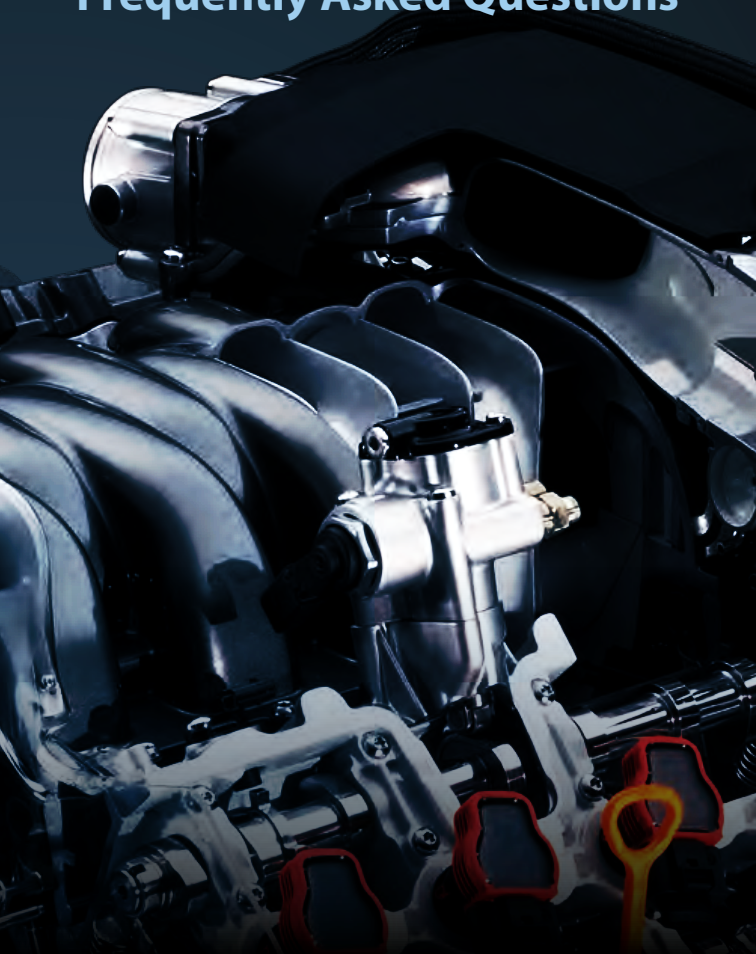




# REVITALIZANT

## XADO Revitalizants Frequently Asked Questions



**XADO**  
CHEMICAL GROUP

[www.xadomalaysia.com.my](http://www.xadomalaysia.com.my)



Today, the revitalization technology has become a part of car operation. Its description is included in textbooks on tribology, quality effective products containing revitalizant can be purchased in stores all over the world.

**The efficiency of revitalizants has been proven by certification tests in 35 countries.**

*Products with XADO revitalizants are entered into TecDoc informational system on service maintenance and automobile parts.*



In this pamphlet you will discover the unique effects of revitalization, as well as the answers to frequently asked questions concerning the maintenance and application of products containing revitalizants.

We invite you to examine how the revitalizant can be useful for your car, and hope that you will find answers to all your questions.

# Revitalization

*(from Latin: VITA – life)*

*Energy and resource saving protective and restoring technology for vehicles and mechanisms. Developed by XADO. Protected by patents in the world's leading countries.*

# About the revitalization technology

## 1 Wear and tear of the operating surface

In order for a defect to occur it is enough to have a scratch or a chip emerged due to impact of solid foreign particles (dust, dirt or cutting waste). This area becomes a zone of enormous surface activity. It appears in places where metal atoms have uncompensated connections. So they can be easily “loosened” and torn from the matrix when the load increases. Metal starts chipping.



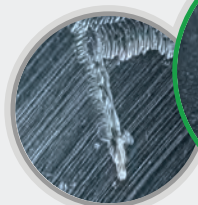
## 2 Start of the revitalization process

The revitalizant gets onto the operating surface together with the lubricant. It starts acting exactly in the zone of the maximal wear, as there is enough excess energy here to start the revitalization process, and metal atoms possess the largest number of uncompensated connections. These connections, like magnets, capture and hold the building material, revitalizant, just in the areas of wear and tear.

## Demonstrably about the revitalization process

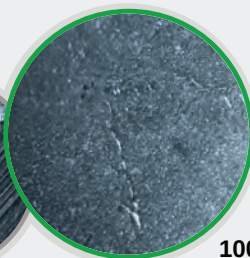
### BEFORE

application  
of revitalizant



### AFTER

application  
of revitalizant



A real surface of  
a part before and  
after the revitali-  
zation.

