World Trends in Maintenance Engineering

A three day conference
DATE: 18-20 August 1997
VENUE: CSIR Conference Centre

Guest speakers:

Nicholas A.J. Hastings
Mount Isa Mines Professor of Maintenance Engineering
Queensland University of Technology

Harry H. Martin
Industrial Engineering and Management Science
Eindhoven University of Technology

Christo van der Walt
Engineering Dynamics (Pty) Ltd

Alan Grodner
Past President of the South African Institute of Tribology

Arranged by:
Jasper L. Coetzee
Department of Mechanical and Aeronautical Engineering
University of Pretoria

Keynote speaker: Raymond Owen
President of the Southern African Maintenance Association

SAMA
Southern African Maintenance Association

IFRIM
International Foundation for Research in Maintenance

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WHY YOU SHOULD ATTEND

South Africa has been isolated for many years. This is as true for maintenance as for any other discipline. Although individual maintenance engineers had the opportunity to travel abroad to various industrial organisations, this did not happen in an organised way. We now have the opportunity to again participate in the newest developments that are taking place concerning the maintenance discipline.

This three day conference will ensure that you are updated in all the main areas of Maintenance Engineering. These include areas such as:

- Total Productive Maintenance
- Maintenance Control
- Maintenance Plan Development
- Condition Monitoring
- Tribology
- Maintenance Information Systems
- Failure Analysis
- Reliability Centred Maintenance

You will be able to set new goals and benchmarks and optimise maintenance effectiveness using the information gained. The two international speakers are both members of the **International Foundation for Research in Maintenance (IFRIM)**, an organisation with a membership consisting of leading maintenance researchers from right over the world.

ABOUT THE SPEAKERS

Dr. Nicholas A.J. Hastings Ph.D., M.A., C.Eng., FIEAust, MIMechE. is Mount Isa Mines Professor of Maintenance Engineering at Queensland University of Technology, Brisbane, Australia. Dr Hastings graduated in mechanical engineering from the University of Cambridge in 1961 and subsequently obtained his Ph.D. in engineering production from the University of Birmingham. He worked for 10 years in the Royal Electrical and Mechanical Engineers in maintenance and logistics roles in the United Kingdom, Germany and Hong Kong. Subsequently he has been involved in education, research and consultancy in maintenance, asset and manufacturing management in Australia and other countries. His interests lie primarily in the development and practical implementation of techniques which improve business profitability in maintenance and related areas.

Dr. Hastings has contributed a number of key developments in maintenance engineering management. In particular, he pioneered the repair limit replacement method, a widely accepted technique for the economic replacement of long life equipment. He has also developed improvements to Weibull Analysis, which result in more accurate distribution fitting and better estimates of reliability. He has published research papers on these topics in leading research journals, as well as several books on quantitative management techniques.

Dr. Hastings has also been active as a software designer and developer, and is the author of several PC based software packages widely used in maintenance engineering and management. He is active as a consultant and short course presenter, and has presented short courses for industry in the United Kingdom, Canada, Australia and Singapore. In his position as professor of maintenance engineering at Queensland University of Technology, he is heavily involved with maintenance engineering and management in such industries as mining, oil production and refining, chemicals, transportation and manufacturing. He is also a member of the board of advisors of IFRIM.

Dr. Harry H. Martin (born in 1961) started studying Chemical engineering at the Twente University of Technology. In 1980 he switched to the Eindhoven University of Technology to study Industrial Engineering and Management Science. He received his M.Sc. in 1986 for his research in maintenance management information systems.

In the middle 80's dr. Martin participated in a joint project of the Eindhoven University of Technology and Philips with the objective to introduce the principles of the development of equipment maintenance plans at the Philips television tube factory in Aachen, Germany. He then joined the "Directoraat Materieel Koninklijke Landmacht" (the main military supply organisation of the Dutch Army). He was then responsible for the development of several information systems in the maintenance and logistics fields.

