ARP [E]

ARP [E] Category II – Reliability Engineer

Asset Reliability Practitioner Training & Certification

Reliability Engineer – Core Education

The **Asset Reliability Practitioner [ARP] Category II "Reliability Engineer Core Education"** course is intended for industrial Reliability Engineers & Technicians responsible for helping the organisation improve reliability and for others who desire an in-depth knowledge of the reliability and performance improvement process. Participants should have at least 24 months' work experience in condition monitoring, maintenance, reliability or process improvement.

Key Topics are:

- A Model Plan for developing Reliability Improvement
- Addressing People Management and Culture issues
- Asset Criticality Analysis and RCM /FMECA analysis
- Developing an Asset Management Strategy
- Reliability Engineering Techniques and Analytical Tools
- RCFA/RCA Techniques
- Defect Elimination and Pro-active maintenance activities
- Precision Installation & Maintenance
- Condition Monitoring Techniques and their applications
- Sustaining and Continuing Improvements

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Detailed topic list:

INTRODUCTION

- Goals of the course
- Goals of reliability improvement
- How reliability/performance improvement is aligned with asset management, operational excellence, TPM and Lean initiatives
- The role of the Reliability Engineer Category II and Category III Program Leader

STRATEGY AND IMPLEMENTATION

- The many benefits of a reliable operation
- Aligning a reliability program to business needs
- How to assist in the development of a "roadmap" and the essential elements required
- Understanding maintenance strategies:
  - Run to fail [RTF]
  - Condition-based maintenance [CBM]
  - Interval-based (preventive) maintenance [PM]

PEOPLE MANAGEMENT

- Culture change strategies
- Helping to gain and retain senior management support
- Engaging people in the reliability and performance improvement effort
- Human error and psychology

DEFECT ELIMINATION

- Designing for reliability
- Procurement for the lowest life-cycle costs
- Managing outside contractors & vendors
- Acceptance testing
- Stores management & caring for spares
- Precision and proactive maintenance
- Operations and operator driven reliability [ODR]

RELIABILITY ENGINEERING

- Reliability fundamentals
- Nolan & Heap and other studies on failure patterns
- Failure modes and consequences
- The pros and cons of doing PMs and the case for condition-based maintenance
- Understanding hidden failures
- Determining the reliability of an asset
- Calculating MTBF, MTTR and MTTF
- The use of statistics in reliability analysis
- Analyzing reliability data a using Weibull, Pareto and other techniques
- Reliability Block Diagrams [RBD]
- An introduction to life cycle cost analysis

ASSET STRATEGY DEVELOPMENT

- Developing the master asset list
- Utilizing ISO 14224 to define the hierarchy
- Developing the Bill of Materials
- Developing an asset criticality ranking [ACR]
- Preventive Maintenance Optimization [PMO]
- Failure Modes, Effects & Criticality Analysis [FMECA]
- Reliability Centered Maintenance [RCM]
  - What is “classic” RCM
  - Understanding the seven key elements of the RCM process according to SAE JA1011
  - How to prioritize the RCM process
  - The logical process to establish the mix of the following outcomes on each asset
    - Run-to-fail [RTF]
    - Condition-Based Maintenance [CBM]
    - Interval-based Maintenance or Preventive Maintenance [PM]
    - Hidden-failure finding tasks [HFFT]
    - Redesign for improved reliability

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WORK AND SPARES MANAGEMENT

- A model for work flow processes
- Work management as the foundation for maintenance, condition monitoring and reliability
- Priotisizing work requests
- Managing Condition Monitoring reports
- Managing PMs
- Managing break-in or emergency work
- Maintenance Planning & Scheduling
- Job tasks and responsibilities
- MRO spares and material management
- Failure Codes
- Reporting, KPIs and continuous improvement

