Glat

Micro-Ceramic

What is Tribology ?
“Scientific verification of friction and abrasion”

Saving effect by the management of lubricationagainst friction and abrasion

1.Reduction of maintenance cost and parts replacement cost
2.Reduction of spreading loss caused by failure
3.Reduction of capital investment by extension of durable years
4.Reduction of energy consumption by friction reduction
5.Reduction of capital investment by improving operation availability and machine efficiency
6.Reduction of labor force
7.Reduction of lubrication oil consumption

Production site revives by eliminating any friction loss.

“Glat” product introduction

Micro Ceramic Oil (5% added to base oil)

This is a very stable lubricant with the latest condensed technology using 14 different ceramics with different functions. (Use only 100% ceramic excluding PTFE) It is a lubricant containing very fine ceramic powder which can correspond to various equipment and motors. It has 14 kinds of ceramics mixed with different kinds and sizes which are selected from more than 1,500 kinds ceramics. And it is mixed in involved processes. The ceramics themselves make the latest oils and industrial oils the most ideal conditions. It is possible to lengthen and stabilize the life of engines and machinery, which leads to cost and fuel efficiency reduction.

Micro Ceramic Grease

- Sliding surface of various machines
- Friction and abrasion parts of various machine tools
- Sliding surface and gear of construction heavy equipment
- Casting mold release agent
- Sliding surface of injection molding machine
- Overhead traveling crane
- Production quality improvement
- Reduction time and cost, reduced power use
- Life extension of mold by reducing friction

Micro Ceramic Spray

After spraying, its viscosity is low, so it permeates quickly. When reaching at the lubrication surface, the viscosity is optimized and it settles to the metal surface. Easy to use on any friction surface, improving running cost and extend machine life. Also it prevents rust because it is completely water resistant.

What is “Micro Ceramic Oil” ? ①

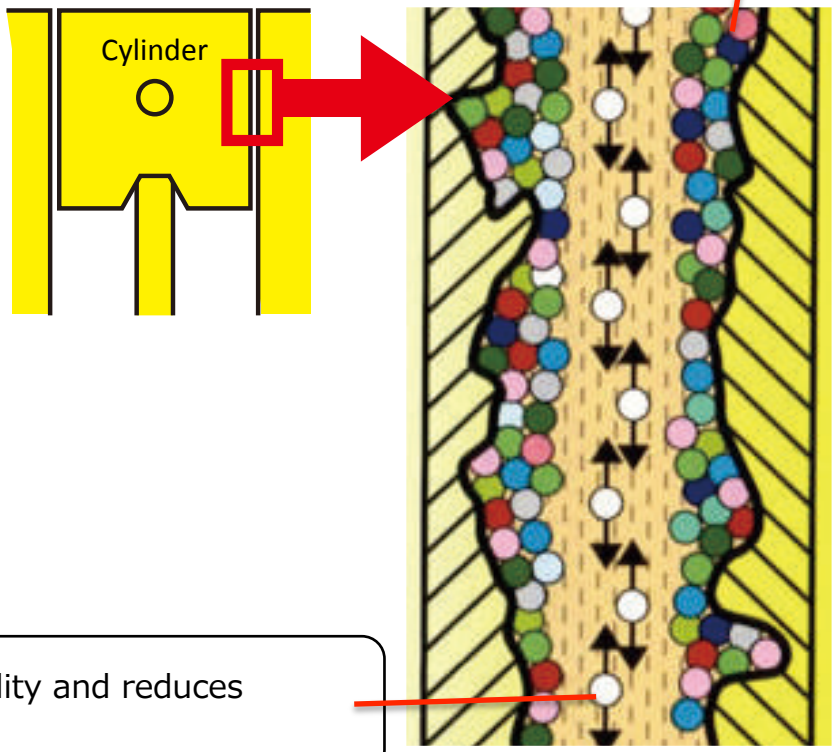
“Glat” is a friction reducing agent born in Germany as environmentally advanced country

Ceramic fine powder in Glat formulated independently makes industrial oil the most ideal condition, and reduces friction and abrasion to the utmost. It also extends the life of machinery and stabilizes it, which leads to fuel reduction. It is a lubricant not containing toxic substances and also suitable for the environment. We recommend “Micro Ceramic Oil” to all sliding parts.

