3</sup>To promote the responsible design and management of plastic packaging along its life-cycle, Castrol defines its plastic footprint as the amount of virgin plastic included in its packaging per liter that is not recycled. The aim to halve it is from its 2019 baseline.

<sup>4</sup>Vs. Castrol's net carbon intensity of its products sold in 2019.





# BASF presents roadmap to climate neutrality

**B**ASF is setting itself even more ambitious goals on its journey to climate neutrality and wants to achieve net zero emissions by 2050<sup>1</sup>. Based on the most recent progress in developing low-emission and CO<sub>2</sub>-free technologies, the company is also significantly raising its medium-term 2030 target for reductions in greenhouse gas emissions: BASF now wants to reduce its greenhouse gas emissions worldwide by 25 percent compared with 2018 – and to achieve this despite targeted growth and the construction of a large Verbund site in South China. Excluding the effects of the planned growth, this means cutting CO<sub>2</sub> emissions in half in the current business by the end of this decade. Overall, BASF plans to invest up to €1 billion by 2025 to reach its new climate target and a further €2 billion to €3 billion by 2030.

In 2018, BASF Group's worldwide emissions amounted to 21.9 million metric tons of CO<sub>2</sub> equivalents. In 1990, this figure was roughly twice as high. The new 2030 emissions goal represents a reduction of approximately 60 percent compared to 1990 levels, which exceeds the European Union's target of minus 55 percent. "The new climate goals underscore our determination and BASF's commitment to the Paris Climate Agreement. Climate change is the greatest challenge of the 21<sup>st</sup> century. In response, we must adapt our processes and our product portfolio. We need to accelerate this transformation now. We must first concentrate on the initial steps of this journey, not the final ones. That is why BASF will increase its use of renewable energies. And we will accelerate the development and deployment of new CO<sub>2</sub>-free processes for the production of chemicals. With transparency and offerings to systematically and incrementally reduce the carbon footprint of BASF products throughout the entire value chain, we help our customers in all industries to reduce the carbon footprint of their own products," said Dr. Martin Bruder Müller, Chairman of the Board of Executive Directors of BASF SE.

At the heart of the long-term transition toward net zero CO<sub>2</sub> emissions by 2050 is the use of new technologies, which will replace fossil fuels such as natural gas with electricity from renewable sources.

In addition to the planned investments in renewable energies, BASF is pursuing a number of specific flagship projects such as the world's first electrically heated steam cracker, methane pyrolysis technology for the CO<sub>2</sub>-free production of hydrogen from natural gas, PEM (proton exchange membrane) water electrolysis system for CO<sub>2</sub>-free production of hydrogen from water and electricity, and one of the largest carbon capture and storage (CCS) projects under the North Sea.

<sup>1</sup> Based on Scope 1 and Scope 2 emissions of the BASF Group; other greenhouse gases are converted into CO<sub>2</sub> equivalents according to the Greenhouse Gas Protocol çevrilmiştir



## A new production complex in Omsk will allow Gazprom Neft to increase production of advanced synthetic lubricants

Gazprom Neft has begun construction of a hydroisodewaxing complex at its Omsk lubricants plant. This complex will produce base oils for high-tech synthetic lubricants used on modern automotive equipment and industrial machinery, allowing the company to free itself completely from using imported base oils in producing premium product lines. The facility has a design capacity of 220,000 tons per year. Gazprom Neft's investment in this project stands at more than RUB32 billion (around 422 million 400 thousand USD).

Construction of the hydroisodewaxing complex is being synchronized with the planned development of Gazprom Neft's Omsk Refinery. Feedstocks for production of Group II- and Group III-quality base oils will be supplied from the hydrocracking unit at the deep refining complex due to be commissioned at the Omsk Refinery in 2021. This solution integrates production of synthetic base oils into a single process chain, facilitating additional output of products in considerable demand on the market while further increasing refining depth (the "conversion factor") at the Omsk Refinery. The new complex will further expand the premium G-Energy- and Gazpromneft synthetic lubricants product ranges, expected to increase Gazprom Neft's market share in packaged lubricants on the Russian market to 25 percent.

The hydroisodewaxing complex has been designed around cutting-edge technological and environmentally friendly solutions. Equipment for the future facility is being produced by leading Russian enterprises Volgogradneftemash (Volgograd) and Uralhimmash (Ekaterinburg). Construction of the complex is expected to be complete by 2022.

"This new complex will be able to meet demand for those high-tech feedstocks essential in producing advanced synthetic lubricants, across all of our plants. Replacing imported alternatives with our own Group II and Group III base oils will allow us to cut the cost of ready-to-use motor oils, while improving their competitiveness. Apart from which, the new complex will allow us to expand our premium G-Energy and Gazpromneft synthetic lubricants ranges," says Anatoly Cherner, Deputy CEO for Logistics, Processing and Sales, Gazprom Neft.



25th May 3-5pm CET (2-4pm GMT)



**CONFIRMED SPEAKER**

**Dr. Suhair Abdelhalim**  
Global Technology Manager, Passenger Car Engine Oils  
Petronas Lubricants International

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## UPCOMING EVENTS

**Tuesday 22nd June** (3-5pm CET)

**Bhaskar Mukherjee**, Business Development Manager, Base Oils, Chevron

**Tuesday 20th July** (9-11am CET)

**Nicolas Champagne**, Research Development Program Manager, Total

## KEY ASPECTS OF THIS EVENT

- This is NOT a webinar with hidden attendees. The set up will be designed to allow all to participate in the discussions and meet as many other attendees as possible face-to-face
- All attendees will have their cameras and microphones on during the networking
- Free movement networking will allow you to approach individuals and groups you choose
- Your choice as to leading or following the conversations taking place
- Petronas presenting on "Exploring the Newly Released ACEA Light Duty Engine Oil Sequences"
- Opportunity to join speaker on the 'stage' and pose your questions direct to them

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## FUCHS opens a new production plant for polyurea lubricating greases at its Kaiserslautern site

The FUCHS Group, which operates globally in the lubricants industry, has invested EUR 25 million in its Kaiserslautern site and officially inaugurated a new production facility on March 24. A fully automated production plant for polyurea and other lubricating grease specialties has been built on a 2,000 m<sup>2</sup> footprint on the over 90,000 m<sup>2</sup> premises of FUCHS LUBRITECH GmbH, which is based there.

