

SOD-1
Plus®

Keep your favorite car in better condition for longer



Use it in almost
all lubrication
situations.

**The only one
in the world**

Add
when the oil is
changed

**Restore
vehicle
performance**

Preventing
internal friction
and oil degradation

**Extending
the life of
the vehicle**

SOD-1Plus User's manual
Vol.5

A universal lubricant additive
that can be used in all situations



Greeting

It gives me great pleasure to introduce to you our company's product SOD-1 Plus. This product works to improve lubrication performance in many ways, to prevent breakdowns and solve problems with power, vehicle response, oil life, and extending the life of vehicle parts. It was developed with the idea of providing a universal lubricant additive.

We worked with the Fukuoka Prefecture Vehicle Maintenance Association and its various members to develop SOD-1 Plus, carrying out many different tests on vehicles, and based on those test results we came up with an additive that everyone recognises as unique. Thanks to this effort we now have customers both in Japan and overseas who value SOD-1 Plus highly. They trust its effect on their vehicles and express great satisfaction. Henceforth companies and individuals who use lubricant oil in vehicles (cars and motorbikes), agricultural machinery, boats, and industrial equipment are able to take advantage of SOD-1 Plus every day. By all means please enjoy this universal lubricant additive.



President Tomoyuki Sonoda

Company History

- 1996 年 Tests commence with Fukuoka Vehicle Maintenance Association
- 1998 年 SOD-1 named
- 2005 年 D1 Chemical Co. established
 - Koas International Ltd begins selling SOD-1, as does AUTOBACS all over Japan
- 2009 年 Honda Okinawa begins using SOD-1 in Honda dealers
- 2010 年 D1 Chemical moves office to Hiikawa in Minami-Ku, Fukuoka
 - Okinawa office established
 - Honda Parts Co. begins selling SOD-1 in Honda dealers
- 2011 年 DOC Korea Corporation begins selling SOD-1 in Korea as agent
- 2012 年 D1 Chemical moves its HQ to Hanmichibashi, Hakata-Ku, Fukuoka
- 2013 年 D1 Chemical receives a licence from the Land Transport Bureau for its factory
- 2013 年 SOD-1 is renewed and name changed to SOD-1 Plus
 - The company presents a paper at the Vehicle Technology Association Spring conference
- 2016 年 Company presents a paper at the Japan Society of Plant Engineers Autumn conference and at the 15th Annual Symposium of the Japan Society of Mechanical Engineers
- 2017 年 Further paper presented at the Japan Society of Plant Engineers Spring conference
 - SOD-1 Plus is further developed to improve its performance

A word from our Technical Advisor Mr Ono, D1Chemical Co. Ltd

More and more non-Japanese cars now using SOD-1 Plus

To reduce the crank rotation resistance (oil agitation resistance) suffered by many so-called "super cars," many cars use the dry sump method (oil supplied from a separate tank). This method stabilises engine condition by reducing oil pressure and restraining oil temperature rising, those being its biggest advantages.

For example, in a Porsche 964 normal oil capacity is 8 litres, and including the oil cooler it's over 11 litres.

However, using the manufacturer's recommend oil change cycle, oil consumption is great with cross-hatched cylinder walls and to avoid risk of oil degradation with extended use many owners do an oil change at 5,000 kms mileage, using very expensive oils costing around Y3,000/litre.

By adding SOD-1 Plus to the oil you can reduce consumption and slow down the degradation of the oil. Further, the adsorption effect on metal surfaces plays a big role in reducing wear and abrasion, and also reduces costs by maintaining the oil better. Previously with engine overheating damage to crankshaft from poor oil maintenance was common, leading to crankshaft replacement. By using SOD-1 Plus you greatly reduce wear on the crankshaft. In Germany and Japan, severe driving conditions arise from frequent traffic jams in Japan. Because of this oil maintenance in Japan is very important, and to do this you need SOD-1 Plus as an essential additive.

Also, with Porsches when the oil temperature doesn't rise and the thermostat doesn't work you get oil reverse flow when pressing the accelerator and oil enters through the intake manifold, burns, and normal combustion doesn't happen. Because of this a period of long idling after starting is necessary. During this period white smoke emissions can occur, which is not oil falling. but oil rising resulting from oil film breaking on piston rings in a horizontal engine. This white smoke from oil rising can't be cured by using even high performance oils, but by adding SOD-1 Plus you can eliminate it. In addition, gear engagement difficulty in H-type shift gate manual transmissions used in Ferrari and Lamborghini vehicles results from clutch malperformance/shift shaft misses, and syncromesh difficulties in transmissions in Italian vehicles are common. SOD-1 Plus can cure these syncromesh difficulties. We want to offer SOD-1 Plus to the owners of such super cars as a way of improving performance. If you have any difficulties by all means contact our Technical Advisor Mr Ono.



Lamborghini (Murciélago)



BMW E90



MERCEDES G550L



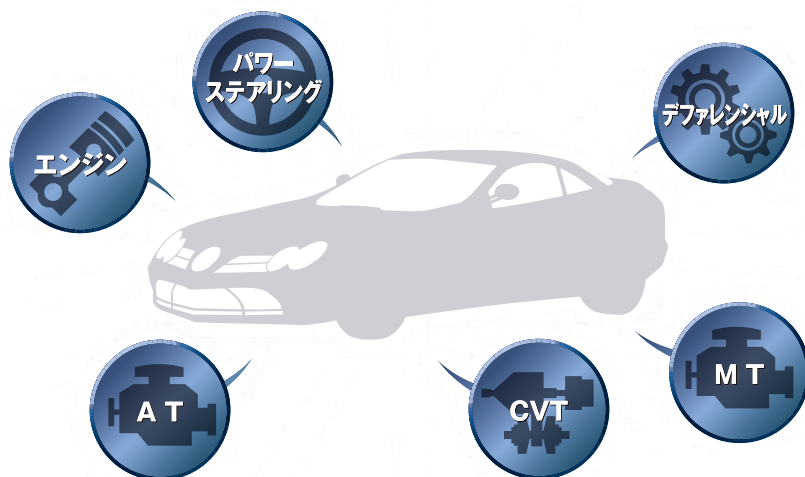
TOYOTA TUNDRA



Ferrari-F40

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Special aspects and effects

Where to use SOD-1Plus ?

- Engines
4 cycle motorbikes • 4 wheel gasoline cars (HV、PHV、RE、Turbo、SC、LPG、Flat-E) and diesel vehicles(celan diesel • DPF • urea SCR vehicles) also bio-fuel vehicles.
*RE:rotary、 SC: supercharger、 Flat-E : horizontal cyliner engines
- Power steering (can be used with all makes of oil fluid • A T F specified fluids)
- Transmission (AT • CVT • MT • DCT • DSG)
*DCT : dual clutch transmission、 DSG : direct shift gear box
- Differential (LSD • active type • 4WD transfer gear)
* Can use with model specific SAE low viscosity oil and SAE0W-16 oil
* Can use with mineral oil、 part synthetic oil、 fully synthetic oils
* Can use with API,ILSAC,ACEA approved oils

1.Strengthened detergent/dispersive effect

- SOD-1 Plus cleans out accumulated sludge and carbon build-up within engines and transmissions、 restores parts to clean condition.Hence improvements in fuel consumption and emissions are possible. Varnishes are prevented from forming on metal surfaces.
- By cleaning the internal parts of AT • CVT • DCT、 a proper friction balance is restored, leading to improvements in judder, shift shock, and gear slipping.。
- Cleans out oxidated substances from power steering fluid and restores performance.

2.Triple micro-particle effect, strengthened oil film and metal coating

- Prevents wear and abrasion on metal surfaces from dry starts。
- Restores engine power by boosting compression in cyclinders to achieve optimum fuel combustion.
- Cleaner emissions possible due to improved combustion efficiency.
- Extends oil life, reduces oil consumption by improving performance under high temp/high shear (HTHS).
- Improves shift feeling by maintaining gear durability under high pressure lubrication.
- Maintains condition of engine, transmission, diff in racing vehicles under extreme stress.
- Improves lubrication efficiency of power steering systems and reduces noise.
- Improves oil rising and falling, prevents black/white smoke emissions from oil burning.

3.Prevent rubber seal hardening and shrinkage, reduce oil and fluid leaks

Improves oil and fluid leaks from seals in engines,transmissions(AT • CVT • MT),power steering systems,prevents seal material hardening and shrinking.

Reducing detergent agent - Example 1

Daihatsu Mira test vehicle



① Test vehicle 100 k ms mileage, around 1 litre oil consumption

② Valve stem seal replaced, but white smoke continued

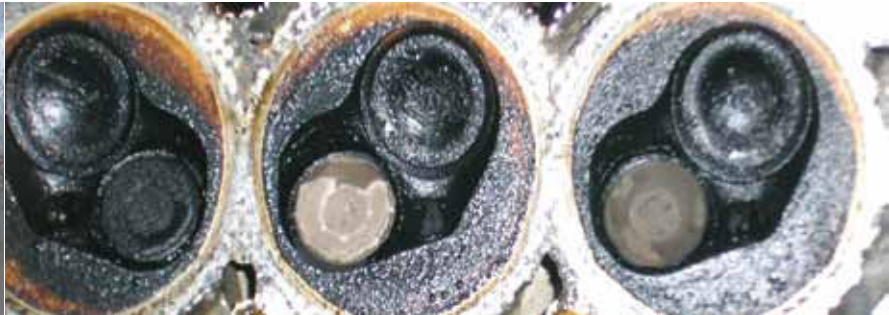
Due to above two faults oil ring clogging suspected, engine was disassembled and piston rings examined.

