

Products to avoid
Squeak- and Rattle-Noises
in the automotive industry





COSTENOBLE IN AUTOMOTIVE INDUSTRY

Presence of the Costenoble company in automotive industry has a long tradition. Soon after the introduction of Krytox™ greases in the half of the seventies, numerous possibilities of their application in this industry were discovered. Costenoble was, therefore, the first distributor of lubricants, that introduced PTFE/PFPE greases to automotive industry.

Except for its durability, both in high and low temperatures, low volatility and - most of all - due to its chemical inertness and high compatibility, Krytox™ greases shortly became a product in demand. In the next decades, Krytox™ and OSIXO® greases were applied to more and more car parts. Moreover, the number of OEMs and sub-suppliers was also rising, who were applying these products in their structural elements.

The further characteristics of PFPE/PTFE products, such as odourlessness and transparency, structure stability and high compatibility with plastics and elastomers have led to the fact that OSIXO® and Krytox™ products started to be applied more often inside the vehicles than to the body or chassis. Finally, the OSIXO® ANTI-SQUEAK aerosol, offered by Costenoble, is one of the first products in the automotive industry, prepared only with the aim of a reduction of squeaks and creaks. Today, it is supported by approximately two dozen other products, numerous types of applicators and unrivalled experience.

Since the first sales of PTFE/PFPE products more than twenty-five years ago, Costenoble found more applications in automotive industry than an average vehicle has bolts today. Thanks to this experience and knowledge advantage, today we are a competent and reliable automotive industry partner.

NOISES INSIDE A VEHICLE - REASONS AND SOLUTIONS

“SQUEAK AND RATTLE” PROBLEM

Vibrations in a vehicle cause the occurrence of unwanted ambient sounds. These squeak and rattle sounds are not, however, a sign of a worse quality or presence of defects. It is rather the requirements concerning the acoustics what has increased nowadays.

Recently, cars have become more comfortable and more soundproof. Since the engine sounds and the noise of rolling tyres are better isolated today, they are also more audible than ever. Today, their removal is an essential factor which influences the image of the manufacturer.

NOISES INSIDE A VEHICLE

Such noises form due to a relative motion of two elements in the place of their contact. While driving, vibrations occur, which set various elements in different types of motion. These motions depend on the structure, workmanship and materials used to manufacture parts. The sounds produced as a result of this friction are sensed by the passengers of the vehicle as unpleasant and bothersome. What constitutes a classic example is “squeaking” ventilation and typical “creaking of leather”.

SOLUTIONS TO A COMPLEX PROBLEM

There are two possibilities of effective avoidance of the bothersome friction sounds: avoidance of contact by means of providing more space or reduction of frictional resistance by means of surface treatment.

The second possibility has considerably lower optical and functional limitations than structural providing more space. Besides, the coatings can be applied on every stage of the production, as well as after its completion.



VARIOUS SOLUTIONS

There are numerous solutions allowing to avoid production of noises inside a vehicle. The fact which ones are effective in a particular case depend on a number of different factors. For almost all solutions Costenoble offers a reliable assistance, from consulting, to a ready product.



DESIGN SOLUTION

Providing more space may constitute appropriate means allowing to avoid frictions sounds. This is, however, a very expensive process, deeply interfering in the structure and the design of the inside of the car. Besides, wide spaces are considered unaesthetic and spoil the overall appearance of the interior of the vehicle. Some places of friction and sources of noise cannot be structurally removed, due to their properties.

Moreover, the design solution is a time-consuming solution. It always requires some time for preparation and its effectiveness can only be assessed theoretically.

Chemical and technological solution

When it comes to the avoidance of noises occurring as a result of friction, the first choice usually consists in the application of lubricating oils, greases or coatings. The fact which agent is the most appropriate, depends on the material, ambient conditions, as well as the visibility and tactual sensations.

OSIXO® ANTI-SQUEAK products have one, indisputable competitive advantage: most of the products from this series are based on PFPE/PTFE which is chemically neutral and practically does not react with the materials on which it is applied. Therefore, without hesitation, it can be applied in almost all materials inside a vehicle.

PARTICULAR SOLUTION: COMPOUNDING

A new surface treatment method was used in the product OSIXO® Polysec. It is a polymer modifying additive, added directly to the plastic and considerably improving the surface of the final product.

It lowers the friction coefficient and improves the material resistance to abrasion and fatigue caused by bending. Thanks to this combination, OSIXO® Polysec is more reliable, effective and durable than the products applied later.

CHOICE OF THE PRODUCT - WHAT CRITERIA SHOULD BE SATISFIED DURING A CHOICE OF AN APPROPRIATE PRODUCT?

Each use is particular and needs an individual inspection. The multitude of factors influencing the choice of an appropriate material only allow general statements concerning the suitability of the product. Nevertheless, based on the empirical values, relatively accurate prognoses can be determined and the product can be pre-selected.

1

COMPATIBILITY Conformity of the applied products with the surfaces and materials they are applied to.