The production plant is state-of-the-art and sets the highest standards in terms of safety, energy use and environmental protection in the manufacturing process. "The new production is one of our final projects in the global growth initiative launched in 2016, which is focused on capacity increase in line with advanced technology," said Stefan Fuchs, Chairman of the Executive Board of FUCHS PETROLUB SE. "It will enable us to significantly increase the production capacity of polyurea greases, allowing us to respond quickly to specific customer requirements and supply tailor-made polyurea greases, for example for use in the e-mobility, wind power and food industries."

"The new plant is a milestone for the entire FUCHS Group in terms of the production and distribution of polyurea greases. The production concept implemented will serve as a blueprint for other Group sites and sets a global standard for grease technology at FUCHS," explains Lucas Haaß, Managing Director of FUCHS LUBRITECH and responsible for Production and Supply Chain.

After the current investment, FUCHS LUBRITECH GmbH, which currently employs 353 people at its Kaiserslautern site, still has a considerable area of land available for future expansion on the premises.



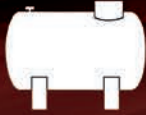
# ÜRETİMDEN SON TÜKETİME KADAR HER AŞAMADA FROM PRIMARY PRODUCTION TO FINAL CONSUMPTION

Sondaj  
Kimyasalları



Drilling  
Chemicals

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Kimyasalları



Production  
Chemicals

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Katkıları



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Chemicals

Madeni Yağ  
Katkı Maddeleri



Lubricant  
Additives

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## PETDER Ordinary General Assembly Meeting was held

The Ordinary General Assembly Meeting of the Petroleum Industry Association (PETDER) was held in Istanbul Hilton Bosphorus Hotel on March 18, 2021 with all necessary health and safety precautions. At the Ordinary General Assembly Meeting, PETDER's activities in the previous period and its budget for the last 3 years were presented to the approval of the General Board, and members of the Board of Directors and Supervisors were elected.

Opening speech of the meeting was made by Selim Şiper, who has been the Chairman of the Board of PETDER since April 2018. Stating that PETDER has been representing the fuel industry for 25 years not only as a reliable and objective source of information, but also as an effective advocate, Şiper said that the Association represents approximately 85 percent of the market and continues to work with the aim of providing better fuel, services and products to more than 24 million vehicles all across the country.

Şiper indicated that the ongoing pandemic is the most important development in the world and the sector in his term, and noted that the pandemic has affected the fuel distribution sector very negatively, and the study conducted by PETDER in collaboration with PwC revealed that it caused a loss of approximately 1 billion TL in the sector. Şiper said, "As PETDER, we evaluated the effects of the developments and practices in various platforms on our industry and offered relevant solutions. In addition, we have taken steps to expand our communication channels based on coordination and cooperation by strengthening our relations with our stakeholders and we have observed its positive results."

At the first Board Meeting held after the Ordinary General Assembly, Yüksel Yılmaz was elected as the Chairman of the Board of Directors, Ahmet Erdem was elected as the Vice Chairman and Tümkân Işıltan was elected as the Accounting Member. Ayhan Sırtıkara, Ekrem Ekmenci, Hamit Gürz Kodal, Mustafa Ergi and Selim Şiper became the members of the Board of Directors. The Supervisory Board consisted of Mahmut Kaya Ertürk, Burak Özgül and Emrah Özsavaşçı.







# Petroyağ awarded at the 63<sup>rd</sup> International Safety Awards

Petroyağ won an award at the 63<sup>rd</sup> International Safety Awards organized by the British Safety Council.

The International Safety Awards is an award scheme that recognizes organizations which have demonstrated genuine commitment to

occupational health, safety and wellbeing at their workplaces and meet the highest standards in this sense. This year at the 63<sup>rd</sup> awards organization, Petroyağ won an award for its dedication to occupational health and safety throughout the year 2020, which passed with many difficulties.

"We are very happy with the success we have achieved with the works we have carried on since our establishment and without backing down during the pandemic," said Ünal Soysal, Chairman of the Board of Petroyağ. "We are proud to successfully represent our country at this prestigious organization where more than 100 institutions from Turkey were evaluated and only 15 were awarded. In 2021, we will continue to do what we do best, and we will always work for the better, prioritizing the health and safety of the Petroyağ family," he said.

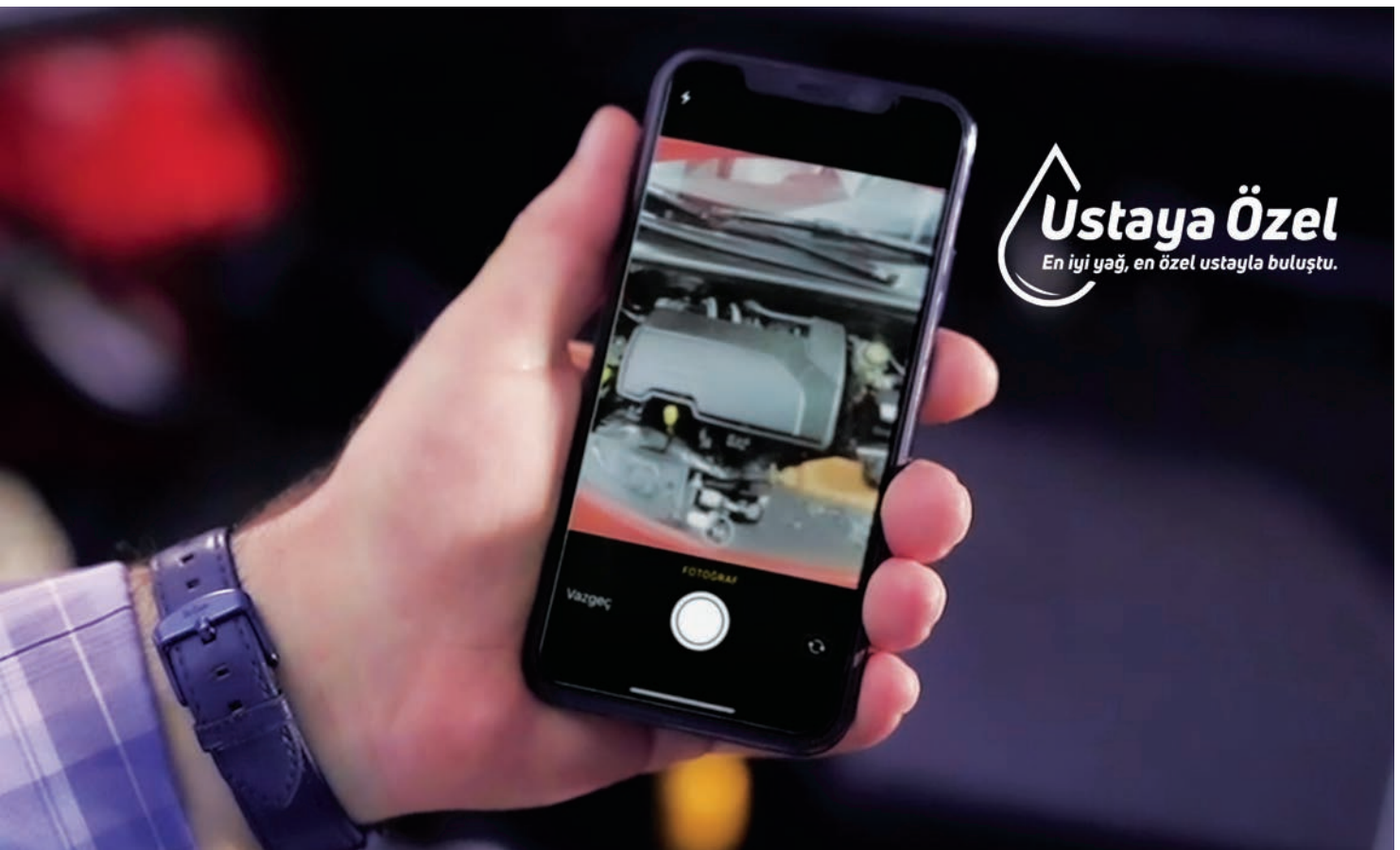
## Joel Zara named Shell & Turcas' new CFO

