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How the PCL market is adapting to rapidly changing environmental conditions

An overview of

2020 with

Sezgin Gürsu

Calcium sulfonate

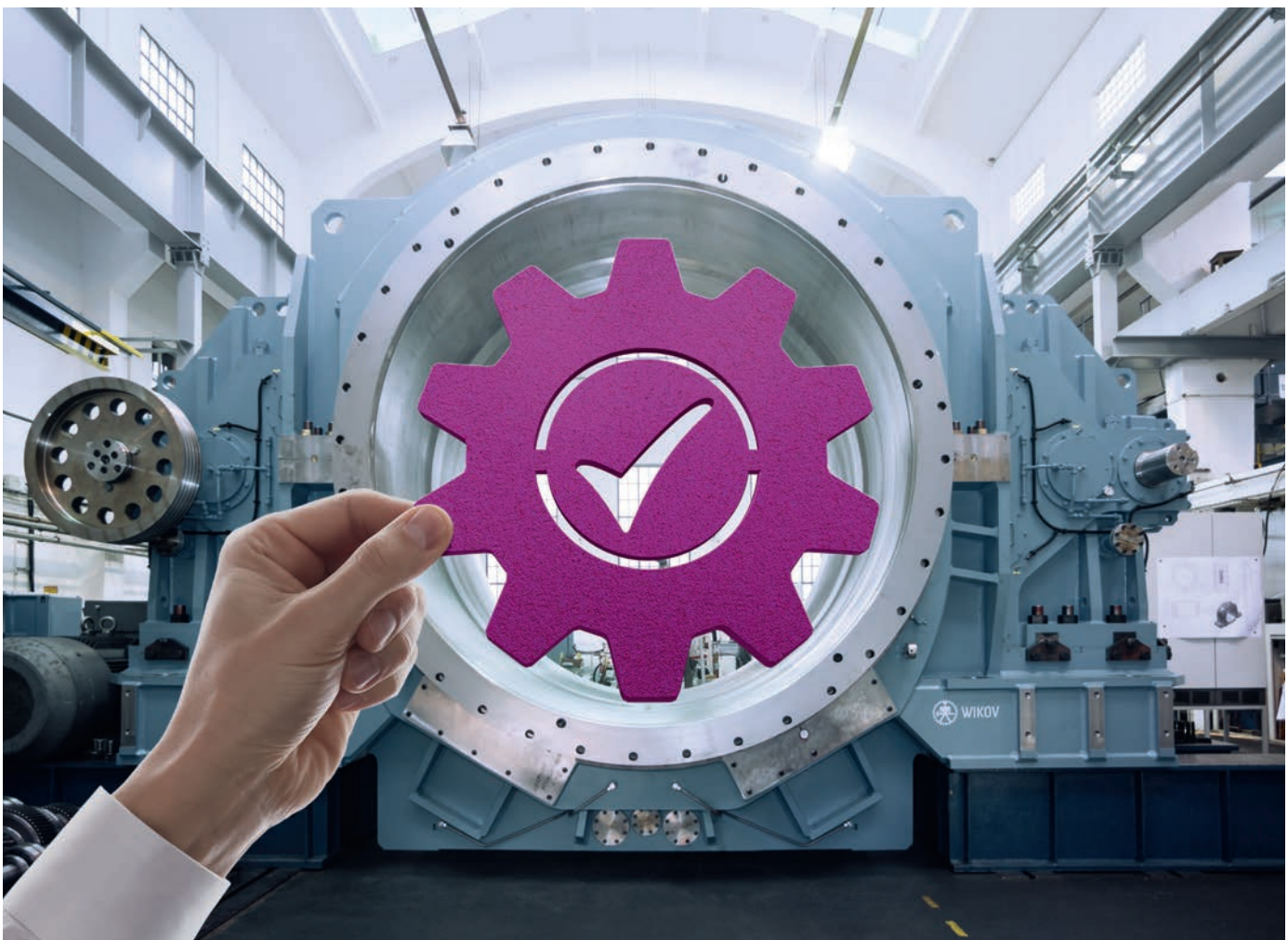
complex greases in the

iron and steel industry

Nynas developed

NYNAS® BT 22 in response

to high 22 cSt demand



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Editor's Letter



We left behind a challenging year and started 2021 with hopes. Although the pandemic still continues to affect our lives deeply, we believe that this year will be better than the previous year. As a matter of fact, we see the signs of recovery in our industry. The sharp demand declines and stock crises we experienced at the beginning of the pandemic are over. As of the second half of 2020, the lubricant demand started to increase and the factories are returning to full capacity operation again.

We made a comprehensive assessment of 2020 with Sezgin Gürsu, Petrol Ofisi Lubricants Director, and reviewed our industry experiences. Petrol Ofisi broke new records in 2020 and has maintained its leadership in lubricants market.

Efsun Acar, Production Coordinator at Vario Engineering, wrote an article about the areas of use for calcium sulfonate complex greases in the iron and steel industry. She explained the different properties of calcium sulfonate complex greases from other greases, and shared the benefits of this grease type.

The passenger car lubricants market is going through a period of change with the increasingly diverse advanced technology production processes of vehicle manufacturers and incentives for the acceleration of the transition to electric vehicles. The market is trying to keep up with these changes and Dr. Colin Morton and Dr. Ewan Delbridge from Lubrizol told about the current situation of the PCL market.

Nynas developed NYNAS® BT 22 to meet the growing demand for 22cSt viscosity. You can find detailed information about this new base oil series of Nynas on our product review page.

In addition to special products developed within the framework of cooperation with OEMs for many years, Castrol develops new product groups for changing needs in the era of electric vehicles. Among these collaborations, the Volkswagen Group comes first.

I hope you enjoy reading all these news and much more.



Turkey Edition

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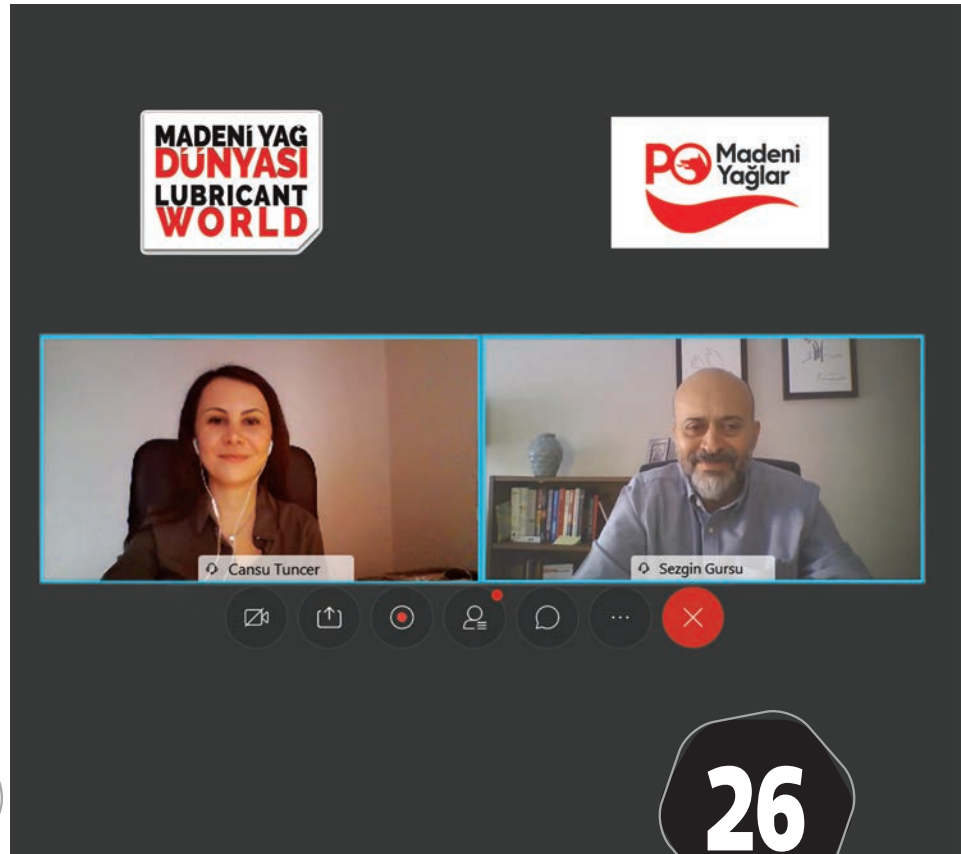
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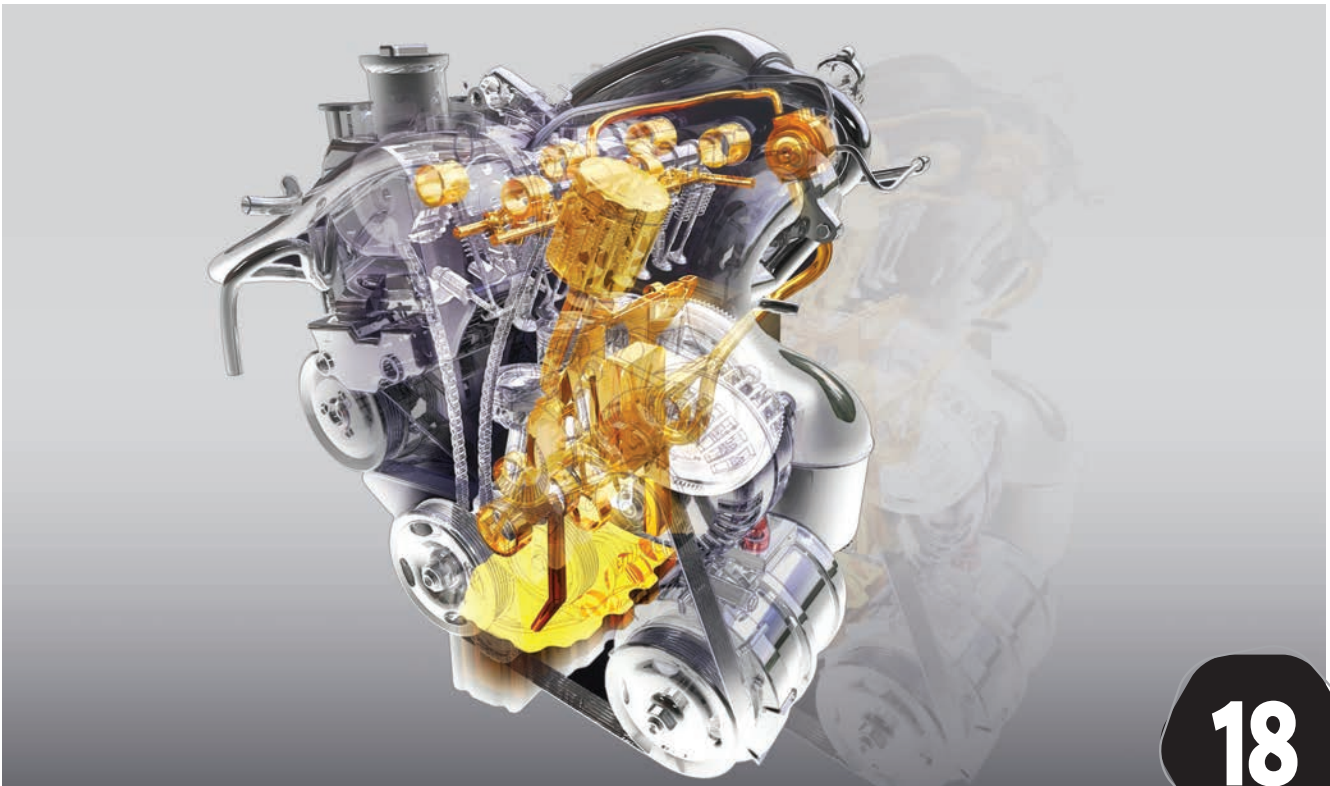
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Although times change, some recommendations do not