2

The analysis of the **AMBIENT CONDITIONS** during application and during further functioning. Factors which can be significant are, inter alia, heat stress, dust or dirt contamination, water and detergents.

3

APPLICATION Is the place where the agent is to be applied, easy to access? Is disassembly necessary for a possible application of another layer? Is an applicator necessary?

4

CONSISTENCE of products: aerosol, lubricating oil, grease or coating:

AEROSOL is recommended if small amounts of the agent are to be applied on a large surface without earlier preparation. Aerosols are also first choice agents when it comes to coating of angular elements or those which are difficult to access. They are also suitable in particular for finishing works

LUBRICATING OIL is recommended if the aim consists in the application of a thicker layer or if the surface is flexible. Oil is, for instance, suitable for coating leather and elastomers. Thanks to the use of specific applicators, oils are particularly suitable for spot and spare application.

GREASE is recommended if the aim consists in obtaining a very thick layer, or for application in places where oil is not sufficiently adjacent and it is impossible to apply a coating. Grease is also used for areas which are particularly exploited in hidden places.

COATING is recommended if the aim consists in obtaining thin layers and a given material is suitable for coating. More absorbable materials, or ones exposed to the action of great mechanical load are less suitable here.



5

SERVICE LIFE: short-term assembly assistance/
solution to the problem or lifelong lubrication?

6

VISIBILITY: Are the products located in a visible
or hidden area inside the vehicle? Does the used
product have a neutral colour?

7

TACTUAL SENSATIONS: Does the applied material influence
the functionality or motion? Is the applied material
supposed to limit the motion or enable it?

8

OTHER SPECIFIC REQUIREMENTS posed to the
applied products or posed by the given material?
Verifiability by means of application of UV-Tracer?



APPLICATION/PRODUCT

| | Coating | Lubricating oil | Aerosol | Paste/ Grease |
|--|---------|-----------------|---------|---------------|
| Sealings and o-rings | Yellow | Green | Yellow | Green |
| Leather squeaking | Red | Yellow | Green | Red |
| Plastic hinges | Green | Green | Yellow | Green |
| Assembly assistance | Yellow | Green | Green | Green |
| Guide bars and slide bars | Green | Green | Green | Green |
| Servo-motors and gears | Yellow | Green | Yellow | Green |
| Ventilator squeaking | Green | Red | Green | Green |
| Choice of plastics within the field of vision | Green | Green | Green | Yellow |
| Choice of plastics outside the field of vision | Green | Green | Green | Green |
| Rotary/lever switch | Yellow | Green | Red | Green |

OSIXO® ANTI-SQUEAK SERIES AND OTHER PRODUCTS FOR THE REDUCTION OF BACKGROUND NOISE

EFFECTIVE NOISE REDUCTION

The OSIXO® ANTI-SQUEAK product series includes high-quality oils, greases, suspensions and antifriction varnishes. These are supplemented by products of recognizable manufacturers, as The Chemours Company™ (formerly Du Pont®) and Dow Corning®.

Along with these products, the OSIXO® ANTI-SQUEAK series forms a unique set of various products for long-lasting ambient noise protection inside a vehicle.

Besides, the series combines products applied during car production for decades with new and long-standing solutions to the approaching challenges.

OSIXO® ANTI-SQUEAK PRODUCTS AS APPEARANCE ITEMS

Using OSIXO® ANTI-SQUEAK series products does not constitute an immediate solution to the problem. Their application does not mean removing faulty or insufficient structure. They are, however, a part of this structure and provide vehicle interior designers and designers with a wide range of possibilities. As a "safety factor" they prevent possible later ambient noises and reduce the structural limits during interior designing.

Therefore, OSIXO® ANTI-SQUEAK products are taken into consideration even on the early stage of planning and their use is a constant item in vehicle interior designing.

UNIQUE PROPERTIES

The properties of OSIXO® ANTI-SQUEAK products are based on a specific chemical structure of the used PFPE. It is composed of shielded polymer chain, which means that the molecule chain is completely saturated and does not react easily.

The size of particles of PTFE used for OSIXO® ANTI-SQUEAK grease production is very small. Thanks to the above, the desired consistency of grease is possible to obtain with the use of a small amount of PTFE. Low participation of densifier in lubricants is responsible for perfect efficiency of lubrication and long life of lubricants.

Application of any of the OSIXO® ANTI-SQUEAK products is one of the most reliable, beneficial, clean and simple methods aiming at constant elimination of undesirable friction sounds inside a vehicle. OSIXO® ANTI-SQUEAK products are applied by almost all German car manufacturers. Within the last years, numerous applications in various conditions have confirmed their usefulness.



HIGH-PERFORMANCE KRYTOX™ LUBRICANTS

Krytox™ Performance Lubricants is a high-quality series of oils and solid oils. Oils are composed of perfluoropolyether (PFPE), solid oils are thickened with polytetrafluoroethylene (PTFE). They offer a low friction coefficient and an extreme stability in the conditions of high thermal and pressure load. The non-flammable products are chemically neutral, colourless and odourless. The high-duty silicone-free lubricants remain on their place and are compatible with all plastics and elastomers commonly applied in the automotive industry.

