The Critical Plant Manager

'We understand your need to effectively manage your assets'

JAHCon
Physical Asset Management Pty. Ltd.

Newsletter

September 2009

A newsletter from JAHCon Physical Asset Management Pty. Ltd. to keep our current and potential clients informed of our ongoing activities and to raise awareness of how JAHCon may be able to help your organisation meet its Asset Management needs.

This newsletter also provides a forum for sharing Asset Management ideas and experiences.

Projects

Despite the many fine CMMS and Document Management Systems (DMS) available today it is common to see large numbers of ad-hoc database's and home-brewed data repositories created by well meaning individuals.

These alternative data storage systems usually make sense to the individuals at the time, especially when the official systems are slow or poorly implemented but simply serve to undermine the effectiveness of the overall system. These alternatives serve to delay any necessary upgrading of the present system by taking away the pressure for change.

The promise of modern CMMS and DMS is to provide integrated, wide area access to data storage and handling and this requires that everyone works with a common package.

If your organisation has significant numbers of unofficial database's and filing systems it may be time to revisit the project that implemented the CMMS and or DMS.

Precision Maintenance

Achieving high standards in maintenance work quality can significantly increase the achievable reliability of components in a given operating environment. Drive alignment, lubricant cleanliness, design integrity and adequacy, balance, etc. can all contribute to achieving the inherent Reliability of equipment. This helps reduce the likelihood of in-service failures. A willingness to accept lower maintenance work standards (often in pursuit of getting the job finished quickly) can increases the likelihood of in-service failures, especially for precision sensitive components.

An important consideration therefore is how far should we take this 'pursuit of perfection' before we get to a point of diminishing returns. In practice, the time allocated to performing a task is broadly set by expectations based on previous experience, pressure from production or other stakeholders etc. Maintenance standards (where they exist) provide quantitative measures of the level of quality to be achieved such as alignment tolerances, lubricant quality standards etc. and the effectiveness and efficiency of the maintenance work performed determines the time required to achieve these standards. Practical considerations of finishing quickly, limited access, limited resources and skills and any limitations of equipment and tools all reduce the likelihood of achieving the desired maintenance quality standard.

It is important to appreciate that some components of a machine are likely to be more precision sensitive than others. The ability to detect these high precision-sensitive components helps prevent over engineering less sensitive components and wasting money and time.

Techniques such as NDT and Condition Monitoring play an important role in 'certifying' the needed level of design and assembly precision has been achieved and provides a high quality baseline for 'through-life monitoring'. High precision requires appropriate work procedures, trained and experienced staff and well designed and maintained equipment.

Training News

JAHCon has recently purchased a Vibration Training Bench to provide support for a number of our training courses. Initially at least, the bench will be used to provide 'clean' example time waveforms and spectral data for training purposes free of the inevitable 'noise' from other influences common to data from real examples. Use of the bench will allow the course to demonstrate the time and spectral signatures of specific defects in isolation and to better demonstrate their characteristics in a training setting.

This will make it easier to introduce participants new to Vibration Monitoring, to various defect signatures and link these signatures to their underlying causes. As the different courses progress, more complex time waveforms and spectra can be introduced representative of more realistic examples from industry. These basic signatures can be combined to demonstrate the signatures of combinations of defects, allowing participants to become familiar with the fundamentals before being 'swamped' by data overload.

The ability to demonstrate bearing defects, gear defects, misalignment, imbalance, as well as quantify the influence of different coupling types, 'loose foot' etc. will allow course participants to learn the fundamentals in a structured way and, when ready, advance to more complex examples.

Human Error in Maintenance

It is a characteristic of many maintenance plans used in industry that they are conceived and drafted as if they were expected to be 100% effective every time they were applied. Even when the potential for things going wrong has been considered, it is usually in terms of spare parts availability, equipment access, the equipment being in better or worse condition than anticipated etc. Rarely do we find specific mention in a maintenance plan of the likelihood and consequences (i.e. Risk) of human error having an undesirable impact on the effectiveness of our maintenance plan.