Joel Zara, CFO of Shell & Turcas, took office on February 1, 2021. In addition to her CFO role, she also became a member of the Shell & Turcas Executive Board and the Shell & Turcas Subsidiaries Board of Directors. Joel Zara previously served as the Project Manager responsible for finances on the Restructuring project at Shell's Head Office in London.

In her new role, Zara, who is responsible for Finance, Information Technologies and Procurement Operations, will take an important leadership role in the implementation of sustainable growth and new information technologies in line with the strategic goals of Shell & Turcas.

Zara started working at Shell in 1989, spent nearly 8 years of her more than 30 years of Shell career working at Shell's Head Office in London. She assumed various roles in the finance team as Shell & Turcas Finance Manager, Retail; Finance Manager Europe & South America, Crude Oil & Refinery Margin Optimization; Treasury Director Central and Eastern Europe & Turkey; Mergers & Acquisitions; Commercial & Supply. She is a graduate of Boğaziçi University Computer Science and Management.





## Total launches a unique platform for vehicle maintenance and repair mechanics

Total Turkey Pazarlama, which has been operating in lubricants production and marketing industries of Turkey for more than 30 years, has launched its digital platform, “Made for Mechanics”, for the use of mechanics. The platform, which is the first and only one in Turkey to provide comprehensive services and privileges in the lubricants industry and which employs an integrated system, offers a unique experience for vehicle maintenance and repair mechanics. Total Turkey Pazarlama Marketing and Technology Director Firat Dokur said, “Our goal was to create a platform by using TOTAL and ELF’s global expertise in the field of lubricants, together with our ability to make use of innovation and technology in Turkey, and we managed to do it.” We interviewed Dokur about the new platform and TOTAL’s close relationship with mechanics, which has been ongoing for many years.

**H**ow did Total Turkey Pazarlama come up with the idea for the “Made for Mechanics” platform?

At Total Turkey Pazarlama, we

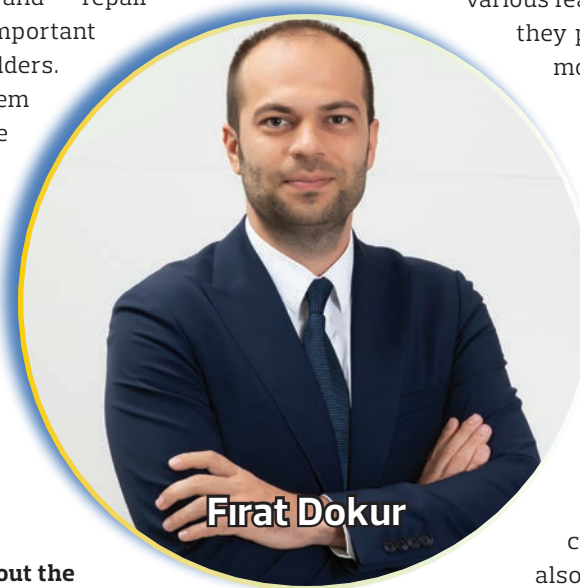
have been operating in the production and marketing of lubricants in Turkey. We have a strong sales and distribution network that supplies products, mainly engine oils, to the automotive, industrial and maritime-





transport sectors, both directly and through our distributors. We produce approximately 50 thousand tons of lubricants and special products annually at our lubricants-blending plant in Menemen, Izmir, which meets the highest international and local standards.

Vehicle maintenance and repair mechanics also hold a very important place among our stakeholders. So we wanted to offer them a unique experience, one without equal within the sector, through our "Made for Mechanics" platform, which we developed with their priorities in mind. We created a platform that can be easily accessed via mobile application and our website. We offer special privileges to mechanics who prefer TOTAL and ELF lubricants.



**Firat Dokur**

**Can you provide details about the privileges that the platform offers? What do mechanics experience on this platform, and what kind of services are available?**

The platform, which can be used either via mobile application or website, offers special campaigns and qualified services for mechanics. Mechanics can earn "Lub point" from the lubricant purchases they make during campaign periods, keep track of their points through the application, and get free products by using these points in their next order. Since all current accounts are automatically tracked through the integrated distributor sales system, no manual or additional procedures are needed to enjoy these benefits. Mechanics can earn "activity points" through professional content sharing and competitions that

they can take part in via the application. These points can then be converted into gift vouchers that they can exchange for free products.

