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Department: T.O.

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Contamination of gasoil by micro-organism

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Contents:

Photographs:

RIVO REPORT

Translation from the French of Test Results from the Rijksintituut Voor Visserijonderzoek - the Dutch Fishing Industry Research Institute.

1. INTRODUCTION

Most vessels in the Dutch fishing industry are fuelled by gasoil. This is a middle distillate fuel-oil refined from crude oil and because of the changes in refining processes in the last few years there have been subtle changes in the quality. During this period of change in crude oil and refining, slight differences could be detected, the nature of which was not immediately apparent. One such difference, however, which has been detected, has been the increase in contamination by microorganisms, which include bacteria, fungi, and yeasts, separately or in combination.

The contamination can develop from:

a. the atmosphere;

b. polluted service pipes and / or storage tanks;

c. water.

The problems confronting the fishing industry were serious especially with regard to blocked filters. These blockages resulted in high costs including frequent maintenance down-time and loss of fishing. There were also a rapidly growing number of losses due to appreciable corrosion in fuel pump plungers and injector nozzles. Once contamination occurred it could develop very quickly, even by a factor of one million within twelve hours.

The speed at which the microorganisms develop is dependent on available nutrients and the presence of water in the gasoil. Water can arise by condensation in the storage tanks, by the microorganisms themselves producing water, and be carried in the distribution system. Additives to the gasoil during or after refining can also increase the amount of available nutrients to above the normal level of the base crude oil.

Apart from filter-blocking, and often noticeable damage to fuel pumps and injectors, contaminated gasoil can also be detected by its colour, smell, sludge-forming and the visible presence of a fungal slime. When this type of problem arises in an industrial sector such as the fishing industry, the market immediately reacts by advocating a number of "solutions" even though, very often, it is not clear what the origin of the problem is.

In this case a product came from New Zealand, through France. The inventor claimed to have solved the contamination problems with a De-Bug unit.

The one thing that was definitely established was that this problem was also known on the other side of the world.

2. ACTION

This De-Bug unit consists of a number of magnets in a marine grade aluminium housing. Microorganisms present in the contaminated gasoil are subjected to a strong magnetic field as they pass through the device, and over a period of time are physically disrupted enough to disintegrate, pass through the filter and burn with the fuel in the cylinder.

Over a number of years of experimentation in New Zealand it has been so successfully established that a well-known oil company promotes its use.

3. RESEARCH METHOD

Before introducing the De-Bug unit to the Dutch fishing industry, BO & AC Nederland requested R.I.V.O. Ijmuiden to select two ships with contamination problems to test the L4000 De-Bug unit for a period of six months.

Photographs 1 and 2 show the position and function of the L4000 De-Bug unit fitted to the bypass between the daytank and the main engine, in front of the fuel filter and after the mixing tank. After every fishing week of about 100 running hours a number of samples were taken from the main tank, the day tank, before, from, and after the L4000 De-Bug unit. These samples were examined in the research laboratory for fungi, yeasts, and bacteria, specifically sulphur reducing bacteria which produce corrosive acids.

Before starting the tests the trawlers GO 22 (photograph 3) and GO 28 were contacted. The first is 45.6 metres in length and is equipped with a 2868 Kw Deutz SBV 16M 628 engine. The second ship, GO 28, is 42.44 metres length and is propelled by a 1986 Kw Stork 8SW 280 engine. The ships were built in 1987 and 1986 respectively.

Before the start of the tests in July 1990, the gasoil in both ships was found to be heavily contaminated with bacteria and fungi, the table on page 6 shows the levels of contamination. In the initial first month tests were conducted on a weekly basis and thereafter once a fortnight. Samples were drawn from the main tank, the day tank, and the three points before, from and after the L4000 De-Bug unit. Every fishing week there were 100 hours run on the main engine.

4. RESULTS

The table on page 6 shows the results obtained during a period of 4 months. This period was shorter than initially planned but in view of the consistent results it did not make sense to continue with the trial. Although the tanks were initially contaminated by fungi and bacteria, it was conclusive from the results that this contamination disappeared by the end of a week.

During the tests the tanks were regularly drained of bottom water.

The attached photographs (6 to 9) show microbiological plate tests to illustrate the results of testing during the trial.

5. CONCLUSION

From the research it is now definitely established that on the test ships GO 22 and GO 28 the contamination was controlled within one week of the installation of the L4000 De-Bug unit.

Following a mishandling accident to the magnets in the L4000 De-Bug unit on board the GO 22 the importance of the magnetic field became apparent. The magnets were reassembled incorrectly and contamination reoccurred in the fuel (5 Oct. on table, page 6).

It was also very evident from the research that the source of contamination can be very localised. In spite of keeping the gasoil free of water as much as possible it seemed, from taking the samples, that varying contamination could suddenly appear without the bunkering of new gasoil. This shows that with condensation and the presence of microorganisms, a matrix for contamination can develop. For this reason we recommend that, in the building of new ships, special attention should be given to tank drainage, to avoiding great differences in temperature within the fuel system and also providing filters and service pipes with drains.

Furthermore, it is worth mentioning that installing the L4000 De-Bug unit on the GO 22 increased the service life of the fuel filters from two weeks to 14 months, while the lifetime of the injector nozzles was lengthened from 9 to 14 months.