The leading car manufacturers and their sub-suppliers use Krytox™ products for production, further treatment and maintenance.

In mechanical, electric and optical components of vehicles, Krytox™ products are successfully used, from fog lamps to the boot lid and from the chassis to the ceiling lining inside. The emphasis is placed on lubrication of components in the conditions of thermal and pressure load and on the elimination of squeaks and cracks inside and on the body.

MOLYKOTE® LUBRICANTS

Dow Corning® is a leading company in the scope of silicone-based technologies and it currently offers over 7,000 various products all over the world. Especially thanks to the high-duty Molykote® series lubricants, the *Dow Corning®* company is a long-standing partner of the automotive industry.

Molykote® products care for effective optimization of the efficiency of components, modules and systems used in cars. Specific Molykote® solid oils, pastes, anti-friction coatings, oils and suspensions are products thanks to which *Dow Corning®* has an extremely extensive offer.

Molykote® series lubricants are designed for use in extreme conditions. They particularly manifest their advantages in the case of use in the conditions of high pressure, extreme temperatures, high vibratory and impact loads or on sliding surfaces which are subject to strong impacts. They also offer a very broad range of ambient working temperature and an efficient protection against damage caused by friction and abrasion.

OTHER COSTENOBLE PRODUCTS

Except for the aforementioned products, Costenoble offers a number of other items for the automotive industry. Apart from high-quality effect pigments to car varnishes, these are also fabric and material covering impregnants, as well as various detergents.

PRODUCT REVIEW

| MANUFACTURER | SERIES | PRODUCT | TYPE | SPECIFIC |
|---------------------|------------------|----------------------------|--|-------------------|
| Costenoble | OSIXO® | ANTI-SQUEAK aerosol | PFPE fluid/aerosol | with a p |
| Costenoble | OSIXO® | ANTI-SQUEAK 32 aerosol | PFPE fluid/aerosol | - |
| Costenoble | OSIXO® | ANTI-SQUEAK 700 GR aerosol | PFPE/ PFPE paste/ Aerosol | - |
| Costenoble | OSIXO® | ANTI-SQUEAK 357 to 657 | PFPE fluid with a various degree of viscosity | with an improv |
| Costenoble | OSIXO® | OS 03, 05, 06 | PFPE fluid - suspension | - |
| Costenoble | OSIXO® | GS 0320, 0620, 0630 | PFPE/ paste with a various degree of base oil viscosity - suspension | - |
| Costenoble | OSIXO® | ME-99 UV | PTFE - suspension | with a U additive |
| Costenoble | OSIXO® | Polysec S | PFPE fluid | to be m plastic |
| Costenoble | OSIXO® | Solvent 60 | dissolvent | - |
| Chemours™ | Krytox™ | GPL 103 to 107 | PFPE oil with a various degree of viscosity | - |
| Chemours™ | Krytox™ | GPL 203 to 207 | PFPE/PFPE paste with a various temperature range | - |
| Chemours™ | Krytox™ | GPL 213 bis GPL 217 | PFPE/PFPE paste with a various temperature range | high pr improve |
| Chemours™ | Krytox™ | GPL 223 bis GPL 227 | PFPE/PFPE paste with a various temperature range | with rus |
| <i>Dow Corning®</i> | <i>Molykote®</i> | D-96 | solid oil - suspension | - |
| <i>Dow Corning®</i> | <i>Molykote®</i> | D-96 UV | solid oil - suspension | with a U |
| <i>Dow Corning®</i> | <i>Molykote®</i> | G-1056/1057 | PAO grease | copoly |
| <i>Dow Corning®</i> | <i>Molykote®</i> | G-1060 | PAO grease | for plas with gla |
| <i>Dow Corning®</i> | <i>Molykote®</i> | EM 30 L/EM 50 L | PAO grease | dampin |

| CHARACTERISTIC FEATURE | OIL/BASE OIL | THICKENER/ SOLID OIL | DISSOLVENT/ ADDITIVE | APPLICATION |
|------------------------------------|--------------|-------------------------|--|---|
| precise needle | PFPE | - | OSIXO dissolvent | spraying (with a needle) |
| | PFPE | - | OSIXO dissolvent | spraying |
| | PFPE | PTFE | OSIXO dissolvent | spraying (with a needle) |
| adhesion- improving agent | PFPE | - | adhesion-improving agent | application with a brush/a sponge |
| | PFPE | - | OSIXO dissolvent | application by immersion / with a sponge |
| | PFPE | PTFE | OSIXO dissolvent | application with a brush |
| UV-Tracer | - | PTFE | water/ UV-Tracer | applicator with a brush |
| mixed with | PFPE | - | - | stirring |
| | PFPE | PTFE | OSIXO dissolvent | - |
| | PFPE | - | - | application with a brush/a sponge |
| | PFPE | PTFE | - | application with a brush/a sponge/a trowel |
| pressure resistant | | | EP additiv | |
| rust prevention | PFPE | PTFE | corrosions additive | Schwamm-/Spachtelauftrag |
| | - | grease | adhesion-improving agent/dissolvent | spraying |
| UV-Tracer | - | grease | adhesion-improving agent/dissolvent | application with a brush/a sponge |
| thinner thickener | PAO | copolymer | - | application with a brush |
| plastics reinforced glass fibre | PAO | lithium soap | grease | application with a sponge/a trowel |
| greasing grease | PAO | lithium soap | inter alia PTFE | application with a sponge/a trowel |