100x

After 500 km (300 miles) of run the defect has been completely removed. As a result of revitalization a perfectly smoothed protective ceramic-metal coating has been formed on the surface of the part.



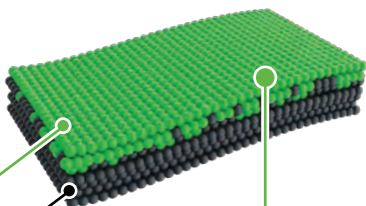


### 3 New coating formation

In a few minutes after beginning of the revitalization process a ceramic-metal patch appears in the place where a scratch was. The zone of enormous activity disappears. The energy processes stabilize, the growth of the ceramic-metal coating stops.

*Conglomerate of metal carbides' atoms*

*Conglomerate of part's surface atoms*



### 4 Completion of the surface modification

Due to diffusion of the protective layer into metal an extremely firm gradient ceramic-metal coating with unique operating properties is created.

	Without revitalizant	With revitalizant
Microhardness	200–300 kg/mm <sup>2</sup>	650–750 kg/mm <sup>2</sup>
Roughness, Ra	0.9–2.1 μm	up to 0.06 μm highest level of cleanness
Corrosion resistance	Low	High

*Basic properties of the protective coating*

# Revitalizant – medicine against age and illnesses

What is revitalizant for your car? Consider it medicine. If your car is “ill” with noise, smoking, overconsumption of oil or fuel, decrease of power and compression level, the revitalizant will “heal” it.

Revitalizant also works as a preventive agent, so your car does now get “ill” at all. Treatment of car parts will protect your car from serious problems in future.

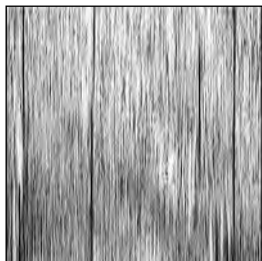
*After the XADO Chemical Group had introduced the term “revitalization” into use, the medical and cosmetic companies working on rejuvenation and struggle with ageing have started to use it widely.*

## After-effect

Once the new coating is formed as a result of revitalization, it retains its unique properties regardless of the revitalizant's presence or absence in the lubricant.

The unique restoring and rejuvenation properties of the coating can be seen from the following test. A scratch on the working surface is still healed even after 10 oil changes, when each oil change equals a run of 10,000 km (6,200 miles). Such a fantastic after-effect is achieved due to the restoring properties of the coating, and the gained potential of contracting inner stresses.

*Before Application*



*Scratches  
(with depth up to 0.1 mm)*

*After Application*



*Scratches have vanished; smooth  
ceramic-metal coating can be seen*

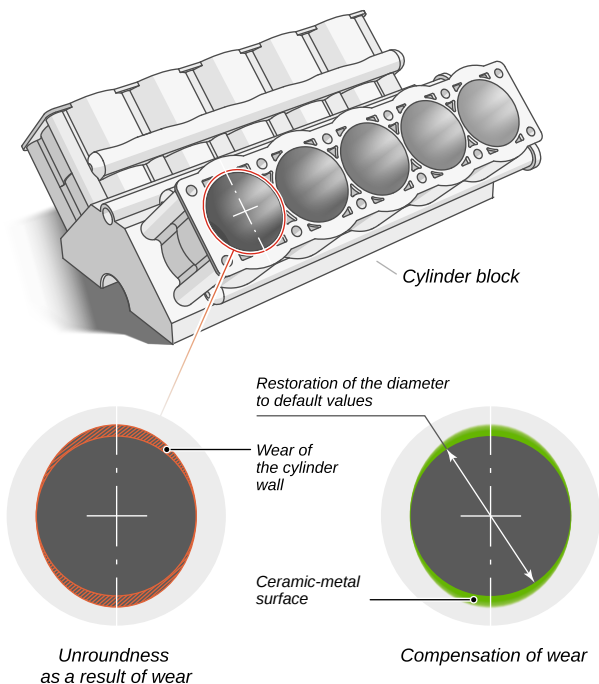
# Application Experience

## New cars

It is known that during the breaking-in period of the new engine, the toughest metal losses occur. In the presence of the revitalizant the metal abraded from the surfaces is immediately replaced and a protective coating is formed on the parts' surface. With the revitalizant, the engine will be preserved in its "new" state.