PRECISION SKILLS AND PROACTIVE MAINTENANCE

- What is precision and the importance of precision installation
- Precision mechanical and electrical fastening
- Precision shaft and belt alignment
- Soft foot correction
- Precision balancing and balancing standards
- The importance of developing and following written procedures
- The importance of precision installation in components such as bearings, seals, gears, power transmission and electrical equipment
- The key operating principles of rolling element and journal bearings, gears and hydraulic components and how they impact on the reliability of rotating equipment
- Understanding common electrical system system faults
- Understand mechanical resonance and the basic correction techniques.
- Precision lubrication (oil and grease) including selection, storage, replenishment and the effects of contamination.
- Filtration and ISO 4406 cleanliness standards
- Keeping equipment and workplaces clean and organised.
- The importance of commissioning and following the correct start-up procedures

ROOT CAUSE ANALYSIS

- Root Cause and Root Cause Failure Analysis [RCA and RCFA]
- The importance of conducting and making improvements
- How to perform RC(F)A
- Determining when it is justified to perform RC(F)A and selecting the appropriate process
- A review of 5-whys, fault-tree, Ishikawa, and other techniques
- A systematic approach to determining the root cause(s), determining the solution(s), selecting and implementing the best solution, verifying the results and managing the process

CONDITION MONITORING

- Overview of CM principals for mechanical and electrical equipment
- The relationship between CM, planning and scheduling and operations
- An introduction of the technology & application of:
  - Vibration analysis
  - Ultrasound
  - Oil analysis
  - Wear particle analysis
  - Infrared (Thermal Imaging) analysis
  - Electric motor testing
  - Electrical equipment testing
  - Partial discharge detection
  - Non Destructive Testing [NDT]
  - Process/performance monitoring
  - Visual inspections
- The future of CM and predictive analytics

CONTINUOUS IMPROVEMENT

- The importance of continuous improvement, Kaizen & PDCA principals
- The need to reassess business conditions and what is critical
- Utilizing metrics to measure & improve performance
- The need to collect accurate data
- Communicating results and success
- The importance of establishing the right KPIs
- The need for on-going education, training and skills development.

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ARP [E] CAT-II Distance Learning Course

Delivery:
The course is made up of short video recordings, totaling 32 hours, presented by Jason Tranter, the Mobius CEO and founder. It is very comprehensive and informative, with audio commentary and animated visual slides. A colour bound printed manual is available for study and reference.

Certification Exam:
The 100 question multiple-choice exam is 3 hours and can be taken either on-line or by hard copy. Pass grade is 70% for certification.

Certification Prerequisite:
Prior experience is not required, however 24 months of relevant industrial experience and passing the exam is required for certification.

What our Category II students have said:

" The course was very good, covering all the subjects that a reliability engineer needs to know. It has given me a good base for my new role."

"I thought it was a very comprehensive course covering all aspects. Well balanced and very informative."

"Good training as it covers a wide range of reliability related topics. Excellent instructor who is clearly passionate about reliability engineering"

Highly credentialed certification

The Asset Reliability Practitioner (ARP) certification scheme follows the independent format of the time-tested ISO certification programs, such as ISO 18436, and it follows the guidelines defined under ISO/IEC 17024 – the same process followed by the independently accredited Mobius Institute Board of Certification [MIBoC] certification scheme that has already certified tens of thousands of men and women from over 170 countries.

Two independent international committees developed the certification program. The Scheme Committee defined the topics and the requirements (such as training, experience, and examination). The Technical Committee approved the topics and is responsible for approving training courses and the examination database.

Both committees are made up of experienced practitioners, consultants and educators from around the world to ensure that the scheme meets the requirements of the majority of industries in all countries.

ARP [E] Certification

All MIBoC certified reliability practitioners receive personalized logos with their certification number and name for their own professional use. Mobius Institute also maintains a listing of all certified analysts on their website and provides each person with a certification confirmation webpage.

For more information about Mobius Institute's accreditation, please visit www.mobiusinstitute.com/certification.

Learn more about other Classroom, Distance Learning or On-Line training options.

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Reliability Institute

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