



S.I.T Schiffs- & IndustrieTechnik GmbH



History

1973 - 2006

PREFACE

The homogenising systems, developed by SIT, for fuel conditioning on vessels and power plants are nowadays the normal state of art and installed a thousand times.

By using the systems CD92-SR, CD92-CI, CD92-WiDE and CD92-WOR, solely developed by SIT, the highest ecological and economical demands in operation of large diesel motors will be fulfilled.

In the following the development of homogenising technology will be described in all details from the beginning until today.

- 1973** Oil Crisis.
Egon Stache, manager of a shipping company for chemicals at Hamburg, looks for new ways to reduce the high costs for energy, caused by the oil crisis.
- 1974** Tests with additives have not been successful. During discussions with experts ES had the idea to use homogenizers, as already used in cosmetic and pharmaceutical industry, also for fuel treatment. His idea is to bring the different hydro carbons to a similar size by homogenisation.
- 1978** After a long period of workshop tests, the first prototype of homogenizer was installed on an ocean going vessel, in the beginning to improve combustion in the auxiliary steam generators on a company owned ship. Fuel quality used on this vessel was 180 cst.
- 1979** After successful tests the first homogenizer was installed on another company owned tanker in front of main engine.
- 1980** After recognizing an improvement of combustion, a second homogenizer was installed and operation was changed to permanent use of HFO 180 cst instead of MDO. Now the first goal was reached in view of fuel costs reduction.
- 1984** The oil market was stabilized. While ES was on board of a company owned vessel during drydocking at Rio, the chief engineer invited him to come on board and have a look on pistons and liners after more than 10.000 hours in heavy fuel operation. It was recognized that due to operation with homogenized fuels the pistons and liners were in such a good condition that spare parts, which already had been bought, could be returned and change of working parts postponed to a later date. An expert from MAK was on board and confirmed. Due to the possibility to reduce costs for maintenance and spare parts, ES decided now to pay more attention to development of the homogenizers again.
- Now the technology "CD92-CI – Combustion Improvement" was born.
- 1986** Prof. Grossmann from the technical university of Berlin got the order to analyse the development of wear and tear of the MAN main engine on a product carrier, which also had been equipped with a homogenizer 1 year ago. The tests resulted to a reduction of wear and tear of 50%. Boll & Kirch carried out measurements of particle sizes and confirmed the reduction of fuel droplets size from \varnothing 60-80 μ to < 10 μ .

- 1987** ES decided now to enter the market and offer and deliver the homogenizers also to other customers.
- 1989** HS, who had his first experiences with homogenizers during his seafaring time, took intensive care of development and analyses.
- 1990** MAN Augsburg contacted ES and informed him that from the year 2000 NOx emissions will have to be reduced and IMO 2000 will come in force. ES had the idea to reach this goal by using, amongst others, a fuel-water-emulsion. Positive effects are already known, but there is still a strong demand for production of an effective and stable fuel-water-emulsion. MAN asked ES to investigate if such stable emulsion can be generated by homogenizers.
- 1991** ES and HS are introducing the production of emulsion to MAN Augsburg. MAN declares that the presented emulsion fulfilled in all respects the requirements for a stable fuel-water-emulsion.
- Shell Brochure "Know Your Fuels":
- Shell explains the conditions for improved combustion of blended fuels:
"The mechanism of the blending process itself is equally important. The components must be completely homogenised, and this is extremely difficult to achieve without suitable efficient blending equipment."
- These conditions are exactly fulfilled by the homogenisers CD92, developed by ES.
- 1993** February 04.
Again the oil prices are increasing, fuels with higher viscosities up to 380 cst are used more and more and the requirements for environmental friendly operation of vessels are becoming stronger. These developments were the reason why ES and HS founded SIT for the purpose to put all efforts only on production, development and sale of the homogenizers.
- First order was received from the company Cellox Paper from Thailand. Units were delivered to Jebesen and Suedzucker.
- MAN ordered a test-homogenizer for operations on their testbed to analyse the reactions of motor and emissions under the use of emulsion.
- SIT named their homogenizer "SIT-CD92" (Conditioning Device 92 - year of patent application).
- 1995** After offering the CD92 units to Evergreen more than 1 year, beginning 1995 SIT got the order to deliver 2 homogenizers free of charge for a 2 years test period.
- Conditions for a successful test were:
1. prolonged lifetime of 5 μ -fine filters up to abt. **3.000 hours**.
 2. significant reduction of oil sludges
 3. prolonged lifetime of pistons, liners and exhaust valves
- In February 1995 SIT installed on the Evergreen vessel "Ever Garland" a unit in front of separators and fine filters, which was the first time at all in the fuel treatment field. The second unit was installed in front of viscosimeter.

ES and HS remained on board during voyage to New York in order to measure the daily oil sludge production. It was possible to reduce the oil sludge production from 600 ltr./day to 100 ltr./day.

The CD92-SR-System (Sludge Reduction System) was born.

Fine filter flush intervals and differential pressure remain unchanged, which was already confirmed as improvement by chief engineer.

1995 August.
After measuring a lifetime of fine filters of meanwhile more than 3.000 hours without affecting the flushing intervals in differential pressure system, SIT got a phone call from Evergreen, who declared the 2 years test as ended after only 6 months. Evergreen paid for the units and at the same time ordered CD92-SR and CD92-CI (Combustion Improvement) systems for all 11 sister vessels out of their GX series.

1996 Evergreen is satisfied with further delivered units as well and confirms an average reduction of oil sludges of about 80%. Now Evergreen asked SIT to develop a system for treatment of the remaining 20% oil sludges.

