Asset Reliability Practitioner (ARP)

Reliability & Performance Improvement Training & Certification

GCC Electrical Testing Laboratory
المختبر الخليجي لفحص المعدات الكهربائية

Category I - Reliability Advocate
Category II - Reliability Engineer
Category III - Program Leader

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BOARD of CERTIFICATION
ISO/IEC 17024 ACCREDITED

Practitioners and leaders involved with the important role of improving the reliability and performance of an industrial facility should be recognized for their knowledge, experience, and contribution.

Mobius Institute Asset Reliability Practitioner (ARP) certification scheme will recognize the knowledge and basic experience of people at three levels; the Advocate who contributes to the initiative, the Reliability Engineer, and the Leader of the program. In addition, the certification scheme will separately recognize reliability engineers and leaders who have proven competence.

Asset Reliability Practitioner (ARP) utilizes an international scheme, with independent, aligned training available all over the world, and on-line. It is time for Reliability Engineers, Program Leaders, and Advocates to be educated, motivated, and certified regardless of their industry, country, or language.

Course Schedule for Year 2020

COURSE NAME / DURATION	DATES
Asset Reliability Practitioner [ARP] CAT I / 3 days	Apr 5 - Apr 7, 2020
Asset Reliability Practitioner [ARP] CAT II / 5 days	Sep 13 - Sep 17, 2020

GCCLAB Training Center, GCCIA Building, Dammam

https://goo.gl/maps/QgJRhaxaUyHwKeoRA

For more information and inquiries:

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The new Mobius Institute Asset Reliability Practitioner (ARP) Category I-III courses and accredited certification are recognized worldwide.

ARP Category I – Advocate – Manager-Engineer Awareness

Asset Reliability Practitioner Training & Certification

CAT-I

The Asset Reliability Practitioner [ARP] Category I "MANAGER-ENGINEER AWARENESS" course is intended for senior management, maintenance and operations/production management, engineers, junior reliability engineers, and condition monitoring professionals who need to understand the "big picture" of the reliability and performance improvement process.

Detailed topic list:

INTRODUCTION

- Overview of reliability and performance improvement
- What causes equipment to be unreliable or perform poorly
- The relationship between reliability improvement and asset management, operational excellence, TPM, and lean strategies
    - An introduction to ISO 55000
- The relationship between reliability and safety

BENEFITS

- An overview of the benefits, with basic examples

ASSESSING YOUR BENEFITS

- What is important to your business?
- What are you good at, where do you need help?
- What do those gaps cost you?

CULTURE CHANGE

- The importance of developing the culture of reliability
- The steps necessary to change people's and an organization's culture
- Being aware of human error and human psychology (e.g. biases)
- The importance of defining who is responsible and accountable, who will provide support, who should be consulted, and who should be kept informed [RASCI]

SELLING SENIOR MANAGEMENT

- Building the business case based on the goals of the business, the identified gaps, and the value gained by closing those gaps
- How to ensure you gain and retain senior management support

STRATEGY

- What is involved in developing a strategy
    - Setting goals
    - The need for a mission/vision statement
    - The main components of a "roadmap" strategy
    - The need to establish a "steering committee"
    - Gaining support across the organization

UNDERSTANDING FAILURE

- Why does equipment fail?
    - Mechanical failures
    - Electrical failures
- Understanding equipment "failure patterns"
    - Does all equipment wear out with age?
    - What are "random failures"
    - Early age "infant mortality" failures
- Why is this so important?

DEFECT ELIMINATION

- Overview of the goals of defect elimination
- An overview of each of the main sources of defects and how to eliminate them
    - Design for reliability, maintainability, operability, and sustainability
    - Procurement for lowest life cycle costs
    - Transport without damage
    - Acceptance testing to reject defective equipment
    - Storage to eliminate degradation
    - Eliminating maintenance induced failures through precision installation, maintenance and commissioning
    - Eliminating operator induced failures
    - Proactive tasks that reduce the likelihood of failure and poor performance

ASSET STRATEGY

- Overview of run-to-failure, condition-based, and interval-based maintenance
- The need for the master asset list and bill of materials
- Establishing the asset criticality ranking
- Utilizing Preventive Maintenance Optimization [PMO], Reliability Centered Maintenance [RCM], and/or Failure Modes Effects (and Criticality) Analysis [FMECA] to develop the asset reliability strategy
- Operator driven reliability [ODR]

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WORK MANAGEMENT

- The benefits of coordinated, planned, and scheduled work
- An overview of the complete cycle: work requests, planned tasks, kitting, scheduling, managing break-in work, precision job execution (and the need for written procedures), job feedback and improvement
- The opportunity to improve work efficiency (or "wrench time")
- How planning can minimize time/costs with shutdowns and outages
- The role of the computerized maintenance management system [CMMS] or enterprise asset management [EAM] system

SPARES MANAGEMENT

- The financial and work management benefit of efficient spares management
- Basic introduction to spares selection
- Caring for spares

