



Sending a signal

by Barry Sullivan, *Senior Technical Service Engineer, Castrol*

Condition monitoring has always underpinned reliability and uptime in shipping. Oil analysis is the industry's trusted way to track the condition of the assets that matter most – the ones that earn money or cause real pain when they fail. Real-time, continuous oil monitoring – also extending beyond the main engine – becomes essential the farther and longer a vessel operates away from shore.

What counts as business-critical differs by owner and vessel type. For a dredging operator such as CEMEX, it typically means the main engines and the dredging hydraulic power units. For a ferry operator such as Stena Line, it is the main engines themselves. For an LNG carrier, it can be the cargo compressors.

Today and into the future, used oil analysis (UOA) remains the industry's default tool. A sample is taken on board, sent to a shore laboratory, and results are back within days or weeks. For many applications, this approach remains effective. The context, however, is changing. On average, vessels are getting older with a greater risk of fault. Due to regulations, they are starting to operate on new fuels that introduce greater complexity in the engine room. And crews are balancing varying roles, grappling with increased reporting and documentation.

In zones such as the engine room, these multiplying pressures converge. The low threshold for failure in the engine room means that we can't tolerate things going wrong. **According to the Swedish Club** the average claim cost for lubricant-related failures runs to £430,000, and an internal analysis from Everllence suggests around 70% of such failures are detectable in the oil itself.

This lag between sampling, knowing the result, and providing the fix is a limitation increasingly exposed by that shift. Real-time monitoring is built to close it, covering whichever of those assets a given owner cannot afford to lose. The engine is one entry point into that story, not its outer limit.

Under pressure

The first increasing pressure is the economics of asset life. Newbuild orders continue, but high prices and long lead times mean owners must increasingly extend the working lives of existing tonnage alongside any new acquisitions rather than simply replacing like-for-like.

The trend is striking across short-sea shipping, reports Kuehne+Nagel, with some segments of gearless coasters in the 2,600-4,500-deadweight range now averaging 26.3 years. Demolitions are so rare that they occur roughly once per sector every two years. And the deep-sea picture tells a similar story, with the global bulk carrier fleet's average age climbing toward 13 years.

The second pressure relates to crew time. Today's seafarers manage more – sophisticated systems, documentation, and regulatory requirements – than previous generations. Anything that lessens manual

burden without compromising oversight is worth serious consideration. The practical value of that is well illustrated by CEMEX UK's experience aboard one of its dredger vessels, where Castrol SmartMonitor detected a water ingress event early enough to limit repair costs to £12,600, against an estimated £150,000 in potential engine damage. The system did the watching; the crew could act on a clear signal rather than needing to search for one.

The third pressure is the growing use of alternative fuels. Methanol, LNG, and biofuel blends each introduce their own contamination and lubrication challenges across the fleet. As a result, the engine room is getting harder to manage, and the consequences of getting it wrong – such as deposits, corrosion, and lubricant breakdown – can develop long before a periodic sample would catch them. As more vessels enter service on these fuels, the case for continuously monitoring lubricant condition becomes more compelling.

A widening gap between data and insight

UOA remains the industry's default tool for tracking equipment health and, in many applications, is sufficiently effective. But the process – a sample taken on board,

