

# NanoVit<sup>®</sup>

MSH  
Mineralstoffhandel GmbH

## Technology



# Booklet

## Industrieapplication

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# NanoVit<sup>®</sup> Technologie

## NanoVit<sup>®</sup> – Mixture for Protection Wear

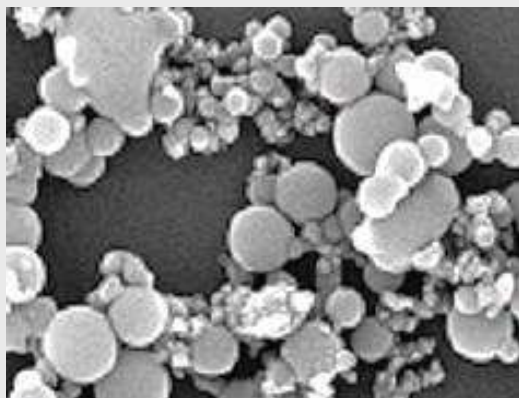


- modified silicon dioxid,
- activated aluminiumoxid
- special Grafit

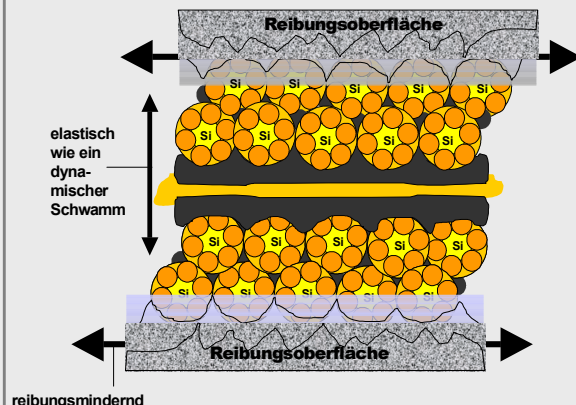
BET-Surface =. 100 - 150 m<sup>2</sup>/g

The NanoVit<sup>®</sup> – Mixture consists of a special mixture of modified silicon oxide, aluminum oxide and plasma treated graphite, which is consistent up to 1,200 °C. This composition is produced by a unique method, where all components were activated. The NanoVit<sup>®</sup> - Mixture forms a firmly, adhering, elastic, ball-shaped, durable anti-friction coating with a long-last effect and a low friction coefficient on the surface of the rotating engine parts as well as the metal matters. These parts react with each other to a metal organic connection, whereby attrition and friction are reduced and the life endurance is prolonged

### Molekular Structure

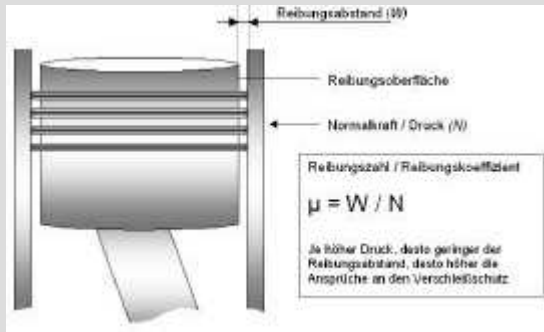


### NanoVit<sup>®</sup>-Layer



Analyzing the active centres of the friction surface within engines, the result would be the following:

*Draft: Cock and cylinder*



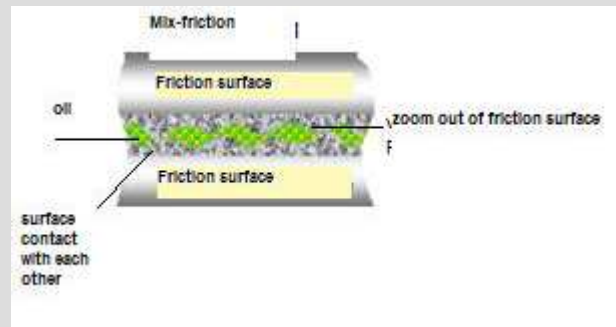
**Result 1:**

The friction changes depending on pressure and temperature.