What is “Micro Ceramic Oil” ? ②

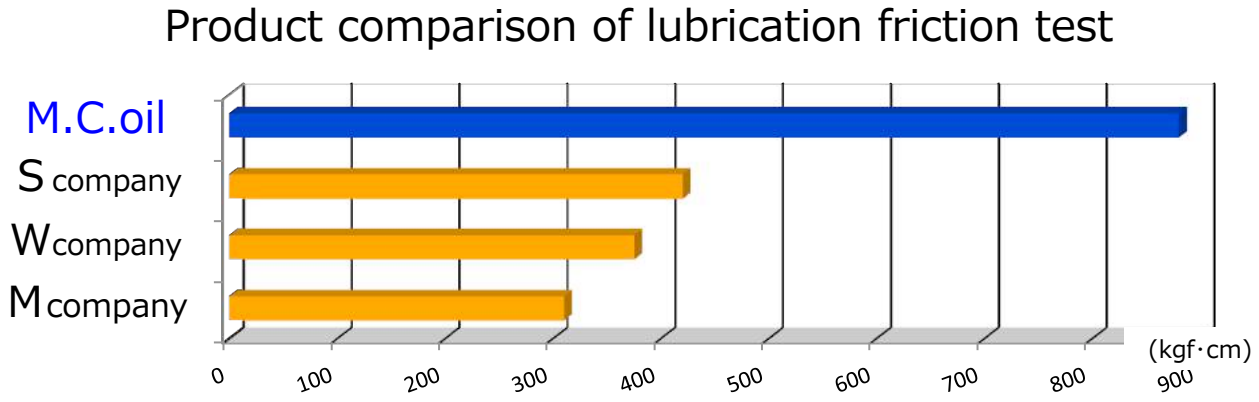
Micro Ceramic Oil is blended 14 different ceramics with different sizes from 0.02 to 0.15 micrometer in their own distribution. By adding Micro Ceramic Oil to the base oil, ceramic fine particles will settle to the metal surface of the machine equipment, and it reduces the friction and abrasion of the moving parts. In addition, ceramic fine particles that are not fixed on the metal surface float in the oil, it increases the airtightness inside the cylinder and increases combustion efficiency.

① 14 kinds of ceramics are fixed on the metal surface and make more smooth of it.



②Ceramic floating in oil improves slidability and reduces friction and abrasion.

Product comparison ①



Lubrication friction test has been done with 4 types of oil including Micro Ceramic Oil.
As a result, the most slippery of the four products was Micro Ceramic Oil.
Second place is S company (Japan), third place is W company (Japan), fourth place is M company (USA)

①It does not stop even if a resistance of 800kgf・cm is added.
②S company: Two time tests have been done, it stopped under resistance of 420kgf・cm for both tests.
③W company: At first test it stopped under resistance of 400kgf・cm, and it stopped at resistance 350kgf・cm on second test.
④M company: It stopped under resistance of 300 – 320kgf・cm

Product comparison ②

Features of Micro Ceramic Oil

①Friction reduction effect (Low friction coefficient)
②Heat dissipation effect (High thermal conductivity)
③Oxidation reduction effect (High heat resistance)