Result: after 500kms mileage, oil ring clogging, white smoke, and oil consumption improved.

Piston and combustion chamber before SOD-1 Plus used



Oil ring clogging



Dirty condition of piston and combustion chamber



Piston and combustion chamber after SOD-1 Plus added + 500kms mileage



Oil ring sticking solved



Carbon almost gone from combustion chamber
Improved compression,
clean chamber from optimum combustion

Photos taken 14/7/2005 by Okinawa Vehicle Maintenance Assoc.

※Recently many vehicles use low-viscosity oil, leading to faster oil degradation and oil ring clogging, greater oil consumption. Because of this oil volume should be checked before changing, and if depleted add SOD-1 Plus.

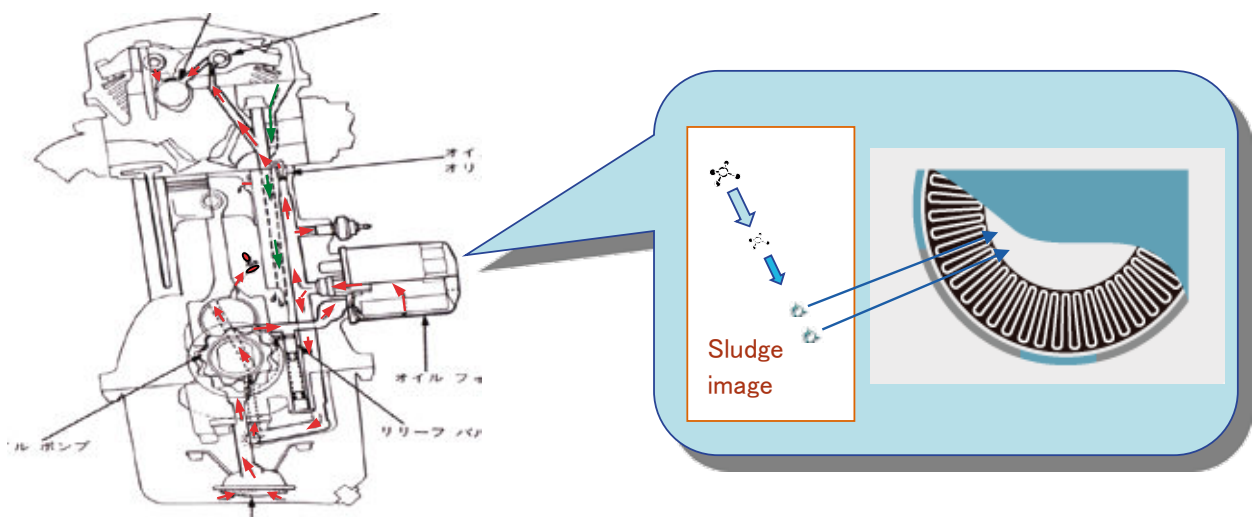
Reducing detergent agent- Example 2



SOD-1 Plus removes sludge buildup

- ① Accumulated sludge is gradually removed from all surfaces
- ② Esters gather up sludge reduced to particles around 0.1 micron in size
- ③ Particled sludge in the oil passes through the oil filter
- ④ SOD-1 Plus mixes well with all base oils and remains within the oil unchanged

Diagram showing sludge removal



Reducing detergent - Example 3

SUZUKI Alto test vehicle



- Model year : 2007
- Type : HA24V
- Mileage : 31,007 km

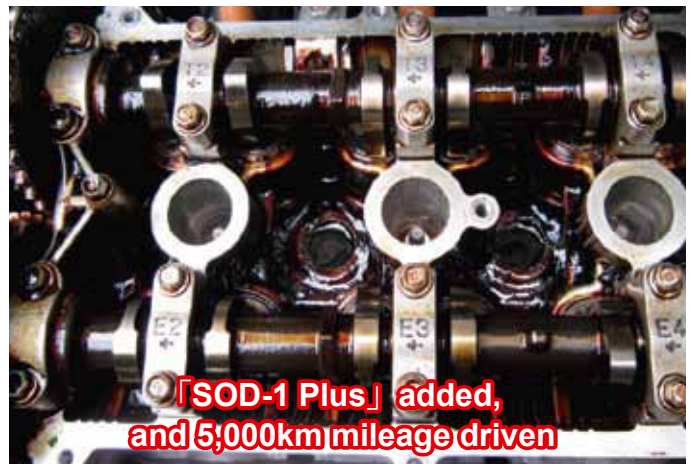
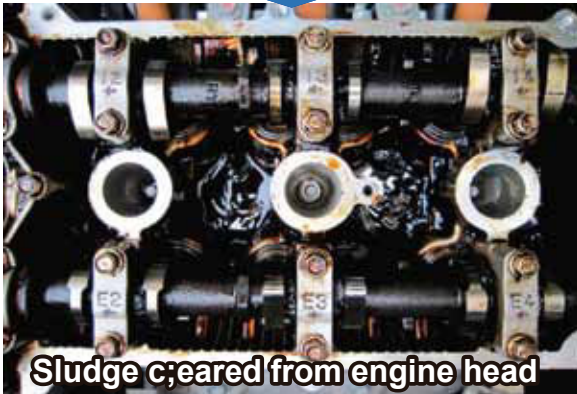
<Vehicle condition>

- 1 oil change in 3 years
- Heavy sludge buildup on head cover, camshaft

<Task>

- Gain customer's understanding and carry out work.

【Task content】
Remove sludge by hand,
oil flushing to remove sludge from oil pathways



Warning

when sludge is heavy do not drive fast. Add SOD-1Plus and leave car idling for 4-5 hours, then drive normally.

Emission gas improvement test

SUZUKI Alto test vehicle

- Model year : 1998
- Mileage : 7,625 km

<Car use>

Used as second car. Oil changed regularly



Emission before adding SOD-1Plus
CO 0.00%
Hydrocarbon 50ppm



Add SOD-1Plus
to engine oil at 10% ratio



**「SOD-1Plus」 added
and car driven for 40 mins**
CO 0.00%
Hydrocarbon 1ppm
Hydrocarbon 49ppm improvement

Results of vibration improvement test on diesel vehicle

SUZUKI Alto test vehicle

- Model year : 2015
- Type : LDA—DJ5FS (DPF attached)
- Engine : S5 Skyactive diesel turbo
- Capacity : 1,500cc
- Mileage : 0 km (new vehicle)

<Car use>

commercial/urban, high speed

<Task>

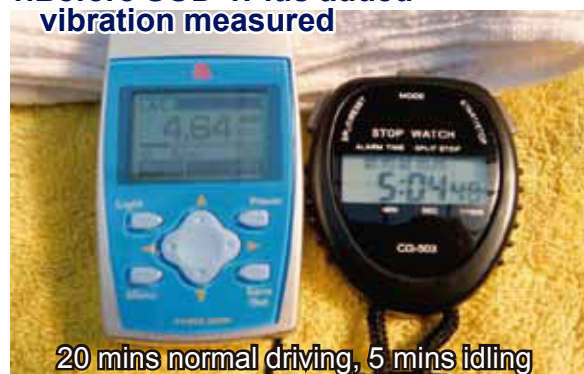
Add SOD-1Plus to engine oil at 10% ratio (510cc)



Test parameters

SOD-1 Plus added, vibration improvement detected Using a vibrometer
(improvement detected in new car)

1. Before SOD-1Plus added vibration measured



20 mins normal driving, 5 mins idling
(Measurement 4.64m/s²)

2. SOD-1Plus added to engine



3. After SOD-1Plus added vibration measured



10mins idling then measured
(Measurement 3.88m/s²)

4. After SOD-1Plus added vibration measured



20mins idling then measured
(Measurement 3.89m/s²)

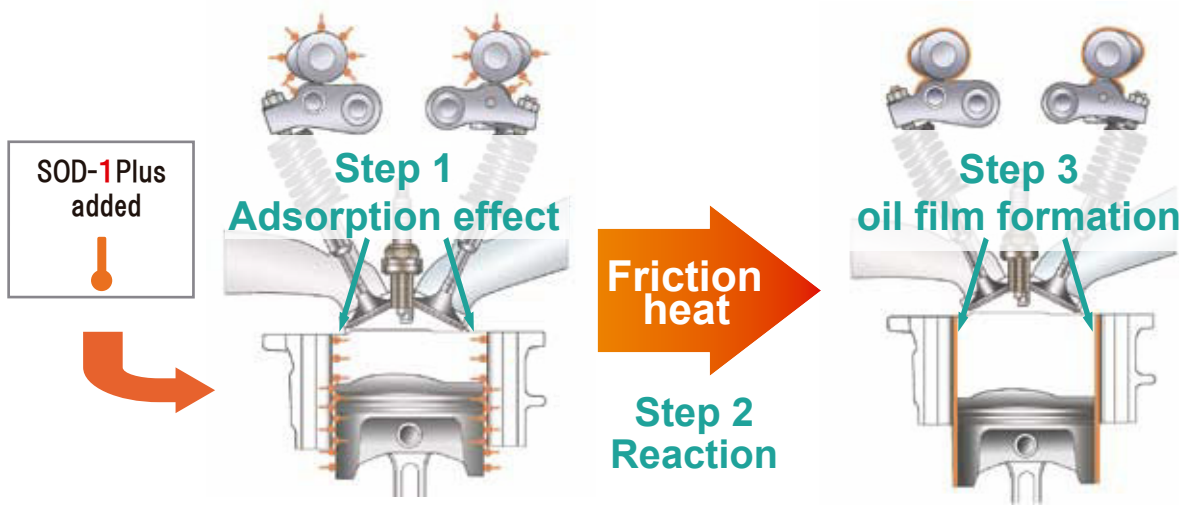
Test result

SOD-1Plus added to new Demio Skyactive turbo-diesel, vibration measured with vibrometer before and after additive. Measurement value 「4.64m/s²」 before addition After addition 20mins idling, measurement value 「3.89m/s²」, an improvement of 「0.75m/s²」

Because of adsorptive effect of SOD-1Plus friction and vibration reduced, proving effect of the additive to maintain condition of new vehicle. Same result expected in a gasoline engine vehicle. To reduce engine noise and vibration we recommend adding SOD-1 Plus.