Motul signs new partnership with Glickenhaus

The 300V Motorsport series produced by Motul to excel in competition will be used by Glickenhaus in FIA WEC races. All products in this leading line of Motul have successfully proven their reliability, performance and quality engineering, and Motul's experts are working with engine developers to get the maximum performance from the vehicle when the best pilots hit the track in 2021.

Under this partnership, Motul will also provide Glickenhaus with a high performance fluid line for the first fill of all models. Glickenhaus will recommend Motul to owners of the high-performance sports model SCG 004S and SCG Boot off-road vehicles. In this way, these vehicles will benefit from Motul's highly successful experience in challenging races such as Dakar.

Motul's Chief Value Officer Nicolas Zaugg commented: "Being the official lubricant partner of the FIA WEC and the Le Mans 24 Hours, as well as the recommended lubricant supplier for all V8 engines used in the LMP2 category by Gibson definitely prove Motul's commitment to endurance races. However, our portfolio lacked the new Hypercar category and it is now complete with our partnership with Glickenhaus. We are excited to be part of such an enormous technical challenge as well as the human adventure represented by the Glickenhaus team, which belongs to the Hypercar category. Our best experts work closely with the Glickenhaus team to put the last touches on the car, and it is important to us that this experience will not only benefit future Glickenhaus racing models, but also their road and off-road vehicles. We can't wait to see two Glickenhaus 007 LMH cars race this year's WEC season!"

Glickenhaus Racing President James Glickenhaus said: "I'm excited to start a long-term collaboration with Motul to provide our road and racing cars with great Motul lubricants. I am very happy that Motul's technical experts are working together with our engineers to customize products for vehicles, just like driving from Baja to Nürburgring, WEC to Le Mans, Paris to Dakar. I remember that our collector cars Ford MK-IV, Ferrari P 3/4 and Ferrari 412P competed against each other in 1967 at Le Mans and Motul was the sponsor of this race. Racing in Le Mans with a car with our name written on it in the upper class under the sponsorship of Motul is a dream come true."





PETRONAS launches new Urania engine oil range

PETRONAS Lubricants International (PLI) announced the launch of its new PETRONAS Urania oil range, engineered with core strength for both light commercial and heavy duty trucks. With new Strong Tech™ technology, PETRONAS Urania delivers the durability needed to withstand the toughest situations across EMEA.

Facing extreme engine temperatures, oxidation and damaging deposits, PETRONAS Urania brings core strength to the trucks and commercial vehicles that must survive in the harshest conditions under the heaviest loads. From extreme weather to higher demand to restock store shelves quickly, every innovation has been tailored to maximize performance across all major vehicle brands. Through its unique formula this new range of high-quality Engine Oils extends drain intervals, minimizes wear, reduces unplanned downtime and ultimately ensures complete operational flexibility.

Developed with StrongTech™ technology at the PLI Global Research & Technology Centre in Turin, Italy, the new formula enables vehicles to stay stronger for longer as the oil forms a uniquely strong fluid film. Incredibly robust molecule chains lock away soot to maintain optimal viscosity and defend against wear and oxidation, extending the oil's efficiency right up to the next drain. PETRONAS Urania is designed to increase an engines life under pressure, so it can continue to inspire confidence in fleet managers, and reduce the threats faced by those who earn a living behind the wheel.

The profitability that comes with staying on the road and maximizing the vehicle's capabilities is thanks to 20 years of PLI experience in improving fuel efficiency and reducing the total cost of ownership. In addition, the support services PLI provides to its customers further enable users to get the best from their PETRONAS Urania lubricants. Only with the smartest technologies and best support can drivers have the sheer confidence in their truck to get the job done on time and within budget. These decades of experience and extensive research have produced a better fuel economy, reduced emissions, enhanced reliability and extreme durability. PETRONAS Urania has been engineered with CO₂ reduction in mind, so drivers can maximize uptime without compromising on sustainability.

Domenico Ciaglia, MD EMEA, PLI, said: "Our customers are looking for core strength they can trust. Many of them face challenging schedules, challenging terrains and challenging weather on a daily basis. The new PETRONAS Urania formula provides the strength for trucks to run stronger for longer thanks to development and testing at the most extreme events, including Formula 1, Moto GP and the Dakar Rally. This technology has proven its mettle time and time again. With PETRONAS Urania, fleet managers, drivers and their vehicles will have the confidence to face any challenge."



Millers Oils launches new and improved commercial vehicle engine oils

Independent British lubricant manufacturer, Millers Oils, has launched a range of new Commercial Vehicle engine oils suitable for all types of heavy-duty vehicles.

This new range has been developed to deliver improved product quality and a more extensive specification portfolio from its successful predecessors. Both the flagship brands, Truckmaster and Multifleet, use modern technology to suit new and current heavy-duty vehicles. The top tier products cover vehicles up to EURO 6 and where ACEA E9 is called for, so even the most modern of fleets will be catered for whilst also remaining applicable to older fleets with backwards compatible technology and offering various viscosity grades.

The premium Truckmaster range of engine oils has Original Equipment Manufacturers (OEM) approvals which further enhance the coverage and give fleet owners the peace of mind that vehicle's still in their warranty period are covered. The OEM approval certificates include some of the top manufacturer specs called for such as: VDS-4.5, LDF-4 and MB 228.52.

The Truckmaster range utilises Dynamic Fluid Technology (DFT), a unique, superior lubrication technology developed and blended by Millers Oils. DFT uses the very latest and best additive technologies, which act synergistically to maximise protection and enhance performance.

Andy Ogley, Millers Oils Technical Manager explains further:

"Engines are most susceptible to damage and wear during the start-up phase, and modern driving conditions only exacerbate this vulnerability – sitting in heavy traffic, stopping and starting the engine, can result in reduced engine life. Dynamic Fluid Technology combats these effects, exploiting the molecules' surface chemistry to form a dynamic protective film over all engine component surfaces, thereby safeguarding the engine.

We now have a full and comprehensive range of heavy duty engine oils to suit all fleet types, the wide ranging needs of this sector and the demands and pressure on the vehicles."

As well as manufacturing engine oils for the Commercial Vehicle sector, Millers Oils also produces driveline lubricants, ancillary products, fuel treatments and provides an oil analysis service.



API plans ambitious aftermarket audit program for 2021

The American Petroleum Institute announced the start of the 2021 cycle of the Aftermarket Audit Program (AMAP) with the goal of testing up to 1,300 packaged and bulk engine oil samples this year from around the world. AMAP oversees sampling of API-licensed oils in the marketplace and tests them to verify compliance with the engine oil specifications. This ensures oil marketers, distributors, installers and consumers that they can have confidence in the quality of API-licensed motor oils in the marketplace.

"API is making API SP and ILSAC GF-6A and GF-6B engine oils a focus for testing in 2021 to be certain that they are compliant with the rigorous specifications required for use in today's gasoline engines," said Jeffrey Harmening, manager, EOLCS with the American Petroleum Institute. "In addition, API plans to develop an annual summary report detailing AMAP program's results."

