



FMRIMS	<h1>Gas Turbine Reliability Improvements</h1>	Reliability, Integrity & Maintenance Training
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Course Description

The course covers reliability management program development and implementation for gas turbine to lead an oil & gas company to a pacesetter performance comprising of:

- Assessment of current performance in reliability, availability and maintenance costs for gas turbine.
- Comparison to pacesetters and identification of gaps. Benchmarking
- Defining what Best Practices and Degradation Templates need to be implemented to close the gap.
- Development and management of the plan for close gaps, operation and functional departments.
- Key Performance Indicator, Goal Setting & Performance Monitoring for Gas Turbine

Who Should Take the Course

The course is ideal for persons with assigned responsibilities improvements in the reliability and maintainability area, as well as managers who want to increase awareness of the payoffs of improvements managements.

Engineers who need to know the reliability management as they apply to developing reliability improvement programs for gas turbine. Design engineers, technical specialists, maintenance specialists, operations technical specialists, reliability specialists, and product/program managers will benefit from the course.

What Will You Learn

The participants will gain knowledge of programs and methods to achieve reliability improvements for gas turbine to reach target performance. They will learn the proven Best Practices and Degradation Templates that are appropriate to apply for different development situations as well as the basics of implementing the practices to reach reliability, availability and maintenance cost reduction targets.

Included Materials: Attendees will receive a copy of:

- Gas Turbine Design Handbook
- RAM Guide
- ISO 20815 Reliability Management
- Use of FMRIMS Software During the course
- Course Text Book
- Course Slides

Course Outline

- **Establishing plant and system reliability and availability targets**



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<ul style="list-style-type: none">• Gas Turbine Reliability System Elements Assessment of current reliability considering reliability system elements• Plant/systems reliability analysis Asset Reliability KPI's Bench marking
<ul style="list-style-type: none">• Applying Reliability principles to focus on systems and equipment based on criticality: Identifying types of failures and their consequences Identifying loss for various failures Prescribing the overall reliability approach and Methodologies "Mix"• Equipment assessment process to meet RAM requirements Operational history Robustness in design Maintainability Life cycle cost determination After sales service
<ul style="list-style-type: none">• Applying reliability principles to equipment management Mean Time Between Failures (MTBF) Strategies (age or random) Arresting deterioration Performing RCA on "bad actors" Improving reliability by component substitution Monitoring equipment condition to determine optimal overhaul/replacement• Applying best practices technology tools to ensure ongoing reliability Risk Based Methodologies (FMRIMS) Degradation Templates outline:<ul style="list-style-type: none">• Degradation Mechanism<ul style="list-style-type: none">• High Pressure Drop• Corrosion• IGV Bushing Wear• Incorrect IGV Angle• Fouling• Erosion• Foreign Object Damage• High Cycle Fatigue• Incorrect Opening/Closing• Thermal Fatigue• Localized Hotspot• High Temperature Oxidation• Hot Corrosion• Fretting Damage• Clogging-Combustor Fuel Nozzle• Clogging-Combustor Cooling Holes• Creep-Turbine Nozzle• Creep-Turbine Disk• Creep-Turbine Bucket



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- Gas Turbine/Driver Misalignment
 - Lube Oil System Degradation
 - Fuel System Contamination
 - Improper Fuel Supply Control
 - Operation Outside Operating Envelope
- **Interdisciplinary Reliability Focus Team**
 - Organizing for Reliability
 - Understanding human factors in Reliability
 - Operator Driven Reliability

Course Instructor: Namik Kosaric is a Canadian Professional Engineer with experience with PETRONAS, Bahrain Petroleum Company and ESSO Petroleum Canada in reliability improvements and maintenance cost reduction, mechanical design, project engineering and technical support of Oil Refineries and Oil Production Facilities.

For the last 8 years in PETRONAS Namik Kosaric was responsible for providing technical and knowledge leadership in development, coordination and implementation of plant reliability and integrity improvements and program to PETRONAS OPU's to improve and support the overall Petroliaam Nasional Berhad objectives.

In BAPCO, Namik Kosaric, pioneered and implemented a root cause failure analysis of lost profit opportunities and chronic failures using a multi-disciplinary teams to improve plant reliability, availability, safety and to ultimately reduce operating costs. Significant cost savings were achieved as a result of over 200 completed investigations.

For 23 years in ESSO Petroleum Canada, Namik Kosaric has made significant contribution worldwide in reliability improvements, design, projects and maintenance cost reduction in upstream and downstream facilities.