## Used cars: Ellipse Shape in Cylinder

Ellipse shape occurs in engine cylinders of cars with high mileage. Wear in the upper and lower parts of cylinder bore could be substantial enough to be measured with instruments or even with a bare hand! During the process of revitalization the shape of cylinders is restored and they return to their original dimensions, and ellipse shape is eliminated. The result is proved by compression measurements and micrometer measurements of cylinder bearing surfaces.



## Transmission Noise

The main reason of noise and grate appearance in operation of transmissions and differentials is the wear of gear teeth in the points of disengagement. The revitalizant compensates wear, builds up the coating on the gear teeth and completely removes unpleasant noise and vibration.

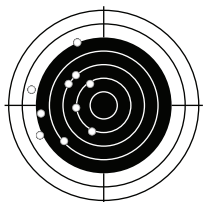
## Run Without Oil

As it has already been mentioned, the coating obtained as a result of revitalization is unique in its strength properties. It is designed to protect units in case of superloads. The protection's safety margin is demonstrated via evident tests. At different times the cars, which have gone through the cycle of revitalization, have undergone such a rigorous test as operation without oil. Even without the oil, their total run exceeds 5,000 km (3,100 miles). This test effectively demonstrates the potential gained by the vehicles after the process of revitalization.

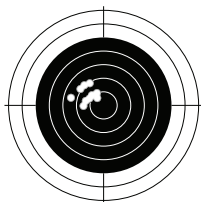


## Guns

Guns with rifled barrels are subject to tough wear. Going through the barrel, time after time, the bullet takes away metal from the bore. The barrel loses its class and safety after only 100 shots. With the help of XADO patented revitalizant-gel, after just several shots the barrel is almost fully restored. The enormous speed and friction force of the contacting surfaces creates ideal conditions for revitalization. The protective coating is formed directly on the "bullet-barrel" contact surface, i.e. on the surface of the rifling, restoring its original shape. The best proof of the revitalizant's effect is instantly increased accuracy of grouping.



*Before  
the revitalization*



*After the revitalization  
accuracy of grouping is increased!*

# Revitalization laws

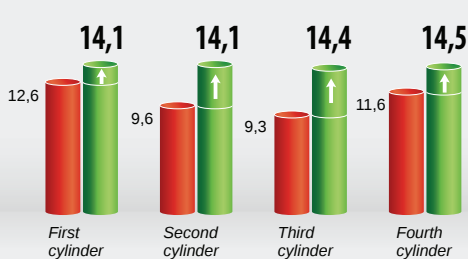
Thanks to XADO products the revitalization became an integral part of technical maintenance of vehicles. During the revitalization a new multifunctional gradient coating is formed on friction pairs. The parts regain their initial size – those very “hundredths” and “tenths” which seemed to have been irrevocably lost during the operating life.

## This is the effect of repair or the First law of Revitalization

It results in considerable increase and equalization of the compression in cylinders, reduction of fuel consumption, increase in engine acceleration, restoration of oil pumps, turbocharged units, shafts and bushings. Noises in operation of the transmission, howling in the power steering pump, bearing plays and runout are eliminated. **The new coating possesses unique properties:** essential strength, high corrosion resistance, and low roughness. After the revitalization the parts will reliably serve you two to four times longer.

## How the revitalization benefits

### Compression increase in cylinders of the engine \*



Factory value ↑



### Reduction of fuel consumption

↓ 5,3 %

*in a mixed cycle of vehicle operation like "city – highway"*

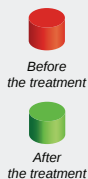


6.962 L for 100 km (60 miles)



7.351 L for 100 km (60 miles)

Average fuel consumption value



\* Mazda vehicle, manufactured in 2002, 2.0 L.

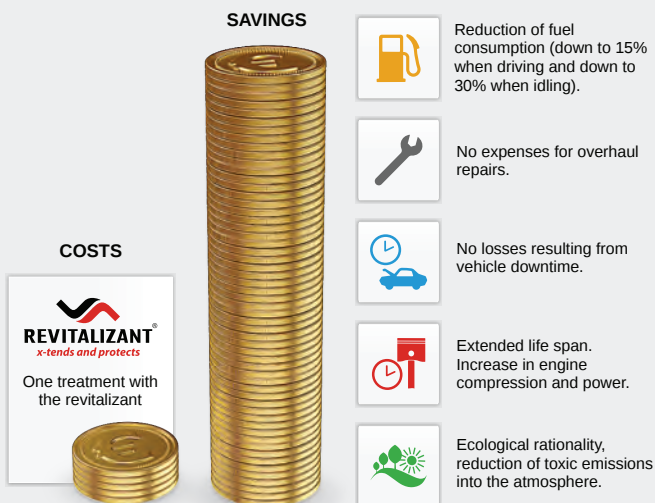
***After the revitalization the parts will reliably serve you two to four times longer.***

## **This is the effect of antiwear protection or the Second law of Revitalization**

An important feature of the ceramic-metal coating created by the revitalizant is its self-regeneration ability. Even after ten oil changes and operation time equal to 100,00 km (62,000 miles) km of run the scratches which have appeared on the cylinder surface will soon be closed. A guarantee for such durability is in the accumulated potential of internal compressive stresses which remains almost unchanged within the whole operating life. Owing to application of the revitalizant assemblies and mechanisms can always be maintained in a perfect state.