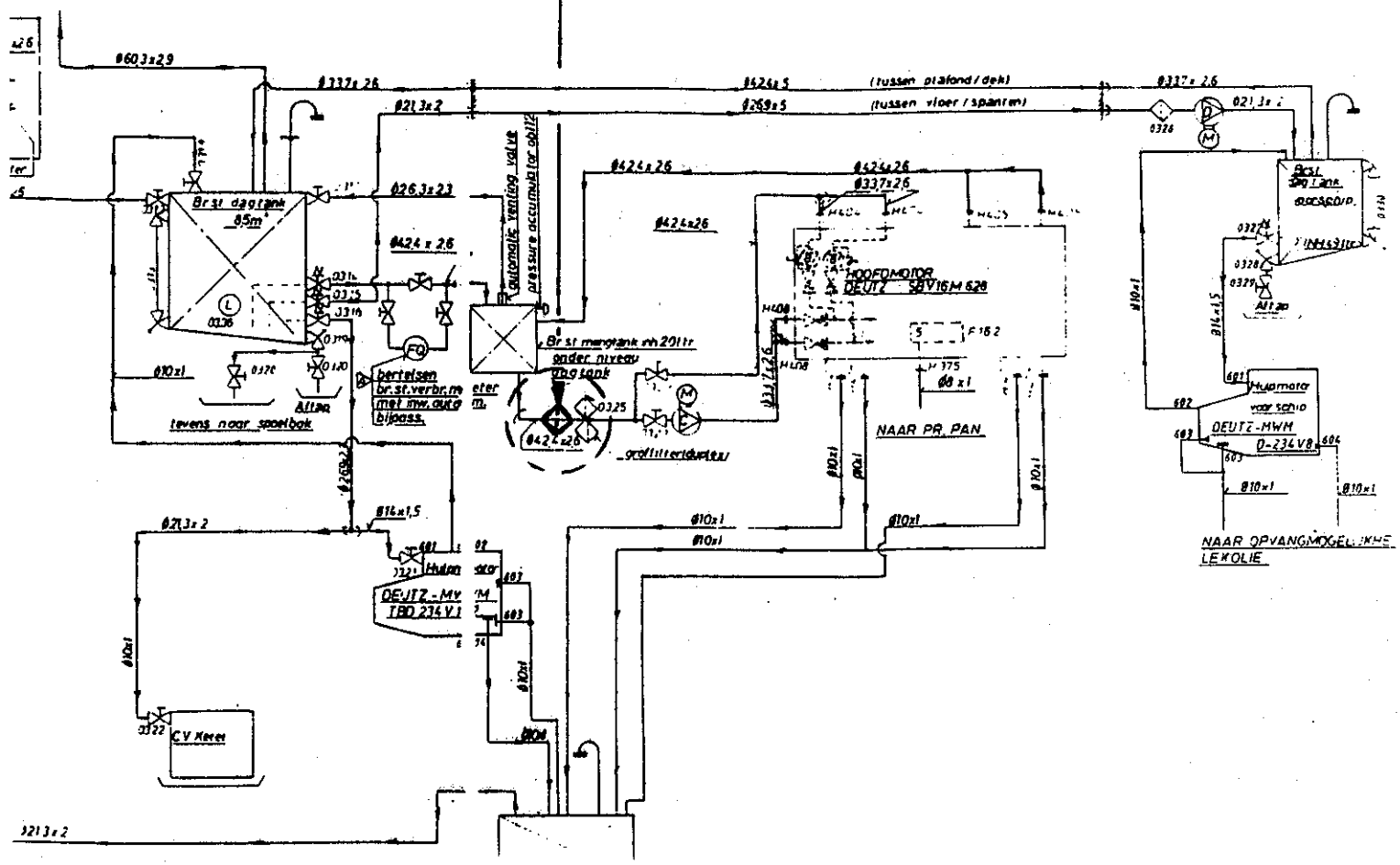
In conclusion the R.I.V.O. is aware of many unanswered questions, but the trials conducted with the L4000 De-Bug unit on the two ships have clearly shown that the De-Bug unit is a solution to contamination problems.

At this time in Holland about 150 ships are fitted with the De-Bug unit.

Date	GO 22					GO 28				
July 1990	Before Installing De-Bug Heavy Contamination In All Tanks					Heavy Contamination In All Tanks				
	Bunker	Daytank	Before De-Bug	Out of De-Bug	After De-Bug	Bunker	Daytank	Before De-Bug	Out of De-Bug	After De-Bug
10-08		MC	MC	SC	NO C	HC	HC	HC	MC	SC
17-08	HC	MC	SC	NO C	NO C			MC	SC	NO C
24-08		MC	MC	SC	NO C			SC	SC	NO C
31-08	MC	SC	SC	NO C	NO C	MC	SC	SC	NO C	NO C
07-09	SC	SC	NO C	NO C	NO C			SC	NO C	NO C
21-09		SC	SC	S C	NO C			SC	NO C	NO C
28-09	A FREE	A FREE	NO C	NO C	NO C	MC	MC	MC	SC	NO C
05-10	MC	SC	SC	SC	MC			SC	NO C	NO C
12-10			SC	NO C	NO C	SC	SC	SC	NO C	NO C
26-10										
09-11	MC	MC	MC	SC	NO C	SC	MC	MC	NO C	NO C
23-11	SC	SC	SC	NO C	NO C	SC		SC	SC	NO C

A FREE - Almost Free
SC - Slight Contamination
MC - Moderate Contamination
HC - Heavy Contamination

De Bug



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