AMAP, which was launched in 1992, moved online in 2014 enabling API to quickly alert licensees to audit results and allowed for prompt corrective action to be taken when necessary. Through AMAP, API has tested more than 8,600 oil samples since 2014 to confirm that they met the API standards for which they are licensed. If a licensed oil does not match the specified physical and chemical requirements, API works with the licensee to evaluate the root cause and take appropriate corrective action. Unresolved nonconforming licensees are subject to additional enforcement actions in accordance with API 1509 - Engine Oil Licensing and Certification System. In addition to sampling licensed oils, API also samples and tests products encountered in the marketplace that are using the API certification marks without the authorization of API.

API tests oils from around the world and plans to expand the international program throughout the coming year. Oils for gasoline-powered engines will account for about 60 percent of tests and oils for diesel-powered engines will account for about 40 percent of tests in 2021. In addition, diesel exhaust fluid samples are also tested as part of the AMAP program with about 500 expected to be sampled and tested in 2021.

API represents all segments of America's oil and natural gas industry. Our more than 600 members produce, process and distribute most of the nation's energy. API was formed in 1919 as a standards-setting organization. In our first 100 years, API has developed more than 700 standards to enhance operational and environmental safety, efficiency and sustainability.



Opet Fuchs launched its e-commerce platform Fullcheck Shop

Opet Fuchs started providing products and services directly to customers in the traditional lubricants market with its online sales platform Fullcheck Shop. Turkey's first online lubricant platform Fullcheck Shop, which serves private services, retailers, commercial and station customers, offers lubricants that suit the needs of each vehicle brand and model.

Opet Fuchs Sales and Marketing Director Erçin Bıyık said: "As Opet Fuchs, we broke new ground in the lubricants industry, with the Fullcheck Shop, which we have launched in line with our vision of 'becoming a service company offering direct, end-to-end and digital solutions to our customers'. We have implemented many projects by supporting all our company strategies, business models and current processes with modern and agile digital infrastructures. With the Fullcheck Shop e-commerce platform, we offer retail sales points and private services the opportunity to shop directly from the manufacturer."

Opet Fuchs has brought a new dimension to customer habits with the Fullcheck Shop e-commerce platform. Turkey's first online lubricants platform Fullcheck Shop is launched by Opet Fuchs for private services, retailers, commercial and station customers. The website offers lubricant products for every brand and model, and provides the customers with the convenience of placing order 24/7, direct shopping from the manufacturer, "click to spend" and installment options for credit cards. Customers also have the opportunity to benefit from daily, weekly and monthly special offers, as well as the loyalty system, "win as you buy" and free shipping.

Winner of Golden Award in the SAP "Business Transformation" category

The Fullcheck Shop project, which is the first digital platform launched in the sector by Opet Fuchs, ranked first in the SAP Turkey Quality Awards Business Transformation Category and was given the Golden Award in the previous months. Opet Fuchs will represent our country in the field of "Business Transformation" at the "SAP EMEA Region Quality Awards" with Fullcheck Shop. Fullcheck Shop, which includes more than 300 products, provides convenience to customers with more than 150 campaigns monthly, weekly and daily. The field experts of the application, which meets the needs of customers of all automotive groups with its fast and broad delivery network, visit customers and provide them with information and consultancy services about products, services, campaigns and applications. Fullcheck Shop currently serves B2B customers and it is targeted to transform it into a platform that offers different products and services to B2C customers in the future. With this target, it is planned to create a marketplace where different products and service groups are sold in addition to lubricants.



Erçin Bıyık



Shell introduces a global portfolio of carbon neutral lubricants

Shell announced it will offer customers carbon neutral lubricants across a range of products for passenger cars, heavy duty diesel engines and industrial applications with its target to become a net-zero emissions energy business by 2050.

Shell aims to offset the annual emissions of more than 200 million litres of advanced synthetic lubricants, expecting to compensate around 700,000 tonnes of carbon dioxide equivalent (CO₂e) emissions per year, which is equivalent to taking approximately 340,000 cars off the road for one year.

"As the world's largest lubricant supplier, we are ready to meet the changing demands of our customers. By using more renewable energy in the production of our lubricants, reducing our waste and increasing the efficiency of our operations, we are committed to stop or reduce emissions. With these practices, we help our customers to reduce their carbon emissions," said Parminder Kohli, Shell Vice President Lubricants Europe, Russia and Africa.

Shell & Turcas Lubricants Director Mehmet Ünal commented: "As part of Shell's target to become a net-zero emissions energy business by 2050, we are happy to share our carbon neutral product portfolio both for the automotive and the industry with our business partners and customers. Our carbon neutral products will help our customers to benefit from high performance and protection while reducing and offsetting their carbon emissions to reach their sustainability targets."

Shell's carbon neutral lubricants will be available in key markets across Europe, Asia-Pacific, the Middle East and North America, including the UK, Germany, France, Italy, Spain, Poland, the Netherlands, Belgium, Luxembourg and Turkey. This portfolio will also be available through Shell distributors in all countries where Shell operates. Shell will offset the emissions from a mix of advanced synthetic lubricants in these markets, including Shell Helix Ultra 0W for passenger cars; Shell Rimula R6 & Ultra, Shell Tellus S4, Shell Omala S4 & S5, Shell Mysella S5 & S6 & S7, Shell Morlina S4 for industrial applications, Shell's range of eco-Label products "Shell Naturelle", and Shell Gadus S5 product range for wind turbines.

The carbon neutral product portfolio will make a significant contribution to Shell's commitment to become a 'net zero emission' energy business by 2050.

While measures to avoid and reduce emissions offer the best way to tackle emissions in the long term, until scalable solutions are deployed, carbon offsetting programmes provide an immediate solution to balance CO₂e emissions across Shell's portfolio and value chain. Shell's global portfolio of nature-based carbon credits will compensate CO₂e emissions from the entire lifecycle of these products, including the raw materials, packaging, production, distribution, customer use and product end of life.





TP Lubricants are now available at e-commerce platforms

TPLubricants, which are renewed with an innovative perspective by Turkish Petroleum, Zülfikarlar Holding's 100 percent domestic brand operating in the Turkish fuel industry, are now available at TP stations as well as the leading of online shopping sites as of December.

The shopping habits that concentrated on digital platforms with the pandemic have also affected vehicle owners. Those who would come to a Turkish Petroleum station to change their engine oil or prefer TP Lubricants at their car care service can now buy these products online at leading e-commerce platforms.

In this way, Turkish Petroleum delivers its broad TP Lubricants portfolio at the doorstep of the customers.

TP Lubricants can be purchased at hepsiburada.com, n11.com, Trendyol and PTTAVM

Turkish Petroleum, having 27 different products suitable for almost all vehicle types in its product portfolio including 16 products for passenger cars and 11 products for commercial and heavy duty vehicles, offers its lubricant products to customers at Turkey's leading e-commerce platforms hepsiburada.com, n11.com, Trendyol and PTTAVM. Consumers can choose the most suitable TP Lubricants product for their vehicle's engine and make their orders with a single click, without going to sales points. Turkish Petroleum will also put its lubricant products on sale via Amazon in the future.

In addition to 27 different types of lubricants in the TP Lubricants product range, which take their name from precious stones, there are also vehicle maintenance products produced with advanced technology from windshield washer fluid to Adblue, from hydraulic brake fluid to antifreeze.

TP BORNIT and ONIKS series, which are produced by combining mineral and synthetic-based oils and advanced additives and produced specifically for passenger vehicles, create a stable film layer on key parts of diesel and gasoline engines, reducing vibration in the engine and contributing to fuel economy by reducing friction.

TP RODONIT and FLORIT Lubricants, which are high-quality, mineral and synthetic-based heavy duty engine oils, specially developed for heavy-duty vehicles operating under the harsh conditions of long-distance, protect the systems of these vehicles and extend the life of the engine.

TP Lubricants product range also includes GRANAT as automotive gear oils series, SUPER as industrial oils series, and LUBE2MARINE, which meets the lubrication needs of marine vehicles.



Nynas premium base oils.
The daily grind just got smoother.

The superiority of metalworking fluids made with Nynas base oils is just one example of how a daily chore can turn into a regular delight with the right naphthenic solution. The same goes for greases and lubricants, where Nynas base oils offer high solvency and excellent low temperature properties.
www.nynas.com > base oils



Calcium sulfonate complex greases in the iron and steel industry



Efsun Acar

Chemical Engineer
Production Coordinator

Vario Engineering and Production Technologies Inc.

Establishing an iron and steel factory require very high investment value due to the size of their equipment and long production lines. Such investments must pay off as promptly as possible. To achieve this, low operating-maintenance costs and reliable operation without unplanned downtime are required. Any unplanned event can result in significant revenue losses. In addition, each component of the steelmaking process must produce higher quantities of steel annually while maintaining the quality level and meeting stricter environmental standards.

Lubrication is of paramount importance to help the

steel industry achieve its goals. Considering that 36 percent of bearing damage is caused by incomplete, incorrect and improper lubrication as per the SKF data, there is a need for a wide variety of lubrication solutions designed to meet the extreme requirements of the industry. To make the iron and steel producers achieve their annual production targets, lubrication should be designed properly to protect the components subject to high temperatures, high loads and continuous vibration and against contamination with water, steam, acid, etc. For long equipment life or increased operating time with reduced oil consumption, mutual engineering work must be carried out.

Although most applications in the iron and steel industry push lubricants to their limits, a different lubrication property is expected from the lubricant at each step of the process. Calcium sulfonate complex greases have a chemical structure that responds to almost each of these challenges, regardless of the stage of the steelmaking process.

