Nano Protect Service
"We protect surfaces"

Test Report

for the utilization of

"NPS Engine Improvement"

On board the vessel "Samskip Courier"

Technology short description
"NPS Engine Improvement"

NPS Engine Improvement – a Nano particle (i.e. very small), amorphous, formless powder, which interfaces between small moving surfaces to provide protection against extreme pressure; reducing friction and decreasing wear – thereby increasing components life.

NPS Engine Improvement is not a traditional additive and not based on any existing additive technology; it works by changing the dynamics of the oil film layer by forming a firmly adhesive and elastic anti-friction coating on friction stressed surfaces.

In addition to the benefits of improved efficiency and improved component-life, NPS Engine Improvement will clean the lubricant circuit and therefore the friction surfaces, improving the viscosity of the lubricant and increasing its lifetime, reducing emissions, regenerating defective spots on friction surfaces, and reducing noise and vibration.

NPS Engine Improvement properties:

- Self-regulating under pressure
- Flexible, elastic
- Retains lubrication abilities at high temperatures
- Steady and permanent, firmly adhering
- Very-low friction coefficient

NPS Engine Improvement benefits:

- Reduction of fuel consumption
- Improves friction values and reduces attrition
- Reducing emissions
- Performance increases under pressure
- Increases period between oil changes
- Forms a firmly adhering wear protection layer

NPS Engine Improvement test evaluation on the vessel "Samskip Courier"

Test Motor Catapillar, Type C18

The test is performed on a Catapillar, Type C18 – 624 PS.

NPS Engine Improvement

Test progress and results

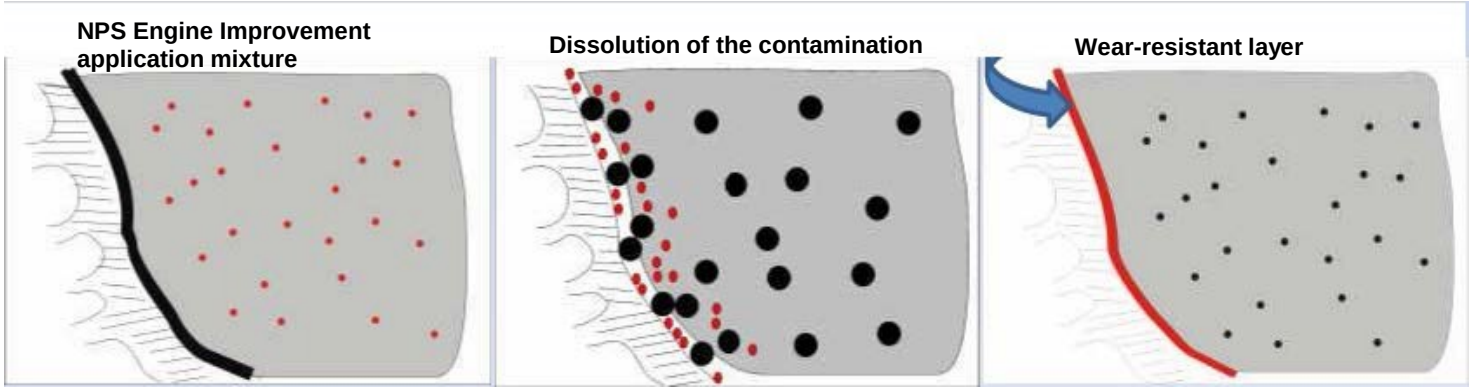
The NPS Engine Improvement® treatment is carried out in two steps

*** The consumption during idle mode was 12 L per hour *.**

February 24, 2016

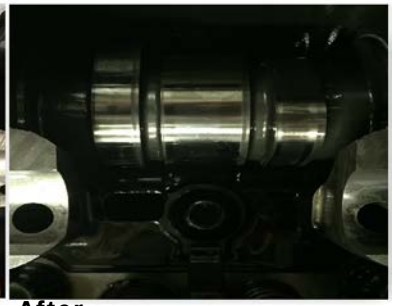
The NPS Engine Improvement – oil concentrate 2x250ml each step (for this type of engine) was used as follows:

- **auxiliary engine must be at normal operating temperature.**
- **NPS Engine Improvement – oil concentrate has to be stirred before usage and then the firs step is added into the warm oil level .**
- **oil and oil filter change is performed after 4 hours running in idle mode, (the pollution of the motor is definitely present in the drained oil and old oil filter).**
- **After oil and oil filter change the second step was addit.**
- **After an average of 150 operating hours, the Nano particles will be evenly distributed.**



Before the start of the NPS Engine Improvement treatment on February 24, 2016 we have made pictures of different engine parts,
after the NPS Engine Improvement treatment 3 weeks later on March 16, 2016 we have made again pictures of the same engine parts.
See pictures: you can clearly see the differences before and after the NPS Engine Improvement treatment.


Before

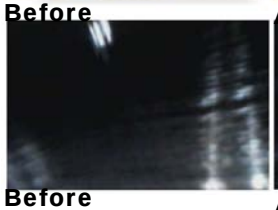

After


Before


After


Before


After


Before


After

*** The consumption during idle mode after the NPS Engine Improvement treatment was 11 L per hour *.**

On March 16, 2016, the consumption is measured again, the result of this measurement is equivalent to the consumption of 11 liters per hour during idle mode. The fuel consumption is hereby reduced by 1 liter per hour.
a reduction of 9.2%.