PRODUCTS AND PRODUCT SERIES (ABSTRACT)

AEROSOLS



OSIXO ANTI-SQUEAK Aerosol is characterized by very good antiadhesive properties. It is distinguished by a particularly low friction coefficient and it can be applied on almost all surfaces. For a long time it effectively removes bothersome noises where materials are connected and prevents the stick-slip effect. OSIXO® ANTI-SQUEAK aerosol is chemically neutral and resistant to aggressive chemicals and detergents. The separating layer formed this way is non-combustible and non-flammable, it does not migrate, it is colourless, odourless and harmless to health.

For a long time the **OSIXO® ANTI-SQUEAK 32** aerosol effectively removes bothersome noises and prevents the stick-slip effect. It is distinguished by a particularly low friction coefficient and characterized by very good antiadhesive properties. The OSIXO® ANTI-SQUEAK 32 aerosol can be applied on almost all surfaces, it is chemically neutral and resistant to aggressive chemicals. The separating layer formed this way does not migrate, it is colourless, odourless and harmless to health.



The **OSIXO® AS 700 GR Aerosol** is a synthetic, high-temperature specific-purpose grease in a specific dissolvent. It is chemically neutral and after vapouring of the carrier - non-combustible and non-flammable. The OSIXO® AS 700 GR aerosol is resistant to aggressive chemicals. The separating layer formed this way does not migrate, it is, odourless and harmless to health.

OILS



Krytox™ GPL 103 - GPL 107 is a series of specific-purpose PFPE silicone-free oils, with a various viscosity level. They are resistant to aggressive chemicals, oxygen and dissolvents. Transparent and non-combustible and non-flammable, high-duty fluids are compatible with all commonly applied plastics, hardening plastics, elastomers, metals, and varnished surfaces. They are characterized by thermal and pressure stability, as well as low volatility.

OSIXO® AS 357 - AS 657 includes the most popular OSIXO® AS products enriched with an adhesion-improving agent. They guarantee a better adhesion even on critical surfaces. Non-flammable, silicone-free oils are compatible with all standard metals, plastics, hardening plastics, elastomers, and varnished surfaces.



GREASES

Krytox™ GPL 203 - GPL 207 are high-duty specific-purpose greases which are characterized by thermal and pressure stability. They are chemically neutral and resistant to aggressive chemicals, oxygen and dissolvents. The silicone-free greases are compatible with all standard metals, plastics, hardening plastics, elastomers, and varnished surfaces. They are non-combustible, non-flammable and characterized by low volatility.



Molykote® G-1056/1057/1060 are PAO-based specific-purpose solid oils of high material compatibility. They cause low degree of crocking and have high resistance to coagulation. The G-1060 variant is particularly suitable for application on plastics reinforced with glass fibre.

Molykote® EM 30 L/EM 50 L are high-quality damping greases. These specific-purpose PAO-based greases are characterized by long pot life. They are thickened with lithium soap, compatible with almost all plastics, elastomers, and metals, and they do not contain silicone.



SUSPENSIONS AND OTHER PRODUCTS



OSIXO® ME-99 UV is a transparent antifriction varnish. A UV factor has been added in order to obtain a better application control. The varnish has a low adhesion factor and is manufactured based on water. OSIXO® ME-99 UV can be applied in a wide range of temperatures and is suitable for numerous material combinations.

OSIXO® OS 05 is a high-quality PFPE oil which is dissolved in a carrier. Fluorided oil, apart from very good anti-adhesive properties, is characterized by extraordinarily high stability. It is distinguished by a particularly low friction coefficient and it can be applied on almost all surfaces. For a long time it effectively removes bothersome noises where materials are connected and prevents the stick-slip effect.





APPLICATORS

OSIXO® ANTI-SQUEAK PEN

OSIXO® ANTI-SQUEAK Pen is a simple and reliable form of application of small amounts of oil in spots and on small surfaces. The used PFPE fluid is an oil of a relatively low viscosity, characterized by extraordinary features. It is colourless, odourless, chemically neutral and particularly resistant to washing out and thermal load. It is resistant to traditional detergents.



OSIXO® PRECI-PEN

OSIXO® Preci-Pen is a spot applicator for oils of medium and low viscosity. It can also be used with various OSIXO® ANTI-SQUEAK series fluids and is also suitable for application of small amounts on very small places or those which are difficult to access.



COATING APPLICATORS

Numerous coatings in the OSIXO® series are available in special applicators. They have various ends - from a brush even to a material closing - which are adjusted to various applications and coated materials. They are particularly suitable for even and uneven, small and medium elements.