Calcium sulfonate complex greases have an excellent technology for grease applications with heat, water, high or shock loads. It provides outstanding rust and corrosion protection, high load carrying capacity, high dropping point and very good mechanical stability even in the presence of water. Unlike other grease types, these performance characteristics are achieved without the use

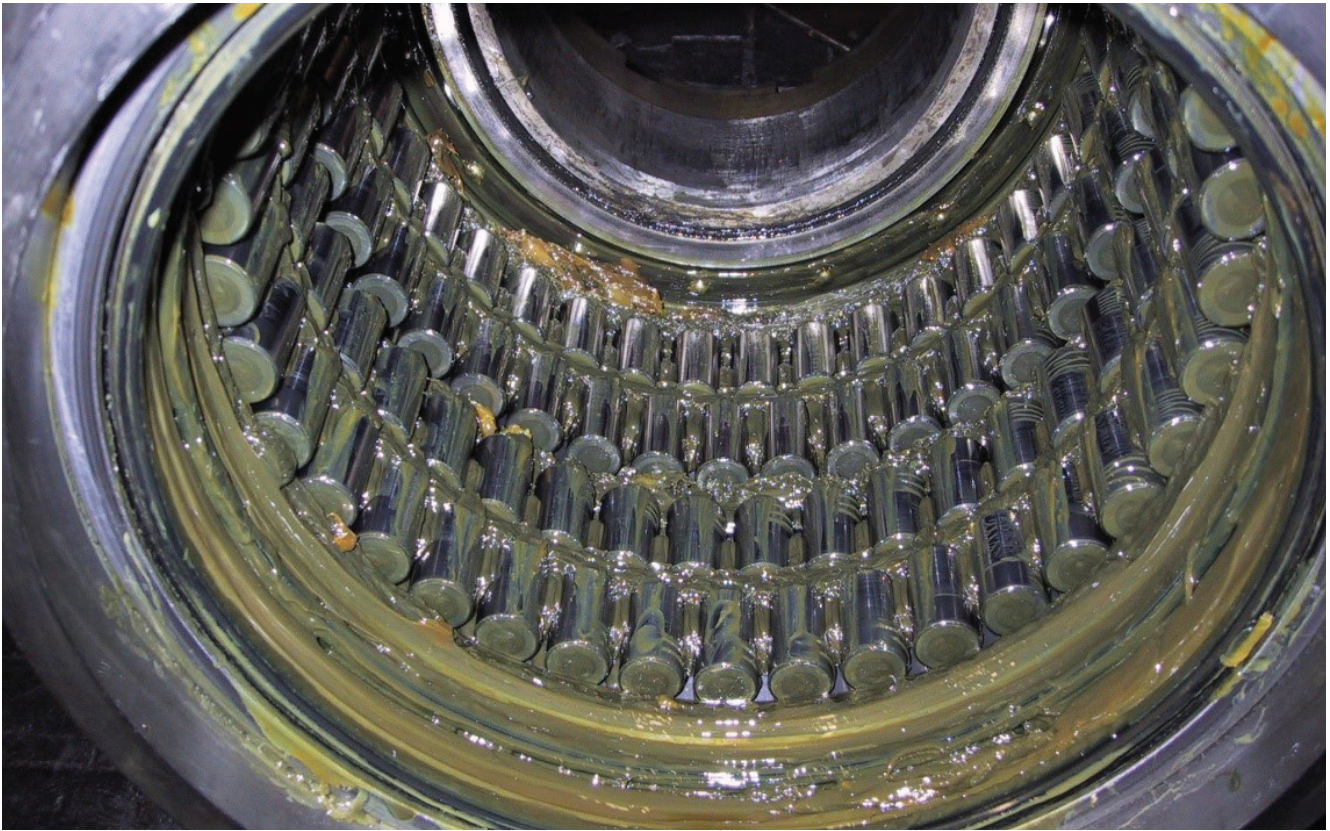


Figure 1: Bearing removed after operation

of any additional raw materials.

Calcium sulfonate complex-based greases are successfully used in iron and steel factories, marine and paper mills, off-road, construction and mining equipment and even in the food processing industry.

Experimental studies

Over-based calcium sulfonates contain large amounts of amorphous calcium carbonate dispersed in the sulfonate matrix. In the presence of suitable chemicals such as acids and alcohols with high boiling point and after the gelation process in the appropriate temperature range, the conversion of amorphous calcium carbonate to crystalline calcite occurs. Since the particle size of the dispersed calcite phase is in the nanoscale range (4-5 nm), it forms a stable gel structure that is strong enough to provide an extremely high surface area and a grease-like consistency.

Here it is important that an appropriate reactor should be used and pressure should be 50 psi on average. At this point, the grease still contains water due to the reaction and must be dehydrated to produce lubricating grease. This is commonly referred to as calcium sulfonate gel or calcium sulfonate grease. During this process, over-based calcium sulfonates typically need to be prepared by reacting the appropriate acids in the presence of calcium

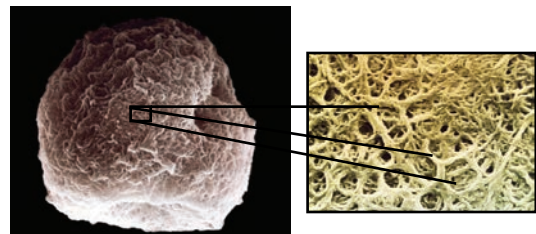


Figure 2: Structure of grease soap

oxide and carbon dioxide by stoichiometric calculations in a closed and pressurized (50 psi) reactor.

After the conversion in the chemistry of calcium sulfonate greases, complexity occurs by the addition of calcium oxide or (usually) hydroxide, followed by reaction with boric acid/acetic acid and 12-hydroxystearic acid.

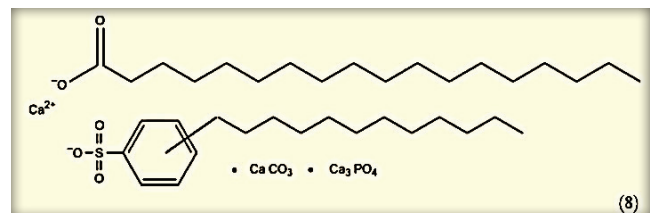


Figure 3: Chemical formula of calcium sulfonate complex grease

The following technical specification has been prepared using the field experiences and interviews with experts in the sector.

Test	Standard	Desired Values
Base oil	--	Mineral
Base oil viscosity - (cSt)	ASTM D445	460 +/- 46
Worked penetration, 60 stroke @ 25°C/77°F - (1/10 mm)	ASTM D217	285 - 320
4 ball EP, boiling load - (Kgf)	ASTM D2596	Min 500
4 ball wear test, wear diameter - (mm)	ASTM D 2266	Max 0.60
Worked resistance (100 k) 25°C, 60 st. change 1/10 mm - (%)	ASTM D 217	Max +/- 10
Rolling resistance, RT, 1 hour, penetration change - (%)	ASTM D 1831	Max +/- 10
Rolling resistance, RT, 3 hours, penetration change - (%)	ASTM D 1831	Max +/- 10
Water washout, 79°C/175°F - (%)	ASTM D 1264	Max 5.0
Water spray, 100°F, 5 min - (%)	ASTM D 4049	Max 35.0
Rust test, 48 hours @ 52°C/126°F	ASTM D 1743	Acceptable

Table 1: Target Specification for the Product

With calcium sulphonate greases, high amount of calcium oxide or the entire hydroxide should not be raised to amorphous calcium carbonate in order to improve the production technology. Time and pressure are very important at this stage. As a result of our laboratory studies, FTIR and some performance values change according to time and pressure.

Laboratory analyzes

The products obtained through R&D studies have been tested within the scope of the relevant ASTM standard. Penetration, water resistance, rolling resistance, rust test, load resistance and wear diameter analyzes were conducted for the product.



Figure 4: Penetration test (ASTM D217)



Figure 5: Water spray test



The final product analyzes obtained as a result of the studies are as follows:

Test	Standard	Nihai Ürün
Base oil	--	Mineral
Base oil viscosity - (cSt)	ASTM D445	460 +/- 46
Worked penetration, 60 stroke @ 25°C/77°F - (1/10 mm)	ASTM D217	285 - 320
4 ball EP, boiling load - (Kgf)	ASTM D2596	620
4 ball wear test, wear diameter - (mm)	ASTM D 2266	0,40
Worked resistance (100 k) 25°C, 60 st. change 1/10 mm - (%)	ASTM D 217	+/- 6
Rolling resistance, RT, 1 hour, penetration change - (%)	ASTM D 1831	+/- 5
Rolling resistance, RT, 3 hours, penetration change - (%)	ASTM D 1831	- 1
Water washout, 79°C/175°F - (%)	ASTM D 1264	1,1
Water spray, 100°F, 5 min - (%)	ASTM D 4049	15
Rust test, 48 hours @ 52°C/126°F	ASTM D 1743	Acceptable