In both the main engine(s) and the auxiliary engine(s) at full load the average fuel reduction will be by an average of 18%.
In order to reach an average saving of 18%, main engine(s), auxiliary engine(s) and the gearbox must be treated with NPS Engine Improvement.

The durability of the NPS Engine Improvement protective layer is 12,000 to 15,000 operating hours.
After this time, the engine needs a small refresh treatment.

Example calculation of the main engine Samskip Courier

Technical data main engine:

Mak 9M43, 11424 PS (8400 KW), 500 Upm
Oil volume 14.000 Liter
Fuel consumption ca. 1,2 MT Heavy fuel per hour
At 16 operating hours a day this is equal to 19.2 MT heavy fuel consumption, monthly 576 MT times € 550 per MT heavy fuel gives € 316,800 Fuel costs per month.

With the treatment of NPS Engine Improvement under the intended load on the engine there is a expected saving of 18%. This corresponds to a saving of € 57,000 per month.
Also, the gearbox and the drive shaft should be treated with NPS Engine Improvement to achieve the savings of 18%.
Experiences from tests are documented, see presentation "Lehmann Trader".
The investment costs of the NPS Engine Improvement treatment for an engine with 14.000L oil volume, gearbox and driveshaft commonly 3000l oil volume are approximately € 153,000.
The effectiveness of the NPS Engine Improvement structure in the engine will take about 200-250 operating hours, This corresponds to about 14 days.

Return of Investment is reached at about 3 months.

The NPS Engine Improvement layer will remain 12,000-15,000 operation hours.
In approximately 16 operation hours a day, this is equal to 28 months.
Minus 3 months, this results in a saving of approximately €1.425 million in 25 months.

After approximately 25 months the engine, gearbox and drive shaft requires, if it is determined that the consumption increases again, only a refreshment treatment of the NPS Engine Improvement layer.
The investment will then be considerably smaller.

Example calculation generator
Samskip Courier

Technical data Generator:

Catapillar C18 , 624 PS (465 KW) , 1800 UPM
Oil volume 49 Liter
Fuel consumption ca. 50 Liter Diesel per hour.
At 8,3 operating hours a day, this is equal to 416L diesel fuel consumption.
Monthly 12.500L diesel times +/- € 0.70 gives € 8750 Fuel costs per month.

With the treatment of NPS Engine Improvement under the intended load on the engine there is a expected saving of 17%.
This corresponds to a saving of € 1488 per month
Experiences from tests are documented, see presentation "Lehmann Trader".
The investment costs of the NPS Engine Improvement treatment for an Generator with 49L oil volume are approximately € 790,-
To reach 100% effectiveness of the NPS Engine Improvement treatment will take about 100 operating hours, This corresponds to ca. 12 days.
The NPS Engine Improvement layer in the generator is compared to the main engine developed faster because the generator operates at 1800 rpm.

Return on investment is reached at about 1 month.

Like the main engine, the NPS Engine Improvement layer will remain 12,000-15,000 operating hours.
In approximately 8.3 operation hours a day, this is equal to 51 months.
Minus 1 months, this results in a saving of approximately €75.888 in 51 months.

Reference data:

Appendix 1:

J.Kahrs Bereederung
Managing Director

Company: J.Kahrs Bereederung GmbH & Co KG

Appendix 2:

Dipl.-Eng. Spiridon Ciorba
Technical Superintendent

Company: J.Kahrs Bereederung GmbH & Co KG

Let us advise you !
We will inform you about the possibilities and benefits.

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	J.Kahrs Bereederung GmbH & Co KG	Date	12.04.2016
		No.	9
Subject:	Recommendation Letter	Page	1 of 1

TO WHOM IT MAY CONCERN

This is to confirm that **Nano Protect Service** product was used as oil treatment conditioner on our diesel generators with excellent fuel consumption reduction results.

The test been done on:

- MV "SAMSKIP COURIER" – aux engine no. 2
- MV "SLEPNER" – aux engine no. 2

The fuel consumption measurement been done before and after treatment. The average fuel consumption reduction was abt. 10%.

Except fuel consumption reduction benefit, it has been observed also an improving of visible wear surfaces.

We are looking forward to extend **Nano Protect Service** product application, on all our vessels on auxiliary engines inclusive main engines.

J.Kahrs Bereederung
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Managing Director

Date 12.04.2016

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TO WHOM IT MAY CONCERS

During testing of Nano Protect product, I worked as Technical Superintendent for firma J.Kahrs Bereederung GmbH & Co KG. In this time I was witness the whole process of engines treatment with Nano Protect product. From the preparation stage until final measurement readings and interpretation, I was present to ensure correctitude of test and measurements. In view of all above, I confirm that Nano Protect product was used with excellent fuel consumption reduction.

The test has been carried out on next vessels and engines belong to :

- MV "SAMSKIP COURIER" – aux engine no. 2
- MV "SLEPNER" – aux engine no. 2

As result of whole test, the average fuel consumption reduction was about 10%.

Except fuel consumption reduction benefit, it has been observed also an improving of visible wear surfaces.

About test done and results obtained after Nano Protect treatment, I am open to share our good experience with Nano Protect customers.

Dipl.-Eng. Spiridon Ciorba

Date 16.04.2016

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