## **A medicine against aging of vehicles and mechanisms exists – this is the Main or Third law of Revitalization**

### **Time and money savings**



# Questions and Answers

## 1 What is the thickness of the ceramic-metal coating formed as a result of revitalization?

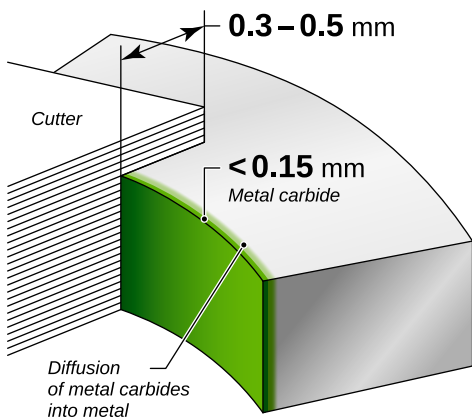
The unique quality of the revitalizant is that we are not talking just about atomic layers, but about real microns in the pump element, several hundredths of one millimetre in the engine cylinder-piston group and several tenths – on the reducer gears.

## 2 Is there a risk of ceramic-metal layer growing in excess? Can it cause the engine to seize up?

No, the engine will not seize up. Revitalization is a self-regulating process, where the friction of surfaces is the necessary condition for it. When the coating is formed, the friction is reduced drastically and the growth of the surface stops.

## 3 A superhard coating is formed as a result of the revitalizant's application. Can the engine be re-bored, if necessary?

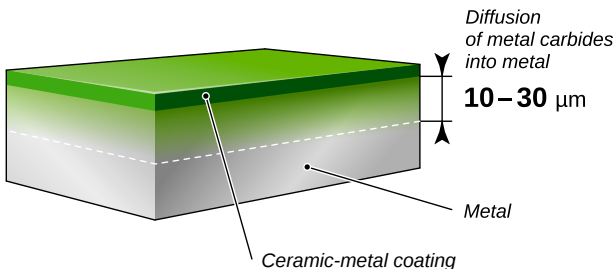
This is a common question from car owners, and we would like to set their minds at ease. The ceramic-metal coating is formed to the depth of 10–30 microns, and the boring tool can remove tenths of a 1 mm. Also, the traditional major engine overhaul can become unnecessary altogether; the revitalizant's exceptional ability to restore the original shape of worn parts allows car owners to avoid tedious and expensive repairs.





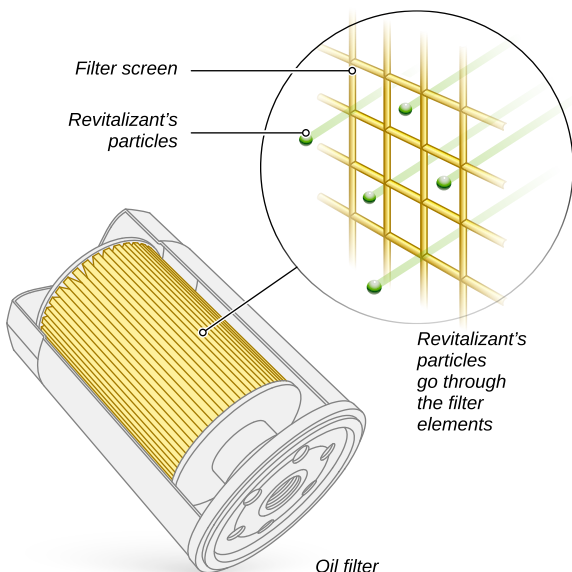
#### 4 | What if the ceramic-metal layer peels off in operation?

It is not possible for the ceramic-metal layer to peel off in operation. A reciprocal diffusion of metal and metal carbides to the depth of 10–30  $\mu\text{m}$  (micrometer) takes place. There is no distinct border between the initial surfaces and ceramic-metal coating, so there are no conditions for the ceramic-metal layer to “peel-off”.