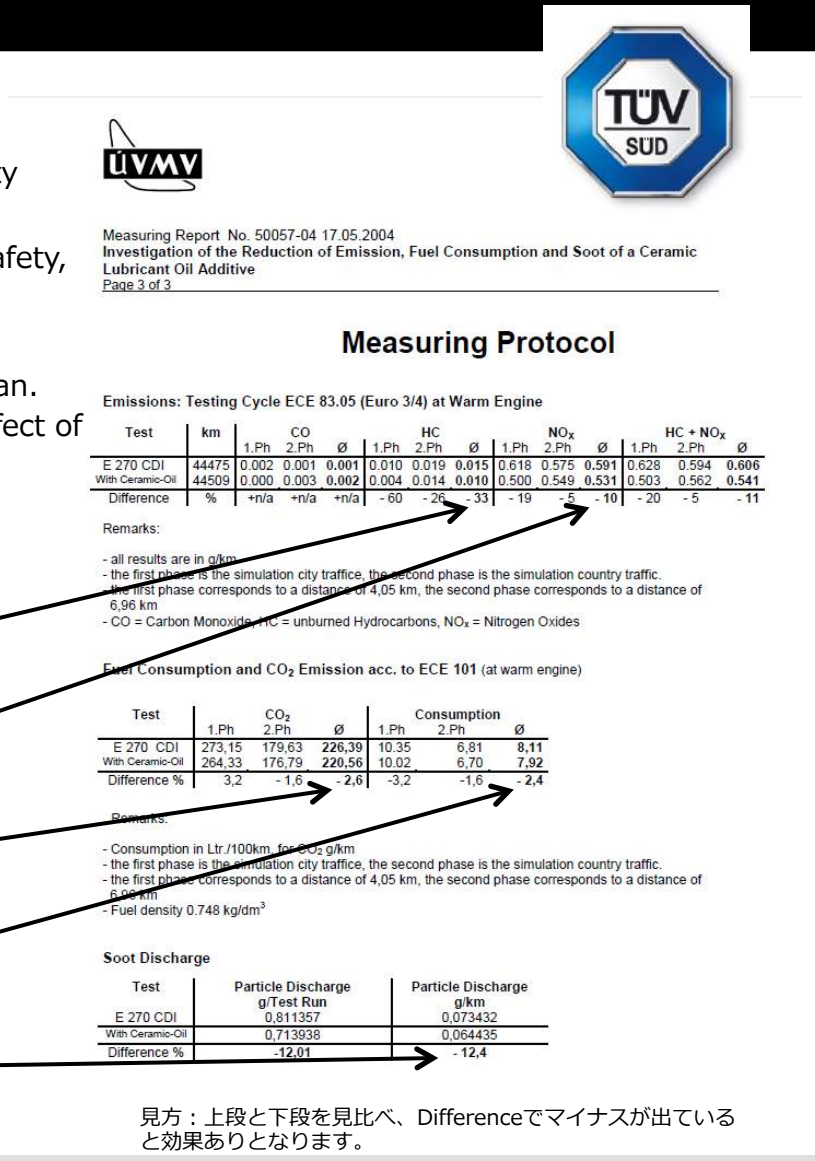
	MC oil	PTFE	General engine oil		
	Micro ceramic	Teflon additive	Mineral oil	Synthetic oil	
Coefficient of friction	0.02-0.18	0.04-0.6	0.29	0.23	The lower the coefficient, the lower the frictional resistance
Thermal conductivity		0.24w/mk	25w/mk	27w/mk	The higher the number, the faster thermal conductivity
Operating temperature	1000℃	270℃	120℃	180℃	Maintain performance up to display temperature
Decomposition temperature	3000℃	327℃	230℃	280℃	Component decomposition occurs when the display
Metal adhesion	○	×	Depending on conditions	Depending on conditions	Whether or not to continuously fix on the metal surface
When disassembled	Nontoxic	Toxic	When disassembled	Nontoxic	With toxicity or without toxicity during decomposition
Kinetic viscosity (40℃)	3000㎟	100-200㎟	40-100㎟	100-200㎟	The higher the numerical value, the less the viscosity change due to temperature and higher retention of oil film.
Kinetic viscosity (100℃)	33㎟	9-13㎟	9-13㎟	9-13㎟	
All bases	13KOH/g	11KOH/g	7KOH/g	8KOH/g	High numerical value prevents oxidation (= deterioration) of oil.

Notes: PTFE is said to be harmless, but polymer gas is generated during thermal decomposition, and its gas is harmful.

Performance of trust certified by a third party organization ①

Performance of trust certified by a third party organization ①
The performance of Micro Ceramic Oil has been tested by third party institutions and its effectiveness has been demonstrated.
By verification test of TUV which is provider of global technology, safety, certification service, and both environmental performance and fuel consumption performance were recognized.
We also conducted a bench test at a third party organization in Japan.
By comparing data before and after using Micro Ceramic Oil, the effect of improving fuel economy was confirmed.