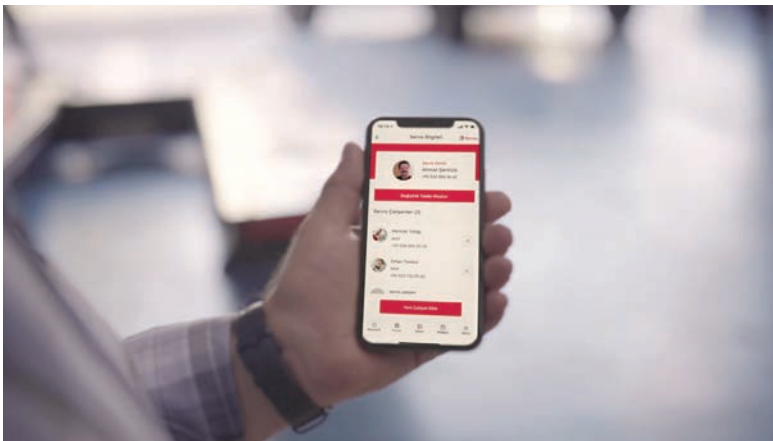
Moreover, mechanics who use the platform, share quality content, and actively use the application's various features can also win surprise gifts if they place at the top of the weekly and monthly rankings.

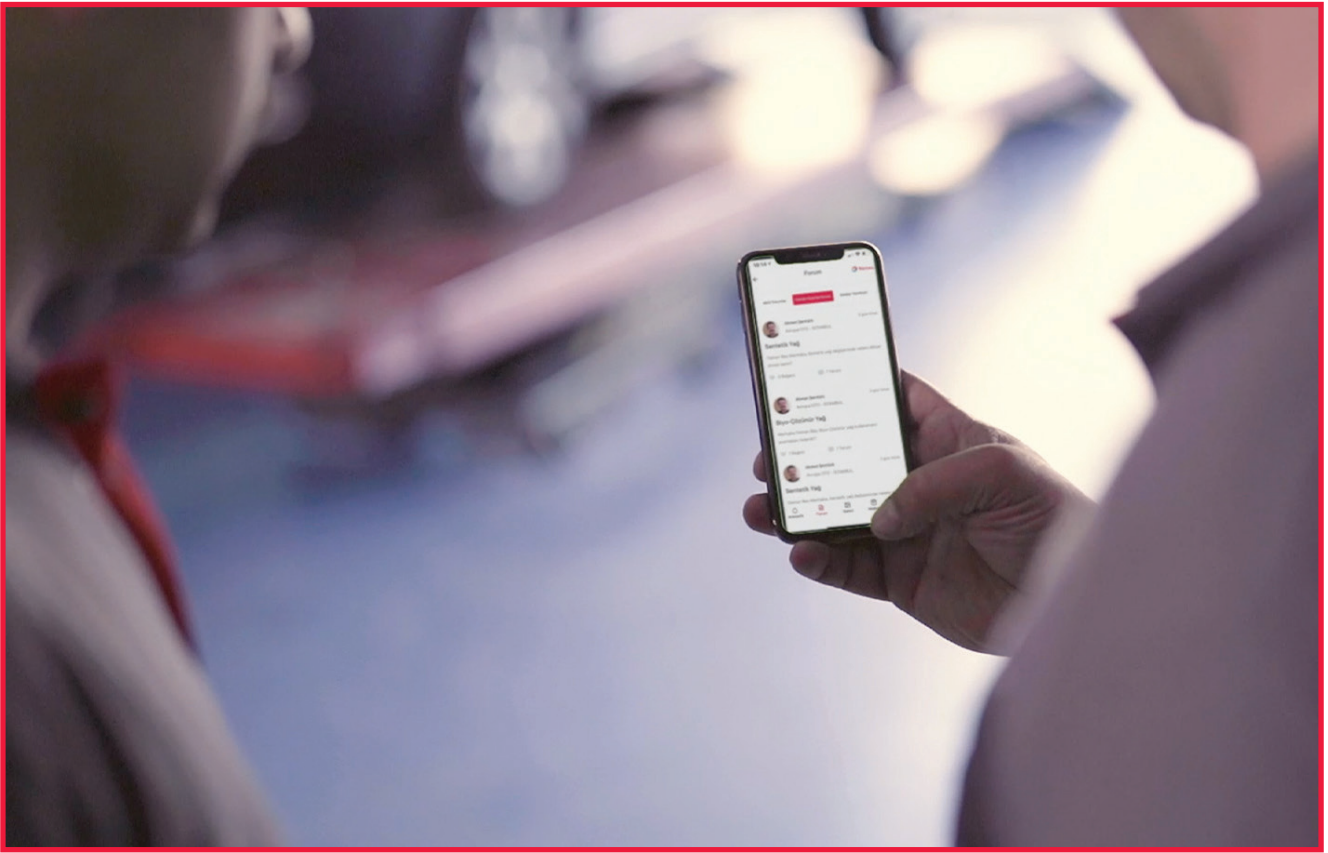
**How can users exchange information with Total or other users on the platform?**

Mechanics can communicate and exchange information with their counterparts from all over Turkey through the forums available on the "Made for Mechanics" platform. They can ask each other questions and respond to content by posting comments or likes. They can also obtain support on challenging technical issues from expert consultants who have been authorized by TOTAL. What's more, they can access training videos that have been meticulously prepared by TOTAL's Technical Services Team and Turkey's leading expert instructors, along with frequently updated technical bulletins via their mobile phones.

**How many members do you aim to reach through the "Made for Mechanics" application?**

The application is the first of its kind in the lubricants industry. Therefore, we have had more users than we initially expected, even though the platform has only been implemented at the pilot level in certain cities. Ultimately, however, we aim to have more than





10 thousand members before the end of the year. And we believe this number will increase exponentially in the years ahead.

**Will the platform introduce any unique innovations any time soon?**

We are proud to offer this great application to valuable mechanics who use TOTAL and ELF products in independent workshops. By directing end-users to the "Made for Mechanics" program's membership services through the "TOTAL Service Finder" website, which we will soon launch in tandem with the application, we aim to provide another valuable service to all users within the lubricants ecosystem. In addition, we plan to transform this application into a communication tool that will bring the TOTAL and ELF brands together under a single umbrella. We plan to do this by moving our promotions, events and communications onto a private platform in line with the needs of the modern era.

**What other plans does Total Turkey Pazarlama have for mechanics? Are there plans to meet with mechanics operating in the field, as you have done in previous years?**

Total Turkey Pazarlama always prefers to be out in

the field with our business partners. We consider this to be one of our strengths. We have met with some six thousand mechanics in more than 20 cities at the "Get Together With Mechanics" events that we held in 2018 and 2019. In doing so, we aimed to help mechanics, who are integral to the industry, by providing them with technology and know-how, and have received very positive feedback. Due to the pandemic, we were unable to hold these meetings last year. But we are working hard to get back into the field, and we are looking forward to meeting again with mechanics from all over Turkey.