#### 5 | Can the revitalizant clog up filters...

No. The gel-revitalizant completely dissolves in oil and doesn't alter its viscosity or any other physicochemical properties. It simply uses oil to be distributed into working friction surfaces and easily goes through filters directly to the friction zone.



6 **I am going to apply revitalizant to my new car, but it is under the warranty...**

We stick to the emphatic opinion that it is best to apply the revitalizant compound to the engine during the breaking-in period. The application of the revitalizant is especially efficient when engine parts are new. Due to the revitalizant effect the breaking-in goes quicker, softer, more efficiently and almost without losses of metal into "boring".

7 **What is implied under the protection guarantee for 100,000 km (62,000 miles) of run?**



Guarantee of the coating for 62,000 miles

It is implied that the surfaces will not wear out during the guarantee term provided the car is operated in a regular mode. For example, should a scratch appear on the cylinder wall on the 99th (61th) thousand of the run, it would disappear due to the revitalizant's high restoring properties. The scratch will "heal!"

8 **When is it best to start the application of the revitalizant?**

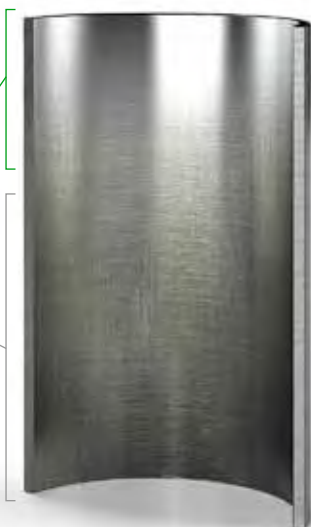
Revitalizant is effective at any stage of car operation and is always useful. The most important thing is that the assembly must be in an operative state. Ideally, the revitalizant should be applied from the breaking-in period on.

9 **What happens to the honing by revitalizant's application?**

*Modification of the honing in the areas of the most intensive adjustment*

*Honing remains unchanged*

Honing is designed to provide relatively safe adjustment of parts and to hold oil on the cylinder walls.



The revitalizant modifies honing in the areas of the most intensive adjustment (cylinder-piston group near the top dead point) and preserves it unchanged in the unloaded zones.

**10 Can I drive without oil if I use revitalizant?**

No. Driving without oil is only a spectacular test that demonstrates the unique properties of the ceramic-metal coating. The revitalizant has not been designed for driving without oil; only for the increase of the operational life and reliability of car parts.

Oil is not just a lubricant. It also washes, cools, works as a hydraulic fluid by operation of hydraulic lifters, and provides other functions. Oil is necessary even for the car that has undergone the full revitalization cycle. However, under extreme conditions such as loss of oil or driving with a perforated housing, the revitalizant will provide reliable protection for your car.

**11 How long does the revitalizant's effect last?**

Tests show that the protective coating remains even after 100,000 km (62,000 miles) of run. After 100,000 km (62,000 miles) it is advisable to repeat the revitalization cycle. To support the surface restoring potential at the highest level it is strongly recommended to use oil with the atomic revitalizant XADO Atomic Oil or Atomic Metal Conditioners (AMC) with revitalizant after each oil change.

**12 What kind of oil is the best for treatment: old or new, synthetic or mineral?**

It makes no difference because the revitalizant is compatible with any type of oil. It does not chemically react with them and does not change their viscosity, physicochemical or operational properties. The oil only carries the revitalizant to the friction surfaces.

**13 I am the second owner; I have no idea what kind of oil was used in the engine. Can I use XADO products?**

Even if some additives have been applied to the engine earlier, they will not cause much effect on the revitalizants' action.

**14 Won't the revitalizant settle in the bottom of the oil pan and lose its efficiency if the car is not used for a long period of time?**

No, the revitalizant will not settle. After the revitalizant's application, the engine should idle from 2 to 5 minutes.

At this time the revitalizant will completely dissolve in oil, even if the mechanism has not been used for a long period of time.

**15 While idling, the oil pressure indicator blinks. Will the revitalizant help?**

There are many reasons for reduced oil pressure, ranging from a failure of the sensor to serious wear of the oil pump, bushings or crankshaft journals. If the wear is not substantial, the revitalizant will help.

**16 Will the revitalizant help in case of increased oil consumption?**

There are still more reasons for increased oil consumption, such as wear of parts in the cylinder-piston group, bedding, gumming-up or breakage of the piston rings, valve stem seal failure, or oil-leaking through seals. If the reason is wear, the revitalizant will help.