Table 2: Final product analysis results

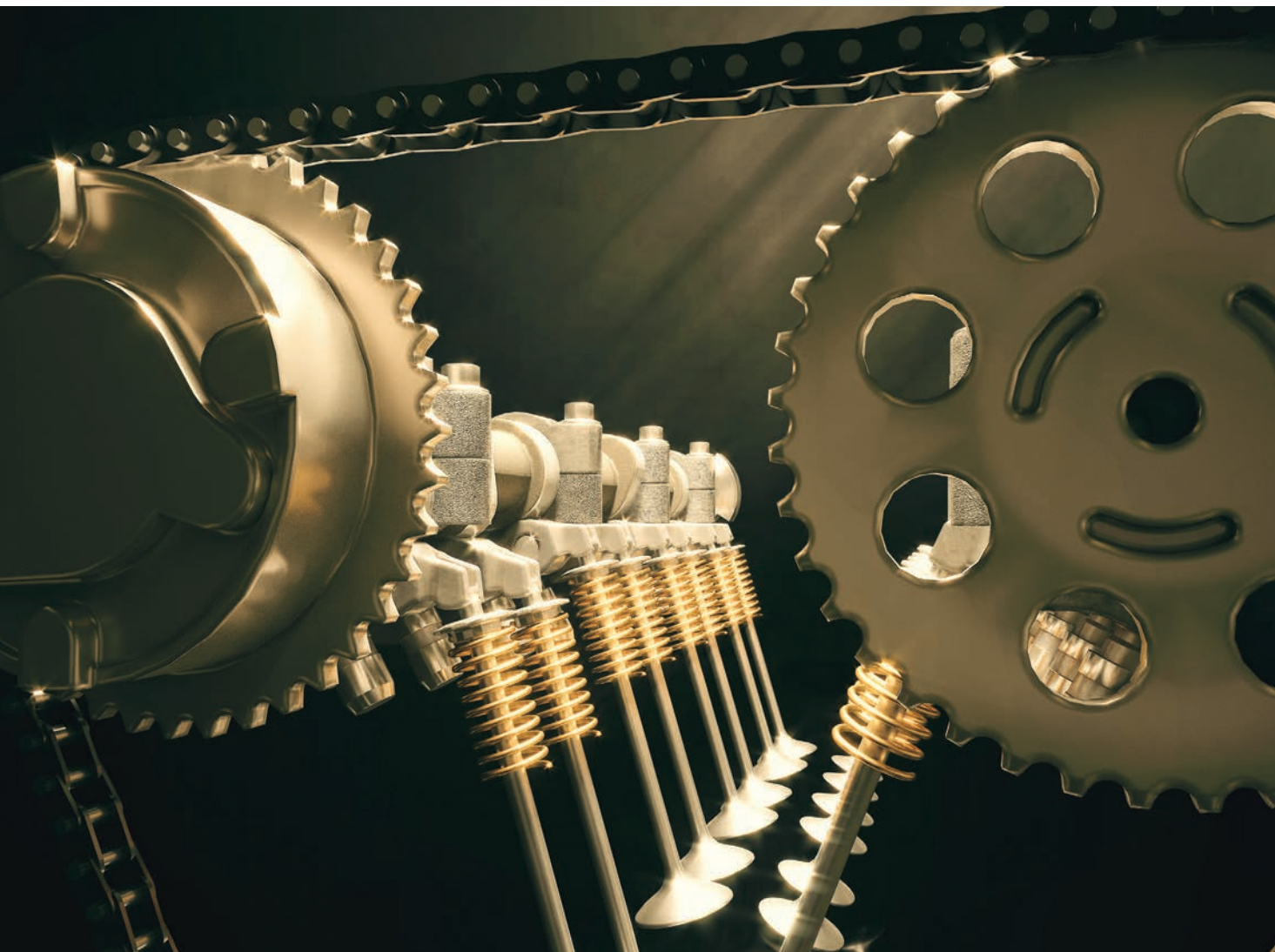
	Pros	Cons
Lithium Complex	<ul style="list-style-type: none"> • Suitable for multi-purpose applications. • Very good pumpability 	<ul style="list-style-type: none"> • Needs additives for performance • Requires high raw material cost • Not suitable for food grade applications
Aluminum Complex	<ul style="list-style-type: none"> • Suitable for multi-purpose applications. • Good water resistance 	<ul style="list-style-type: none"> • Low oxidation resistance
Polyurea	<ul style="list-style-type: none"> • Does not cause ash/dirt formation • High oxidation resistance It has noise canceling feature. 	<ul style="list-style-type: none"> Low mechanical stability. • Needs additives for performance • Raw material-related problems may occur in production
Calcium Sulfonate Complex	<ul style="list-style-type: none"> • High mechanical stability • Very high rust and corrosion protection • High load and wear resistance thanks to its structure 	<ul style="list-style-type: none"> • Not suitable for low temperature applications • Not suitable for high speed applications (Requires special production)

Table 3: Grease comparison table

Table 3 shows that calcium sulphonate complex greases are more favorable for harsh operating conditions of the iron and steel industry.

Calcium sulphonate complex-based greases often appear to be problem solvers in heavy-duty

applications. They show superior performance compared to other grease types with their very good mechanical stability, rust and corrosion protection, inherent pressure resistance and wear resistance features.



How the PCL market is adapting to rapidly changing environmental conditions

Dr. Colin Morton

Dr. Ewan Delbridge

Since no unified lubricant solution exists to encompass the changing requirements, only the nimblest manufacturers who can adapt quickly to new realities will survive.

Climate change is becoming more of a concern in countries around the world and, with more than 1.2 billion passenger vehicles on the road, the vehicles' role in creating greenhouse gases is being taken more seriously. There

is a continued effort to keep up with rapidly changing environmental conditions, and the passenger car lubricant (PCL) market is doing its part.

But the complexity of the PCL market is the result of multiple value chain participants, as well as balancing



the needs of both business-to-business customers and consumers. As each of those participants' needs change, so too must the PCL manufacturers' outlook and product mix, making it a constantly evolving market in which only the nimblest companies will survive.

In this article, we will delve into what those changes look like and how they are affecting the PCL market during the COVID 19 pandemic, as well as forecast what the future will hold.

Where the market stands:

At its heart, societal needs guide the PCL market, namely:

- To encourage more environmentally responsible lubricant composition.
- To shape more energy-sustainable transportation opportunities.

No single unified lubricant solution currently on the market satisfies all those conditions, which means manufacturers are faced with the prospect of producing multiple formulations designed to reduce passenger car emissions and improve fuel efficiencies to optimal levels.

As the market grows increasingly fragmented, it requires new technologies to flourish. In many cases, they demand backward compatibility or are specifically designed for specific engines and vehicles. But it is not just the PCL market that is evolving: Engine design focuses on greater efficiencies, including low speed pre-ignition (LSPI) mitigation, higher loads, a wider variety of operating temperatures, and the ability to accommodate aftermarket emissions-mitigating equipment.

What we are seeing: One of the most striking effects of COVID 19 was the fact that new car sales were expected to be 20 percent to 30 percent lower in 2020 than they had been in previous years, this turned out to be around 16 percent lower when year-end sales closed. In part, that's because remote working reduced the number of miles that people travel, as well as the reduced movement within the economy as shutdown orders have kept people at home more frequently. In addition, consumer concerns over the spread of the virus have slowed the growth of shared

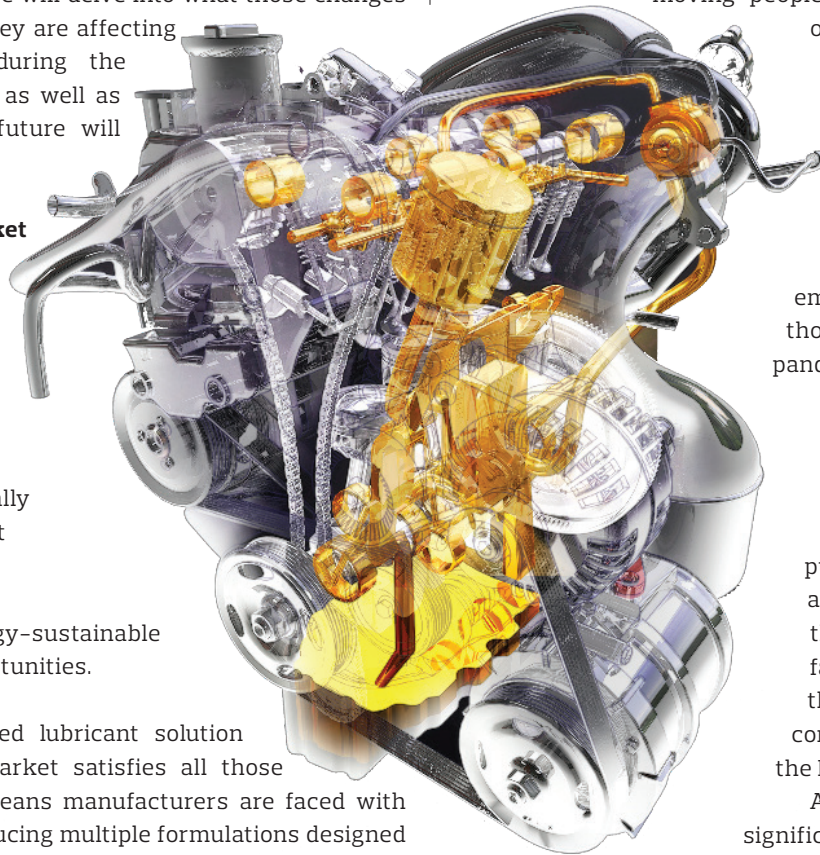
mobility schemes like Uber and Lyft.

Despite lower sales numbers, there are significant changes happening within the passenger car market. New car sales incentives, designed to clear inventory, stimulate production and encourage electrification of the fleet, are moving people toward more efficient

options than previous generations. In addition, the clean air that has resulted from the COVID 19 pandemic has placed more governmental emphasis on maintaining those gains as the pandemic recedes.