Hydrocarbon reduction	-33 %
NOx reduction	-10 %
Carbon dioxide reduction	-2.6 %
Reduction of fuel consumption	-2.4 %
Soot (PM2.5 etc.) reduction	-12 %



UVMV

TÜV SÜD

Measuring Report No. 50057-04 17.05.2004
Investigation of the Reduction of Emission, Fuel Consumption and Soot of a Ceramic Lubricant Oil Additive
Page 3 of 3

Measuring Protocol

Emissions: Testing Cycle ECE 83.05 (Euro 3/4) at Warm Engine

Test	km	CO			HC			NO_x			HC + NO_x		
		1.Ph	2.Ph	Ø	1.Ph	2.Ph	Ø	1.Ph	2.Ph	Ø	1.Ph	2.Ph	Ø
E 270 CDI	44475	0.002	0.001	**0.001**	0.010	0.019	**0.015**	0.618	0.575	**0.591**	0.628	0.594	**0.606**
With Ceramic-Oil	44509	0.000	0.003	**0.002**	0.004	0.014	**0.010**	0.500	0.549	**0.531**	0.503	0.562	**0.541**
Difference	%	+n/a	+n/a	+n/a	- 60	- 26	- 33	- 19	- 5	- 10	- 20	- 5	- 11

Remarks:

- all results are in g/km
- the first phase is the simulation city traffice, the second phase is the simulation country traffic.
- the first phase corresponds to a distance of 4,05 km, the second phase corresponds to a distance of 6,96 km
- CO = Carbon Monoxide, HC = unburned Hydrocarbons, NO_x = Nitrogen Oxides

Fuel Consumption and CO_2 Emission acc. to ECE 101 (at warm engine)

Test	CO_2			Consumption		
	1.Ph	2.Ph	Ø	1.Ph	2.Ph	Ø
E 270 CDI	273,15	179,63	**226,39**	10.35	6,81	**8,11**
With Ceramic-Oil	264,33	176,79	**220,56**	10.02	6,70	**7,92**
Difference %	3,2	- 1,6	**- 2,6**	-3,2	-1,6	**- 2,4**

Remarks:

- Consumption in Ltr./100km, for CO_2 g/km
- the first phase is the simulation city traffice, the second phase is the simulation country traffic.
- the first phase corresponds to a distance of 4,05 km, the second phase corresponds to a distance of 6,96 km
- Fuel density 0.748 kg/dm³

Soot Discharge

Test	Particle Discharge g/Test Run	Particle Discharge g/km
E 270 CDI	0,811357	0,073432
With Ceramic-Oil	0,713938	0,064435
Difference %	**-12,01**	**- 12,4**

見方：上段と下段を見比べ、Differenceでマイナスが出ていると効果ありとなります。

Performance of trust certified by a third party organization ②

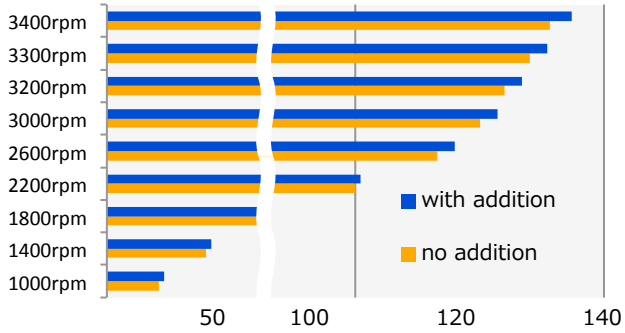
Toyota test institution bench test proved significant improvement data.

Test period: from April 9, 2011 to May 10, 2011
Test car: 2,982cc diesel engine with turbo charger w/intercooler

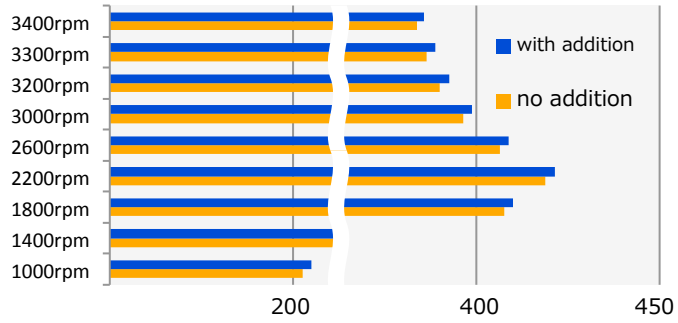
Before use: Oil performance is the best condition at the beginning of use, and it is expected that the value of output and torque will go down as time elapses. It is also expected that the amount of exhaust gas will also increase.