***Scan the QR codes to listen to the mechanics' experience with the application***







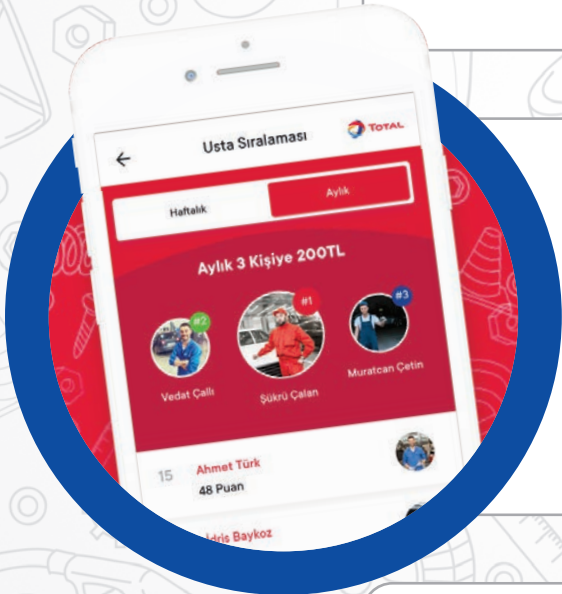
Follow the contests, do not miss the prizes



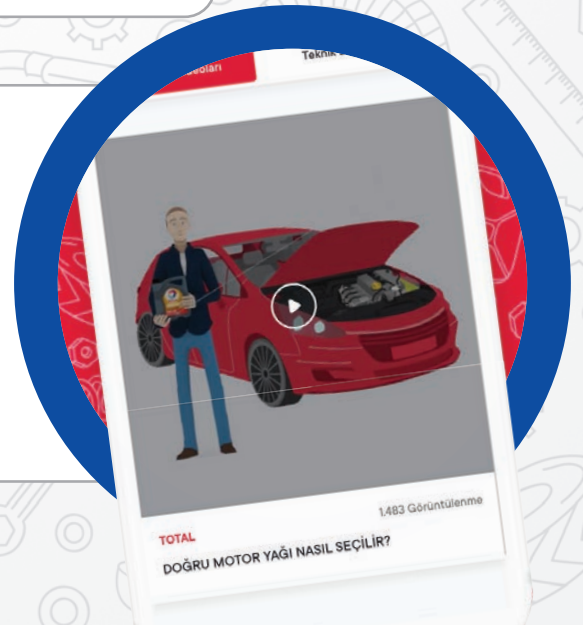
Include all your service employees to the platform

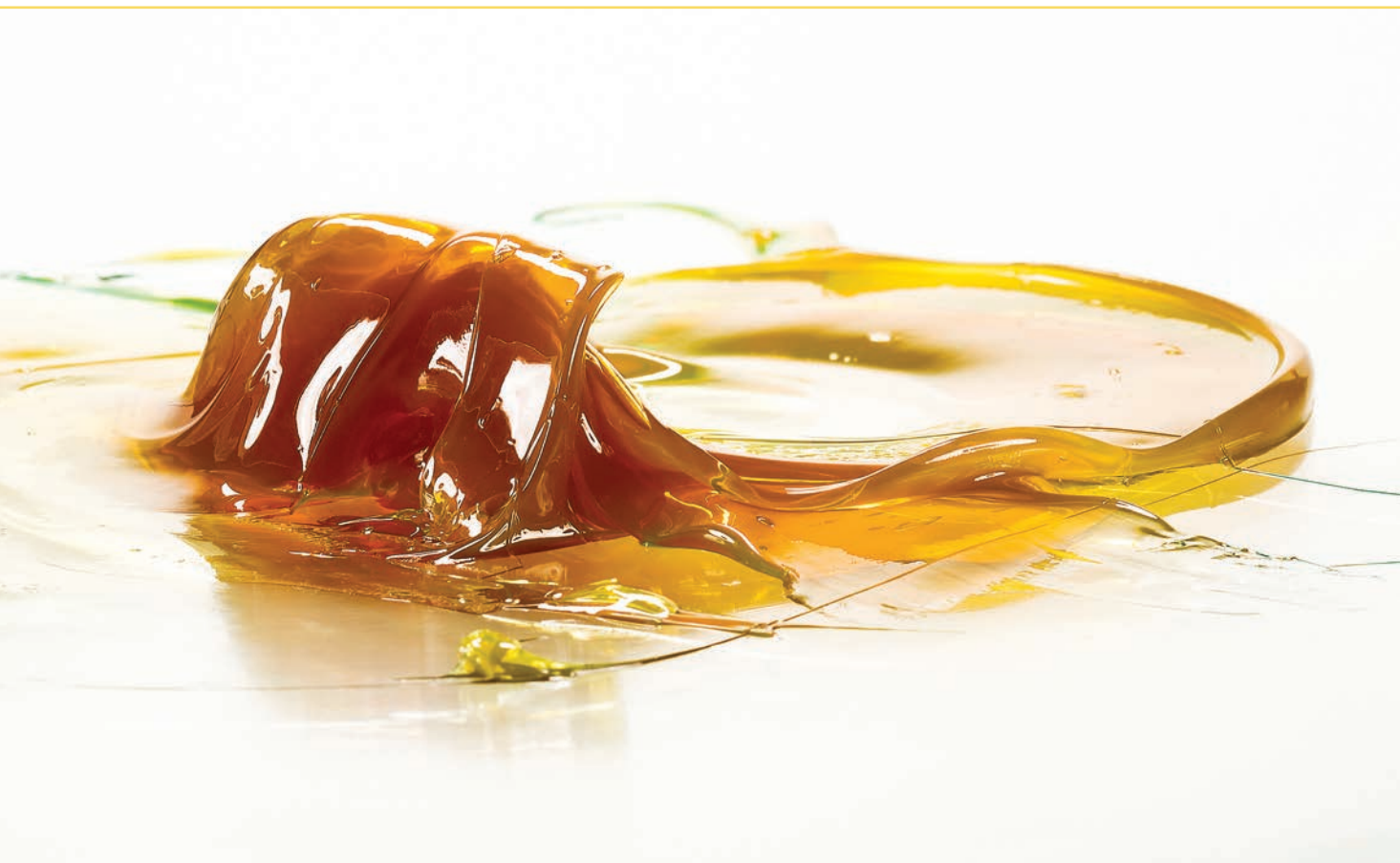


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## Superb behavior in aluminum complex grease

**To support grease manufacturers eager to diversify and move away from thickeners based on lithium hydroxide, Nynas' grease specialists studied the behaviour of NYNAS® T 600 in aluminum complex grease and found it to be an excellent choice.**

“As pressures grow on the availability and price of lithium hydroxide, an increasing number of grease manufacturers are looking for alternative thickener systems, for example by using aluminum-based soap,” says Nynas' grease specialist and Senior Technical Advisor Mehdi Fathi-Najafi.