"*People are the only responsible agents in a system and their errors assume an importance, commensurate with their responsibilities*" (API 770). Procedures, permits, work instructions etc. are all designed to reduce the impact of human error on critical functions in the organisation. Equipment and systems design can increase or decrease the likelihood and/or consequences of human error and should form a critical part of any project design.

A large body of research is available (too much to cover here) that assesses the impact of human error on industrial application, especially as it pertains to safety program effectiveness. Much of this research provides insight into what types of errors are made, how errors occur, what can be done to minimise or eliminate them and how do we identify and monitor the occurrence of human errors (given that most that don't end in catastrophe will probably be covered up). I will develop this topic further in future newsletters.

The Asset Management Cycle - 'Identifying the need'

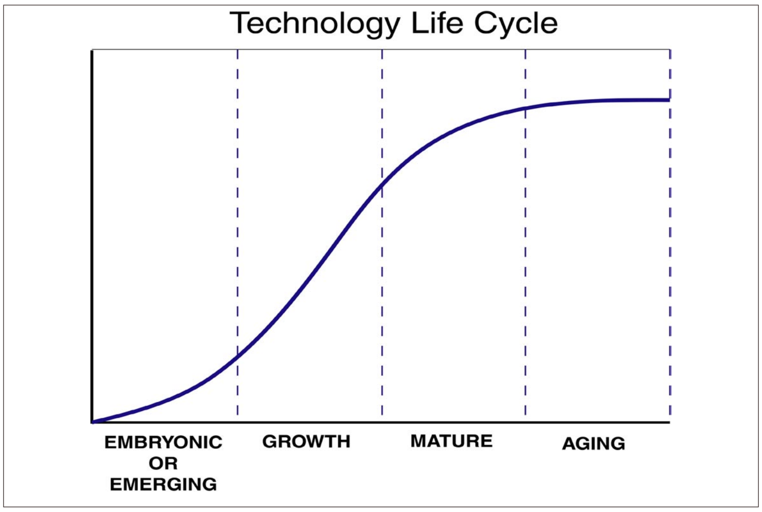
Our June '09 newsletter started a discussion on 'Identifying the need' in the Asset Management (AM) cycle. It is critical to get this stage of the AM cycle 'right' as it forms the foundation of the rest of the life cycle and any errors are difficult or expensive to rectify.

One useful tool that can support the 'Identification of need' process is 'Technical Limits Analysis' (TLA) which can include both economic and non-economic criteria. The purpose of TLA is to develop a "... quantitative measure of the value of undertaking technology development..." ("*Developing Economic and Non-Economic Models - Incentives to Select Among Technical Alternatives". Donald M. Merino. The Engineering Economist, Vol. 34, Number 4, Summer 1989*).

TLA is a process or methodology which tries to determine the remaining potential for improvement of an existing product or technology. Most typical products will reach a point in their development where the 'easy' improvements have been realised and further improvement is achievable only at an ever increasing cost.

Once product development reaches the point where continued investment in development is no longer offset by additional earnings, the product has reached its 'end of development life' and a new or significantly redesigned product must be substituted to return to the high yields previously generated by the current product.

The level of analysis involved in TLA can vary widely depending on the complexity of the product and its relationship with the market in which it is sold. TLA is commonly represented by variations of the so called 'S-curve' which is the relationship between effort (investment) and reward (improvement/return/profit). The shape of this curve for real data sets can vary widely but can be represented by the four stages shown in the accompanying figure.



The stages of the life cycle are identified as 'Emerging, Growth, Mature and Aging'. The underlying concept is to try to identify that point in the products life cycle where the return starts to decrease for incremental investments. This point identifies when new products must be developed if the relationship between investment and return is to be maintained or improved. The longer the new investment takes to reach the 'Emerging-Growth' stage the earlier the 'Identification of need' must be.

TLA therefore can be a useful tool in the 'Identifying the need' stage of the AM cycle and provides a means of making judgements between competing options. In addition, TLA can help identify the point in the product life cycle at which new investment should be initiated and when the existing product should be retired and the new product rolled out.

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