

**ACTSYS**

Process management  
consultants

# Asset Optimization for Power Plants

**New Date**

22nd –23rd Sep 2011

**Time:** 0900hr - 1700hr

**Venue:** RELC International Hotel  
Stevens room - 507  
30 Orange Grove Road (S) 258352

**Sign up:** Justine@actsys.com

**Deadline for registration:** 16 Sep 2011 (extended)

## Course Fees:

Full rate (Foreigners) \$1,850 (before GST)  
WDA funded (Singaporeans/PRs) \$740 (before GST)  
EENP Partners\* (Singaporean/PRs) \$555 (before GST)

\*limited to a maximum of 3 participants per EENP Partner company

[http://www.e2singapore.gov.sg/industry/eenp\\_fp.html](http://www.e2singapore.gov.sg/industry/eenp_fp.html)

Accredited by  
Professional Engineers Board  
14 PDUs

WDA &  
EENP  
funding

Supported by:





## **Course Background**

In early 2011, the Singapore Workforce Development Authority (WDA) working together with a consortium of Power Generation Companies in Singapore and the Union of Power and Gas Employees (UPAGE) identified a need to raise the level of knowledge of Energy Efficiency and Asset Optimization amongst staff in Power Generating Companies. As ACTSYS is a main provider of performance monitoring services to the Power Industry in Singapore, WDA is collaborating with ACTSYS to make this course available for the industry.

This course is recognised by the Energy Efficiency National Partnership (EENP) under the EENP Learning Network, and is also accredited by the Professional Engineers Board (PEB) for 14 PDUs.

## **Course Objectives**

This course is intended for a sharing of best practices to improve the efficiency, reliability and productivity of a Combined Cycle Plant. There will be discussions on plant efficiency aspects, thermodynamic performance monitoring and maintenance optimization methodologies. By raising awareness, it is hoped that the course participants will learn to recognize Asset Optimization areas that have improvement potential in their own organisations.

## **Energy Efficiency and Performance Monitoring**

### **Session 1 : Thermodynamic Fundamentals of Combined Cycle Operation**

Refresher on Brayton Cycle of the Gas Turbine engine and the Rankine Cycle of the Steam Turbine for key operating parameters that determine efficient performance. Basis for equipment degradation affecting plant efficiency and base load.

### **Session 2 : Performance Monitoring Methodology**

Sharing of established performance monitoring methodologies based on thermodynamic simulation models for plant operating data, and statistical analysis tools for results examination. Flexibility in handling inaccurate plant data, mitigating one of the biggest challenges in performance monitoring calculations. All plant degradations quantified in terms of their respective effects on overall loss of thermal efficiency and base load capability. Technique is compared with traditional ASME PTC Performance Test Code methodology of determining plant performance.

### **Session 3 : Case Studies of Energy Efficiency Losses**

Real-life case studies to demonstrate the power of thermodynamic modeling to analyze power plant performance :

- Fouling of Heat Recovery Steam Generator
- Passing Feed water preheater bypass valve
- Non optimal Gas Turbine Inlet Guide Vane control curve
- Loss of Steam Turbine Power
- Gas Turbine Inlet Air Filter comparative performance
- Surface Condenser fouling



### **Session 4 : Online Performance Monitoring Systems**

Reviewing online performance monitoring systems by power plant OEMs and sophisticated thermodynamic engineering models for plant performance calculation. Assessment of the shortcomings and organizational preconditions for effective use of such systems.

## **Session 5 : Role and Responsibilities of Performance Team**

Regional industry best practice sharing for roles and responsibilities of the Performance Team in Power Plants; what works and what does not. Recommendation on integrated role of Performance Team with operational and maintenance counterparts, in relation to the Singapore Energy Conservation Act implementation by the Government in 2013 and also Energy Management System ISO 50001.

## **Session 6 : Potential Retrofits for Performance Improvement**

Improvement retrofits for CCP in terms of potential efficiency and baseload capacity gain.

- GT inlet air cooling
- GT compressor blade coating
- High Efficiency Inlet Air Filters
- Cooler Preheater inlet water temperature
- Variable Speed Drives for Boiler Feed Pumps.