TECHNICAL INFORMATION

In numerous OSIXO® products and in all Krytox™ products, PFPE (perfluoropolymer) is used as the base oil and PTFE (polytetrafluoroethylen) as a thickener. The useage of the fluorided thickener gives a solid oil a similar thermal and chemical stability as the base oil, so it can also be applied in extreme and demanding conditions.

TYPICAL FEATURES

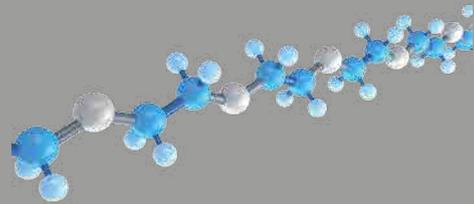
Most of OSIXO® ANTI-SQUEAK oils, solid oils and aerosols, as well as Krytox™ products are resistant both in terms of the temperature and the pressure. They are non-combustible and non-flammable, compatible in terms of oxygen and resistant to aggressive chemicals. They function very effectively, since they are extremely stable and durable. Compared to the traditional greases, they attract customers with their definitely longer pot life.

The products work effectively in a wide range of temperatures. They are chemically neutral and do not migrate even in high temperatures. Oils and solid oils which do not contain silicone, are nonotoxic and biologically neutral, non-conducting and compatible with almost all commonly used polymers, elastomers and metals. They are easy and safe in usage and insoluble in most of dissolvent. However, in the case of some strongly fluorided fluids, a suspension can be formed. They also constitute a basis for aerosols from this series. Thanks to the colourlessness and odourlessness, Krytox™ and OSIXO® ANTI-SQUEAK series products are suitable for use in visible places.

In Molykote® G-1056, G-1057 and G-1060 products, polyalphaolefin was used as the base oil. They are thickened with a copolymer. This results in the fact that in the conditions of thermal or mechanical load, loss of the base oil is very low. Solid oils are reliable and durable in a wide range of temperatures.

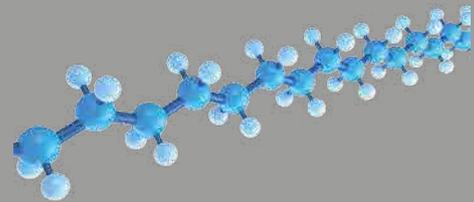
CHEMICAL STRUCTURE

Unique characteristics of PFPE/PTFE products are based on their particular molecular structure. PFPE and PTFE molecules are composed of a so-called "shielded" polymer chain, which means that the chain of molecules is completely saturated and does not react easily.



PFPE molecular structure

A polymer chain only contains carbon, oxygen and fluorine.



PTFE molecular structure

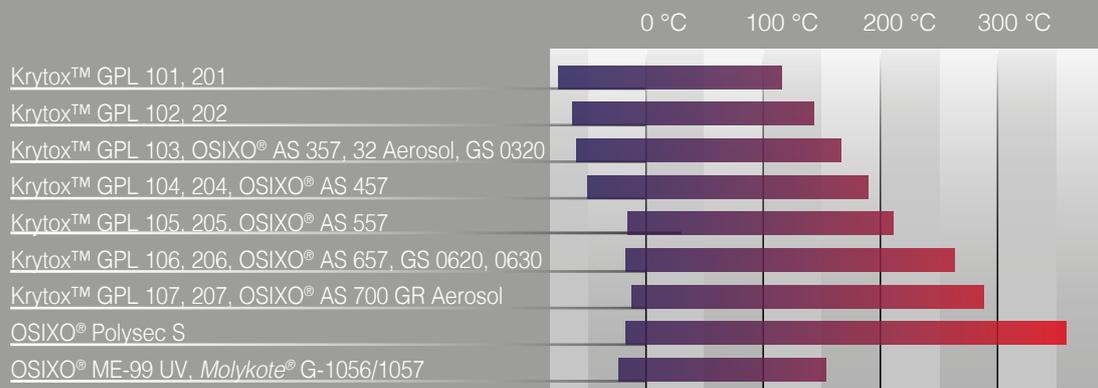
Most of the particles of PTFE used in solid oils is very small. Thanks to the above, the desired consistency of grease is possible to obtain with the use of a small amount of PTFE. Low participation of densifier in lubricants is responsible for perfect efficiency of lubrication and long life of lubricants.

TEMPERATURE SCOPE

Krytox™ and OSIXO® ANTI-SQUEAK series products offer a high stability in a wide range of temperatures. Standard products of the series are optimum for use in automotive industry, in working temperature between -40 °C and over 120 °C. Special products are available for use in lower or higher temperatures.

NON-COMBUSTIBILITY

Krytox™ and OSIXO® ANTI-SQUEAK oils and solid oils are only composed of carbon, oxygen and fluorine. Since the chemical compound does not contain hydrogen, they are non-flammable, nor do they support combustion, even in the presence of 100% fluid or gas oxygen.