**17 How can fuel economy be reached?**

For cars with high mileage, the fuel economy is first reached by the engine's wear compensation and reconditioning of its operating parameters to their default values. On a new engine, the optimization of the interfacing and reduction of friction losses will help you cut down the expenses down the road.

**18 While undergoing maintenance, there is a high measurement of toxicity in exhaust gases in my car. Will the revitalizant help?**

Increased emissions of harmful substances into the atmosphere could be due to the quality of the fuel used, adjustment and operation of the fuel outfit. The most frequent reason for harmful emissions is engine wear. In this case, the revitalizant will definitely help. The application of revitalizant reduces the emission index by ten times and some parameters by hundred times.

**19 How will I feel the effect of the revitalizant on my car?**

The driver will feel an increase in engine power, acceleration, flexibility and change in the sound of the engine operating in different modes. Drivers will notice improvements after 50–100 km (31–62 miles) of run from the product's application.

These improvements are the result of the revitalizant's restoring effect, as it increases and equalizes compression in cylinders.

## 20 | Will revitalization help any engine?

Yes, all kinds of engines can be improved with revitalization, as long as the engine is operative. Whether the engine is gasoline, liquefied petroleum gas (LPG), diesel, biofuel, along with high-powered ones, with direct injection, multivalve, or equipped with turbo-charger, revitalization will help.

In order for the protective ceramic-metal coating to be formed, the engine must be in an operable state.

The validating parameters, which can measure the engine's operating capacity, are compression and fuel consumption. The decrease of compression by 20–25 % from the nominal parameters, its dispersion in cylinders by more than 0.4–0.6 % from the fuel consumption can indicate the critical condition of the engine.

### **Examples of the critical condition of an engine:**

1. The rated value of the compression in the engine is 14 units (atm).  
The value of the compression in one of cylinders is 10,5 and less units (atm) or the compression is 11 and 13 units (atm).
2. The fuel consumption in the engine is 10 L for 100 km (1 gal for 25 miles), with oil consumption of 800 ml for 1000 km (1 US qts for 750 miles) and more.

Critical condition of an engine is indicated by 100% wear of its parts (parts are damaged).

The revitalizant shows its restoring effect even when the engine is in a critical condition. However, in this case the full restoration of the engine's operational parameters to original values may not occur.

## 21 | When is it recommended to use the revitalizant for cylinders? Is there a revitalizant to treat the whole engine?

The gel-revitalizant for cylinders is designed to treat working surfaces and is applied directly onto the cylinder walls to remove shape defects such as ellipse shape, scorings and scratches up to 0.1 mm.

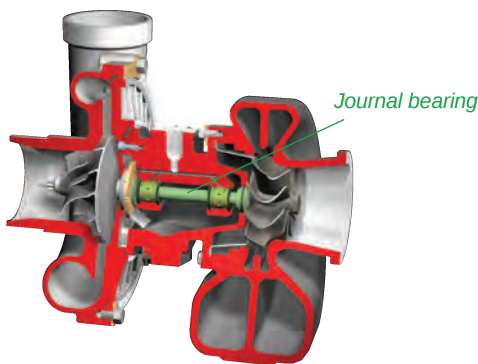
Service stations have found revitalization useful even for complete engine overhauls. Prior to the final engine assembly, the cylinder-piston group and crankshaft bearings of the gas distribution mechanism are lubricated with a mixture of the gel-revitalizant for cylinders and oil in equal parts. This guarantees their effective bedding-in, eliminates inaccuracy of the reconditioning and considerably increases the engine's service life.

22 **Should the treatment of the diesel engine and fuel outfits be done separately or simultaneously?**

It is better to do it simultaneously. The simultaneous treatment not only improves the engine operation by increasing its power, but it also improves the performance of the fuel outfits. The fuel pressure increases and the fuel-injection improves, what results in greater fuel economy.

23 **Does the revitalizant damage the turbine?**

No, the revitalizant protects the turbine and extends its operation life. The turbine is designed in such a way that its journal bearings are lubricated with a relatively thick oil coating (hydrodynamic lubrication mode) in practically all operational modes. The main wear of a bearing occurs at start and stop, when this coating is disturbed. The revitalizant comes into full action exactly at this moment of highest wear for the turbine moment, forming a protective coating on the bearings.