Aluminum complex grease is a smooth gel with a slightly stringy texture. Preferably, it should be produced using high-viscosity oil, providing two important characteristics – good water resistance and good rust protection.

“However, this type of grease also needs some additives in order to improve certain behaviors, mainly relating to shear stability, low-temperature pumpability, and compatibility with other soap-based greases such as lithium and lithium complex greases,” explains Mehdi Fathi-Najafi.

In order to find the best possible balance between these strengths and weaknesses, Nynas in cooperation with MOL Lub Ltd. conducted a study comparing the behavior and suitability of NYNAS® T 600 and Bright Stock (BS) in aluminum complex greases.





“We found that NYNAS® T 600 offers an excellent choice for this type of formulation. A better thickening effect as well as improved low-temperature flowability and resistance to water were among the benefits we were able to demonstrate,” says Mehdi Fathi-Najafi.

In the comparative study, four different greases were produced based on different base oils, see table. The consistency of the greases revealed that when NYNAS® T 600 was used, the thickening effect improved significantly.

Excessive oil separation is one typical weakness of aluminum complex greases. Grease B and Grease C (based

on NYNAS® T 600) showed a significantly lower degree of oil separation compared with the other greases. The lower oil separation can to some extent be attributed to the higher consistency. Despite their higher consistency, the greases based on NYNAS® T 600 also displayed impressive flow pressures at -20 °C.

Aluminum complex greases generally show good resistance to water. Hence, all greases performed very well in the static water spray-off test. However, in the dynamic water wash out test, the greases based on NYNAS® T 600 (B and C) showed a more than 65 percent better result.

Characteristics	Method	Grease A	Grease B	Grease C	Grease D
Base oil		BS + SN 350	T 600 + SN 350	T 600	BS
Average viscosity @ 40 oC, [mm2/s]		220	220	600	450
Fixed Thickener content, [wt. %]		7.0	7.0	5.3	5.3
Dropping point [oC]	IP396	254	258	253	251
Penetration (60), [mm-1]	ASTM D217	263	233	219	299
NLGI grade		2	3	3.5	15-2
Oil separation @ 40o C/168 hrs, [wt. %]	IP121	5.36	2.53	0.70	4.46
Cu-corrosion, [rating]	ASTM D4048	1	1	1	1
Flow pressure @-20 oC, [mbar]	DIN 51805	1570	645	1170	1545
Water wash out, [wt. %]	ASTM D1264	18.6	6.5	11.3	36.3
Water spray off, [wt. %]	ASTM D4049	0.7	0.4	0	8.2
4-ball weld load, [N]	ASTM D2596	1500	<1400	1400	<1400
4-ball wear scar, [mm]	ASTM D2226	0.74		0.70	0.70

Table showing characteristics of the aluminum complex greases used in the comparative study.

### Aluminum alternative

The current increase in lithium-based applications, especially within the battery industry, raises concerns for grease manufacturers regarding the price volatility of lithium hydroxide. The industry is vulnerable as more than

70 percent of its global production is still based on lithium hydroxide thickener systems.

Diversification into greases with alternative thickeners is increasingly seen as a way of mitigating the risk, and aluminum offers one such alternative.

### Mehdi Fathi-Najafi

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## Lubrication in environmentally sensitive areas: Making the right choice with esters

**While environmental concerns are rising all around the world, lubrication in environmentally sensitive areas is an important issue that needs special attention. NYCO Technical and Sales Manager Arnaud Radigue tells that synthetic esters offer great properties while doing no harm to the environment, but selection should be made carefully.**

### Lubrication in sensitive areas

Protecting the environment against various harmful industrial effluents is obviously a key issue, worldwide. Simple awareness has been losing ground to demanding, binding regulation. Lubrication is no exception, in

particular when outdoor equipment is likely to expose the environment to harmful oils or greases.

The notion of loss lubrication, whether accidental, partial or total, as defined by the 2018 European Ecolabel, refers to operations that may release, partially or totally, lubricants to the environment. If the lubricant in question



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shows harmful features, then the lubrication operation represents a threat to the environment that must be dealt with. In particular, water catchment areas, or the marine environment are considered highly sensitive areas where lubrication will be under specific scrutiny.

A number of applications may be listed where loss lubrication is a reality: snow mobile, jet skis and outboard marine engines, ski lifts, chainsaws and forestry equipment, hydraulic turbines used in dams, stern tubes and rudders on ships, construction lubricants (hydraulics in particular), and even subsea equipment in offshore operations.

A particularly meaningful example of problematic lubrication operation is the case of stern tube oils. Stern tube bearings, supporting the propeller shaft, are lubricated with oils that are contained with specific leap seals. Although many designs are possible, a number of those seals release a small quantity of oil to the sea by design. But the amount of sea freight worldwide is such that an estimated 37 to 61 million litres of stern tube oil leak out to the sea annually, as part of standard operations. This is simply the equivalent of an average oil spill, every year.

### Labels, standards and regulations

There are numerous labels and standards across the world dealing with requirements, recommendations or best practises on the evaluation and reduction of the

environmental impact of lubrication on the environment. The European Ecolabel is probably the most well-known of them in our industry, requesting no hazard classification, biodegradability, no aquatic toxicity, and recycling in the use of packaging materials. We may also mention the EN 16807:2016 standard that defines the term "biolubricant", as well as other standards, labels or programmes like the Blue Angel, the Nordic Swan, the Swedish Standard, or the USDA Biopreferred®. All of these measures are voluntary schemes designed to encourage the use of environmentally "friendly" lubricants. Such lubricants may be required, though, in tenders for public works.