PRECISION AND PROACTIVE WORK

- What is precision and the importance of precision work
    - The basics of precision shaft and belt alignment, soft foot correction, fastening, machine balancing, and other common mechanical and electrical tasks
    - The importance of developing and following written procedures
    - The importance of precision installation, such as bearings, seals, gears, belts, pumps, electrical equipment, and other equipment
    - The importance of commissioning
- The importance of taking proactive steps to avoid future problems, including precision lubrication, resonance correction, power quality control, and keeping equipment and workplaces clean and organized

CONDITION MONITORING

- Overview of CM principles for mechanical and electrical equipment
- The relationship between CM and planning/scheduling and operations
- A detailed overview of:
    - Vibration analysis
    - Ultrasound
    - Oil analysis
    - Wear particle analysis
    - Electric motor testing
    - Infrared analysis
    - Non-Destructive Testing [NDT]
    - Process/performance monitoring
    - Visual inspections
- The future of CM and predictive analytics

BREAKING OUT OF REACTIVE MAINTENANCE

- What to do if you are trapped in the reactive maintenance cycle

CONTINUOUS IMPROVEMENT

- The principle of and importance of continuous improvement, Kaizen, PDCA, and Lean
- The need to reassess business conditions and what is critical
- Utilizing metrics to measure and improve performance
    - Benchmarking against industry and the facilities "best day"
    - The importance of establishing the right KPIs
    - Suggested metrics and KPIs and the most effective use of KPIs
    - The importance of accurate data collection
- The importance of constant communication
- Root cause (failure) analysis [RCA and RCFA]
    - The importance of conducting RCA/RCFA
    - The importance of making the improvements
    - How to perform RCA/RCFA
- The need for on-going education, skills, and awareness training

ARP Category II – Reliability Engineer

Asset Reliability Practitioner Training & Certification

CAT-II

The Asset Reliability Practitioner [ARP] Category II "RELIABILITY ENGINEER CORE EDUCATION" course is intended for industrial reliability engineers charged with helping the organization improve reliability and performance, and for anyone else in the organization who desires to have an in-depth knowledge of the reliability and performance improvement process.

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
  - An introduction to ISO 55000
- The role of the reliability engineer
  - Making improvements
  - Providing data and recommendations
  - Supporting the Category III Program Leader

STRATEGY AND IMPLEMENTATION

- Benefits of reliability and performance improvement
  - Aligning the program to meet the business goals
- The need for the business case
  - How to provide data to support the business case
- How to assist in the development of the "roadmap" plan
  - What are the "essential elements" of a holistic approach
  - How do you break out of the reactive maintenance cycle
- Understanding the maintenance strategies
  - Reactive maintenance
  - Strategic maintenance in summary
    - Run-to-fail
    - Condition-based maintenance [CBM]
    - Interval-based (preventive) maintenance
    - Hidden-failure finding tasks

PEOPLE MANAGEMENT

- Culture change
- Helping to gain and retain senior management support
- Engaging people in the reliability and performance improvement effort
  - Training and certification
  - Skills development
  - Awareness sessions
- Human error and psychology
  - Why errors are made
  - Why knowledge and observations about failure may be flawed
- Steering committee
  - The role of the RE with the steering committee

DEFECT ELIMINATION

- Overview
- Design for reliability
- Procurement for the lowest lifecycle costs
- Transportation for minimal degradation
- Managing outside contractors
- Managing vendors
- Acceptance testing
- Work management - introduction
- Spares management/caring for spares
- Precision and proactive maintenance – introduction
- Precision operation and operator driven reliability [ODR]

RELIABILITY ENGINEERING

- Reliability fundamentals
- Understanding equipment "failure patterns"
  - Does all equipment wear out with age?
  - What are "random failures"
  - Early age "infant mortality" failures
  - Nolan and Heap and other studies
  - Understanding failure modes

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RELIABILITY ENGINEERING cont'd

- Understanding failure consequences
- Understanding hidden-failures
- Collecting failure data to aid PMO, RCM, FMECA, Pareto analysis and RBDs
  - Develop meaningful, useful, useable failure codes
- Determining the reliability of an item
  - Strengths and weakness of MTBF
- The basic principles and pros/cons of CM and CBM
- The basic principles and pros/cons of interval-based (preventive) maintenance

- Analyzing reliability data
  - Weibull and other analysis techniques
- Reliability block diagrams [RBD]
  - An introduction to constructing RBDs
  - Estimating system reliability and availability based on RBDs
- Lifecycle cost analysis [LCCA]
  - The principle of lifecycle costs versus purchase price
  - An introduction to LCAA

