

**Who should attend**

- Machinery and Mechanical Plant Maintenance Engineers.
- Rotordynamic and Balancing Engineers.
- Reliability Engineers.
- Procurement and Purchasing Engineers.



Registration Fee of \$1950/ SR 7315 must accompany this registration form.



Dr. Aly El-Shafei is a Certified Vibration Analyst, Category IV. He holds a Ph.D. from the Massachusetts Institute of Technology (MIT) and is a world renowned expert on vibration analysis, rotordynamics and machinery diagnostics. In addition to serving as Managing Director at RITEC, Dr. El-Shafei is also a Professor of Vibration Engineering at Cairo University, Egypt. Prof. El-Shafei chairs the ISO working group ISO/TC108/SC2/WG10 responsible for developing international standards on machinery vibration diagnostics, and serves on the IFToMM Scientific Committee on Rotordynamics, the Vibration Institute Certification Committee and the IMechE Scientific Committee on Vibrations in Rotating Machinery. Dr. El-Shafei is known as a seasoned diagnostics engineer and has solved many chronic problems worldwide. He is also known worldwide for his work on Squeeze Film Dampers, and the developing of new technology for the control of rotating machinery vibration. Dr. El-Shafei has received 3 US patents and has published more than 80 papers on rotordynamics and machinery diagnostics.

**For further information, please call RITEC in Egypt**

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**[www.ritec-eq.com](http://www.ritec-eq.com)**

**E-mail: [ritec@ritec-eq.com](mailto:ritec@ritec-eq.com)**

**In Saudi Arabia, please call: Pan Gulf Industrial Systems**

**Attn: Mr. Tarik Abbas**

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**Pan Gulf Industrial Systems Co.**

**The Official Representative of RITEC and the Vibration Institute In Saudi Arabia**

*Invite you to attend the Official Vibration Institute 5-Day short course*

**Rotordynamics & Balancing**

In preparation for ISO Category IV exam

Course Instructor

**Dr. Aly El-Shafei**

February 4 - 8, 2012

Golden Tulip, Al-Khobar , Saudi Arabia

REGISTRATION FORM

**Rotordynamics & Balancing**

February 4 - 8, 2012

Name:-----

Title:-----

Employer:-----

Address:-----

Telephone:----- Fax:-----

e-mail:-----

## ABOUT THE COURSE

Rotordynamics is the cumulative theory and techniques used in the analysis design and diagnosis of rotating machinery vibrations. Understanding the dynamic behavior of rotating machines is of utmost importance to the use and operation of rotating machinery, particularly high speed - high performance machinery. Problems of stability, critical speeds, balancing, rubs and shaft cracks are not uncommon. This course is designed to aid in the understanding of the dynamic behavior of rotating machinery, as well as to aid the participants in the analysis and measurement of rotating machinery vibrations, and the diagnosis of common faults.

The main anomaly in rotating machinery is the unbalance force due to the non-coincidence of the geometric axis and the inertia axis. Balancing is the art of moving the inertia axis to coincide with the geometric axis. This course presents static, couple and dynamic balancing as well as the balancing of flexible rotors, including modal balancing, influence coefficient balancing and the unified balancing method.

The course provides a unique format in which an abundance of case studies are presented as application of rotordynamics and balancing.

The objective of all of **Vibration Institute** and **RITEC** courses is to prepare participants to be better analysts. This course will enable their understanding of rotordynamic principles and techniques and add to their practical knowledge of machines. With these tools participants will be better able to think through rotordynamic and balancing problems.

**Vibration Institute** and **RITEC** courses are designed to provide the participants with theory, techniques, and procedures as well as practical case histories that illustrate ways to analyze various types of equipment. In-class demonstrations and workshops will help in learning the methods used to solve rotordynamic problems. ISO 18436 Certification Exam Category IV to be held on February 9<sup>th</sup>, 2012. Certification fee is \$470 per person. Deadline to register is on January 18<sup>th</sup>.

## PROGRAM

Each day in this five day course will be divided into four sessions as follows:

Session I from 08:00 to 09:30

Coffee Break

Session II from 10:00 to 11:30

Lunch

Session III from 12:30 to 14:00

Coffee Break

Session IV from 14:30 to 16:00

The course content will be covered as follows:

### **Saturday, February 4<sup>th</sup>, 2012**

Introduction to Rotordynamics. Rotor-Bearing Modeling. Transfer Matrix Analysis. Finite Element Analysis. Campbell Diagram and Critical Speeds. Modal Behavior of Rotors.

### **Sunday, February 5<sup>th</sup>, 2012**

Modeling of Rotating Machinery. Modeling of fluid film bearings. Examples and Case Studies. Computer exercises using RIMAP rotordynamics software.

### **Monday, February 6<sup>th</sup>, 2012**

Measuring the Dynamic Characteristics of Rotors. Transducers and Filtering of Measured Signal. Critical Speed Testing. Run-up/Coast Down Analysis. Bodé and Nyquist Plots. Measuring Phase and Phase Conventions. Calibration of rotordynamic models.

### **Tuesday, February 7<sup>th</sup>, 2012**

Balancing of Rotating Machinery. Balancing of Rigid Rotors. Single and Two Plane Balancing. Static - Couple Balancing, Dynamic Balancing. Balancing Pitfalls. Vector Diagrams. Balancing of Flexible Rotors. Modal Balancing, Influence Coefficient Method and Unified Balancing.

### **Wednesday, February 8<sup>th</sup>, 2012**

Stability of High Speed Rotating Machinery. Stability Maps. Effect of Fluid Film Bearings on Rotordynamics. Design and Selection of Fluid Film Bearings for Rotordynamic Applications. Critical Speed Maps. Diagnosis of Fluid Film Bearing Faults.

## HOTEL AND REGISTRATION

The course will be held at Golden Tulip Al-khobar, Saudi Arabia, in the period February 4<sup>th</sup> – 8<sup>th</sup>, 2012.

The usual course fee of \$ 1950 /SR 7315 covers the cost of all sessions, luncheons, beverage breaks and notes on selected topics.

Please register in advance. Use the registration form and mail it to **Pan Gulf Industrial Systems Co.** at the following address:

**Pan Gulf Industrial Systems Co.**  
**P.O.Box.2473; Al-Khobar 31952 KSA**  
**Tel: (+966 3) 8975651 Fax:(+966 3) 8975654**  
**E-mail: [tarik.abbas@pgisystems.com](mailto:tarik.abbas@pgisystems.com)**

**Attn: Mr. Tarik Abbas**

Participants will receive confirmation of registration by mail. If you must process a company check, enclose a copy of the registration form with the check. Make check payable to **PGIS**.

The course is taught by Certified Analyst from the Vibration Institute, with at least 10 years experience in vibration analysis, condition monitoring and training.

The **Vibration Institute** is a not-for-profit organization incorporated in the USA to spread the knowledge among the specialists working in the field of vibrations through conferences, seminars, meetings and publications. The Vibration Institute publishes **Vibrations** and holds an annual meeting in the USA in June.