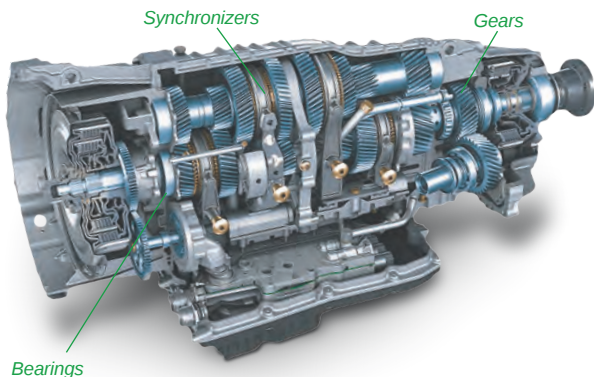


24 **I have “Common Rail” injection system, diesel engine CRDi. Has the revitalizant been tested for use in these engines?**

Yes, it has been tested, and regularly undergoes testing for new constructive innovations. Modern systems of diesel engine fuel lines with the high-pressure generation, such as “Common Rail” and “Pumpe-Düse” (pump-injector) types, have plunger pumps where the plunger and sleeve wear the most. There are no technical restrictions for applying revitalizants to these fuel supply systems. The coating formed on the plunger’s surface provides protection for the complex mechanism from low-quality fuel, that may contain mechanical fouling or water, and from fuel with bad lubricating properties. This includes nonsulfurous fuel, or “dry solar oil”, biofuel with a high ethanol concentration.

## 25 | If the box is droning, will the revitalizant help?

There are two main reasons for the increased noise from transmission mechanisms. Droning can occur gradually, as it is connected with the wear of gear teeth, bearings and shafts. The revitalizant always helps in such instances. However, sometimes the box drones from the beginning of its operation as a result of production deficiency, causing problems in the gear teeth changeover or causing the teeth to come together too tightly. The revitalizant will work in this case too, but if the deficiencies are substantial, the noise may not disappear.



*The places where the revitalizant should be applied*

## 26 | How can gear shifting precision be improved?

The gear shifting precision can be improved with a new coating formation. The distinguishing feature of the revitalizant is formation of a protective coating not only on the ferrous materials, but on the nonferrous metals as well. This is especially evident on the synchronizers, which are manufactured from bronze alloys, or nonferrous metals, and are responsible for gear shifting.

## 27 | What gel should be used when modern robotized gearboxes stand between the mechanical and automatic gearboxes?

Robotized gearboxes and gearboxes with dual clutch, or dual clutch transmission are improved automatic gearboxes. For the revitalization, it is recommended to use the gel for the gearboxes and reducers.

**28 | What should be applied for a mechanical gearbox with the liquid for automatic gearboxes?**

In modern mechanical gearboxes where liquid for automatic gearboxes (ATF) is used, it is recommended to use the gel for the gearboxes and reducers.

**29 | Will the revitalizant harm the performance of friction clutches in self-locking differentials?**

No, it won't. The revitalizant can be used without any hesitation in axles with self-locking differentials. The assembly is designed in such a way that the torque transfer of the friction clutches occurs through the oil and depends on its viscosity. The revitalizant has no effect on the viscosity properties of oil.

**30 | The automatic gearboxes (CVT) with the V-belt variable speed drive unit differ in their capriciousness. Will the revitalizant help?**

Yes, it will. The weak point of the variable speed drive units is the contact of the wedge-like surface of the belt with the pulley, and it is this contact that is effectively protected by the revitalizant. The revitalizant also protects other metal parts such as gears, bearings and couplings.

**31 | My scooter has separate oiling system. Where should I squeeze the gel – in oil or in fuel?**

A special gel is manufactured for the motorcycling vehicles. During the treatment of a four-cycle internal combustion engine, the revitalizant is applied directly to the oiling system of the engine.



Scooters with two-cycle engines can have separate and mixed oiling system.

During the treatment of the two-cycle engine with the separate oiling system, the revitalizant is added into the oil tank of the scooter. In scooters with mixed oiling system, the revitalizant, after first being dissolved in a small amount of oil, is applied directly to the fuel tank.



**The bearing is droning.**  
**What kind of Revitalizant should be applied?**

Along with gels-revitalizants, XADO manufactures lubricating greases. In order to choose the correct grease, it is necessary to determine the wear rate of the assembly.



The **Protective** grease is applied to new as -semblies and assemblies with insignificant wear, or with wear rate up to 10 %, and it is a multi-purpose substitution for any lubricating grease.



The **Restoring** grease contains more active components. That is why it not only protects the surface of a part, but also restores its original shape. It is applied to assemblies and mechanisms that have up to 50 % of wear.



The **Repairing** grease is applied to assemblies with the wear of up to 80 %.

You can also choose a suitable packaging – tube, cartridge or container, and the amount of grease needed.