ASSET STRATEGY DEVELOPMENT

- Getting the house in order
  - Developing the master asset list [MAL] aka asset register [AR]
    - Utilizing ISO 14224 to define the hierarchy
  - Developing the Bill of Materials [BOM]
    - The importance of having an accurate BOM
- Developing an asset criticality ranking [ACR]
  - The importance of having an ACR
  - Understanding criticality
  - A methodology to develop the ACR
  - Prioritizing maintenance, reliability, and other decisions based on criticality
- Utilizing Preventive Maintenance Optimization [PMO]
  - What is PMO
  - Assessing existing PMs and either keep them, improve them, or remove them
  - The strengths and weakness of PMO
- Utilizing Failure Modes, Effects and Criticality Analysis [FMECA]
  - How the process may be used in asset strategy develop
  - The overlap between FMECA and RCM
- Utilizing 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 [IBM] or Preventive Maintenance [PM]
    - Hidden-failure finding task [HFFT]
    - Redesign for improved reliability or performance
- Utilizing Pareto analysis
  - What is Pareto analysis
  - How to collect accurate, reliable failure data
  - Analyzing the data
  - Utilizing Pareto analysis to prioritize maintenance and reliability decisions

WORK AND SPARES MANAGEMENT

- An overview of work management and spares management and how they are connected
  - How they relate to preventive work, condition-based work, work requests, and break-in work
  - How they relate to shutdowns/turnarounds/outages
  - The benefits of work and spares management and key benchmarks
  - Key components
    - Handling maintenance requests via observations and CM
    - Spares management
    - Managing preventive tasks (PMs, CM tasks, proactive tasks)
    - Scheduling
    - Managing break-in work
  - Reporting, and KPIs to collect and trend
  - Ensuring there is feedback for continuous improvement

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WORK AND SPARES MANAGEMENT cont'd

- MRO spares and material management
  - The consequences of a poor MRO spares management
  - Spares policy identification
  - The definition of a "critical spare"
  - Spares sourcing
  - Inventory control
  - Spares issuance
  - Documentation and analysis
- Maintenance planning
  - Creating a job plan
  - Allocating people to work
  - Determining time, tools, skills, equipment, and safety requirements
  - Job kitting
- Maintenance scheduling
  - How to prioritize jobs
  - Coordinating with production
- Managing break-in work
- Shutdowns, turnarounds, and outages
  - Scope, time, quality, communications, human resources (site and contractor), and risk management
- The computerized maintenance management system [CMMS] or enterprise asset management [EAM] system
  - Information and data that should be managed
  - The link with work and spares/material management
  - Failure codes

PRECISION SKILLS (PRECISION AND PROACTIVE MAINTENANCE)

- What is precision and the importance of precision work
  - A detailed introduction to:
    - Precision shaft and belt alignment
    - Precision soft foot correction
    - Precision mechanical and electrical fastening
    - Precision balancing and balancing tolerances/standards, and
    - Other common mechanical and electrical tasks
  - The importance of developing and following written procedures
  - The importance of precision installation in components such as bearings (rolling element and journal/sleeve), seals, gears, belts, pumps, electrical equipment, and other equipment
  - Understand the key operating principles of rolling element and journal bearings, seals, gears, pumps, fans, transformers, steam traps, and valves
  - Understand how to verify electrical systems: fault current, earth loop, impedance, insulation resistance, and protection testing
  - Understand the issues related to power quality: earth loops, power factor, harmonics, EN60130
- Understand mechanical and acoustic resonance and the basic correction techniques
- Proactive maintenance
  - The importance of taking proactive steps to avoid future problems
  - A detailed introduction to:
    - Precision lubrication (oil and grease) including selection, receipt, filtering, storage, issue, and replenishment and the effect these have on contamination
    - Resonance correction
    - Power quality control, and
    - Keeping equipment and workplaces clean and organized
- The importance of commissioning
  - Safety practices and preparation
  - The importance of following the correct start-up procedures
  - Calibration

CONDITION MONITORING

- Overview of CM principles for mechanical and electrical equipment
- The relationship between CM and planning/scheduling and operations
- A detailed introduction of the technology and application of:
  - Vibration analysis
  - Ultrasound
  - Oil analysis

CONDITION MONITORING cont'd

- Wear particle analysis
- Electric motor testing
- Infrared analysis
- Electrical equipment and insulation testing
- Transformer testing
- Partial discharge
- Non Destructive Testing [NDT]
- Process/performance monitoring
- Visual inspections

- The future of CM and predictive analytics

CONTINUOUS IMPROVEMENT

- The principle of and importance of continuous improvement, Kaizen, PDCA, and Lean
- The need to reassess business conditions and what is critical
- Utilizing metrics to measure and improve performance
  - Benchmarking against industry and the facilities "best day"
  - The importance of establishing the right KPIs
  - Suggested metrics and KPIs and the most effective use of KPIs
  - The importance of accurate data collection
- The importance of constant communication
- Root cause (failure) analysis [RCA and RCFA]
  - The importance of conducting RCA/RCFA
  - The importance of making the improvements
  - How to perform RCA/RCFA
    - Determining when it is justified to perform RCA/RCFA 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 the best solution, implementing the solution, and verifying the solution – all in a cost justified manner
- The need for on-going education, skills, and awareness training