## **Maintenance Optimization**

### **Session 7: Introduction to Physical Asset Management**

- Asset Optimization Framework
- PAS 55 Physical Asset Management Standard
- Asset Management Maturity Mapping

### **Session 8: Reliability Management**

- Reliability Improvement Process
- Asset Criticality Analysis
- Failure Defense Plan creation
- Failure Defense Task Development

### **Session 9: Condition Monitoring**

- Condition based maintenance integration: the process
- PdM maturity Framework

### **Session 10: Risk Management**

- Risk Informed Maintenance Decision Making

### **Session 11: Work Management**

- Work Identification
- Work Planning & Scheduling
- Work Execution
- Work Feedback



## **About ACTSYS Process Management Consultants**

ACTSYS Process Management Consultants serves the process industries which include power plants, refineries and petrochemicals plants . ACTSYS assist their customers to squeeze profits by identifying process and energy efficiency improvement measures.

Potential for improvement usually exist in plants which significantly deviate from design point or in plants which do not have efficiency driven condition monitoring maintenance programs.

Going back to basics, by reviewing plant against design and implementing the appropriate performance monitoring systems, ACTSYS help to identify improvement opportunities and prioritize operational and predictive maintenance measures in a continuous manner.

ACTSYS has extensive technological and operational experience in the process and power industries. This puts ACTSYS in a unique position to work with customers on plant redesign aspects as well as operational and maintenance excellence.

ACTSYS's project involvement with customers are also always accompanied by significant technology transfer after which the plant engineers are equipped with new knowledge and tools to be more proficient in their jobs.

With effect from 26 October 2005, ACTSYS is a Nationally Accredited Energy Service Company for the Power, Refining and Petrochemical Industries. Singapore National Environmental Agency (Energy Sustainability Unit).

Power Plant track records:

<http://www.actsys.com/trackrecord.php>

For full credentials, please refer to:

[http://www.actsys.com/CompanyProfile\(Apr11\).pdf](http://www.actsys.com/CompanyProfile(Apr11).pdf)

## **Trainers' Profile**

### **Norman Lee**

Norman is the Managing Director and founder of ACTSYS, providing consultancy services for performance monitoring and energy optimization of power plants, refineries, and petrochemical complexes. With more than 30 years of industrial experience, Norman is a leading consultant in thermal conversion, distillation, gas treating and utilities, providing plant performance monitoring and technological services for refinery projects, plant modification and optimization.



Norman graduated from Imperial College, University of London in 1979 with a first class honours degree in chemical engineering. He also completed his M.Sc. Advanced Chemical Engineering degree from the same university, and is a Chartered Engineer member of the Institution of Chemical Engineers (UK) and a Singapore Certified Energy Manager.

## Trainers' Profile

### **Hendro Purwanto**

Hendro has close to 20 years of industrial experience and is currently the Project Director of PT. MTS Indonesia. He has lead various Asset Management related workshop and Asset Management Maturity Assessment and Engineering Audit at Chevron Indonesia, Kaltim Prima Coal, Indonesia Power, Chinese made Cilacap & Labuan Steam Power Plant.



Hendro has extensive hands-on experience in vibration analysis of rotating machineries & non-rotating structure, tribology (Lube oil ) on-site & off – site analysis, infra- red thermography, and various Reliability & Maintenance softwares.

Hendro graduated from Metallurgical Department, Indonesia University, in 1992 with an outstanding degree in Metallurgical Engineering. He is a member of Vibration Institute & certified as Vibration Specialist I (2000) and Vibration Specialist II (2000).



### **Asahari Utama**

Ashari is the Director for PT. MTS Indonesia, with extensive experience in power plant related projects. His specific areas of interest and experience include condition monitoring technologies, reliability engineering setup utilizing streamlined RCM methodology, asset management maturity assessment and plant efficiency improvement.

Before joining PT. MTS Indonesia, Ashari is the engineering support section head for PT. Powergen Jawa Timur, an O&M company for 2 x 610 MW coal fired power plant.

### **N Murali**

Murali is a senior consultant of ACTSYS with extensive experience in power plant feasibility studies, power plant performance monitoring, root cause analysis in power plants, Preliminary Energy Audit (PEA), Detailed Energy Audit (DEA), investment grade audit for energy cost reduction, Performance Contract (PC), trouble shooting projects and performance assessment projects.



Murali has more than 14 years of experience in handling local and regional projects with combined cycle, cogeneration based, coal and liquid fuel thermal power plants, and has performed performance analysis for other types of power generating units such as reciprocating engines (design power generation units) and biomass based cogeneration units.