**What is the difference between the 1 Stage revitali-zant and an usual engine gel?**

Today, the 1 Stage is one of the most powerful products in the revitalizant line. The advantages and differences from an usual engine gel are the operating speed, high-speed surface modification, the universality of the application and the one-phase treatment.

**Operating speed.** The new, perfect formula of the compound makes it possible to fully restore and perfectly protect the engine after a 100 km (62 miles) of run, and guarantees its absolute protection from wear for 100,000 km (62,000 miles).

**Universality.** The compound is ideally suited for gasoline and diesel engines of any construction and uprating grade. The product is universal in respect to any state of the engine's wear. It is also suitable for cars with high mileage as well as for new cars.

**One phase treatment.** The revitalization is carried out in one phase. It saves time and makes the treatment procedure much easier.

**1 Stage** is a perfect choice for the consumer who appreciates a quick and reliable result.

### 34 What should I choose for the treatment: the package with 3 tubes, 1 Stage revitalizant or Metal Conditioner Maximum with the revitalizant?

Every product has its advantages.



The classical engine revitalizant package with 3 tubes is priced well and offers a 3-stage application process in one purchase.



Gel-revitalizant in a syringe differs by its enhanced action (+ 20% comparing to the product in a tube) and convenient cost effective package.



The comfort one-phase treatment yields a quick result and universality regardless of the engine type. Its mileage capability is an obvious advantage of the 1 Stage product.



Advantages of AMC: quick effect, guarantee of antiwear properties of ceramic-metal coating for 100,000 km (62,000 miles), improved lubricating properties of oil.

All of these revitalizant products restore and protect the engine.

**35 | Doesn't good synthetic oil already contain all necessary additives?**

Manufacturers tend to minimize their costs and make the product cheaper, and motor oil makes no exception. Additive packages are enough to correspond to the minimal obligatory requirements, but not a grain more.

**36 | Do car manufacturers recommend application of additional engine treatments?**

The modern car is the embodiment of engineering and technological advances of modern world. However, their warranties are limited and the cost of new parts can be quite significant. The revitalizant helps to increase the surface life of a car and its parts by 2–4 times, thus saving large sums of money.

**37 | What does the RF mark mean?**

The Revitalization Factor (RF) is an efficiency index of restoration and protection of the engine against wear.

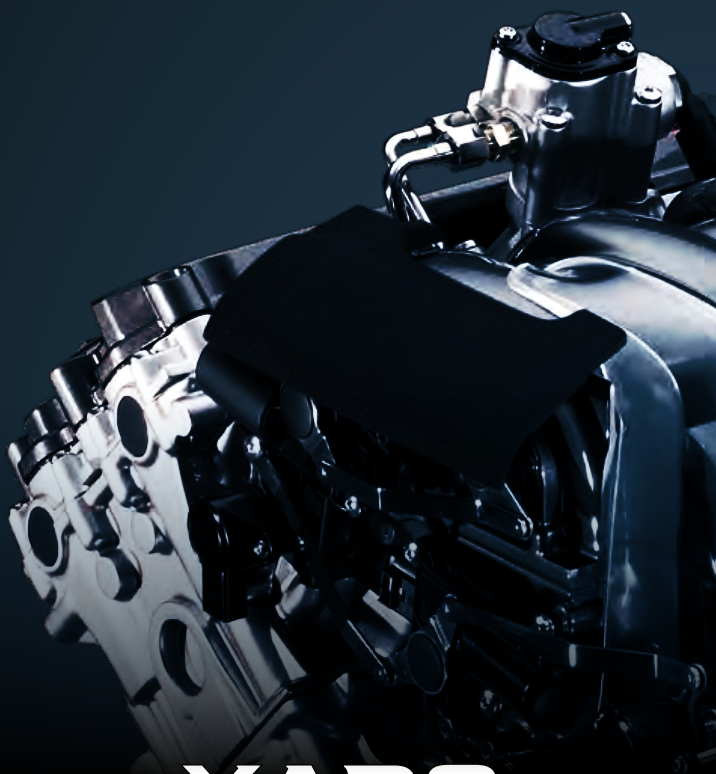


The product with the RF 100 mark possesses the maximal restoring and repairing properties. As a result of its application, the surface is fully protected from wear for at least 100,000 km (62,000 miles) of run.

The product with an RF lower than 100 is designed for the partial revitalization, protection from the current wear and maintenance of the protective qualities of the surface which has undergone the revitalization cycle on a high level.

**38 | Is the revitalizant toxic?**

No, it is not. All products have sanitary allowance for application in the food industry and are hygienically certified.



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