CHEMICAL INERTNESS

PFPE/PTFE-based Krytox™ and OSIXO® ANTI-SQUEAK series lubricants are compatible with almost all metals, polymers and plastics. The applied PFPE and PTFE molecules are composed of a so-called “shielded” polymer chain, which means that the chain of molecules is completely saturated and does not react easily.

Biological properties and the environment

PFPE/PTFE-based oils and greases are chemically inert and biologically neutral. Since they are not metabolism products, they do not support any biological growth. They are nontoxic, do not contain silicone or chlorine, nor do they emit any volatile organic compounds (VOC) to the atmosphere or to the ozone layer.

DURABILITY

Numerous Krytox™ and OSIXO® ANTI-SQUEAK products have, theoretically, unlimited durability, if they are stored unopened, in a clean and dry place. They do not migrate, or oxidize, or decompose during storage. They remain stable, until they reach their decomposition temperature, which exceeds 350 °C. In the case of some solid oils, some oil may be separated after a long storage period. This does not affect the efficiency of the solid oil: after a short stirring, the oil will mix with the solid oil again. Molykote® series products have limited durability, which usually reaches from 24 to 36 months from the production date.

OTHER EXTERNAL APPLICATIONS

In the case of the external application, what constitutes an advantage of OSIXO® ANTI-SQUEAK series products is high resistance and stability of the structure, also in the conditions of high pressure load. Numerous products from this series are characterized by high resistance to washing-out and to chemicals used for cleaning.

The products are used both as short-term problem solutions and assembly assistance, as well as to lifelong lubrication of car parts. External components, such as panels and shields are lubricated in order to prevent noise production during twisting movements. In the case of parking sensors, products from this series are applied, for instance, as assembly assistance. In addition, there are classic, mechanical applications, for instance on car door handles or boot lock.



APPLICATION IN MOTOR SPORTS

Costenoble has a long tradition in motor sports. Costenoble products were applied in the Paris–Dakar Rally, the 24-hour race on the Nürburgring track and in Le Mans, in DTM races, Formula 1 and numerous smaller races. All over the world, a number of motor sport teams have relied on oils, solid oils, and coverings produced by Costenoble.

ANTIADHESIVE AGENTS

Costenoble offers a range of antiadhesive products for form separation. Most of water-based or dissolvent-based suspensions containing PTFE are characterized by high separating effectiveness, simple, safe and clean service, a long storage period and a high material compatibility.

ASSEMBLY ASSISTANCE

As assembly assistance, the OSIXO® ANTI-SQUEAK products attract customers with a clean and safe service and storage. Numerous products from this series do not have a specified validity date, so they can be, with no troubles, stored for a longer period of time. They are nontoxic, colourless and odourless, do not migrate and offer a permanent high quality. Moreover, their chemical inertness dissipates all doubts concerning the possible reaction with various materials. It makes them reliable and safe auxiliary agents in assembly.

SURVEY OF TYPICAL USAGES INSIDE AND OUTSIDE (ABSTRACT)

INTERIOR

- squeak and rattle solutions for:
 - dashboard
 - ventilation flaps
 - control mechanisms
 - rotary and slidable control unit
 - sun strip
 - seats and belts
 - rear-view mirrors
 - speakers
- headrest guides
- screens and multimedia systems
- speaker seals
- breakdown sensors
- instrument board systems
- seat belt systems
- airbag lining
- leather and fabric finishing
- mirror fastening
- internal lighting
- leather and fabric impregnation
- antiadhesive agents for rubber and plastic parts
- ...

BODY

- LED headlight control modules
- rear lighting
- door and locker systems
- window raising
- linear guides
- slide guides
- mirror regulation
- sunroof seals
- noise insulation
- external decorations
- external mirrors
- seal profiles
- wiper systems
- glass elements
- lighting
- ...

COOLING, AIR-CONDITIONING

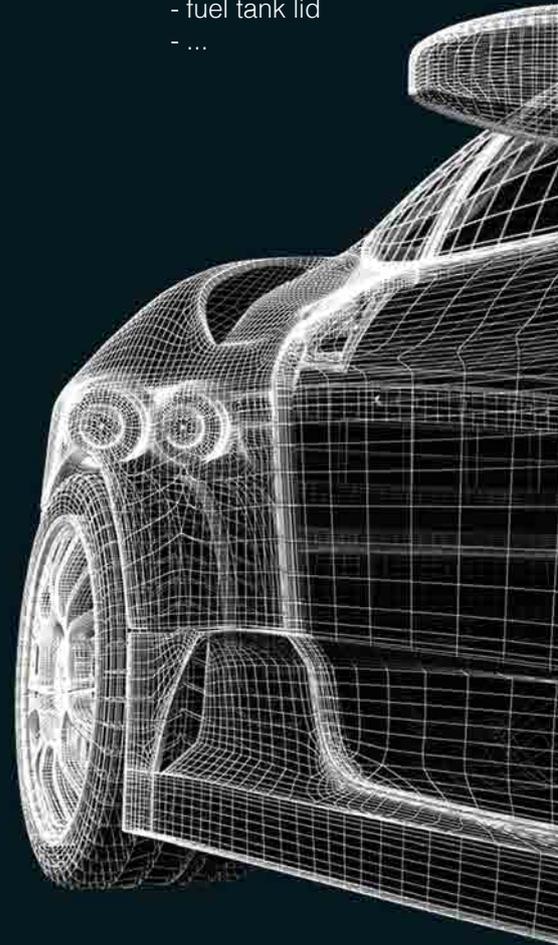
- heating/air conditioning modules
- coolant tubes
- fan clutches
- radiator fan bearings
- water pumps
- thermostat housing
- feeding air radiator
- electronic heating systems
- air flaps and canals
- air conditioning compressor pistons and clutches
- front wall gates and seals
- controller drives
- filter systems
- o-ring seals
- ...