After use: The result that the numerical value of output and torque increase. Also, the exhaust gas volume has been greatly improved. And the test data which was done by TUV in Germany was reconfirmed.

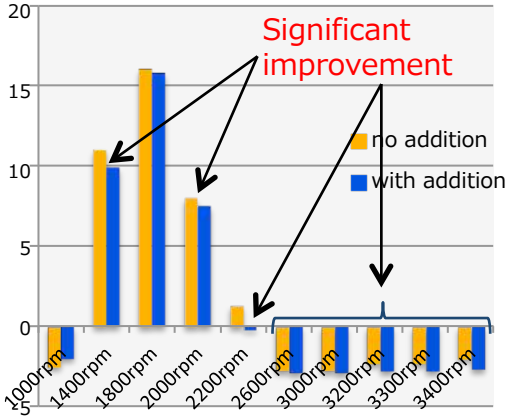
Modified axis output（km）

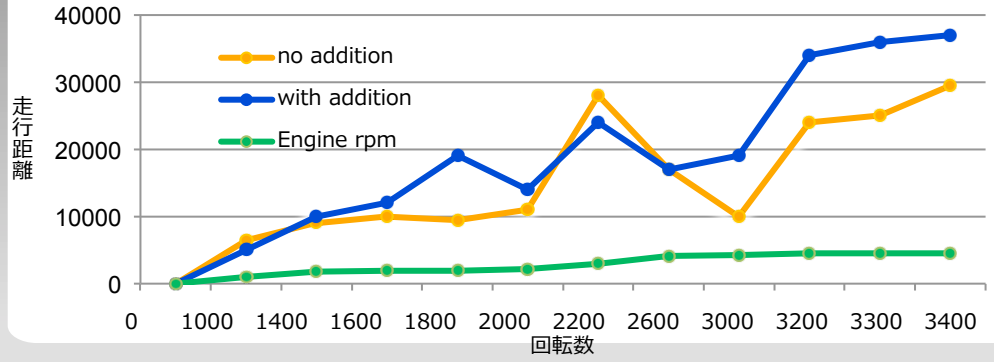


Modified shaft torque (km)



Exhaust gas emissions（%）





Improve fuel economy

【About improving fuel economy】
Usually after the addition of Micro Ceramic Oil, is it said that film forming effect appears after running 1,000km, but better results than expected were confirmed at the time of data calculation after running 900km.

The effect of Micro Ceramic Oil

Lubrication performance

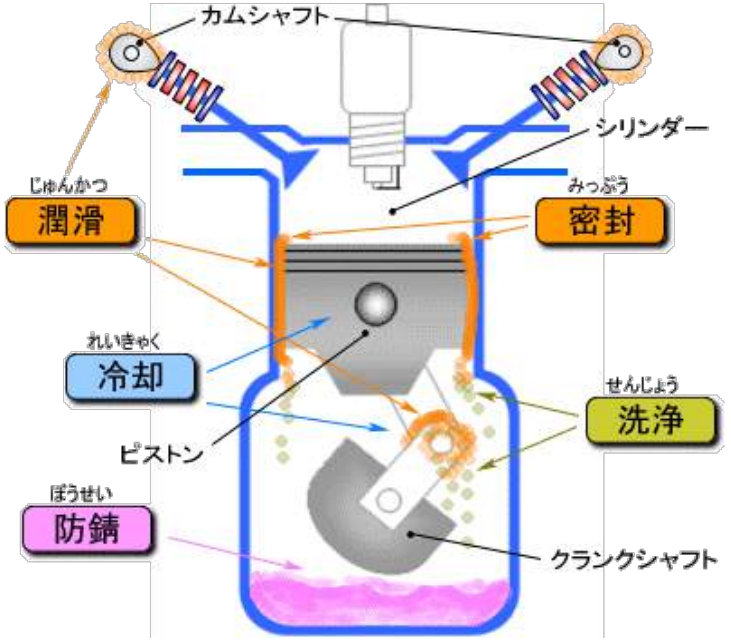
o.15 micrometer ceramic particles settled in the gap between the piston and the cylinder wall, it minimizes extreme pressure conditions and reduces friction.