Adsorption effect on metal surfaces

SOD-1 Plus forms a strong oil film on engine's internal surfaces

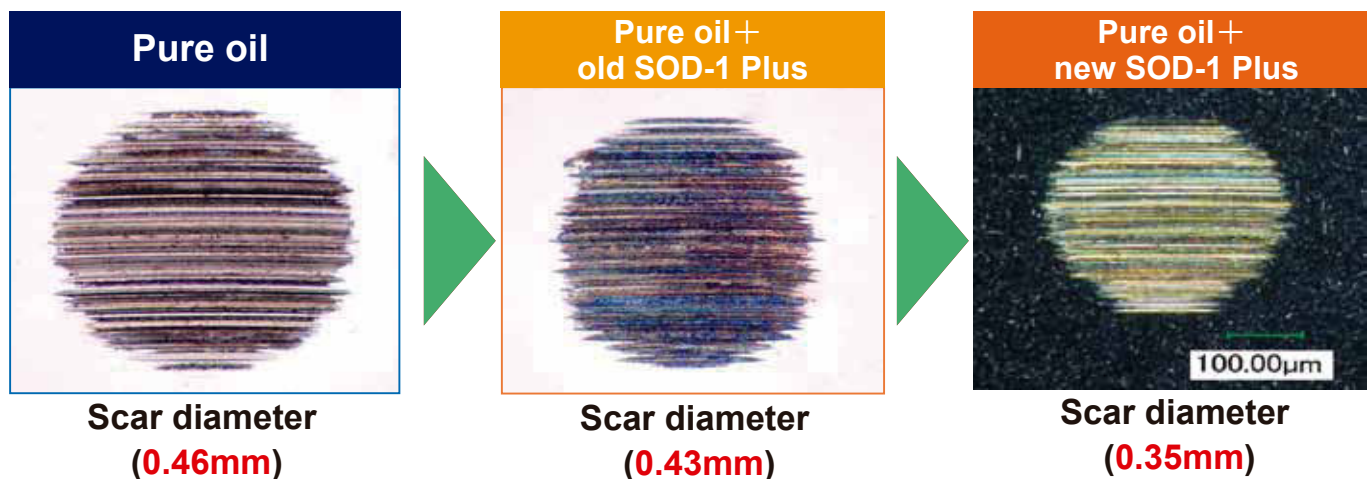


- Sticks to metal surfaces within engine forming strong oil film, causing improved lubricity
- Engine protected by superior wear resistance (dry starts prevented)
- Friction loss greatly reduced, sharp acceleration response realized

This special adsorption effect does not occur with normal mineral oil etc. SOD-1 Plus has the energy (polarity) needed to stick to metal surfaces and form a strong oil film.

Adsorption effect/wear resistance test (Shell 4 Ball Wear Test)

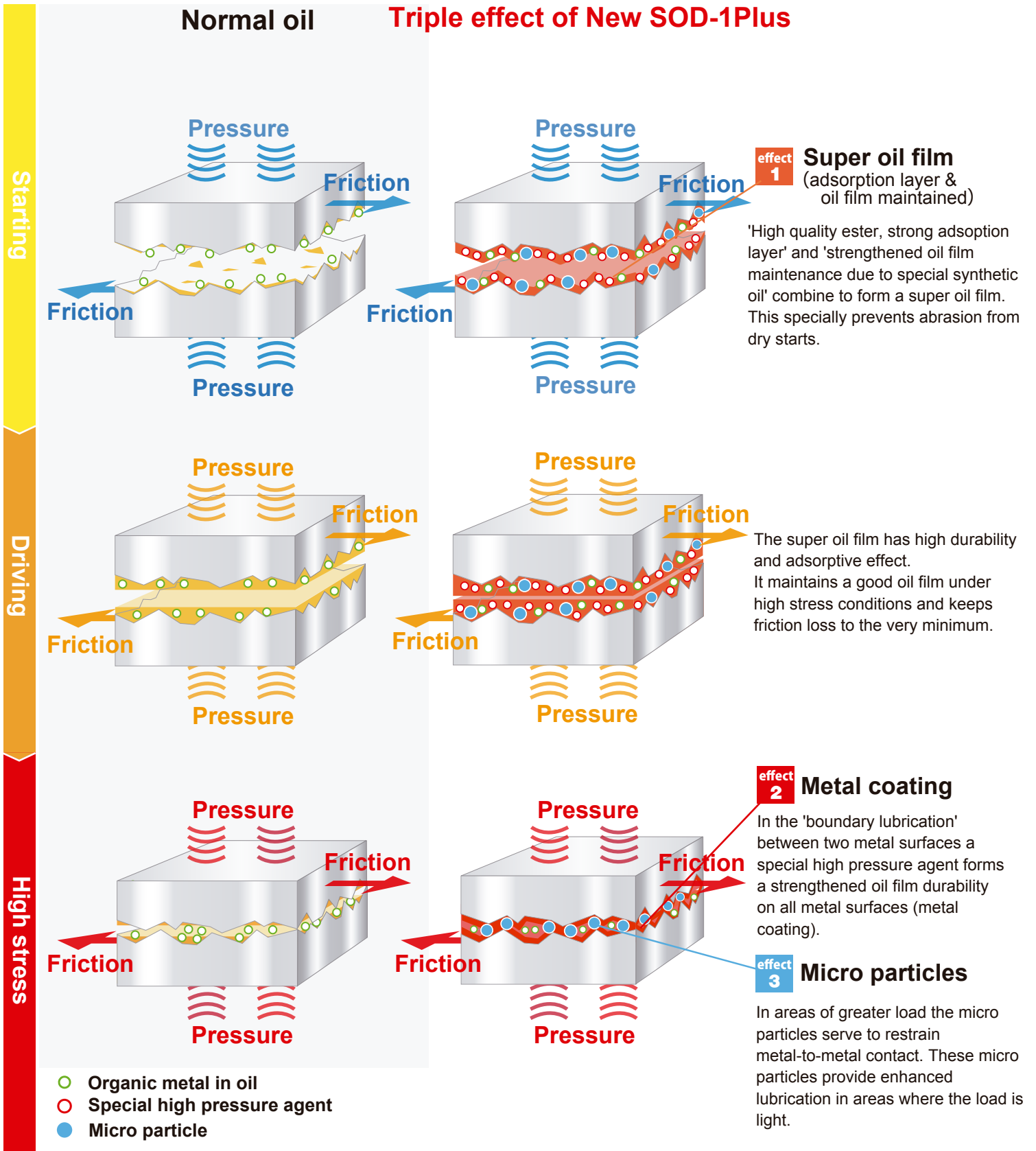
Test conditions	
Rev. speed : 1,200rpm/min	3 steel balls fixed in container. In their centre one revolving ball.
Load : 40kg/cm ²	The revolving ball is immersed in oil during test..Wear scar diameter is then measured after test carried out. Smaller scar means higher wear resistance. Oil used in test was 0W-8.
Temp : 75°C	
Time : 60mins	



「SOD-1Plus」 added and wear resistance increased.

Mechanism of improved SOD-1Plus

Triple effect to strengthen wear resistance



Adding SOD-1 Plus: Key point 1

A customer should not use SOD-1 Plus without first consulting a vehicle service expert. This additive is one path to choose, so advice should be sought from a mechanic before it is used in a vehicle.