CHASSIS, BRAKE

- ABS/ESP systems
- pedal systems
- hydraulic elements
- clutches
- handbrakes
- shock absorber seals
- steering column
- tyre pressure control system
- wheel bolts
- seals
- ...

DRIVE

- bearing and gear lubrication
- location and knocking combustion sensors
- oil seals
- suction manifold seals
- EGR valve
- pistons
- clutch start-up
- gear change
- constant velocity joints
- electronic injection systems
- fuel tank lid
- ...

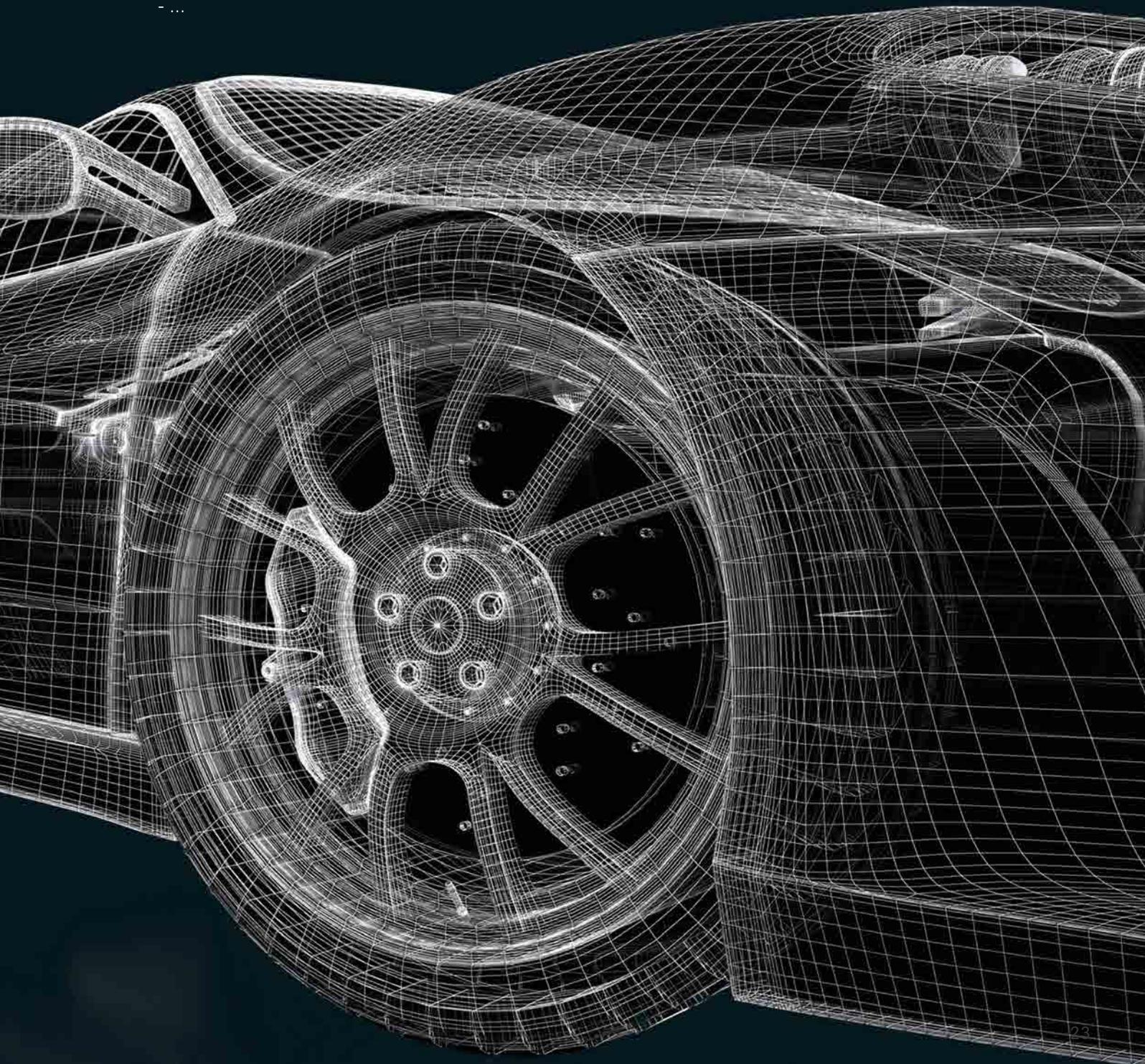


ASSEMBLY AND MAINTENANCE

- assembly pastes
- Anti-corrosion protection
- general lubricating and preserving products
- detergents and care products
- polish lacquer, care of plastics and rubber
- impregnants
- ...