*Draft: Friction surface concerning mix friction*

**Result 2:**

Through high surface pressure on the absolute contact points of the friction surface, it occurs a weld of these points and therefore attrition and a deficit of material



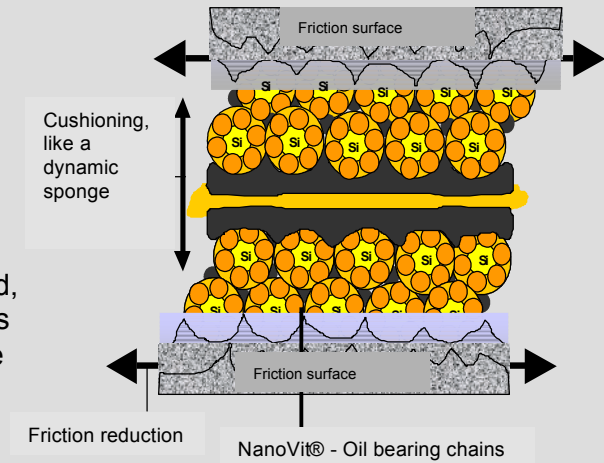
The tribological requirements for this geometry are linked to a criterion of exclusion. I.e. a system-comptabile reduce of friction by a wear protection must be.....

- elastic and adhering
- adjust flexible to the working conditions
- resistant against high pressure load
- less friction and improve wear protection
- warranty a surface regeneration
- lubricant abilities at high temperatures
- no influence on the characteristics of the oil
- warranty a long-last impact

## NanoVit® the „Construction Element“ for surface functionalisation of composite engines

NanoVit® means:

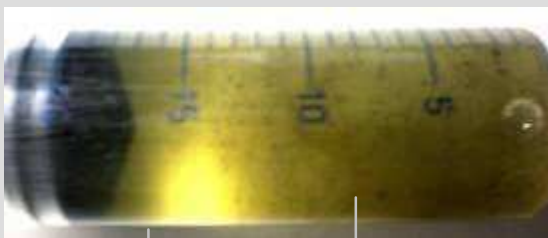
- under pressure self-regulating
- flexible, elastic,
- keep lubricant features on high temperatures
- stable and permanent firmly adhering
- minimal friction coefficient concerning the wear protection, which has a tridimensional, ball-shaped, elastic, net structure of 3 to 700 nanometres that is formed under pressure and temperature within the friction areas



Via utilization of the friction energy (pressure and temperature) on the centre of friction surface a firmly adhering, ball-shaped, elastic net structure is build.

This process is called „Revitalization“. Revitalization is a physico – chemical process between the friction partners. Through friction occurs an energy overload with the goal to destruct it. Now, if you implement a unique material into the friction area, which uses the energy to set up the molecules and adjust flexible to the labour conditions, then it forms a self-regulating process on this specific coat

The NanoVit® -concentration part of the oil is below **0.001 %** and works at the nanoscale. These mixtures lead to a self-regulating Oil – Molecule – Connection. The oil molecules restructure themselves new and a flexible, elastic molecular structure is formed.

