

Teaching syllabus for Classic Engine type L23/30H & L28/32H

The training course consists of 20 modules. The training will be both in the class room and in the work shop each covering chapters in the instruction manual. Teaching method will mainly be theoretical training in the morning and each afternoon the training course will be in the work shop.

1. The mechanical cycle of 4-stroke

This lesson is a detailed description of all strokes in the 4-stroke diesel engine, what happens at each stroke and what effect low load operation will cause the engine and its life time.

After this lesson all participants will have a full understanding of how and why the four stroke engine is working as they are.

2. General engine description

This lesson is a detailed description of the main components of the engine and how these components are built in to the engine as well as the function of these components.



After this lesson the participants will be able to identify all components on the engine, this will be supporting for this training course.



3. Cylinder head -Theoretical

This lesson will give the participant a detailed training in how the cylinder head is build up. We will go in to details regarding maintenance as well as overhaul at the same time participants will be informed about the correct grinding angels. Maximum wear and correct clearance of all moving parts on the cylinder cover. Participants will be instructed in adjustment of valve clearance.

Upon completion of the module the participants must be able to remove and dismantle the cylinder head and be able to overhaul the cylinder cover and get it back to the required standard.

4. Cylinder head-Practical

This lesson will be a practical training in a complete overhaul of cylinder head. The cylinder head will be dismantled completely; all parts will be overhauled according to the instruction manual:

- Measuring of wear in valve guide
- Measuring of wear in valve seat/valves
- Rocker arm bearing wear
- Check of fuel oil injector liner
- Correct grinding of the valve and the seats

There after the cylinder head will be assembled and measured in order to secure that all parts has been assembled correct.

After completion of this module the participants will be fully trained in overhauling of a cylinder head of a L23/30H.

5. Piston, connecting rod and liner

This module will be a theoretical training in the buildup of the piston, con.rod and the liner, where participants will learn all the parts to look for during daily operation and during overhaul of these parts.

Participants will learn about maximum wear in piston ring groove, big- and small- end bore of the connecting rod and about the wear and cause of wear in the cylinder liner.

6. Lubricating oil system.

This module will guide the participants through the complete lubricating oil system, during this tour in the system we will discuss in details, centrifuge, centrifugal filters and by-pass filters. The participants will be instructed in the importance of maintaining the lubricating oil at a high standard in order to protect the engine from wear caused by incorrect treatment of the lubricating oil.



After this module no participant should have any doubts about the consequences caused by incorrect treatment of the lubricating oil.

7. Engine frame, oil pan.

This module is a description of the frame and the oil pan and pipes attached to the frame.

After this module the participants will know in details how the frame is build up and understand the connections to the frame, such as lubricating oil and cooling water. They will also here learn about the main and guide bearing as well as camshaft bearing. We will talk slightly about the gear wheel also but go deeper into this in a later module.

Participant will after this module be able to find the especially pipe connection, they will be able to remove a main bearing and the trust bearing.

8. Crank shaft

This module is a description of the crank shaft and the gear wheel attached to the shaft as well as the vibration damper.

The participants will learn how the complete crank shaft is built up, how the crank shaft is being used as a transportation of lubricating oil. Participants will know how and why deflection measuring is important. They will also know about restrictions in the lub oil bores in the crank shaft.



Upon completion of the module the participants will know how the crank shaft is build up and they will know how to maintain the shaft. The participant will also know about measuring of the deflection of the crank shaft and how to take samples of the vibration damper.

9. Measuring of piston, connecting rod and liner

This module is a practical training in dismantle the piston, connecting rod. Participants will do all the required check, measuring and judgment of the parts as well as filling in the measuring reports. Bearings will be measured and checked for any wear and decide whether the parts can be used again. Cylinder liner and piston must be measured and controlled for any wear and connecting rod will be checked for ovality and cracks in the serration.



Upon completion of this module the participants will be able to do a complete check and overhaul of the piston, connecting rod and the liner and decide whether the parts can be reused or they must be renewed.

10. Operating gear for valves

This module is a theoretical training in the buildup and function of the operating gear.

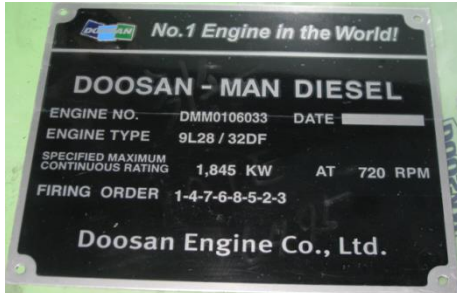


Participants will learn about the roller guides, how to dismantle them, they will learn about the rollers and the bearings and the lubricating oil systems. Participants will learn how to adjust rocker arm clearance the correct way and to the correct clearance.

Upon completion of this module all participants will be able to do a correct and safe adjustment of valve clearance and be able to exchange parts on the roller guide and understand the importance of retighten the housing.

