Increasing interest from ship operators in a more flexible way of adjusting and optimising the cylinder oil consumption of two-stroke engines motivated Hans Jensen Lubricators to develop its HJ Mechtronic system. Lubricant consumption is reduced, as the Danish specialist’s original Hans Jensen lubricator is reportedly the only system able to lubricate as a function of engine speed.

The HJ Mechtronic system comprises a traditional Hans Jensen mechanical lubricator box and an oil flow regulator unit (built onto the box pump unit) with a solenoid valve for each lubrication point. An external electronic feed rate control system is used to calculate the necessary oil flow.

No modification of the main engine itself is required, and the system can be installed without disturbing the ship’s routine operations. The new control system features a number of local flow controllers (normally one for every two lubricators), a main flow controller with computer interface, alarm functions and pick-ups.

Built-in redundancy in all electronic key functions is provided for safety in the Mechtronic flow control system. The cylinder oil flow control system makes it possible to control and regulate the feed rate in all the normally required operating modes, such as rpm, mean effective pressure or kW/bhp modes, as well as for centralised adjustment of the feed rate for the complete engine.

When running in piston rings and liners or individual cylinder units, the running-in feed rate settings must be implemented by adjusting the pump stroke length on the appropriate lubricator box. The purpose of the solenoid valves arranged on the flow regulator unit for each lubricator point is to activate or de-activate the oil flow to those points.

When activated, the oil from the pump outlet is returned to the lubricator box, bypassing the corresponding lubrication point. The signal for activation or de-activation of the solenoid valves is delivered from the Mechtronic control system according to the chosen operating mode.

The signals enabling the control system to calculate the cylinder oil feed rate for the given mode are the engine load index, which is taken from a transmitter fitted on the fuel regulating shaft, and the engine rpm, which is taken from a rpm pick-up fitted on the common driveshaft for the lubricators. All other required parameters for feed rate calculations are programmed into the cylinder oil flow controllers.

Control of the feed rate in different operating modes is effected in the following ways:

- **in rpm mode**: there will be oil flow to all cylinder lubrication points at all loads
- **in mep mode, kW/bhp mode or reduced load mode**: one or more of the solenoid valves will be activated, resulting in the corresponding lubrication points being bypassed; activation of the valves takes place in a rotating order for each engine revolution.

In the event of a power or electronic failure, the oil flow is activated by a backup set of solenoid valves.
A synthetic sterntube oil developed by Kluber Lubrication for lubricating the bushes and shaft seals of fixed pitch and CP propeller systems is offered as a reliable environment-friendly alternative to conventional mineral oils. Kluberbio RM 2-150 is non-toxic to marine organisms (according to OECD 201, 202 and 203 tests) and has a biodegradability of at least 60 per cent (OECD 301 F test).

Viscosity-temperature behaviour is particularly good, the German specialist reports, facilitating smooth start-up of propellers, even at very low temperatures. A thicker lubricating film ensures that good wear protection forms at higher temperatures; additionally, the new oil promises a long service life thanks to its stability towards oxidation, hydrolysis and temperatures.

Kluberbio RM 2-150 is miscible with mineral oil-based sterntube systems, easing changeovers to the new product.

Synthetic lubricants have emerged as genuine alternatives to mineral oils, which will give way to synthetic products for more sophisticated applications in the medium term, Kluber suggests. The new generation of speciality lubricants rewards operators with extended maintenance intervals and reduced lubricant quantities for a given duty.

Ester oils or low-viscous polyethylene glycols may be considered as readily-biodegradable oil candidates, Kluber reports, but such oils must be chosen with great care as they may affect the characteristics of the elastomer seals used in systems. Damage or premature seal failure would be the consequence.

Kluber has also introduced an eco-compatible alternative to mineral oil for lubricating the gearing of thrusters and rudder-propellers. The biodegradable Kluberbio EG 2-150 is claimed to offer the reliability required to handle the demanding duty as well as compatibility with the elastomer material used in many seals.

The product is also said to demonstrate high scuffing resistance and a superior service life and viscosity-temperature behaviour to conventional mineral oil-based gear oils.

In developing both synthetic sterntube and thruster gear oils, Kluber Lubrication co-operated with affiliated companies SIMRIT and Merkel Freudenberg Fluidtechnik, which are leading suppliers of shaft seals and profiled seals to the marine industry. The lubricants passed dynamic endurance tests on a rig fitted with original seals.

A special test bay enables Kluber to simulate the high stresses that lubricants are subjected to in the marine and offshore industries, such as strong variations in temperature, high surface pressure, micro-movement and contact with salty air and sea water. The components are loaded to failure on the rigs, the causes examined and the results applied in developing optimised lubricants.

Eco-friendly oil for sterntube lubrication

Failure in the Mechtronic control system the lubricators will all be in normal rpm mode, resulting in all the solenoid valves in the flow regulator being de-activated.

Essentially, says Hans Jensen Lubricators, the HJ Mechtronic system is a combination of its original reliable mechanical lubricator box and a flow regulator controlled by a simple electronic system. Electronic control of mechanical lubrication facilitates a variable cylinder oil quantity control and centralised oil feed rate adjustment as well as other normal required modes of rate regulation.

Centralised feed rates can be set for each cylinder or for all cylinders, underwriting operating flexibility irrespective of the engine design or size. A short payback time is promised as savings in lube oil consumption are secured immediately, the designer reports.

HJ Mechtronic is one of three types of cylinder lubrication pump offered by Hans Jensen Lubricators. The company’s conventional HJ mechanical lubricator pump has been refined over 100 years, including the development of various load-dependent regulation systems for optimised lube oil consumption and enhanced user-friendliness during part-load operation.

The electronically-controlled HJ Lubtronic system is described as ideal for engines without mechanical drives and wherever flexible operation is desirable. An advanced hydraulic solution makes possible stepless adjustment of both the lube oil quantity and the timing, resulting in large reductions in lubricant consumption.

Fresh cylinder oil is delivered at every piston stroke via a patented variable stroke length adjustment to ensure safe engine operation even in super-slow steaming mode.

Hans Jensen also offers its Swirl Injection Principle (SIP) valve, designed to spray cylinder oil on the upper liner wall where most wear takes place. A small amount of pressurised oil is injected into the cylinder at every piston stroke just before the piston passes the injection level, the precise distribution significantly reducing the amount of lube oil required: 25-70 per cent savings in consumption are claimed in lubricating larger bore two-stroke engines, fostering payback times as little as six months.

SIP valves are said to be compatible with all current two-stroke engine designs and bore sizes, and applicable for new engines and retrofits (using the existing holes of the cylinder liner and with only minor machining.) The installation time normally varies between one and five days, depending on the engine type.