SIT created the CD92-WOR (Waste-Oil-Regeneration) system.
This system is treating the remaining sludges incl. water, lubeoil and other waste oils in such a way that a product without residues and without addition of expensive diesel can be burned in power plants ashore, incinerators or auxiliary engines.

After successful testing all other 11 GX types from Evergreen were also equipped with WOR-systems.

1997 During a MARPOL inspection the vessel "Ever Good", equipped with CD92-SR, -CI and -WOR systems, was named as "low sludge generator vessel".
SIT-CD92-SR and -WOR systems are officially accepted by Marpol as sludge reduction equipment.

1997 In February the first SIT-fuel-water-emulsion plant (NOx reduction) was installed on a car carrier from owners Leif Hoegh.

The CD92-WIDE-plant (Water-in-Diesel/Fuel-Emulsification) is born, first as semi-automatic plant, later fully automatic.

In the year 2002 the customer confirms utmost satisfaction with plant after years of operation, also with viscosities up to HFO 500 cst.
SIT obtained further orders from Evergreen for delivery to another 11 newbuildings out of the D-series.

At this time Alfa Laval heard about the homogenizers and wrote a letter to Evergreen. Alfa Laval claims that separator cannot fulfill it's function with homogenized fuel and they expect damages to main engine.

Due to these wrong and unjustified statements SIT is afraid to loose orders. However, Evergreen replied that meanwhile more than 2 years experience on their own vessels have proven that Alfa Laval's statements are wrong and instead they were able to reduce sludges and emissions successfully and without any negative influence on main engine operation.

Evergreen also placed orders for delivery of CD92-units to 11 vessels out of their D-series and to further vessels

- 2000** SIT delivers CD92-SR and –CI to NYK.
After 2 years testing by research department NYK declared the tests as successfully completed. The results are:
- significant reduction of oil sludges
 - 1,2 – 3% specific reduction of fuel consumption
 - clean and stress-free operation , even with 500 cst quality and without use of additives.
- NYK Research Department recommends to install homogenizers on all newbuildings.
NYK Research Department analyzes the possibilities of effective separation and filtration.
The results were published in 2004 on the CIMAC congress at Tokyo.

Statement:

“Utmost efficiency of separators will be obtained with homogenizer connected in front of separator.”

This finally proves that CD92 connected in front of separator does not reduce the efficiency of separation, but instead is increasing it.

- 2002** As first manufacturer of separators Westfalia orders CD92 for installation in front of separator.

- 2003** Although the efficiency of the CD92 systems in respect of sludge-, emissions- and fuel costs-reduction has been proven and found worldwide acceptance, SIT was now confronted with serious problems regarding the reliability of the units.
Unacceptable early breakdowns and leakages were leading to more and more claims and a drop of orders.

Reasons for this development:

The mechanical seals used in the plants were latest state of art. However, SIT has tested various types of mechanical seals from reliable makers. All have proven as not suitable for operations in heavy fuel in homogenizers (this also applies for pumps operating in heavy fuels). This led to early and serious leakages (partly after abt. 4-6 weeks of operation) and heavy oil spill in engine rooms. Even the vessels' safety was affected.

All well-known makers of mechanical seals had been contacted and requested to solve the problems. The makers were not much interested . They explained that spare parts orders are their main business, which is the reason why they are not interested to remedy things. Guarantees including possible refund of costs were rejected in general.

Since SIT was not willing to go ahead under such conditions, they decided on short notice to develop a new sealing system. Mechanical seals and ball bearings had been eliminated and the magnetic drive was developed.

Although also here some difficulties with operations in heavy fuels were predicted, SIT succeeded, inspite of all arguments against it, to develop a differential pressure lubrication, patent pending, which made the magnetic drive reliable in such a way that trouble-free and hermetically sealed operations can be granted for at least 2 years.

Since April 2004 all units delivered by SIT are equipped with magnetic drive.
Guarantee claims went back to nearly zero. Customers' satisfaction and confidence could be regained. Actually the units are fulfilling customers' highest requirements with regard to efficiency and reliability.

2004 Type Approval was issued first by American Bureau of Shipping and later by Lloyd's Register of Shipping. This Type Approval was prepared after 1 ½ years of own and independent investigations by Lloyd's Register with regard to efficiency of the units and quality of the homogenized fuels. Amongst others Lloyd's Register also visited a power plant at Madeira, equipped with homogenizers, and took samples of fuel for analysis. On A.I.E. power plant at Madeira all four SIT-systems are installed.

Lloyd's Register confirms in their Type Approval:

As oil fuel treatment processor on ships and offshore installations classed or intended for Classification with Lloyd's Register.

- a) Homogenisation of inhomogeneous and incombustible structures***
- b) Forming non-mineral and non-metallic particles in sizes below 0,05 mm***
- c) Diminishing of re-agglomeration of hydro carbons (asphaltenes) leading to fuel utilization/improvement***
- d) Significant reduction of sludge formation (up to 85%)***
- e) Generation of a long stable water-in-diesel-fuel-emulsion***

With this document finally the official and independent proof is given about the efficiency of SIT-CD92-units and that operations are harmless to main engines, auxiliary engines and oil-fired boilers.

2005 SIT received first orders from Westfalia Netherlands for delivery of stainless steel homogenizers for biofuel treatment, another type of modern fuel treatment system.

2006 SIT delivers CD92 units with serial numbers "2000".

EPILOG

It is my honest wish to express my thanks to those persons who always supported me with their confidence and firm conviction.

Especially I want to say thank you to my son Heino Stache, my good friend Arild F. Erichsen, Mr. Juergen Rischmann, Lloyd's Register surveyor, and his colleague Ms. Ramona Zettelmaier.

The systems, exclusively developed by my son and me, do not mean that research has been finished.

Egon Stache
Hamburg, 22.09.2006