ELECTRIC INSTALLATION

- ignition cables
- ignition plug cable ends
- plug-in sockets and their seals
- starters
- electric generators
- lighting
- ...



INTERNAL USAGES IN OTHER TYPES OF VEHICLES

OSIXO® ANTI-SQUEAK series products have a number of advantages which can be useful during arrangement of the interior of the car. Similarly high requirements concerning comfort and travelling quality also exist in relation to other types of vehicles. Also here, the OSIXO® ANTI-SQUEAK products have a number of advantages.

AIRWAY

Structural interior components of modern passenger trains have to withstand very high physical loads. Trains move with the speed up to 250 km/h and are, at the same time, exposed to great twisting movements, which results in a non-sufficient effectiveness of traditional lubricants. High-quality OSIXO® ANTI-SQUEAK products are distinguished with a great mechanical durability. Their long life lowers maintenance cost and results in the fact that the inside of passenger trains is free from bothersome friction noise for a long time.

AVIATION AND AEROSPACE

PTFE products have a long-standing tradition of usage in air and space industry. PTFE coating on plates protecting against high temperature in the module of the Apollo mission lander enabled moon landing. From space travels, through air force, to civil aviation - application of PFPE and PTFE-based products has a long-standing tradition.

They are particularly distinguished with their chemical inertness and material compatibility connected with it, as well as complete non-combustibility and non-flammability. Moreover, they are extremely resistant to oxygen and work efficiently in the conditions of subatmospheric pressure or vacuum. They are also reliable in low temperatures and their volatility is low.

COMMERCIAL VEHICLES

What constitutes the advantage of using OSIXO® ANTI-SQUEAK series products inside commercial vehicles is their particular resistance to dust, dirt, and aggressive environment. In the case of commercial vehicles, it is obvious that the technical aspect predominates the aesthetic side, however, OSIXO® ANTI-SQUEAK products have great advantages when compared to competitive products.

BOATS AND YACHTS

The OSIXO® ANTI-SQUEAK products are silicone-free. They do not migrate even in high temperatures and remain in the place of application without almost any loss. Moreover, they are highly resistant to washing out and salt water. PFPE and PTFE products do not support any forms of biological growth, therefore they are suitable for use on boat hulls and engine parts which are below the water level.

CARAVANS AND OUTDOOR

In modern caravans and camper vans, lighter and lighter materials must be applied in order to maintain their kerb weight on a low level, with a simultaneous high number of equipment elements. Light structural components are, however, generally considered as not very valuable. Damping greases particularly give these parts high-quality tactual sensations. Along with OSIXO® ANTI-SQUEAK products preventing squeaking and cracking, caravan and camper van sub-suppliers and manufacturers have a range of possibilities in order to improve the interior of vehicles considerably.



H. Costenoble GmbH & Co. KG - keeping on course towards innovations for 50 years

For over half a century, the company Costenoble is a recognizable producer and a respected company offering chemical and technological base materials, additives and specific chemicals. The Costenoble trade mark - the characteristic "C" is placed on numerous solutions to a number of applications in almost all branches of industry.

The power of the company Costenoble is in the ability to offer top state-of-the-art products. At the same time, what is of prime importance is always, next to product and service quality and reliability - a particular benefit

of a customer. This way, individual solutions are formed from particular tasks.

As a specialist and a supplier of products of recognizable industrial enterprises all over the world, Costenoble knows how, thanks to quality, reliability and service, it can be a competent partner.

Trade partners



Products

- Specific-purpose and industrial greases
- Silicone oils and silicone suspensions
- Dry PTFE coatings
- Anti-abrasive varnishes and adhesive agents
- Colour and effect pigments
- Adhesive and sealing agents
- Functional additives
- Care products



Basic information:

- the company was founded in 1952 as DuPont® distributor
- since 2006, a channel partner of Dow Corning®
- DGE (Distributors Group Europe) member
- registered office in Eschborn, departments in Poland and Hungary
- since 1994, a place of production and warehouse near Köln/Bonn
- approximately 35 co-workers in the scope of production, administration and distribution



Industry branches

- automotive industry and sub-suppliers
- construction of machines and appliances
- air and space industry
- food industry
- obtaining energy
- medical technology
- ship industry

Trademarks

OSIXO®

Krytox™

DryFilm®
PTFE-Coatings

TraSys®
Release Agents

M **MOLYKOTE**

DOW CORNING

Stoner

ZIP®
CHEM
PRODUCTS

Tecnite®

COSTELAN
PFLEGE UND WERTERHALT



H. Costenoble GmbH & Co. KG
Rudolf-Diesel-Straße 18
65760 Eschborn, Germany

Phone: 06173 9373-0
Fax: 06173 9373-30

E-Mail: service@costenoble.de
Internet: www.costenoble.de

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