11. Cam shaft and timing

This module is a theoretical training in the cam shaft itself and the correct timing of the cam shaft according to the firing order



The participant will learn how the camshaft is build up according to numbers of cylinders and the way they are lubricated. They will also learn about the firing order and they will learn how to build up the complete camshaft according to the firing order.

Upon completion of this module participants will know how to assemble a complete cam shaft in the right order, they will also know about wear on the cams.

12. Fuel oil system

The module is a theoretical description of the fuel oil system and the equipment in connection with the fuel oil system.

The participant will be introduced to the fuel oils, to pressure and temperature in the system as well maintenance and treatment of the fuel oil. The participants will learn about the fuel equipment, how the equipment is working and the correct adjustment of the same.

On completion of this module the participants will understand the importance of maintaining and treat the fuel oil and the fuel oil equipment correct.

13. Check of fuel injection valve

This module is a practical module where fuel valves will be tested.

The participants will learn how to dismantle the fuel valve and judge all individual parts, they will assemble the valves test them to the right opening pressure.

14. Cooling water system

This module is a theoretical description of the cooling water system.

The participants will be introduced to the cooling water system the quality and the treatment of the cooling water in order to prevent rust, corrosion or any other harm to the engine or its equipment.

Upon completion of the module the participants will know that not maintained cooling water is harmful to the engine parts.

15. Compressed air system

This module is a description of the starting air system and the safety equipment attached to the system



The participants will be introduced to a detailed presentation of the starting air system and the starting procedure and the sequences during the start of the engine. Furthermore the participants will be introduced to the lambda controller system as well as the mechanical over speed system. Also emergency start will be discussed

Upon completion of the module participants will be able to understand how the system is build up and the function of the system and thereby be able to trouble shoot on the starting air system.

16. Safety, control and monitoring

This module is a description of the safety, control and monitoring system and adjustment of the same.

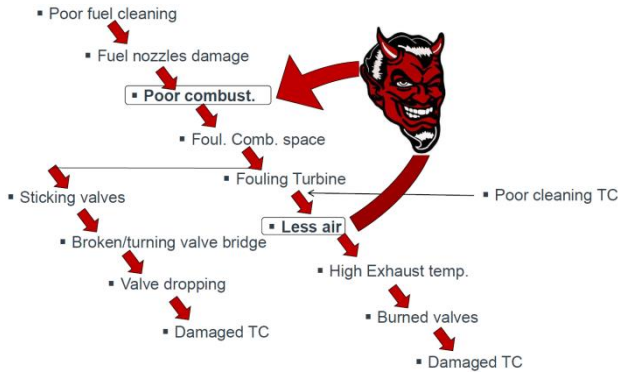
The participants will be introduced to the entire system how to adjust and check that the controlling is always up to date and that fuel oil regulating is always working perfect. The participants will in detail be told how to adjust and check if pressostate/thermostats are working properly. Also adjustment of Lambda controller and fuel index will be a part of this lesson. The mechanical over speed device, the working principle and adjustment will be discussed

Upon completion of this module participants will be able to adjust the entire safety, control and monitoring system.

17. Remove valve seat – practical

This module is a practical module where participants will try to remove the valve seat from the cylinder head. The valve seat and the groove will be inspected as well as cooling water holes in the grooves.

18. Performance



This module will be a theoretical description/discussion of performance on the 4-stroke engines

The participants will be introduced to the maintenance of the engines and be a part of a discussion about correct operation and maintenance of the four stroke engines. The participants will learn to start up the correct way after stand still, they will learn about consequences by

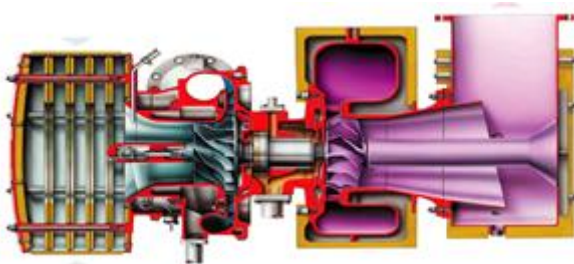
running the engine on low load, cold fuel oil, and bad fuel/lub oil as well as to cold or fast running cooling water etc.

It is the intension with this module that the participants should be aware of poor maintenance will lead to shorter overhaul intervals.

19. Turbocharger

This is a theoretical description of the turbocharger build up and how it is working.

Participants will learn about the turbocharger parts and about the nozzle ring for what reason it is there. Furthermore the participants will learn how to calculate maximum wear on the nozzle ring. Water washing and dry cleaning will be discussed.



Upon completion of the lesson participants will be more familiar with the turbocharger; the way it is working and the importance of understand the necessary maintenance of the turbo charger.

20. Turbocharger – practical

This lesson will be a practical lesson where the turbo charger will be dismantled, parts will be discussed, nozzle ring will be measured and the diffuser ring and compressor wheel will be checked, furthermore the clearances will be checked.