The market delivery systems are also changing in the COVID 19 world. Where before most consumers purchased their PCL from authorized dealerships, they are now becoming far more comfortable, thanks to pandemic conditions, to purchasing the PCLs online.

As a result, there's significant pressure to produce lower viscosity PCLs from safe and sustainable chemistries, even though they are subjected to a wider range of operating temperatures than previous PCLs. For example, TGDI engines stress lubricants more than PFI engines, and the expectation is that PCLs will reduce the number of LSPI incidents.





As we survey the market, it is clearly moving toward higher-performing, higher-value lubricants. Light viscosity lubricants are now the norm, formulated to improve efficiency gains despite the challenges they provide for manufacturers. After all, lower viscosity lubricants are complicated by the natural thickening agents of macromolecular additives, performance polymers and new additive technologies, all of which are increasingly necessary to provide efficiency and durability. But those complications also present opportunities for manufacturers to improve their products and make sure they meet these new, more stringent guidelines—which leads us to the final trend we see in the PCL market.

As environmental concerns rise in importance across the country, people are showing more interest in which chemicals lubricant manufacturers use to make their products. What this means in practical terms is that the scope of available new chemistries is shrinking, and fewer elements from the periodic table can be used in new formulations. As a result, chemists are now required to extract the same chemistry from less-resource-intensive processes, including energy usage. That means that some of the current chemistry may need to undergo reformulation.

What it means: Since the necessary performance levels never go backward, new technologies are necessary to continue meeting the ever-elevating standards of the PCL market. Not only will new testing be required to accommodate new efficiency, durability and aftertreatment capability standards, additives and performance polymers must change as well.

Additionally, new design criteria beyond lubrication must be considered (e.g., viscosity profiles). Not only will performance polymers be affected, but also dispersants, detergents, antioxidant systems and anticorrosion-/friction-reduction systems must be enhanced. In short, lubricant manufacturers must grapple with the reality of making efficient, safe and sustainable chemistries.

Where we are going: As rapid as the changes to the PCL market have become, it is an exciting moment in its history. It has never been as dynamic and sophisticated as it is today and will only get increasingly more so as we move into the future. Though 2020 was a challenging year, bringing with it as it did the unexpected challenges of COVID 19, it also marked the start of a new decade, which we believe will be marked by significant improvements in the PCL market. It is important to build a sustainable future through partnerships between OEMs, industry bodies and trade groups. After all, it is those partnerships that will be the key to any future success of the PCL industry.

Dr. Colin Morton is the senior director for Consumer Lubricants for The Lubrizol Corporation. Dr. Ewan Delbridge is the director of technology for Consumer Lubricants for The Lubrizol Corporation.



Lubricants & Greases

TRANSMISSION & GEAR FLUID



REXOIL TRANSMISSION OILS , formulated synthetic base oils with new additive technology give improved lubrication and longer life for equipment. Suitable for automotive and heavy duty equipment transmission, axles, differentials where an EP (extreme pressure) lubricant is required when the manufacturer recommends a GL-5 transmission oil with a viscosity of SAE 75W-80.



Nynas developed NYNAS[®] BT 22 in response to high 22 cSt demand

In a market where the 22 cSt viscosity is much sought after, customers can be left struggling to fulfil their need for this popular base oil grade. However, with the latest addition to its constantly expanding base oil portfolio, Nynas offers help.

“Answering calls for increased availability, we developed NYNAS[®] BT 22, which is now globally available in any quantity. With its high naphthenic character, allowing the same functionality and performance as NYNAS[®] T 22, we expect NYNAS[®] BT 22 to receive a warm welcome, indeed it is already greatly appreciated



by customers looking for solutions," says Dr. Thomas Norbby, Technical Manager Nynas.

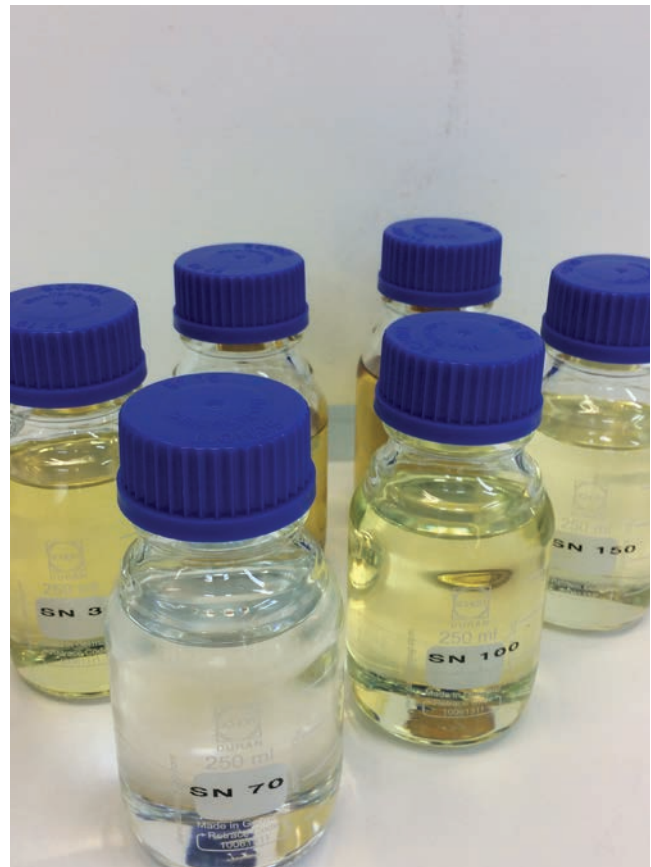
NYNAS® BT 22 can be used in the formulation of metalworking fluids for a variety of operations, such as emulsion coolants for metalworking operations that involve cutting, drilling, milling and turning, as well as in sheet metal rolling oils. Its excellent solvent power, despite a low level of aromatic content, enables NYNAS® BT 22 to dissolve high additive loads, and to keep residues and sludge dissolved whilst in operation.

"The solvent power is the driver of the outstanding emulsion stability in metalworking fluids formulated with NYNAS® BT 22 and NYNAS® T 22. We have demonstrated this in many studies performed in-house at Nynas, and our results have been mirrored by several different additive companies supplying the metalworking fluid industry with emulsifiers," says Thomas Norbby.

In addition, NYNAS® BT 22 can be used in the production of low-temperature lubricating greases and in automatic transmission and hydraulic fluids, where it offers several advantages over paraffinic oils, for instance, excellent low-temperature properties and superior solvency. "Formulators can also use NYNAS® BT 22 in blends with other base oils to arrive at viscosity and solvency levels that perfectly suit specific applications or environmental conditions," says Thomas Norbby.

In order to confirm that the behavior of NYNAS® BT 22 equalled that of NYNAS® T 22. Thomas Norbby put the new base oil product through the same rigorous technical testing that has previously been used to establish the premium performance of NYNAS® T 22.

This technical benchmarking process involved using three different emulsifier packages to make



different semi-synthetic emulsion concentrates. The stability of emulsions made from these and their relative sensitivity to water hardness was then studied using an array of instrumental methods.

"Our investigation showed that the two base oils share many key features and we found very few differences between the two products. The main marked difference is in the flash point, with NYNAS® T 22 having about 10 °C higher flash point than NYNAS® BT 22. There is also a slight difference, which doesn't impact on the performance," says Thomas Norbby.

Dr. Thomas Norbby

Dr Thomas Norbby, Technical Manager Nynas, is also an Adjunct Professor in the Department of Machine Design at the Royal Institute of Technology (KTH) in Stockholm. He joined Nynas in 2014.





Although times change, some recommendations do not

Castrol offers products suitable for vehicles manufactured so far, while also preparing products that help meet the design-related needs and carbon emission targets of new vehicles to be manufactured in 2021 and beyond. Castrol helps to reveal the real performance of the engine with its products that have the optimum viscosity value for the characteristics of the vehicles.

Castrol is the recommended lubricant brand for 27 years by Turkey's leading automotive distributor Doğuş Otomotiv. Castrol maintains its leadership as the most recommended lubricant brand in the authorized service network of Volkswagen, Audi and SEAT brands under Doğuş Otomotiv. Yüce Auto, which is increasing its penetration in Turkey, recommends, Castrol for ŠKODA

while Doğuş Otomotiv chooses Castrol for the vehicles in the Volkswagen Group.

Castrol develops special products for Volkswagen Group vehicles

Lubricant giant Castrol reveals the real performance of cars with its latest technology products. Lubricants



suitable for the latest technologies and vehicle manufacturers' preferences reduce carbon emissions while providing fuel efficiency. As well as offering special products for the vehicles manufactured so far, Castrol is also working on products that help meet the design-related needs and carbon emission targets of new vehicles to be manufactured in 2021 and beyond. Castrol helps to reveal the real performance of the engine with its products that have the optimum viscosity value for the characteristics of the vehicles.

For many years, Castrol offers products specially developed for the vehicles of the Volkswagen Group, including Audi, SEAT and ŠKODA. In 2021, the company is ready to offer its EDGE Professional



LL IV FE 0W-20 product with 0W-20 viscosity to be used as the first-fill lubricant and for the maintenance of the Volkswagen Group vehicles.

Castrol EDGE Professional LL IV FE 0W-20 provides fuel efficiency* and low carbon emissions. Castrol

EDGE Professional, developed with the micro-filtration technology, stands out with its carbon neutral (CO₂) certification according to the first and highest standards worldwide. Castrol EDGE Professional with patented Liquid TITANIUM Technology changes its shape under pressure and gains a stronger form. It helps to reveal the real performance of the engine by reducing metal-to-metal contact and friction.