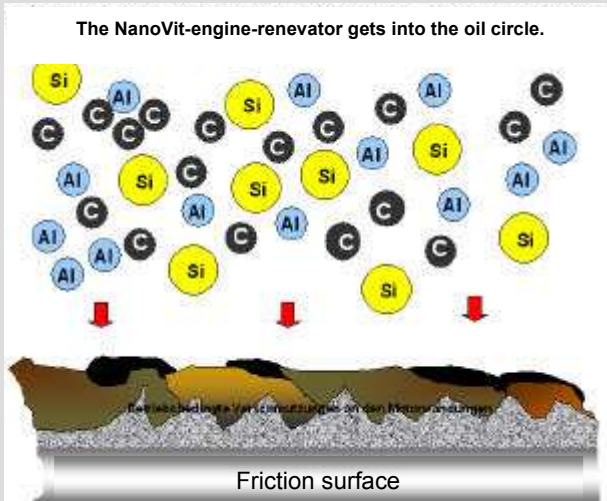


oil

NanoVit-Gel

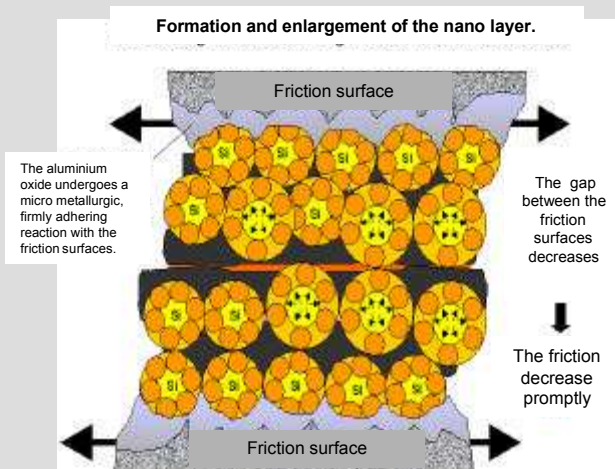
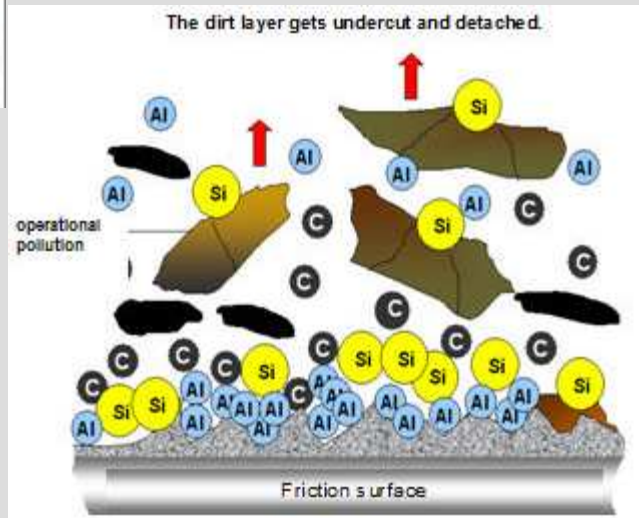
*NanoVit® – Gel – concentrate – dilution ratio 1:100,000 proportion in oil*

## NanoVit® „Mode of Operation“ e.g. the Engine



1-stage:  
The 3 main components (SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, plasma processed graphite) get into the oil circle of an nano amorphous form. The aluminum oxide detaches all operational contaminations.

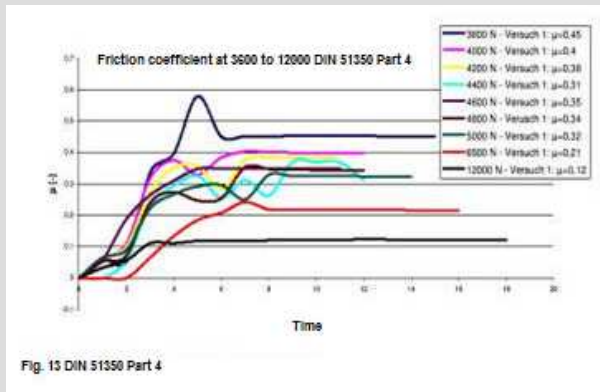
2-stage:  
The aluminum oxide undercuts the contamination coat and fits on the friction surface. The silicon oxide sediments permanent on the aluminum coat in form of a flexible silicon atomic structure. The engine oil transfers into the silicon atomic structure. The graphite connects with the surface of the silicon structure.



3-stage:  
The aluminum oxide and the friction surface have connected each other into a firmly adhering position. The coat is stretching under pressure, that means it absorbs the existing, extern energy for its development. The elastic, ball-shaped silicon oil molecules adjust flexible to the labour conditions and can change their size due to the different pressure.

