

Proposal of Maintenance Engineering to ISEM Scope

While ensuring equipment safety and maintaining our beautiful natural environment, it is imperative for mankind to promote the improvement of effective maintenance. From this perspective, organizing maintenance into a structured system as a field of study and guaranteeing human beings a comfortable lifestyle while living in harmony with the environment requires commitment from multiple disciplines. However, although there are many who stress environmental preservation, very little attention is paid to the development and organization of maintenance technology.

The reason for this may be because maintenance is a complicated task and building a hierarchical, structured system is not always possible. Also, it is common knowledge that there are no rules within maintenance activities that allow a systematic treatment.

When trying to organize maintenance into a systematic science, we see that rather than a natural science, maintenance is very much similar to linguistics. This is because the generation of sentences and groups of text is extremely similar to the way maintenance planning is executed. Just as linguistics has been structured into a system, it should also be possible for maintenance to be organized. And, while establishing “maintenology,” we can also help the Earth’s environment.

From such a standpoint, physics, mechanics, and electronics are some of many fields of study that contribute to and support maintenance and define a system-based approach to the study of maintenance engineering. A system is made of component parts and the complex relationship between the “parts” and the “entire system”. In order to predict the future behavior of the system with time we must first figure out what kinds of studies are needed.

Many present studies have been devoted to the “parts” whereas Maintenance is a study related to the “entire system” behavior. ISEM’s aim is to research the interaction of different mechanical phenomena with research objectives that are focused on the “parts.” It is also seen that new research related to the “parts” is continuing to diminish. Although such research will always be needed, if we consider the expansion of studies to be an essential part of such study, it is important to pursue problems of the “entire system” based on the research achievements about the “parts.”

In light of this, based on abnormal climate caused by global warming and the finite life of fossil fuels, it is important to recognize nuclear energy as an alternative to guarantee the welfare of globe and mankind. But there is a presupposition in this assertion: as a safe and stable energy source is made a reality by today’s nuclear power plants, maintenance technology should be established as a field of study for ensuring

their safe operation. To do this, traditional values and views should be cast out, new ideas embraced, and new research topics should be considered.

Condition monitoring technology is an example of an effective tool for maintenance activities. Noninvasive detection of abnormal conditions inside machines is a type of condition monitoring technology. Orthodox techniques, detection based on vibration, temperature measurement, and oil analysis are main-stream for rotating equipment and may detect problems in rotary conditions. Recent research has shown that proposed technologies are by far more precise and reliable than those that already exist. This is called speed electromotive force, which uses electromagnetic phenomenon. Because the application of such technology is limitless, we may call this “electromagnetic maintenology.”

Thus, we would like to suggest that ISEM include “electromagnetic maintenology” in its agenda. Presently, there are no international conferences that takes up electromagnetic maintenology and although electromagnetic researchers are usually interested in the “parts,” they are not interested in the efficiency of the “entire system.” It is known that detecting eddy currents that are generated in rotating bodies within an artificially applied electrostatic field is extremely effective in detecting problems before failures occur. Such techniques may be applied to impellers, rotation axis’, roller bearings, air blowers, generators, etc. Countless numbers of these machines exist in the world. In the case of nuclear power plants, being able to use machines until it is on the brink of breakdown largely affects flexibility in a plant’s shutdown intervals. However, this is not limited only to nuclear power.

Being allowed to take on new challenges would give ISEM a way to develop even further. The challenge to move from simplified experiments done in laboratories to complexities encountered in real world problems requiring new developments for the expansion of parts to an entire system is not limited to electromagnetic maintenance. Such challenges are shared by other research themes as well. From this view point, wouldn’t it be favorable for ISEM to adopt this broader view of a system in its state-of-the-art research topics?

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March 6, 2007