However, there are also a number of binding regulations on the market, the first of which being the Vessel General Permit (VGP), initially released in 2013 by the EPA, and now called the Vessel Incidental Discharge Act (VIDA). The key requirements for such lubricants used in sea water interfaces (basically under the water line, and sometimes on deck) revolve around biodegradability, ecotoxicity, and bioaccumulation, thus defining the notion of "Environmentally Acceptable Lubricant" (EAL). It should be noted that whilst formerly, a lubricant that was certified with any of the usual labels (European Ecolabel, Nordic Swan, Blue Angel, Swedish Standards, OSPAR...) did automatically comply with the requirements of the VGP, the VIDA may eventually have its own set of requirements that must be met regardless of compliance with any other label or legislation.







The OSPAR (Oslo Paris agreement) is an accord between several countries of Northern Europe that, when translated into local legislation, restricts the use of offshore fluids depending on their marine environmental profile. Properties such as marine biodegradability, toxicity to specific marine species, and bioaccumulation need to be assessed in this case.

We may also mention the 2017 International Maritime Organization's Polar Code, applying to ships operating in polar waters, and requiring the use of non-toxic, biodegradable lubricants in direct seawater interfaces.

Whether voluntary or regulatory, these criteria do not only revolve around environmental innocuity, but they also specify, sometimes, a minimum performance requirement level.

## Environmental and technical profile of esters

### a) Biodegradation

Biodegradation is the ability of a substance to be degraded into smaller fractions by bacteria. In the case of ultimate biodegradation, a complete mineralisation of the organic substance is evaluated. The OECD 301B standard actually monitors the release of carbon dioxide over time, with respect to the theoretical carbon dioxide quantity released if the tested substance was thoroughly degraded. A substance is therefore called ultimately biodegradable if more than 60% of potential CO<sub>2</sub> evolution is observed within 28 days.

Many esters (but not all) are generally highly biodegradable, with typical values revolving around 75%. It should be noted here that viscosity, in the case of synthetic esters, is not necessarily a limiting factor.

### b) Aquatic toxicity

Aquatic toxicity is defined as the toxicity of the substance towards aqueous species, like algae (OECD 201), daphnia (a freshwater crustacean, OECD 202) or specific freshwater fish species (OECD 203). It is expressed as the minimum quantity of substance in water that cause half of the population of the species to die: the higher the better. A vast majority of esters are non-toxic to aquatic species, showing values exceeding 1000 mg/litre. In this notion, the solubility of esters in water must be taken in consideration.

### c) Bioaccumulation

Bioaccumulation is the ability of a substance to be absorbed and eliminated by a living species. It is tightly linked to the ability of the substance to cross cell barriers, and to its lipophilic features. A variety of indicators may be used to anticipate or evaluate bioaccumulation:

- **The molecular size and mass:** the higher, the less



likely the substance may cross the cell barrier. Esters very commonly show molecular diameters exceeding 1.5 nanometer.

- **The differential solubility of the substance between water and octanol:** expressed as log Kow. If very low, solubility in water will be high and the ability of the living species to evacuate the substance will be strong. If very high, the substance will be highly lipophilic, a property generally associated with large molecules that are not likely to bioaccumulate – which is the case with many esters.

- **The BioConcentration Factor (BCF):** the equilibrium that a living species reaches between absorption and elimination of a substance. Synthetic esters typically show a BCF of less than 100 liters/kg.

According to the above criteria, many esters will be considered as non bioaccumulative.

### d) Carbon of renewable origin

If it is necessary, esters may be produced using carbon of renewable origin (typically 80%), as measured by ASTM D6866. However, it should be noted that environmental properties are disconnected from the actual source of the materials used to produce synthetic esters.

### e) Technical profile

Synthetic esters are available in a very wide range of viscosities, ranging from a few mm<sup>2</sup>/s to several hundreds of mm<sup>2</sup>/s at 40°C. Also, they generally show high viscosity indices.

Environmentally acceptable lubricants are normally not expected to be exposed to extreme temperatures. Nonetheless, unsaturated esters, because they are prone to rapid oxidation leading to polymerization, may be unsuitable for some applications. In such cases, preference should be given to saturated esters that provide excellent stability and cleanliness.

Additionally, esters do possess friction modifying properties, meaning they are able to reduce friction and

wear in mixed lubrication regimes.

Esters are designed species, produced from a variety of possible raw materials. This means that their structure, hence their lubricating properties, may be tailored to match the best technical compromise. It is therefore possible to design structures that optimize, for the purpose of environmentally sensitive applications, water separation and air release properties. Elastomer compatibility is also a property that may be put under control, to some extent, by carefully selecting chemical structures.

A common objection about esters is their potential instability to hydrolysis, a legitimate concern in environmentally sensitive applications where water is generally present. The reality is that at low or ambient temperatures, the hydrolysis reaction is so slow that it may be considered as insignificant. At high temperatures, water tends to evaporate, suppressing any possibility of hydrolysis. Additionally, careful selection of ester structures will mitigate the effects of potentially released acids through hydrolysis.

Esters may also be used to produce environmentally friendly greases, like for instance rudder bearing greases, as high viscosities are available without hurting biodegradability properties. The polarity of esters imparts some extent of adhesion and delivers excellent lubricity

features.

In 2-stroke engines, synthetic esters demonstrate clean burning properties, mild detergency and dispersency features, as well as excellent lubricity features, making them of particular interest in this application.

## Conclusion

Environmental awareness is growing, including in lubricating applications. Synthetic esters provide a unique combination of:

- Environmentally compliant features, as a vegetable oil
- Technical performance, as a group V, synthetic base fluid

They are the only synthetic technology showing such a combination of technical and environmental profiles. Yet they have to be carefully selected in order to guarantee maximum performance in a given application.

The development of lubricants dedicated to environmentally sensitive applications is therefore expected to generate an increasing use of synthetic esters.







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## May it be perfect

The waste oil management hierarchy starts with the goal of producing zero waste. For this reason, the industry works for oils that maintain their quality well in the long run. While innovative studies continue for the chemistry of base oils and additives, waste oil is rapidly gaining ground as a circular economy input. Longer useful life of the oil brings an advantage to the stage of minimizing waste production. It is not possible to reuse the waste oil as a lubricating oil. It needs to be processed. Recycling is the most important and priority stage in the hierarchy, and if recycling is not possible, waste oil management proceeds with energy recovery or disposal. Waste oil recycling is essential for a resource efficient sector with a low carbon footprint. The sector has gained strength with the renewed legislation for our recycling success. With the "Regulation on the Amendment of the Waste Oil Management Regulation" dated 23 December 2020, refining facilities were included in the list of authorized organizations for the collection and transportation of waste oil. That was perfect. Because regular collection of waste oils is critical for the sustainable raw material supply chain management of refineries. As is known, in Turkey the only authorized institution for the collection of waste motor oil was the Petroleum Industry Association (PETDER) Commercial Enterprise. PETDER collected 19,469 tons of waste motor oil in 2020, 62 percent of which came from vehicle services and 14 percent from industrial vehicle park.