## Extracts from different „test reports“

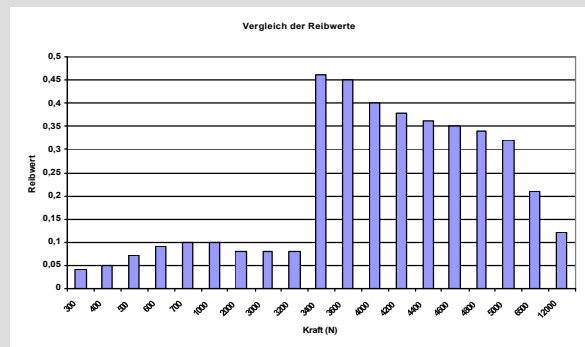
### Attrition Variables DIN 51350 ( SHELL-4-ball apparat)



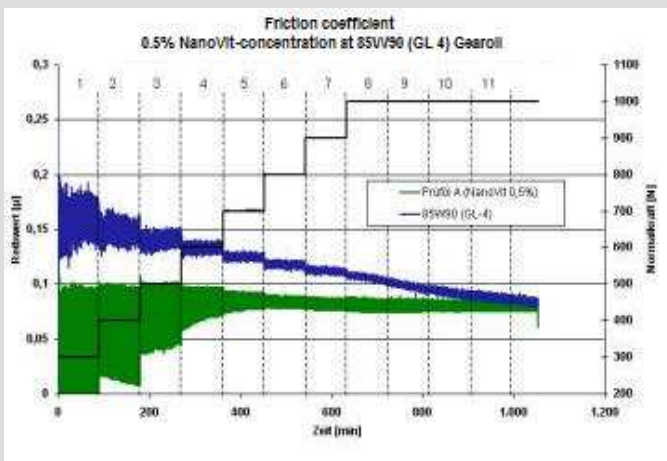
**Result:** At app. 3,200 N (Limit of 10W40) it should have come to a welding joint of the balls.

(doc: testreport KT-TB4(3)-2007 (KUK / FH Lübeck )

**Result:** On high pressure of 12,000 N (1.2 Tons punctual) there will be no welding joint of the balls. (Analyzed product consists of 99.9 % 10W40 and 0.1 % NanoVit-Powder!)



### Comparison between NanoVit® additives gear oil Type 85W90 GL4 and non-additives gear oil Type 85W90 GL4 (Friction coefficient & Attrition analysis)

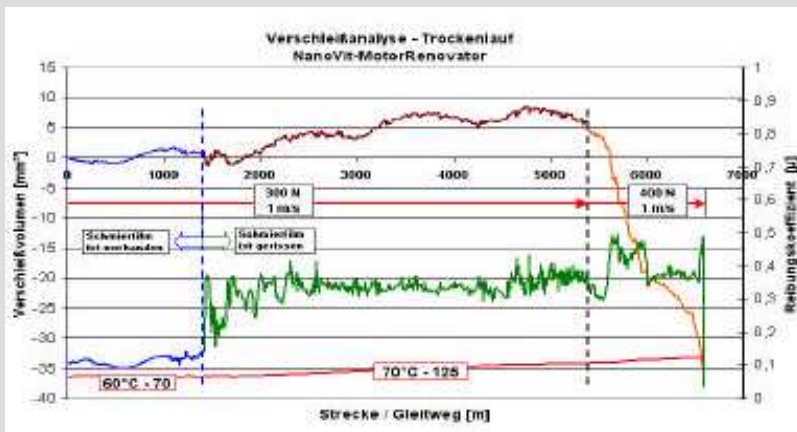


(doc: testreport - PB 8141.076.07-MR (T ÜV Thüringen )

**Result:** NanoVit®-Gear-Renovator lies consistently under the friction coefficient of the non-additive gear oil. The minimum friction coefficient of NanoVit®-GR is at app. 0.0001, at non-additive oil app. 0.08, highest coefficient is app. 0.075 and of the non-additive oil 0.2.

That means a low friction causes a low temperature. As a result its a much less oil and material attrition!