E-liquids of the future for the vehicles of the future

Castrol is also testing its e-liquids developed with Volkswagen for electric vehicles on platforms where new generation cars compete. In this scope, Castrol's e-liquids have achieved significant success over the past few years with Volkswagen's electric race car, the Volkswagen ID.R. The ID.R, powered by Castrol e-liquids, broke new speed records on the Tianmen Mountain road and the Bilster Berg track, and contributes significantly to the development of electric vehicle platforms. The teachings gained through the ID.R and Castrol collaboration drive the electric vehicle and e-liquid technology.

** Based on PV 1451 test result, compared to reference product with 15W-40 viscosity. It may vary depending on the vehicle type, driving conditions and driving style.*





An overview of 2020 with Sezgin Gürsu

The year 2020 was marked with the principle “health first” for Petrol Ofisi. Standing out with works that prioritize human health, Petrol Ofisi finished 2020 with permanent projects and long-term goals. We had a long conversation with Sezgin Gürsu, Lubricants Director, on how the sector took 2020 discussed how Petrol Ofisi crowned this period with new achievements.

We left 2020 behind, we have a year full of surprises ahead. The effects of the Covid-19 pandemic, which we anxiously followed in the first months of 2020 and which was first seen in our country in March, were of course at the top of the agenda. Well, how was 2020 for the industry?

Everything was running normally in the first three quarter of the year, none of us could think of such a situation. We started an ordinary year. However, the sector experienced a 40 percent decrease in sales during April-May. There was a serious decline in demand. None

of us were prepared. There is a saying: “Turkey is ready for crises, Turkish authorities manage crises well.” But this was not like that. This was a very different crisis. Nobody was ready for such a crisis. We all learned by living. Restrictions and decrease in demand on one hand, fluctuations in commodity prices on the other hand forced us to manage multiple issues at a time. When we experienced a 40-45 percent decrease in demand in March-April-May, we run the factory 3 days a week. We said “health first”. Health was our first priority for all our employees, regardless of the factory or field. Also, with the message of Mr. Şiper, we created an atmosphere of trust

in the whole organization. The message that there would be no layoffs and no downsizing due to Covid-19 was very important. This helped people let go of fear and focus on their work. Everyone started thinking, "What can I do under these conditions?"

By the end of May, we wanted to take new steps with the expectation that the restrictions would be gradually reduced and the sector would start to recover. Most companies were doing many things, such as distributing fuel, providing various aids, handing out masks and disinfectants... But we wanted to touch the hearts. We thought about the ways to help businesses recover. 'Siftah', which is a word for the first sale of the day, is a very important concept in Turkey. We prepared this project together in a very short time. In early June, we launched the Siftah project, which brought us very important awards. Thanks to this project, we reached 17 thousand points, including oil change points, repair shops, special services and retail points. We distributed our Maxima and Maximus products as a siftah gift.

In a sense, companies were tested both in a period when things were slowing down and when they started to speed up suddenly. This was a test that shows your preparedness, flexibility and adaptation capability.

Like many other businesses, the lubricant business requires teamwork with integrated management from production to supply chain, from sales to marketing. In this sense, I think we passed the test. We also succeeded in adapting ourselves to the recovery period. In the first phase, communication was a priority for us. We maintained our strong communication with all stakeholders, including our suppliers, customers, dealers, and employees. In this scope, we even organized psychological support sessions for the spouses of our distributors. We received very positive feedback. Then, the Siftah project revived the market indeed. Another phase started in June. After the 40 percent decline, there was an unexpected recovery in the market that we could call an explosion of demand. Friends say "there is a recession in the market that we cannot explain" when the business slows down, and this time we started to experience an increase in demand that we could not explain. The most important reason for this was that people preferred private vehicles over public transport. Road transport was preferred over air transport. Industry also revived very quickly. As a result, our friends, who took 4 days off a week, started working 7 days and 3 shifts during the summer months. We even had difficulty fulfilling the orders sometimes. It is very good for the industry, but this pace was tiring for our friends. I want to thank them once again. While we were having meetings at our homes, sipping our tea or coffee, our friends working



in the factory and the field, devoted themselves to the work. We cannot thank them enough.

Actually, we learned something new at each phase. We learned how we can move from halt of production to full speed operation so quickly. We saw what people can do when there is an urge. In September, at the heart of the pandemic, Petrol Ofisi Lubricants broke 3 records. It was a period of pride for us. Monthly production record, monthly sales record and daily production record were broken. Meanwhile, we experienced an increase in Covid-19 cases. Due to the rapid spread of coronavirus in Istanbul, we had to completely shut down our grease factory. Pending orders amounted to more than our 1 month of production. In fact, for the first time, we experienced difficulties in deliveries to our customers. But in Turkey we saw that everyone went through these times with tolerance and cooperation. It was very valuable for us as a nation to cooperate and understand each other. We empathized our suppliers, our customers empathized us. Together we have overcome this period.

It was also very important to curb the cases in the factory. At this point, Petrol Ofisi made a very critical

decision. Upon this decision, everyone entering the plant have had a PCR test every Monday. This is a practice showing that we stick to our "health first" principle. In this way, we brought the cases under control. We have identified our asymptomatic friends and did not let them enter the factory and thus prevented contamination.

It was a very interesting year, we learned a lot. I have been in this industry for over 25 years, I have never faced a situation like this before. None of us do not have such an experience. We saw currency crises, demand crises, but we have never experienced such a crisis. We now have a new experience.

When we put aside the challenges we faced throughout the year, you became the leader of the lubricant market in 2019 according to PETDER data. The second half of 2020 was better, you broke records in 3 areas. You have run successful campaigns and projects in the field of lubricants. Can we say that this year has been the year of lubricants for Petrol Ofisi?

It would be wrong to say that it was the year of lubricants. I see the last 3 years as a period in which Petrol Ofisi regains its former strength, transforms the power from its roots into results and shows its real performance and capacity. I have been in this company for 15 years. I have worked with many different shareholders since 2007, but for the last 3 years there has been a change that I haven't seen in 15 years. I am saying this very faithfully at every opportunity. There has been a significant change in every part of the company, both on the retail side and on

the commercial fuels side. We are happy if we have made a contribution to this success.

"For consumers, trust is the first thing that comes to mind with Petrol Ofisi."

It is announced that you are the market leader for 2020 as well. What will you say about this success?

As of 2019, we, as Petrol Ofisi, became the undisputed leader of the lubricants sector in all aspects. We have maintained our market leadership in 2020 as well. Of course, tonnage leadership is not the only thing that matters here. It is also very important to be actually leading the sector. It is very important to be the sector leader when our marketing activities, our company culture, and the value given to our employees are evaluated altogether. Besides, of course the tonnage leadership made us happy. The important thing is a leadership that leads the sector and I think we are very good point in this regard. In terms of tonnage leadership, it is very valuable for us

to be maintaining leadership in two areas under such difficult conditions, as well as achieving this by raising market shares. We increased our market share to 29.1 percent in the lubricants market and 30.5 percent in the lubricants and chemicals market. This success, together with the size of Petrol Ofisi in every field, is the result of the devoted work of a large team consisting of our colleagues, stakeholders, distributors and dealers.

This year, one of the most important developments for Petrol Ofisi is the cooperation agreement signed with Chevron. Can you tell us a bit about this agreement?

Chevron Texaco is one of the largest companies in the world. We had long meetings with them for about 1.5 years. They could have chosen another alternative, they could have entered the Turkish market themselves, but they followed us for one and a half years, so to say. Ultimately, we signed a very important agreement that will benefit both sides. Especially in such a challenging year, this is a very important agreement for our country as well. It is a great source of pride to have a world giant invest in Turkey, come to Turkey and choose Petrol Ofisi for doing business here.

This is a long term deal. Rather than an agreement, we can call it a marriage with no clear duration. We cooperated with them in the field of maritime. Somewhat





influenced by it, they decided to expand this cooperation to all sectors. This agreement will benefit both sides. Their expansion to this region will be through Petrol Ofisi. Our distribution network, our trained manpower and what we have done so far in this regard attracted them. We have the largest distribution network with nearly 1,850 stations, approximately 20 thousand points that we serve through more than 30 distributors, and approximately one thousand corporate customers. It is an opportunity for them to use this distribution channel and our trained manpower. For us, this agreement is actually a technology transfer. Taking advantage of their know-how, product portfolio and global experience will be very beneficial for both our employees and our technology, as well as for the company.

We signed this agreement with e-signature in August, right at the heart of the pandemic. We imported the first batch and started selling the products. We are currently in the first phase of the project. We plan to launch Texaco products within this year. We will manage two brands. We will run it with two separate organizations on both the distributor side and our side. Of course, we will do this without compromising the goals of the Petrol Ofisi brand.

Our PCL market share, which was around 9 percent about 8-9 years ago, is now 20 percent. It is a huge gain in such a settled market where we have global competitors. We will not go off track, but in some special areas we will offer our customers the products of their expertise, such as wind turbine oils and some special gas engine oils. We will launch Texaco's main product line to the market with a separate organization from a separate channel, without conflict with Petrol Ofisi.

Texaco products will be produced in Turkey in the upcoming period. In this sense, Petrol Ofisi Technology Center POTEM is of great importance. Does POTEM's expertise in product development and analysis increase the confidence in Petrol Ofisi from the side of Chevron Texaco and other companies as well as the consumers?