The regulation enforces lubricant producers to "collect

10 percent of the lubricant that they put on the market in 2021, 15 percent in 2022, 20 percent in 2023 25 percent in 2024, and in the amount to be determined by the Ministry for the following years". With this obligation, responsibility of producers in waste management is made clear. That was perfect. Besides, the provision "In lubricant production, it is mandatory to use 8 percent base oil produced from waste oil in 2022, 12 percent in 2023, 15 percent in 2024 and at the rates to be determined by the Ministry for the following years. Imported base oils shall not be included in the mandatory usage rates specified in this paragraph" was added. That was perfect. In this way, the refineries' supply of recycled base oils to the sector is supported.

Acıöz, Engin, Golteks and Koza companies, which have an environmental license of "Waste Oil Recovery" within the framework of the previous legislation, have undergone the production qualification audit conducted by the Ministry of the Environment and Urbanization and TUBITAK Marmara Research Center Institute of Chemical Technology in order to obtain an environmental license on "Waste Oil Refining" under the new legislation. TAYRAŞ Upcycling Refinery, which will start its trial production in April 2021, will be audited in April. With a "there is safety in numbers" approach, these organizations conduct collective work on waste oil. That was perfect. Now, last but not least, we are watching and waiting for the success of waste oil collectors and processors in order to be able to say "this is perfect". Wishing all the best to them. May it be perfect.



# EDITORIAL CALENDAR

**MADENİ YAG  
DÜNYASI  
LUBRICANT  
WORLD**

Issue 31	May-June 2021
Features	<ul style="list-style-type: none"> <li>• Food Grade Lubricants</li> <li>• Heat Transfer Fluids</li> </ul>
Content Deadline	5 Jun 2021
Advert Deadline	12 Jun 2021
Events where magazine will be distributed	

Issue 32	July-August 2021
Features	<ul style="list-style-type: none"> <li>• Aeronautics and Defense Lubricants and Fluids</li> <li>• Gear Oils</li> </ul>
Content Deadline	7 Aug 2021
Advert Deadline	14 Aug 2021
Events where magazine will be distributed	Istanbul Airshow 23-26 September – Atatürk Airport

Issue 33	September-October 2021
Features	<ul style="list-style-type: none"> <li>• Latest Trends in Base Oils</li> <li>• Waste Oil Upcycling</li> </ul>
Content Deadline	2 Oct 2021
Advert Deadline	9 Oct 2021
Events where magazine will be distributed	Automechanika Istanbul 18-21 November – TUYAP Fair and Convention Center European Base Oils & Lubricants Summit 23-26 November, Amsterdam-The Netherlands

Issue 34	November-December 2021
Features	<ul style="list-style-type: none"> <li>• Bio-Based Lubricants</li> <li>• E-Commerce in Lubricants</li> </ul>
Content Deadline	4 Dec 2021
Advert Deadline	11 Dec 2021
Events where magazine will be distributed	

Issue 35	January-February 2022
Features	<ul style="list-style-type: none"> <li>• Electric Vehicle Fluids</li> <li>• Dielectric Fluids</li> </ul>
Content Deadline	5 Feb 2022
Advert Deadline	12 Feb 2022
Events where magazine will be distributed	

Issue 36	March-April 2022
Features	<ul style="list-style-type: none"> <li>• Oil Analyses</li> <li>• Heavy Duty Lubricants</li> </ul>
Content Deadline	1 Apr 2022
Advert Deadline	8 Apr 2022
Events where magazine will be distributed	



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# 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

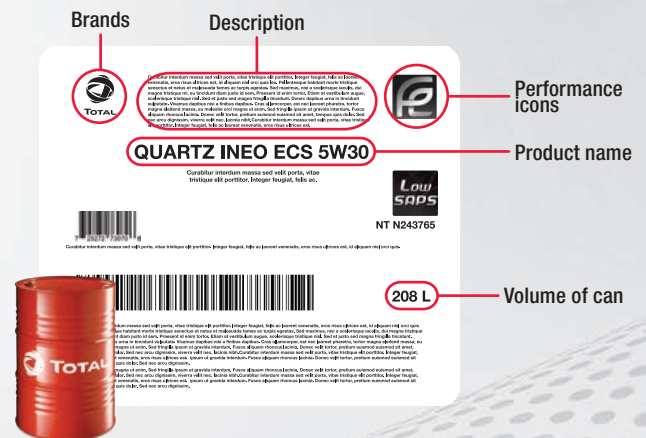
New-generation engine oils and those currently being developed by TOTAL are of increasingly fluid grades: 0W-20, 5W-20, 0W-30 and 0W-16.

## How to read a product label for product selection?

Small packaging:



Large packaging:





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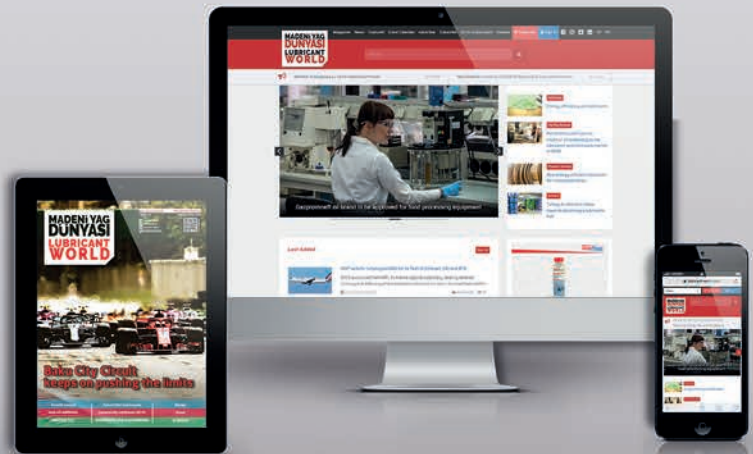
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**For more information visit [www.nynas.com](http://www.nynas.com) or contact your local Nynas sales office.**

### APPLICATIONS

NYNAS T 600 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.