Cleaning performance

The Micro Ceramic Oil moves inside the circulating oil, and it improves combustion efficiency while peeling combustion residue etc.

Antirust performance

Micro Ceramic Oil is harmless, and it is blended with base oil thiophosphoric acid compound. It has sufficient rust prevention.



Cooling performance

The thermal conductivity of Micro Ceramic Oil is higher than general pols and additives, so it helps dissipate heat of engine.

Sealing performance

The Micro Ceramic Oil which forms a film on the metal surface. It keeps the airtightness and exhibits stable function even at high temperature.

The effect of Micro Ceramic Oil

①Improve durability of machine life

Micro Ceramic Oil has a small particle size. So it removes dirt generated in the machine equipment and keeps machine equipment clean while it moves inside the oil. In addition, since friction also decreases, the service life of the machine equipment can be extended.

②It is possible to reduce carbon dioxide and others

The performance of the friction coefficient, endurance temperature, combustion efficiency of the motor equipment has improved. Compared with the case od no addition, carbon monoxide (CO), unburned hydrocarbon (HC) and nitrogen oxide (NOx) have been reduced successfully. It is harmless after decomposition.

③Excellent quietness can be realized

Fine ceramic particles at the nano level fix to the metal surface, it makes the metal surface smooth. And it greatly reduces friction between metals.

④The power goes up

The sliding surface in not completely adhered, there is a slight gap. The base oil enters into this gap to form an oil film, at the same time Micro Ceramic Oil also enters into the gap. It improves airtightness and improves powder.

⑤ Reduce fuel consumption from 5% to 15%

Car: BMW 116i
Model year: 2012
Round trip between Nagoya and Tokyo

	Mileage	Gasoline usage	Fuel economy
No addition	752 km	49.5 L	15.2 km/L
With addition	738 km	39.7 L	18.6 km/L

23% reduction in fuel consumption

Material supplier

Developer
Company name : WABO-Schmiertechnic Gmbh & Co.KG
CEO : Walter Wagner
Established year : 1994
Registration number : DE165260502
Associated company : WABO-Verwaltungs GmbH

Selling agency
Company name : T.M.F Co.,Ltd
CEO : Tsutom Manabe
Established year : 2007
Head office : 2-8,Kiba-cho.,Minato-Word,Nagoya-City,Aichi-Pref 467-0806 Japan
Sales office : 8-7,Mizuho-Av.,Mizuho-Word,Nagoya-City,Aichi-Pref 467-0806 Japan

To maximize effect
Please note the following 2 points.

1) Stirring well
2) 5% Glat added to the amount of oil

In case of standard oil amount 4ℓ → Oil 3.8ℓ + Glat 0.2ℓ
Do not combine with containing additive such as molybdenum.

1)When replacing engine oil, make inside engine clean and replace the oil filter.

2)Ceramic may have precipitated on the bottom of the bottle, so mix it well with rod etc.
Then shake the bottle and stir it well.

3)Please put Glat in the oil jug. (If the amount of oil is 4ℓ → Engine oil 3.8 liters + glat 0.2 liter) .
If the ceramic remains in the Glat bottle, pour a small amount of engine oil into the bottle, stir and shake well again

4)After pouring Glat into the oil jug, pour engine oil into the oil jug to set the specified amount.
It is more effective if you can stir the oil inside the oil jug again.

5)After stirring, please quickly pour oil from the oil jug into the engine.
(No ceramic remains on the bottom of the oil jug) Checking the oil gauge after injection,
if there is oil in the middle between the upper and lower limit is OK.
If it is not enough, please add oil. ※It is useless beyond the upper limit.

6)Please do idling for 10 minutes or run about 10km to fix the ceramic inside surface of engine.

※Storage and disposal
When storing, please seal the container tightly, please do not keep in a place where it is exposed to direct sunlight or in the place of the temperature becomes 40 ℃ or more. Before disposing of containers, please use up all contents inside.