POTEM is a source of pride for us. It is the most advanced laboratory in Turkey as well as the near geography. It is a source of pride for Turkey with its technological equipment and trained manpower. We will produce about 85 percent of Texaco products in Turkey. We may import some special products with low tonnage, but the majority will be produced in Turkey. POTEM is a research lab that Chevron knows well from our cooperation in the field of maritime. They know very well the equipment, manpower and know-how there. This, of course, played a big part in this signature.

POTEM is used as a referee laboratory in many fields.



It is the most advanced laboratory in Turkey in terms of equipment, technologies and quality standards in this sector. There are over 150 test devices in POTEM, and they are the result of investments made for many years. We have 85 accredited test methods. Each of these was obtained with the approvals given after strict inspections. It is a laboratory that has been inspected and approved by all kinds of national and international quality standards. We are proud of it. Both public institutions and many private sector organizations see POTEM as a referee laboratory and can use the test results obtained from here. We will continue to grow this place even more.

POTEM is of course a big advantage for Chevron. It offers great advantage in terms of both quality control and preparation and development of formulas. In addition to the products we have developed with the automotive industry, there are also 'tailor-made' products in POTEM. There are product development studies for special applications. There are also engine oils and special products that we have developed and tested with international automotive manufacturers or additive manufacturers at international standards.

Speaking of POTEM, I would like to mention about our renovation project in the factory. With the increase in tonnage in recent years, our production capacity in the factory can no longer keep up with the pace of sales. Although we work 3 shifts 7 days in a few of our lines, we have reached the limit. We have prepared a 3-year investment plan. As of this year, we are launching a project that will change the entire design of the factory, create a new storage area, and we will make some investments in new technologies related to the production facility. This is an indication of our shareholder's confidence in Petrol Ofisi.

You have been appreciated by and have received awards with your campaigns during the pandemic. Can you tell us about these?

For consumers, trust is the first thing that comes to mind with Petrol Ofisi. All the surveys that have been conducted show this. First of all, consumers trust the Petrol Ofisi brand. In lubricants, we are able to understand our customers' current and future needs very well and offer flexible services. We receive feedback from many of our customers in this direction. This is one of our competitive advantages.

This year, the Siftah project has been the pride of the company. This project received the Felis Award. It was a very successful project in the marketing community in the sector.

In the calm April-May period, we thought about what the customer needs the most in a phase when we could not leave our houses much and non-compulsory production slowed down, and we launched online trainings. We were the first to start such trainings in the industry. We reached approximately 1,200 people through our more than 50 corporate customers with technical trainings on lubricants. We received demands from sectors we never thought of. We got very positive feedback. We still continue our trainings. Our next normal may not be like the old normal, face-to-face trainings will largely be replaced by online trainings. We will be fully prepared and continue these trainings in the best possible way.

Our project Maximus Cabin with Selim Yuhay

continues. During the pandemic, he reached the individual truck drivers, whom we call Maximus men, and shared their problems and challenges. At least he provided highly valuable support psychologically.

We had projects with our business partners. On the automotive side, we collaborated with Kia and Mitsubishi. We got very nice feedback. We continue these collaborations. But of course we miss the days when we hit the field.

During the pandemic, you have also supported great projects in cooperation with ITU Çekirdek. What are these projects?

At the early phases of the pandemic, all companies in the sector tried to do something and offered various supports. Mr. Şiper had a very good idea, he wanted to do something permanent. The projects at ITU Çekirdek appeared just in time during this period, bringing a very important opportunity for Petrol Ofisi to make a lasting impact. There were nearly 250 project applications, each of them were valuable projects. The jury formed with the participation of Mr. Şiper and senior management chose 11 of these projects. These are really interesting, very impressive projects. We have supported these 11 projects developed against the pandemic. This is a great source of pride and joy for us.

Finally, can you share your predictions and goals for 2021?

Perhaps we should say "the unpredictability of 2021". Because I think it will be a volatile and unpredictable year. We learned a lot from the crisis in 2020; we learned flexibility, agility, and taking action rapidly. I think a fluctuating year awaits us in terms of demand, supply, exchange rates and production.

We really don't know what and how the pandemic will affect. There is also a supply problem in base oils, which is the main raw material for lubricants. When the consumption of jet fuel decreases in parallel with the decrease in aviation activities, base oil production in refineries also decreases. Lubricant consumption is not low, but this supply shortage in base oils all over the world has a negative impact on lubricant production. Therefore, supply security is at the forefront for us in 2021. We have established our connections. However, there may be fluctuations in prices due to supply-demand imbalance. There may be fluctuations in demand in different sectors. We think 2021 will end with a lower growth rate of 2-3 percent for the sector.

It is a priority for us to adapt to these changes, to do our best in the current conditions, to launch Texaco products, to start and complete our investment in the factory and of course to keep human health above all.

EDITORIAL CALENDAR

**MADENİ YAG
DÜNYASI
LUBRICANT
WORLD**

Issue 30	March–April 2021
Features	<ul style="list-style-type: none"> • Base Oils • Wind Turbine Lubricants
Content Deadline	3 Apr 2021
Advert Deadline	10 Apr 2021
Events where magazine will be distributed	8 th Annual CIS Base Oils and Lubricants Conference 19-20 May, Moscow-Russia

Issue 31	May–June 2021
Features	<ul style="list-style-type: none"> • Food Grade Lubricants • Heat Transfer Fluids
Content Deadline	5 Jun 2021
Advert Deadline	12 Jun 2021
Events where magazine will be distributed	UNITI Mineral Oil Technology Congress 14-15 July, Stuttgart-Germany

Issue 32	July–August 2021
Features	<ul style="list-style-type: none"> • Aeronautics and Defense Lubricants and Fluids • Gear Oils
Content Deadline	7 Aug 2021
Advert Deadline	14 Aug 2021
Events where magazine will be distributed	Lubricant Expo 7-8 September, Messe Essen-Germany Istanbul Airshow 23-26 September – Atatürk Airport

Issue 33	September–October 2021
Features	<ul style="list-style-type: none"> • Latest Trends in Base Oils • Oil Analyses
Content Deadline	2 Oct 2021
Advert Deadline	9 Oct 2021
Events where magazine will be distributed	European Base Oils & Lubricants Summit 23-26 November, Amsterdam-The Netherlands

Issue 34	November–December 2021
Features	<ul style="list-style-type: none"> • Bio-Based Lubricants • E-Commerce in Lubricants
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"> • Electric Vehicle Fluids • Dielectric Fluids
Content Deadline	5 Feb 2022
Advert Deadline	12 Feb 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

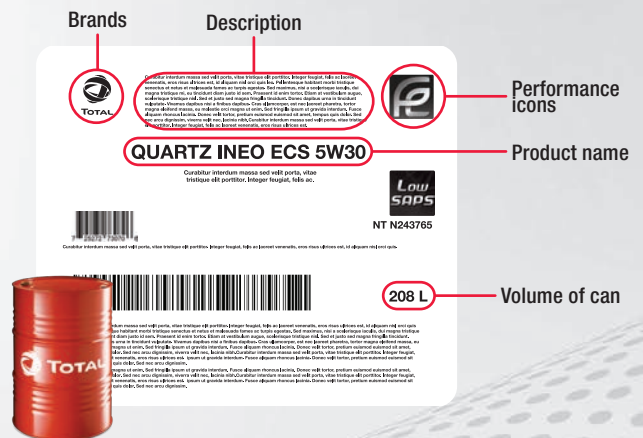
New-generation engine oils and those currently being developed by TOTAL are of increasingly fluid grades: 0W-20, 5W-20, 0W-30 and 0W-16.

How to read a product label for product selection?

Small packaging:



Large packaging:



Connecting producers and consumers around the globe

With our wide distribution network and special content for all segments of the lubricants industry, we connect producers with consumers and seek business synergy at every level.

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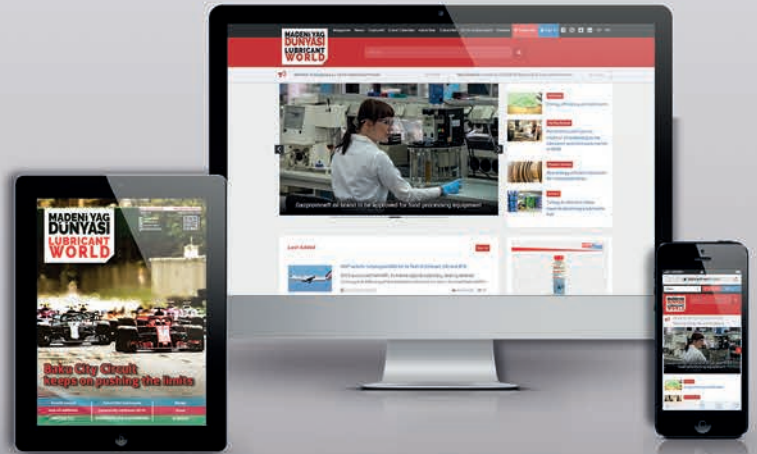
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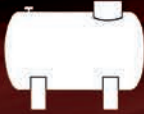
ÜRETİMDEN SON TÜKETİME KADAR HER AŞAMADA FROM PRIMARY PRODUCTION TO FINAL CONSUMPTION

Sondaj
Kimyasalları



Drilling
Chemicals

Üretim
Kimyasalları



Production
Chemicals

Rafineri
Katkıları



Refinery
Chemicals

Madeni Yağ
Katkı Maddeleri



Lubricant
Additives

Akaryakıt ve
Biodizel Katkıları



Fuel And
Biodizel Additives

Bitmiş Petrol
Ürünleri



Finished Petroleum
Products

adco®