Warning! SOD-1 Plus should NOT be used in the following vehicles:

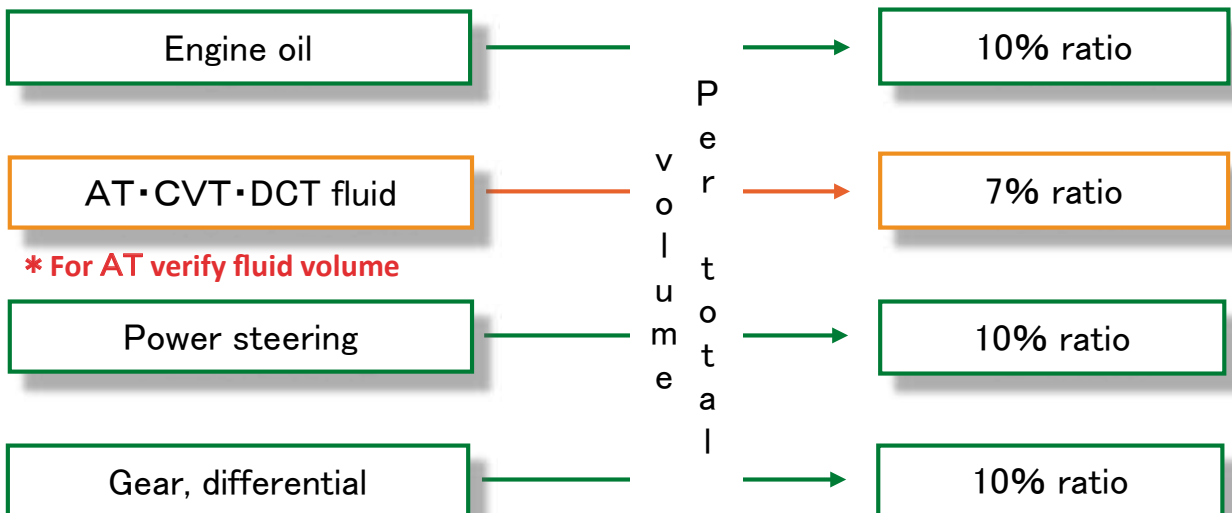
- ① Turbo-charged cars emitting white smoke from muffler (turbine oil leaking)
Even where no such symptoms exist it's not recommended that SOD-1 Plus be used with poorly maintained vehicles
- ② Cars with unusual buildups of carbon sludge from oil leaks. Cars with serious oil leaks have damaged seal. SOD-1 Plus cannot be used with mechanically damaged cars or cars with unusually bad buildups of sludge and carbon.
- ③ Diesel vehicles emitting white smoke. White smoke from diesel vehicles indicates mechanical damage
- ④ Do not mix SOD-1 Plus with other additives. SOD-1 Plus if mixed with other additives may result in a chemical reaction and should be avoided.
- ⑤ Parallel imported cars: in principle we do not recommend SOD-1 Plus be used
This is because the service records are unreliable and flaws in the vehicle may not be recorded.

SOD-1 Plus Addition ratios

◆ **Calculating volume**

Engine oil volume is 4 litres

Oil	3.6L
SOD-1Plus	0.4L
<hr/>	
Total	4.0L



* For AT verify fluid volume

* To improve shift feeling in manual transmissions or to improve noise in the differential for vehicles doing hard circuit work a 15% ratio is appropriate.

【 Pre-addition check 】

Make sure to carry out a check on vehicles with mileage over 80,000kms or older than 10 years.

(Regardless of mileage some cars have damaged engines due to poor oil maintenance.)



The age and mileage mentioned above are general only. If in doubt about whether to use SOD-1 Plus please contact us.

【 Necessary items for judgement 】

[1] Assessing condition

One cannot disassemble an engine just for an oil change. Hence the judgement about engine condition **can be done according to the condition of the oil cap, extracted oil, the change cycle, strange noises, or the oil lamp.**

Unusually bad buildups of sludge and carbon may require an engine overhaul or even replacement before SOD-1 Plus should be used.

A mere oil change may not be sufficient and may be risky. We do not want to see the oil changed, SOD-1 Plus added and oil burning still happening. A thorough overhaul first must be done.

* By adding new oil sediment and accumulated sludge may be forced through the oil lines, clogging them up resulting in engine burning.

Vehicles requiring special attention if using SOD-1 Plus

● Adding SOD-1 Plus to turbo-fitted vehicles:

(1) Vehicles fitted with turbochargers experience high engine temperatures and high pressure, so oil temperature is higher than normal and bleaching can occur and oil degradation is faster.

Because of this special synthetic oil resistant to temperature is necessary. The oil change cycle should be shortened (e.g. : every 3 months) and special attention to oil quality is necessary.

Key points when changing oil

① older model cars (7 years older than current model)

② high mileage cars (over 150,000kms p.a.)

③ cars with poor oil maintenance

④ used cars

⑤ cars with excessive oil change cycles, even if not emitting smoke (over 10,000kms)

※ Please use extra care when assessing the vehicles listed above

* Cars prone to dirt buildup (Refer below)

(Noah, Boxy, engine type (1AZ)、Estima、Alfado (2AZ) turbo-fitted cars)

Please act according to the advice above when assessing vehicles for SOD-1 Plus use.

If oil maintenance has been proper there should be no problems using SOD-1 Plus when changing the oil.

Engine

Adding SOD-1 Plus: Key point 3

Check the oil condition on filler cap and oil vent

Filler cap from car burning oil



Sticky oil on cap

Oil vent in car burning oil



Sludge-like oil residue

Danger

* If vehicle is in condition such as above with heavy oil sludge, do NOT add SOD-1 Plus.

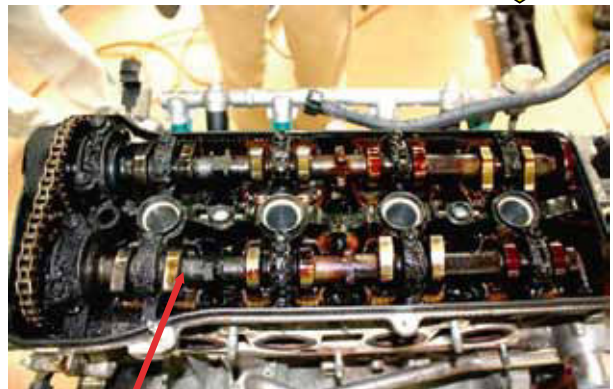
【 Check filler cap and oil vent oil condition 】

Oil sludge on filler cap due to oil burning



Sludge on filler cap, but not around oil vent due to vehicle type.

Oil burning in engine leaves little sludge on oil vent



Removing head cover exposes carbon sludge on camshaft and engine

Danger

* Do NOT add SOD-1 Plus to this sort of vehicle. Check the oil change cycle, filler cap, and assess any strange noises.

Importance of changing the AT/CVT/DCT Fluid

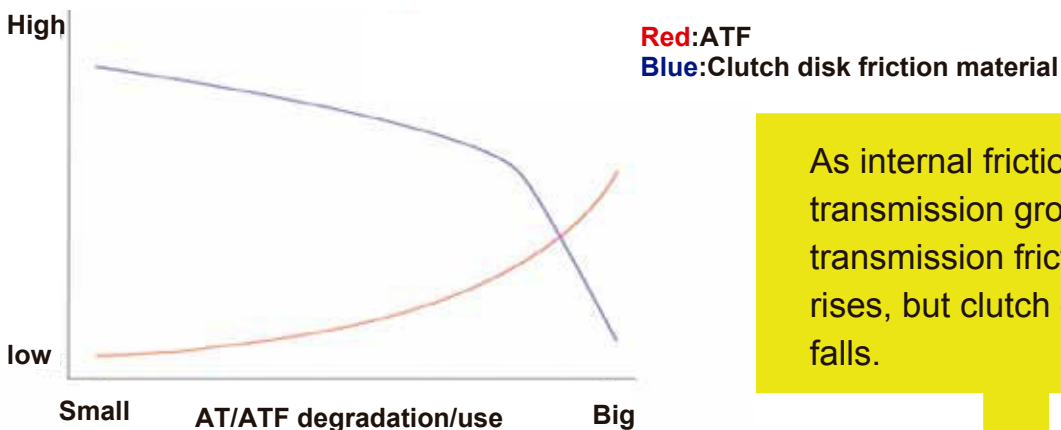
Vehicles with mileage over 100,000kms means more engine trouble

Vehicles without new power transmission parts such as AT • CVT • DCTF experience more frequent trouble. Changing the AT • CVT • DCTF fluid is recommended over 80,000kms, but is often avoided. Failure to change transmission fluid leads to gear change shock and slippage.

What causes gear change shock and slippage?

O-ring oil leaks and excess abrasion on the clutch, sludge build-up (oxidation) cause gear change shock and slippage. If the transmission is worn out, even changing the fluid won't cure shock and slippage. This is due to the close relationship between the clutch disk and the sort of friction that happens in a transmission.

【Friction coefficient: AT and clutch】



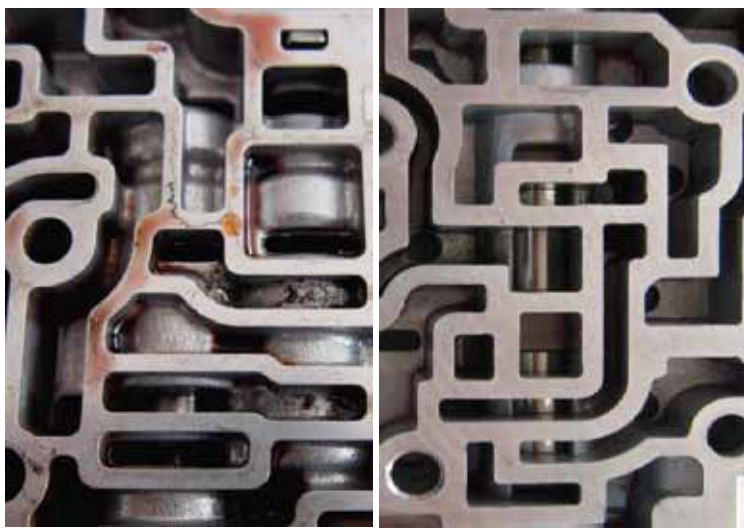
As internal friction in transmission grows transmission friction resistance rises, but clutch disk resistance falls.