## Dry run analysis with the universal tribometer

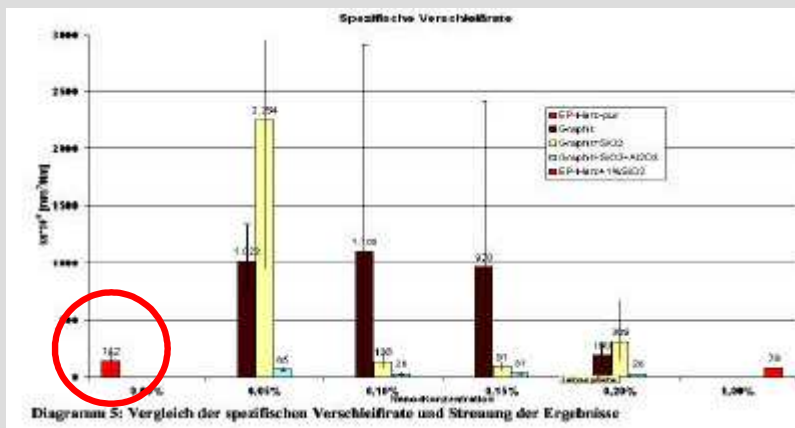


**Result:** NanoVit® could delay the mechanical deadlock by 5,600 m rather than 85 min

TEST REPORTS

(doc: testreport - PB 8141.076.07-MR (T ÜV Thüringen )

## NanoVit® - Epoxy resin

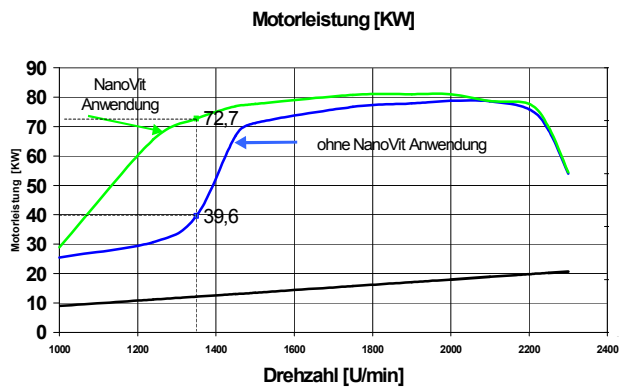


**Result:** With a 0.1 % NanoVit® concentration you get a attrition rate of 26. Compared to other Nano-Powders:  
1% SIO2 concentration = Attrition rate of 79

(doc: testreport KT-TB22-2007-MSH (KUK / FH Lübeck )

## Engine Test Stand

### increase performens



### Fuel saving

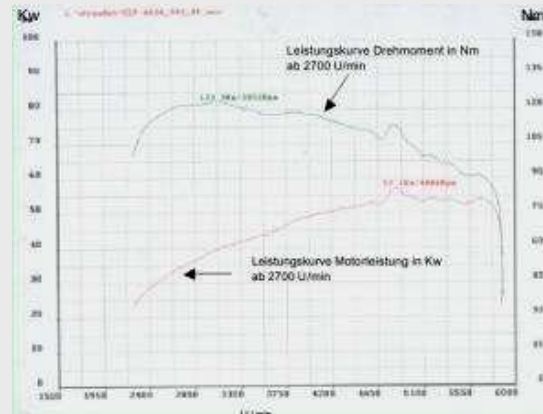
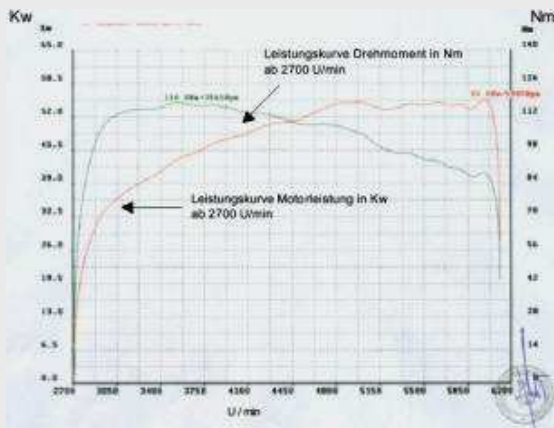


(doc: MSH-testreport MPS/1206/01  
MSH with ZETOR)

## DEKRA-Rolling-Test

I.e before utilization it were 55 KW and about 6,000 rpm.

I.E after utilization it were 57 Kw to about 4,800 rpm and at 2,800 rpm it has 7.76 Kw.



(doc: MSH-Testreport LPS/05/2007)