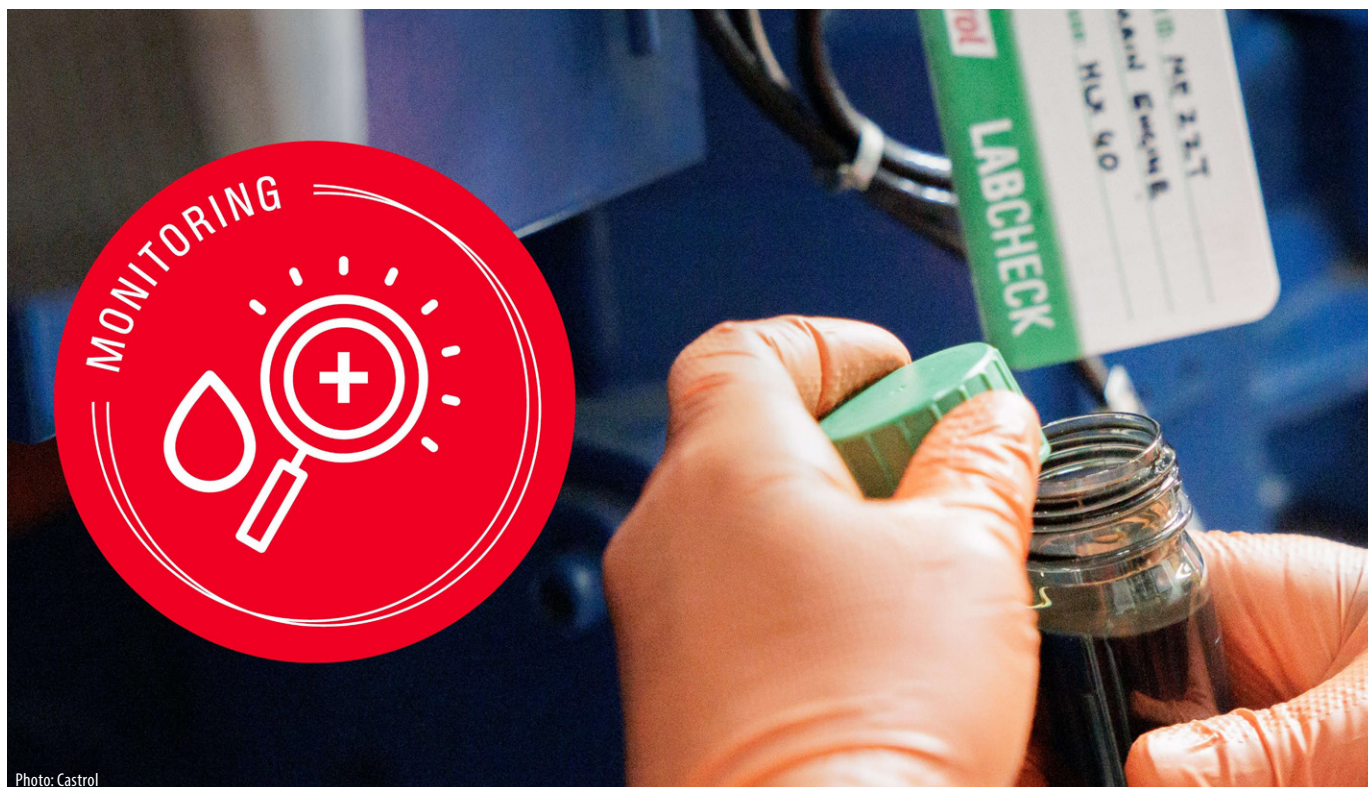


Photo: Castrol

shipped to a lab ashore, results returned days or weeks later – comes with logistical constraints that are increasingly difficult to work around. The longer a vessel is at sea, the further from port, and the leaner the crew, the harder it becomes to act on information that arrives weeks after the sample is taken.

That gap matters more the longer a vessel is at sea. A short-sea operator calling at port every few days can act on a delayed result relatively quickly. A deep-sea vessel several weeks into an ocean crossing cannot. If a UOA sample takes up to six weeks to come back, which it still can, the issue it was meant to catch may already have escalated, or the voyage that prompted the test may be over before the result arrives.

Stena Line's experience shows what continuous monitoring can catch that periodic sampling could miss. Castrol SmartMonitor, introduced across three of the company's ferries on the Irish Sea, picked up two separate water ingress incidents and a leak discovered during a cylinder head removal – in each case in time for the crew to act before the damage spread. A third issue, a leaking purifier allowing water back into the sump, was caught and resolved the same way. "The ability to monitor oil quality in real time has been a game-changer for us," shares Michael Thomson, Vessel Superintendent at Stena Line. On a ferry making daily crossings, that might mean a faster turnaround. On a deep-sea vessel mid-ocean, with higher asset values

and no nearby port to divert to, the same early warning can be the difference between a planned repair and a major failure.

From data to decision – in minutes rather than weeks

This is not an either/or debate. UOA continues to do a job that real-time tools are not designed to replace. What digital condition monitoring adds is visibility in the gaps between samples, the ability to catch a problem developing before it needs a sample at all, and the efficiency gains that come from engineers spending less time on manual checks and more time acting on clear, continuous data.

That distinction is central to how a contamination sensor module works. Sensor data is tracked continuously, allowing the system to separate a gradual change the crew has time to plan around from a sudden one that needs immediate attention. Sean Chambers, Head of Research Ship Engineering at NOC, describes how the system responds to different fault profiles: "It provides trend data to determine whether we're observing a small incremental change, which gives us time to react. If we

see a sudden change, the ship's engineer and captain are notified immediately."

The ecosystem is starting to catch up

Confidence in continuous monitoring is growing beyond the owners already using it. Insurance pricing does not yet reflect lower risk profiles, nor do management fee models directly reward early fault detection. But both are beginning to come into focus as the next frontier. As those structures evolve, the business case for real-time monitoring will only strengthen.

For deep-sea owners weighing up where to start, the direction of travel is clear. The engine track record set out above is a proof point, not the limit of the story; the same case applies to whichever asset a given owner cannot afford to lose.

Real-time monitoring does not replace the judgment of experienced crew or the long-standing value of UOA. It gives both a faster, clearer signal to act on and builds the kind of documented, continuous performance record that will matter more as insurers and managers begin to reward it. The longer and further from shore a vessel travels, the more that signal is worth. ■



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