When friction resistance is balanced clutch disk and fluid balance worsens and slippage starts to occur.

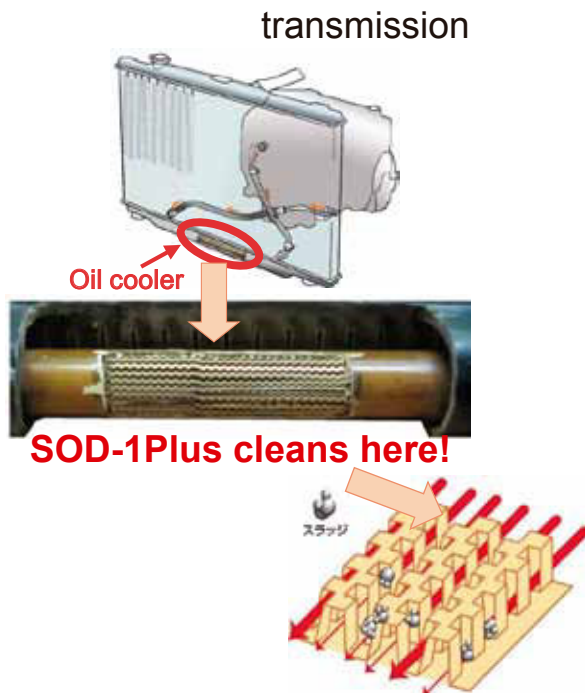
The need for SOD-1 Plus

- **Cleaning away a build-up of oxidised material in an automatic transmission**
(Removing sludge in the clutch valve body)



Left : without SOD-1 Plus, 100,000kms mileage, 2 oil changes)

Right: using New SOD-1 Plus



- **Preventing gear shock, slippage, improving vibration, judder**
(300 Honda dealers nationwide now using SOD-1 Plus.)

Using SOD-1 Plus in automatic transmissions cases of gear slippage much reduced.

Eliminate gear change slippage!

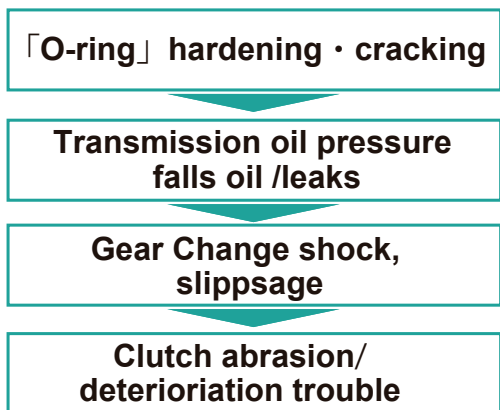
- **Restore rubber O-ring flexibility, reduce hardening**

(Prevent oil leaks。 Restore transmission performance.)
「O-rings are vital for transmission performance. Hardening • cracking leads to AT/CVT trouble.

Using SOD-1Plus means O-rings will stay soft, which avoids transmission trouble. Restore softness to the O-rings if they've hardened. will improve oil pressure and rejuvenate transmission function.

- **Preventing clutch disk/gear friction**

Driving while neglecting fluid maintenance leads to a build-up of sludge and judder (excessive vibration). SOD-1Plus cleans away sludge on the clutch and eliminates judder by reducing clutch friction. By removing coatings from oil deterioration friction loss is reduced, gear and turbine life is extended, thus improving shift feeling.



◆ These three steps will protect the fluid in the AT/CVT/DC

【Pre-work check】

For normal vehicles 8 years old with 80,000 kms mileage: Do a full check before using SOD-1 Plus

(* Before changing fluid what problems are there?)

Whether or not SOD-1 Plus can be used depends on the condition of the vehicle.

【Point 1】

If adding SOD-1 Plus to an AT • CVT • DCTF, add it when changing the fluid.

Always check the contaminants before adding SOD-1 Plus.

If you can't change the fluid avoid using SOD-1 Plus. But if fluid has been changed within the past 6 months or 5,000 kms mileage it is possible to add SOD-1 Plus.

* Use your own discretion about changing AT • CVT • DCTF fluid.

【Point 2】

If seeking to improve gear change shock or slippage be sure to explain to the customer before using SOD-1 Plus.

(Most faults can be eliminated, but we cannot guarantee complete recovery in all cases.)

Vehicles which should NOT use SOD-1 Plus

- ① Vehicles whose AT • CVT • DCTF is burned out or ruined
 - * Metallic deterioration is too severe to be cured.
- ② Vehicles whose AT • CVT • DCTF has become blackened.
 - * A T parts ruined by excessive abrasion
- ③ Vehicles whose AT • CVT • DCTF is filled with sludge.
 - * When the A T • CVT inside is clearly abnormal.
- ④ Where water has leaked into AT • CVT • DCTF and emulsified.
 - * If water has entered the AT/CVT repair is needed.
- ⑤ Vehicles whose fluid is leaking.
 - * Fluid leak must be repaired.
- ⑥ Vehicles with obvious faults (strange noise, heavy vibration, shift shock)
 - * If transmission is damaged repairs are necessary.
- ⑦ Vehicles using another additive.
 - * To enjoy the unique benefits of S O D — 1 Plus it cannot be mixed with other additives.
Mixing with other additives is risky due to unpredictable chemical reactions.
- ⑧ Parallel imported vehicles
 - * It is difficult to trust the maintenance record of such vehicles if faults are obvious.

Addition procedures[Engines]

**SOD-1 Plus can be used for all 4-cycle engines.
2-wheel, 4-wheel, gasoline, diesel(DPF · UreaSCR)
LPG、HV、PHV、RE、SC、Turbo、Flat-E(horizontal)**

① Before oil change please check vehicle carefully.

Check filler cap, oil vent, oil level, and sludge build-up, oil lamp, noise level, white smoke etc and determine if faults exist.

If faults exist please explain to customer whether SOD-1 Plus can be used.

(For vehicles with excessive sludge and carbon build-up do NOT use SOD-1 Plus.)

* For really dirty engines use an oil flushing to clean away most of the sludge.

(This is to deal with the dirty camshaft and finer parts of the oil lines.)

If no obvious problems please go to Step、② below.

② When changing the engine oil first check oil volume, then add SOD-1 Plus at a 10% ratio.

Measure out the SOD-1 Plus then add it as follows:

* When engine oil capacity is 4ℓ:

Oil 3.6ℓ + SOD-1 Plus 400cc = 4.0ℓ

③ After adding SOD-1 Plus upon an oil change leave the vehicle idling for 5 minutes to ensure proper blending occurs.

④ Next rev the vehicle for 1-2 minutes at 2,000rpm (gasoline vehicle) or 1000-1500rpm (diesel vehicle).

(For clean engines Step 3 can be shortened)

(For dirty engines also change oil filter and idle engine for an hour or more.)

White/black smoke and emissions will diminish.

⑤ Record addition of SOD-1 Plus in logbook and explain next oil change should be after 5,000km further mileage.

Explain to customer and seek approval to repeat addition next oil change.

【SOD-1 Plus addition ratio table】

Oil type	Addition ratio	
Engine oil	Oil capacity	10%
Power steering	Oil capacity	10%
Manual/gear oil	Oil capacity	10%
Auto trans. Fluid/CVT	Oil capacity	7%

For DPF vehicles、 after using analytical device for forced combustion、 add SOD-1 Plus. SOD-1 Plus when added will increase compression in combustion chamber, improved combustion will increase gas in chamber. Because of this when first adding it the DPF lamp may light up quickly. When it lights up carry out another forced combustion. Please use designated oil (DL-1, DH-2) in DPF vehicles.

Addition procedures[AT/CVT/DCT]

When adding SOD-1 Plus to an auto transmission or CVT/DCTF do so when changing the transmission fluid. Be sure to determine whether fluid change is needed first. Do not use SOD-1 Plus if fluid change is impossible. SOD-1 Plus cannot be used alone.

However, recently some owners are adding SOD-1 Plus within 6 months or 5000kms mileage.

- ① Carry out vehicle check before fluid change.
If no trouble is detected carry out Step ②. If trouble detected explain to customer.
- ② For auto transmission or CVT/DCTF measure out SOD-1 Plus at 7% of total fluid capacity. SOD-1 Plus should make up 7% of the total capacity.
- ③ Remove the auto transmission level gauge and add SOD-1 Plus.
If using a full auto AT changer first add the SOD-1 Plus to the new fluid and then do the change.
- ④ Next slowly change gears from P range to L range, then return to P range and idle engine for
5 ~ 10 minutes.
- ⑤ Check the fluid volume.
- ⑥ If adding SOD-1 Plus alone to fluid first remove 7% of capacity then add, idle engine for 5 mins and check for stirring or leaks.
- ⑦ Record in logbook adding of SOD-1 Plus and explain that next change should be after 20,000kms further mileage.