Dr. Martin joined the faculty of Industrial Engineering and Management Science of the Eindhoven University of Technology as assistant professor in 1992. His interests lie mainly in the area of the development, evaluation and application of maintenance information systems. He is Honorary General Secretary and Treasurer of IFRIM.

Christo van der Walt obtained the degree B.Eng. in mechanical engineering and the M.Eng. in vibration technology from the University of Pretoria. His first exposure in vibration was with modal analysis, but he soon realised that a more important place to apply his knowledge and expertise lies in industry. This led to him being actively involved in the field of vibration monitoring over the last 8 years.

He conducts regular training courses, with an unique interactive course structure, in condition monitoring technology. He has also presented a number of papers at leading local maintenance seminars. He is the managing director of Engineering Dynamics (Pty) Ltd, which focuses on monthly condition monitoring of client's equipment, as well as condition monitoring equipment marketing, support and training.

Alan Grodner started his career in 1951 as a apprentice fitter and turner, involved in ship repair at Harland and Wolffe in London. He worked on several merchant vessels, of British and South African origin. During this time he was promoted from junior engineer to Chief Engineer. In 1973 he became technical advisor for Mobil Oil, South Africa in the use of lubricants and liquid fuels. In 1981 this was followed by an appointment at JCI as in-house consultant for lubricants and lubrication. This was followed by an appointment as external engineering consultant for lubricants and lubrication at Anglo American Platinum Corporation.

Mr Grodner has conducted training seminars for various institutions and companies in the use of lubricants and correct lubrication practices.

Mr Grodner is a member of The South African Institute of Tribology Executive Committee and was President of the institute from 1994 to 1996.

PROGRAMME

Monday 18 August

08:00 - 09:00	Registration
09:00 - 09:15	Introduction and Welcome - *Jasper L. Coetzee*
09:15 - 10:00	The design of maintenance plans A - *Dr. Harry Martin*
10:00 - 10:30	Tea
10:30 - 12:15	Developments in Maintenance Planning and Control - *Dr. Nick Hastings*
12:15 - 13:15	Lunch
13:15 - 14:00	Keynote speaker *Mr Raymond Owen President, SAMA*
14:15 - 15:00	The design of maintenance plans B - *Dr. Harry Martin*
15:00 - 15:30	Tea
15:30 - 16:30	Panel discussion
16:30 - 17:30	Cocktails

Tuesday, 19 August

08:15 - 10:00	Condition Monitoring techniques in a world class maintenance organisation - *Christo van der Walt*
10:00 - 10:30	Tea
10:30 - 12:15	The EUT Maintenance Model bridging the gap between theory and practice - *Dr. Harry Martin*
12:15 - 13:15	Lunch
13:15 - 15:00	Total Productive Maintenance (TPM) - *Dr. Nick Hastings*
15:00 - 15:30	Tea
15:30 - 16:30	Panel discussion

Wednesday, 20 August

08:15 - 10:00	Tribological Aspects in Maintenance Engineering - *Alan Grodner*
10:00 - 10:30	Tea
10:30 - 12:15	Failure Analysis and Management - *Dr. Nick Hastings*
12:15 - 13:15	Lunch
13:15 - 15:00	Design and Evaluation of maintenance information systems - *Dr. Harry Martin*
15:00 - 15:30	Tea
15:30 - 16:30	Panel discussion

SHORT DESCRIPTIONS OF TOPICS

Dr. Nick Hastings

Developments in Maintenance Planning and Control

In recent years there has been an increasing emphasis on the role of preventive maintenance and its potential in contributing to improved productivity and safety. The technique of Reliability Centred Maintenance (RCM) has been developed as a systematic approach for the creation of maintenance plans. The RCM method of maintenance plan development will be discussed with reference to case studies undertaken by the speaker, and a suggested approach will be presented.

The nature and importance of day to day (and hour by hour) control of maintenance activities will be outlined. Practical approaches to the control of maintenance and liaison with production will be discussed and the use of a computer based communication and scheduling system will be illustrated.

