

Unveiling a new condition-based maintenance approach

Lloyd's Register's new MCBM programme marks a shift from a time to a risk-based strategy for implementing condition-based maintenance

Lloyd's Register of Shipping (LR) is preparing to launch its machinery condition based maintenance (MCBM) programme early in 2012. The initiative will provide a way to align class survey procedures, which are calendar-based, with machinery items which are maintained according to their individual requirements. These individual requirements, in turn, are primarily driven by their condition.

LR has had condition monitoring notations for many years but these have simply allowed existing chief engineer-approved schemes, where the planned maintenance system is subject to approval under the machinery planned maintenance scheme (MPMS), to credit items based upon condition monitoring (CM) activities (the MCM descriptive note). There remained a number of items which the chief engineer could not credit as these were required to be verified by an exclusive surveyor.

"It has become clear to all classification societies that companies seeking to maintain their vessels in the way suggested by generally held 'best practice' methods will find that calendar-based survey processes are not well aligned," points out Danny Shorten, product manager maintenance management for LR. "This leads to the potential for issues for the operator.

"Our new MCBM programme recognises best practice methods and allows all master list machinery items to be maintained and credited for survey in this way. MCBM is based upon the simple strategy that if the predominant failure risks are known and the symptoms of these failures can be suitably assessed using non-invasive means, then condition knowledge can drive the maintenance planning function.

"Equally if a machine is known to fail in a way that generates symptoms that cannot be reliably monitored, then it must be maintained according to the minimum standard set by the manufacturers. Both are equally valid and can coexist. This also provides a driver for CM research and development to resolve. Condition



The MCBM package is designed to align classification survey procedures with emerging best practice in maintenance management

based maintenance (CBM) means that, where possible, maintenance is carried out when condition dictates."

LR will be working with both shipowners and equipment suppliers in the implementation of the MCBM package. Although the owner is the central figure for class societies, prospective service suppliers and CM tool vendors will be required to demonstrate competence. Service suppliers will be encouraged to become approved under the service supplier approval procedures and CM equipment may also be subject to assessment via the condition monitoring product assessment specification.

It is important that the body of competence is intact. CBM systems may comprise a number of devices which extend beyond company boundaries and, as one would expect with any machinery or electro-technical system, all the components of the system must be fit for purpose and be systemically sound.

"LR currently has 92 LNG ships from 23 companies participating in MPMS and we would expect that a good number of these will find MCBM attractive," continues

Mr Shorten. “This, in turn, will lead to a more general takeup in the industry as the benefits become accepted and modern maintenance processes become the norm.

“LR is also providing consultancy support for those companies who wish to be assisted in identifying the best course of action to manage the necessary cultural changes that are required when making the shift from time to risk-based strategies. In principle LNG carriers will be treated the same as other ship types under MCBM. Although LNG carriers may exhibit a different risk profile, which leads to a shift in maintenance emphasis, in essence the processes are the same for all vessels.”

While it will be possible to enrol a single ship in the MCBM programme, owners are likely to embrace the scheme on a multiple vessel basis as the core attribute of MCBM is the maintenance management system, not the ship (although the ship remains the central class asset).

“As a general observation it will be difficult, in the first instance, to quantify how the implementation of MCBM will lead to improvements in safety, reliability and scheduling optimisation as well as reductions in maintenance costs,” states Mr Shorten. “One simple reason is that, because there has to be a cultural change from the time-based to risk-based methodologies, it is difficult to accurately compare costs.

“However, it is hard to argue against the following propositions:

- Performing unnecessary tasks adds unnecessary cost.
- Recognising reliability-impairing conditions in time to take action will incur a lower cost burden and will reduce any unnecessary spend on the avoidance of failures.
- Demonstrating ongoing reliability means less intervention from regulators and associated stakeholders.



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- Skilling engineers to manage reliability instead of machines focuses attention on the precursors to unreliability, not failing components.

- Managing maintenance as a profit centre focuses further upon efficiency and performance.”

The introduction of increasingly sophisticated machinery and systems on LNG carriers in recent years means that specialist skills are becoming part of the system support model offered by original equipment manufacturers (OEMs). This, in turn, helps OEMs build in certain CM obligations that they are asking the clients to adhere to for warranty.

Another subtle trend that has been emerging in recent years also needs to be considered. That is the tendency to opt for the replacement of certain components in maintainable items rather than their servicing. Amongst other things, this development has the effect of pushing the engineer further away from the engineroom environment and thus further away from a position where human perception senses that things are not well.

“There has been a fair criticism that class societies have not made sufficient moves to seriously align classification survey procedures with emerging best practice in maintenance management,” reports Mr Shorten. “Also, in fairness, this somewhat conservative approach by the societies has not been without justification as the majority of the activity in the CM area had been from the position of the tool and service suppliers.

“It is only now that the major OEMs are recognising that through-life support can be enhanced by CM and that the shared benefit is one that endures. This is having the effect that CM is recognised as being more acceptable.

“As the significance of supply chain management is now revealing gaps between certain links in that chain, there is also a move to ensure that standards are maintained in a linear as well as a top-down approach. Similarly shipowners engaging with third party charterers are also looking to build relationships with companies who have a similar ethos to their own to ensure that the quality assurance (QA) system extends to parts of their business which interact with their clients but which they do not have direct managerial control.”

Danny Shorten concludes, “Our MCBM programme is a two-part enabler in that it allows companies already on the path to excellence to become more easily aligned and then, via consultancy support, enables those companies who aspire to this to develop meaningful and achievable optimisation plans to allow them to meet the challenge in an evolutionary and cost-controlled manner.” *LNG*