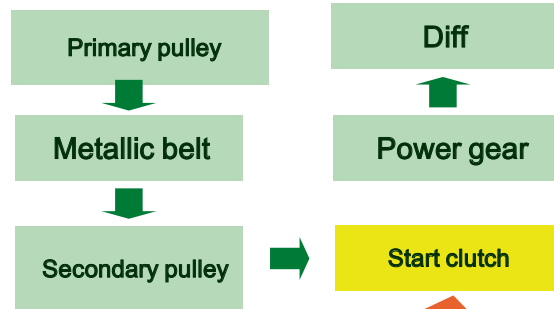
SOD-1 Plus- Improving judder in a CVT

[CVT transmission]

Start clutch



[CVT power transmission process]



To improve judder SOD-1Plus cleans material adhering to clutch plate and protects it with a special coating.



Fluid change and SOD-1Plus addition procedure* Judder (vehicle body vibration) can be eliminated!

- ① Remove some fluid from Honda Multimatic drain (take out around 3.2L)
- ② Add new fluid, idle engine, slowly move shift from P to L and back twice.
- ③ Repeat Steps 1 and 2. Second time add almost all new fluid.
- ④ Then add SOD-1Plus, and idle for 5 mins to ensure circulation. In maker manual carry out stall revolution, and when adding SOD-1Plus no need to stall, just drive normally and it will improve.
* Check addition amount as per below.
- ⑤ After checking fluid level on gauge, judder will cease after 10 ~ 20 mins normal driving.
Even if some judder remains 50 ~ 100kms driving will eliminate it.

* Key points when adding

- For CVT fluid use Honda Multimatic fluid (HMMF) or Castrol Type-H fluid. We do not recommend other fluids.
- When using SOD-1Plus to deal with judder always add with a complete change of fluid. Without a full fluid change even SOD-1 Plus cannot eliminate all judder. If fluid changed only recently (within 1 month or 1,000kms mileage) SOD-1 Plus can be added.
- Honda Multimatic vehicles with over 100,000 kms mileage are more common now, and the transmission can be dirty. Because of this some vehicles still experience judder after SOD-1 Plus is added. In such cases replace the Multimatic fluid and add SOD-1 Plus once again, and judder should improve.
- Using SOD-1 Plus as a judder solution, fluid should be replaced every 2 years or 20,000 kms mileage. This should eliminate all judder.

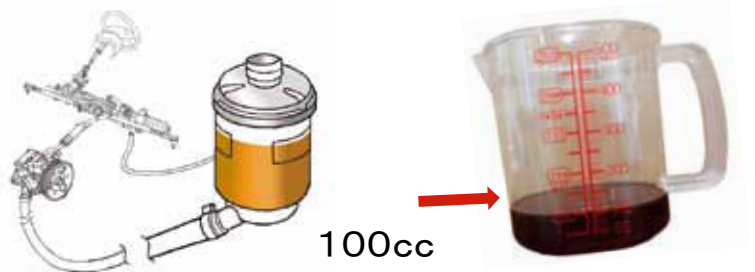
Addition procedures [Power steering systems]

- ① When changing power steering fluid or topping it up you can add SOD-1 Plus at a 10 % addition ratio. * Be sure to maintain the correct volume of fluid.
If the capacity is 1.5L (Fluid 1.35L and SOD-1 Plus 0.15L = 1.5L total)
 * When topping up to add at a 10% ratio please remove enough fluid to ensure proper capacity.
 * Check vehicle type and manual to determine correct capacity.
- ② When SOD-1 Plus is added, to ensure proper blend with fluid rotate steering wheel fully 2 or 3 times. Make sure to fully rotate steering wheel.
 * You'll notice less noise when using steering wheel.
- ③ Record in logbook date of addition of SOD-1 Plus and explain need to replace fluid in future. If you explain the process and effect to customers you'll get a repeat in future.

【Power steering fluid - addition ratio table】

* 10% of total fluid capacity

Engine size	Addition volume
Light vehicle	100cc
1,000cc~2,000cc	150cc
Over 2,000cc	200cc



【Vehicles】

• **All vehicles with hydraulic power steering systems**

Vehicles that should NOT use SOD-1 Plus

① Vehicles with fluid leaks

For vehicles with obvious leaks from p/steering pumps, gear boxes etc (fluid diminishes after topping up/ visible leaks leaving oil marks below) mechanical trouble is the case and SOD-1 Plus should be added only after faulty parts have been replaced.

② Vehicles with strange noises coming from power steering pump.

If leaks are very bad, driving with less than capacity fluid in the system the noise from the pump will worsen. In such cases the pump is damaged and we recommend adding SOD-1 Plus only after pump is repaired.

③ Vehicles using other additives

To get the best result from SOD-1 Plus do not mix with other additives due to unknown chemical reaction.

Sales points

* For new vehicles 3 ~ 5 years old or with over 50,000 kms mileage the power steering fluid will diminish or get dirty. For such vehicles do not merely top up fluid. Use SOD-1 Plus to protect against wear, stop fluid leaks, and ensure reduction of contaminants in the system. If possible replace power steering fluid and add SOD-1 Plus.

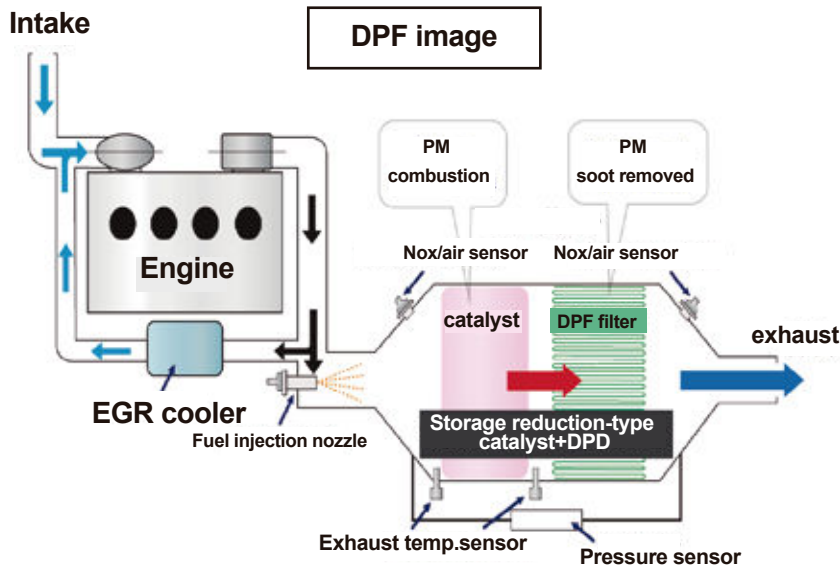
In this way ensure longer life for your vehicle and a well-functioning power steering system.

* Vehicles making strange noises when wheel is used are more common recently. (This is due to harder steering conditions in urban areas.)

* For vehicles with leaks from power steering systems SOD-1 Plus is effective in maintaining condition of system, and can help avoid costly replacement of system parts.

DPF/Urea SCR vehicles - key points and improvement examples

Trucks and diesel vehicles with emission gas devices



- Check lamp lights up during driving. Stop vehicle and repair by hand (av. 20 ~ 30mins)
- Lamp lights up, continue driving, risking serious trouble to vehicle.
- Normal combustion impossible, gradually soot builds up and renewal cycle is shortened.

* SCR
(Selective Catalytic Reduction)

① Near perfect combustion

Improve compression in combustion chamber, reduce unburnt fuel and contaminants.

② Maintain clean engine inner parts

Cleaning effect of SOD-1 Plus • friction reduction effect and oil degradation reduction, extends life of engine by maintaining clean condition.

- ◆ Reduce delivery times
- ◆ Emissions reduction from forced combustion
- ◆ Reduce fuel consumption
- ◆ Lighter burden on drivers

※注 : DPF lamp may sometimes light up. Differences in vehicle type may be significant.

Q&A (Engine 1)

Q1:What sort of engines can use SOD-1 Plus?

Gasoline engines (Turbo,SC,FE [horizontal] ,RE,HV,PHV) diesel engines (including clean diesel) LPG engines (★But 2-cycle engines CANNOT use SOD-1 Plus)

* Supercharged engines, rotary engines, hybrid vehicles and Plug-in hybrids

Q2:What sort of oils can you add SOD-1Plus to?

Not only gasoline/diesel oil, but AT/CVT/MT fluids and other diff/gear/power steering oils.

Q3:What happens to the oil change cycle when SOD-1Plus is added at oil change?

- SOD-1 Plus raises the viscosity index of lubricant oil, cleans the engine, dissolves sludge deposits prevents sludge from accumulating. This improves compression and aids perfect combustion by stopping carbon particles entering the oil. This long drain effect extends the oil change cycle.For diesel engines soot can find its way into engine oil, which raises viscosity and reduces fuel efficiency and reduces engine power. Hence we don't recommend greatly extending the oil change cycle.

- When first adding SOD-1 Plus we recommend an oil change after 5,000 kms mileage. The detergent effect will clean the engine and return it to near-new condition. After that using new oil and SOD-1 Plus you can extend the oil change cycle.