Total Productive Maintenance

Total Productive Maintenance (TPM) is a technique which emphasises the role of the operator in achieving reliability, quality and productivity. Key factors are: Maintaining a clean workplace; Extending the role of the operator in set-up, adjustment and lubrication; Achieving quality improvements through improved operator knowledge and empowerment; Continuous improvement involving operators and maintenance.

The principles and practices of TPM will be outlined and discussed in relation to practical experience, and to related techniques such as Total Quality Management (TQM) and Just in Time (JIT).

Failure Analysis and Management

This session presents a number of systematic approaches to dealing with, and learning from actual or potential equipment failures.

Failure Mode and Effect Analyses (FMEA) is a technique for systematically recording actual or potential failures. It is applicable to design, process and service activities. FMEA is a required technique in the automotive industry in many countries and has been widely adopted in other industries. FMEA and other supporting techniques will be discussed, including Pareto Analysis, Fault Trees, Event Trees and Cause and Effect Diagrams.

Statistical methods of failure and successful performance analysis will be presented, including Weibull Analysis and recent extensions of this technique. The role of these methods in indicating the root cause of failure in determining the appropriate maintenance policy will be discussed and illustrated by examples.

Dr. Harry Martin

The design of Maintenance Plans

The success of a maintenance organisation depends to a large extent on the quality of the maintenance plan. This plan describes the maintenance that should be done to ensure success. It consists of the combination of the various maintenance actions prescribed for equipment maintenance.

The approach presented is a very logical one which has been used with considerable success world wide. It describes the process in three steps, viz. the definition of failure processes, the selection of elementary failure rules and the clustering of maintenance rules.

The EUT maintenance model

One of the important drivers for the development of maintenance engineering is the way in which the maintenance community understand their own function. This was recognised in the early 1970's when the British government appointed a commission to look at the high losses incurred due to an inadequate approach to maintenance. The resulting model, named 'Terotechnology' was a step in the right direction, but did not explain the whole maintenance process well enough. The EUT model is a much more comprehensive model and has been used with success over the last decade at the University of Eindhoven.

The background to the model will be described as well as its scope and purpose. The various aspects included in the model will be described and explained in detail. The accent is on the application of the model to further the discipline of Maintenance Engineering.

Design and Evaluation of Maintenance Information Systems

Sophisticated maintenance engineering can only be applied successfully in combination with properly made and used maintenance information systems. And, while there has been substantial development in this area over the last decade, many organisations world wide still do not manage their maintenance information resource well enough. This problem will be addressed under the headings: Information system evaluation methods; Standard versus tailor made software; Functional analysis of the maintenance situation.

Christo van der Walt

Condition Monitoring (CM) Techniques in a World Class Maintenance Organisation

Condition Monitoring is certainly one of the forefront technologies in the maintenance world. It is developing at a very fast pace and is the only viable preventive maintenance option in the majority of cases.

A summary of the available CM techniques will be presented, and the benefits of CM revisited. The methodology for the definition and implementation of a CM strategy for the organisation will be discussed with the emphasis on the correct implementation strategy (this will be motivated by studying the reasons for widespread failure of CM programs).

The question of interfacing CM results to a CMMS program will be discussed as well as the integration of plant-wide information through data warehousing.

Allan Grodner

Tribological Aspects in Maintenance Engineering

Maintenance Engineering is the practice of keeping machinery in working condition at the lowest cost. An understanding of the relationship between surfaces in relative motion has become a critical part of maintenance engineering decision making. This science is termed Tribology. Tribology covers a wide field, from the selection of materials to friction modification by the use of lubricants. It also includes the prediction of machinery failure by the use of trend graphs generated from oil and vibration analysis.

This paper will try to identify some criteria, related to tribological aspects, that can be used when selecting a predictive maintenance strategy.

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- Cancellations are accepted **IN WRITING** and without penalty, up to 7 working days prior to commencement of the course. **SUBSTITUTES ARE ACCEPTED.**
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