- If using SOD-1 Plus as a preventative measure we recommend sticking to the vehicle maker's recommended oil change cycle. If oil leaks and oil degradation. Turbocharged vehicles suffer oil degradation from excessive temperatures, and the oil change cycle needs to be shortened.

(Sports cars or long-distance driving experience severe conditions, so a 5,000 km or 3-month oil change cycle is needed.)

Q4:After adding SOD-1Plus how long before the engine will be cleaned?

- It depends on how dirty the engine is before adding. Engines using mineral oil (G1, G2 base) for long periods will have substantial sludge deposits, so the period required to clean away the deposits will vary. For normal oil lines 50-100 kms should be enough, but 5,000 kms will be needed for a full cleaning. We recommend repeated additions and oil changes for full cleaning. The dirty surfaces will gradually be cleaned, so time is required to achieve the optimum result for your engine.

Q5:Can really dirty engines be cleaned?

- SOD-1 Plus has a strong detergent/dispersant effect and can wash away deposits of oxidated material (carbon sludge),thus cleaning an engine. For dirty engines we recommend repeated oil changes and uses of the additive.

(★However, for really dirty engines SOD-1 Plus may not be enough. If a customer insists, please contact us for advice.Vehicles over 10 years old or with really dirty engines and over 80,000 kms mileage may need special measures.)

Q6:Can it stop oil leaks?

- SOD-1 Plus works to soften and expand rubber seal material that has hardened, leading to better sealing which will gradually reduce and eliminate oil leaks. (★However, if mechanical faults or broken parts are causing oil leaks those parts must be replaced.)

Q7:Can it eliminate white smoke emissions?

- Because of the chemical polarity of SOD-1 Plus it provides an adsorption layer on the cylinders and increases compression, also cleaning the oil rings and preventing them sticking, which eliminates oil rising and thus reduces white smoke emissions.

- Further, oil falling (leaks from the valve stem seal) and burning can be stopped by restoration/expansion of the seal material. This eliminates white smoke emissions.

Q8:Will it cause problems with turbos or oil coolers?

- SOD-1 Plus does not hinder the function of engine oil, but provides a stronger oil film for high temperature/high revolution periods, thus protecting the bearings in the turbo. It can be used for ordinary turbocharged vehicles or racing vehicles.

- It has no effect on the oil cooler and stabilises the oil temperature in the oil lines.

Q&A (Engine 2)

Q9:Will black smoke emissions be eliminated?

Black smoke emissions result from a lack of proper clearance between the piston and cylinder, combustion. SOD-1 Plus restores this clearance to a proper state, improves combustion and eliminates black smoke emissions.

(★However, if mechanical faults exist parts need to be replaced.)

Q10:Will black smoke emissions be eliminated?

SOD-1 Plus increases sealing within an engine (preventing compression leaks or blow-by) and restores function to the oil lines. Because of this the transmission (auto or manual) will function better.

Q11:How does it clean valves and stop oil entering the combustion chamber?

SOD-1 Plus cleans the engine while it is running, working to restore proper function. This occurs due to an extra oil film adhering to the metal surfaces thus improving compression. Near-ideal combustion is created by the IN/OUT valve being cleaned by SOD-1 Plus.

Q12:Will the knocking noise be eliminated?

If the correct space between the cam and the valve filter is lost clearance is increased, the oil film thins out on sliding metal surfaces which creates a knocking noise.SOD-1 Plus forms a strong oil film to protect the metal surfaces, which restores proper clearance. As the oil lines are cleaned the oil will flow smoothly and noise will decrease. But if the clearance gets too big it can't be restored. We recommend adjusting the valve clearance.

Q13:Will the oil filter become clogged up?

Carbon sludge in the engine is not just cleaned but dissolved into micro-particles in the oil, so the oil lines won't clog up. But for really dirty engines clogging may already occur. Flushing should be carried out and the oil lines checked. If difficult to assess please feel free to consult us.

Q14:Can I use SOD-1 Plus in very cold environments?

As an ester-based synthetic oil, even in minus 30 degree extreme cold it retains its flowability and doesn't affect engine starting or fuel consumption.

Q15:Can I use it with 0W-20 oil and other low-viscosity oils?

Recently low fuel consumption vehicles are more common as makers use low-viscosity oils. You can add SOD-1 Plus to such oils, and fuel efficiency will be unaffected.

Q16:SOD-1Plus cleans an engine after being added.

SOD-1 Plus has a detergent effect on an engine, but engine types differ as does their conditions of use, so the cleaning effect may also differ.In general cleaner oil lines means less degradation of the oil, and oil contaminants will be reduced. Sludge builds up near the head cover and head bolts where oil circulation is difficult. It takes longer to clean these areas.

Q17:Do I need to add SOD-1 Plus every time the oil is changed?

At over 10,000 kms mileage the oil film and lubricity will be better maintained and improvement will be obvious. We recommend using SOD-1 Plus at every oil change to maintain optimum condition.

Q18:Can I use it in sports and racing vehicles?

Engines, transmissions, and diffs under great stress for extended periods experience high temperatures and high pressure. SOD-1 Plus maintains oil quality and slows degradation of oil, giving better vehicle performance. In sprint and endurance conditions to prevent falling oil viscosity you can maintain good engine/transmission/diff performance. We use it in the D1 Grand Prix Golden Cup (cars) and in the 8-hour endurance race (bikes).

Q&A (Engine 3)

Q19:Can I add it to non-Japanese cars?

You can add it to any car, gasoline, diesel, or LPG.It doesn't matter whether the vehicle is made in Japan or not.We use it in Porsches, Lamborghinis, Mercedes-Benz, Ferrari. It can be added to pure long-life oil without difficulty.

Q20:Can it be added to older model vehicles and bikes?

In Japan we use it with classic/vintage cars and motorbikes, adding it to the engine, transmission, and clutch in Harley-Davidsons. Because SOD-1 Plus does NOT contain PTFE or molybdenum it can be safely used in a clutch without causing any slippage.

Q21:Will it clog up the oil filter?

It doesn't remove the accumulated carbon sludge all in one go, but gradually dissolves the sludge into micro-particles, so there's no risk of clogging up the filter.

Q22:Are some oils incompatible with SOD-1 Plus?

No. SOD-1 Plus is a triple ester-based additive so it blends with all kinds of lubricant oils. You don't need to choose a special oil containing titanium or molybdenum to go with it.

Q23:Can it be added to small boats (pleasure boats)?

It can be added to gasoline or diesel engines on boats. For engines with long use it will help restore top speeds and improve fuel efficiency. However, it CANNOT be used with 2-cycle outboard engines.

Q24:Can it be added to 2-cycle engines?

It CANNOT be added to 2-cycle engines in boats. Likewise it CANNOT be added to 2-cycle minibikes or racing go-karts.

Q&A (Manual transmissions)

Q1:Can it eliminate odd noises in a HONDA Acti manual transmission?

Yes, there are many cases of improvement in manual transmissions. Add SOD-1 Plus at a 10% ratio when changing transmission fluid. After adding drive 50 km~ 100 km for the coating effect to begin reducing odd noises.

Q2:Will it eliminate odd noises from gears, transmissions, diffs?

Transmission and diff oil is important in protecting the gear teeth. This requires the oil to have oxidative stability under high temperature/high pressure conditions. SOD-1 Plus boosts such stability and thus reduces noise.

(★However, if mechanical trouble exists the parts will need replacing to reduce noise.)

Q&A (Motorbikes)

Q1:Will clutch slippage occur?

SOD-1 Plus does not cause clutch slippage or clog up the oil filter because it does NOT contain PTFE or molybdenum. Moreover, SOD-1 Plus adheres to the clutch and cleans away contaminants, so the clutch will work better and acceleration will be smoother.

Q&A (ATF/CVTF/DCTF)

Q1: Will AT · CVT shift shock and slippage stop?

ATF · CVT fluid does not degrade as quickly as engine oil, but front-wheel drive vehicles do suffer faster fluid degradation because the transmission and diff are integrated as one. With fluid degradation gear slippage occurs, causing shocks as well. SOD-1 Plus provides the required low temperature liquidity and maintains proper viscosity under high temperature and high pressure, which helps protect gears and improves lubricity, reducing shocks and slippage (★However, it does not cure electrical faults which need separate repairing.)

Q2: Can it be used for all types of AT · CVT?

Different fluids are used for different types of AT · CVT, but the basic function of fluid does not change. Therefore SOD-1 Plus can be used in all cases.

Q3: Can it be used for DCT (dual clutch transmission) vehicles?

SOD-1 Plus can be used with NISSAN Skyline, R35GTR, Ferrari etc with no difficulty.

Q4: Can it be used with DSG (direct shift gearbox) wet or dry type vehicles?

Yes, but because iron particles in the sludge are common we recommend changing the oil strainer at the same time. Warning: for dry-type DSG vehicles oil is not used in the clutch, so judder from the clutch abrasion requires parts be replaced.

Q5: Can it be used with DSG (direct shift gearbox) wet or dry type vehicles?

Yes, it can be used in such vehicles without difficulty.

Q6: How do you change AT · CVTF fluid without a level gauge?

We recommend you look at an appropriate 「You Tube」 video on this topic.

Q7: How do you change AT · CVTF fluid without a level gauge?

We recommend you view an appropriate YouTube video on this topic.

Q&A (Power steering systems)

Q1: Will noises from the power steering pump stop?

SOD-1 Plus adheres to metal surfaces by electrical charge, and because it provides greater lubricity and wear resistance it not only restores the pump to proper condition but also prevents wear to the pump and gears, thus reducing noise. But it cannot improve electric pumps, only hydraulic pumps. Check your vehicle's system before adding.

Q2: Power steering pump noises and fluid leaks will stop?

Seal material is used in a power steering system. SOD-1 Plus softens and expands this material. Because of this the leaks will gradually stop as the seal material improves. Pump noises will diminish as wear resistance and lubricity improves because of the adsorption film on metal surfaces.

(★However, if mechanical faults exist the parts will need to be replaced.)

Q3: What sort of vehicles can you add SOD-1 Plus to the power steering system?

All hydraulic type power steering systems can use SOD-1 Plus, whether in Japanese or non-Japanese vehicles. It can be added to all types of fluid in PS system or automatic transmissions.

Q4: What is the effect on power steering gasket and seals?

A power steering system uses seal material, and SOD-1 Plus contains nothing that will damage this.



What our customers say!

- **Much relieved after a contaminant check !**

I got the dealer to change the ATF fluid on an old car with excessive mileage which people recommended against due to slippage potential. I was nervous about adding SOD-1 Plus to the transmission fluid, but we did a contaminant check of the filter and decided a fluid change was possible, so I was much relieved thanks to you. The vehicle's condition has improved hugely.

【Vehicle : Nissan Laurel, 130,000 kms mileage; work done was contaminant check and SOD-1 Plus added to ATF fluid.】

- **Powerful driving revived !**

After adding SOD-1 Plus the engine and transmission improved a lot. The response was like a new car.

【Vehicle : Honda Vamos, 267,389 kms mileage. Work done: Oil change and SOD-1 Plus added (270cc or 10%), ATF fluid change + SOD-1 Plus (294 cc or 7%)】

- **Good result from preventative addition !**

After adding SOD-1 Plus to the power steering the handling became very smooth, and the feel of the tyre grip was great. My driving got a lot better.

【Vehicle : Mercedes-Benz S63 AMG Mileage around 50,000 kms. Work done: Preventative maintenance, SOD-1 Plus added to engine, AT, power steering.】

- **Shift feeling and emission gas dramatically improved !**

The engine noise in fourth gear stopped, and acceleration became smooth to high speed. The emissions were black smoke, but this got better too. The transmission had a smooth feeling and friction in the diff was lower so gaining speed improved a lot.

【Vehicle : Lexus IS250, mileage 238,000 kms. Work done: ATF fluid change + SOD-1 Plus added; engine, diff SOD-1 Plus added】

- **Gear noise and shift improved !**

When shifting up or down the feeling was bad, and there were occasional gear noises, so we changed the transmission fluid to no effect. Then we added SOD-1 Plus and immediately the feeling of the shift improved, there was no stress and it felt much lighter.

【Vehicle: Nissan Skyline GTR, mileage 127,000 kms; work done was adding SOD-1 Plus to manual transmission.】

- **Uncomfortable feeling disappeared !**

The car vibrated and made noise, so we added SOD-1 Plus and both noise and vibrations palpably decreased. When pressing the accelerator the car vibrated over the past 1-2 years, but this has now gone.

【Vehicle: Lexus, mileage 146,769 kms.

Work done: CVT fluid changed and SOD-1 Plus added (300cc) (Total oil capacity 4.2L, so 7%)】

- **Engine starts, transmission oil pressure insufficient for 1-2 mins, then improvement !**

Contaminants within transmission excessive, strainer clogged so performance poor. Changed strainer and added SOD-1 Plus, vehicle was like new it drove so smoothly.

【Vehicle: Isuzu Smooza, mileage 432,414 kms.

Work done: auto transmission fluid changed (total fluid capacity 6L) + strainer changed and SOD-1 Plus added (7%)】

- **Boat engine noise and vibration dramatically improved !**

After I added SOD-1 Plus the engine noise went quiet and the vibrations were much reduced. A test run at high speed made the boat feel like new.

- **Lengthened the oil change cycle !**

My delivery bike carries a heavy load and experiences stop-and-go conditions which are severe. Because of this I usually do an oil change every 1,000-1,500 kms. But using SOD-1 Plus I've now lengthened the oil change cycle to 3,000 kms or once a month.

【Bike : HONDA Canopy 50cc 4 cycle 50cc 】

SOD-1Plus and Farm Machinery

DPF-fitted tractor case - improvement

During potato harvest I'd drive only 200 metres per hour doing the work, and the burden on the tractor engine got worse, such that combustion worsened and black smoke emissions began. Hence clogging of the DPF happened often, requiring a shutdown and forced recombustion of DPF, all of which caused big problems for the harvest. DPF shutdown also happened outside the harvest. I added SOD-1 Plus to my 3 tractors with DPF trouble and did a test. The length of time until clogging doubled, and one tractor didn't even shutdown once. This was a very good result for me.

(We're doing tests on the life of a DPF filter to lengthen its life.)

Thanks to: Tokachi Area, Hokkaido, potato farmer



Suzuka 8-Hour Endurance race experience



Rider : Minaki Eito
Team RSG
Manager, Coach

Usual endurance race riding 400 kms the shift feeling worsens, but when using SOD-1 Plus I can do 500 kms without any worsening at all, allowing me to compete much better. The gear changes were easier and the engine response improved. Vibration of the bike also lessened a lot.

MOTOR SPORTS USE

D-1 GRAND PRIX
SKYLINE ER-34 RB28
 850hp



Smoother acceleration !

From driver and mechanic

Sequential manual transmission - the shift change feeling improved a lot and metallic noise when changing up or down greatly reduced. Under high temperature/high stress/high speed conditions I could press the accelerator to the floor without fear, and even at 200 kph changing up or down was smooth.

New
Scar diameter 0.83 mm

**Without SOD-1Plus
(2hours driving)**

Used
Scar diameter 0.93 mm

**With SOD-1Plus added
(2 hours driving)**

Used oil
Scar diameter 0.38 mm

Obvious change!

Manual transmission fluid

Fluid analysis · metallic elements (mass ppm)

Test No	Fe (鉄)	Pb (鉛)	Cu (銅)	Cr (クロム)	Al (アルミ)	Ni (ニッケル)	Sn (錫)
19120796	24.9	0.0	0.5	0.2	3.1	0.0	0.1

Fluid analysis · metallic elements (mass ppm)

分析No	Fe (鉄)	Pb (鉛)	Cu (銅)	Cr (クロム)	Al (アルミ)	Ni (ニッケル)	Sn (錫)
19120797	1.2	0.0	0.2	0.0	0.2	0.0	0.0

Diff oil

Fluid analysis · metallic elements (mass ppm)

分析No	Fe (鉄)	Pb (鉛)	Cu (銅)	Cr (クロム)	Al (アルミ)	Ni (ニッケル)	Sn (錫)
20090787	35.5	0.0	1.1	0.2	1.1	0.0	0.0

Fluid analysis · metallic elements (mass ppm)

分析No	Fe (鉄)	Pb (鉛)	Cu (銅)	Cr (クロム)	Al (アルミ)	Ni (ニッケル)	Sn (錫)
20090788	4.7	0.0	0.0	0.0	0.2	0.0	0.0

MOTOR SPORTS USE

Gold Cup Race (AUTOPOLIS) Touring Cars 300km Endurance - Impressions
Nissan Prince Fukuoka - NISSAN NOTE NISMO E12 Improved Driver: Ichimura Takashi

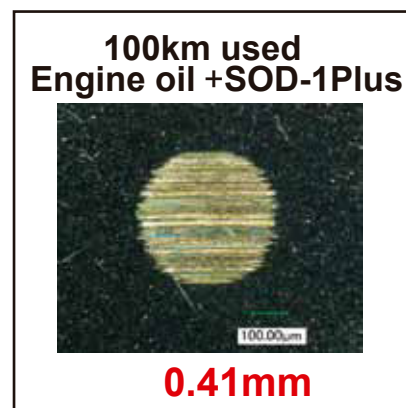
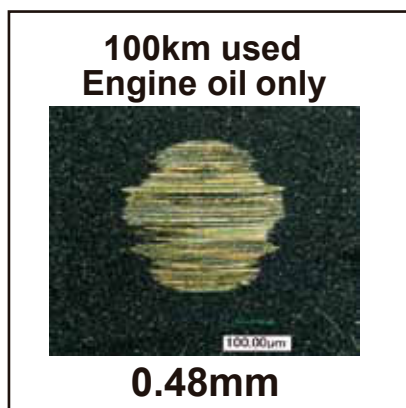


We tested SOD-1 Plus in this race in the engine and transmission. Previously we had a problem when changing into 3rd gear, but this improved a lot with SOD-1 Plus, and we drove without any problems until getting the chequered flag.

* Test oils: Engine - Motul300V High Rpm 0W20; Transmission - Motul 75W-90

Analysis report

Shell 4-Ball Wear Test Scar diameter images



* Shell 4-B Wear Test conditions : 1200RPM,load : 40kg/ cm²、 Temperature : 75°C、 Time 60 mins
Scar diameter of ball: smaller diameter means less wear.

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