Indian Institute of Technology Kharagpur (WB) 721 302, INDIA

Cryogenic Engineering Centre

Announces

A 2-day 16-hour Training Programme for Engineers

SAFE DESIGN AND OPERATION OF OXYGEN SYSTEMS – 2010 (Open Course)

March 26 - 27, 2010 (Friday & Saturday)

Introduction:

Oxygen is a serious fire hazard. Oxygen burns materials faster and easier than it does in air. Three elements are needed to cause a fire: Fuel, oxidizer and ignition. When oxygen is present in systems like vessels, pipelines, valves, fittings and regulators — it has both: oxidizer and fuel, because the pipes etc. act as fuel. In an oxygen system, we cannot avoid the fuel and the oxidizer to come in contact with each other. Therefore, what we should try to prevent is ignition, which can be done by avoiding the causes that provide ignition energy (ignition mechanisms), using appropriate metallic and non-metallic materials that would not catch fire under the given operating conditions (ignition sensitivity of metals and non-metals) and finally, to design the system in such a way that it does not provide the sources of fire or facilitate creation of a fire or its propagation (appropriate design and operation of oxygen systems). Therefore, it is important to have a clear knowledge on these aspects.

Course Outline:

Properties of Oxygen and Related Hazards: Oxygen as an element/molecule and thermophysical information on oxygen with its oxidizing ability. **General Concepts of ignition and combustion:** Ignition theory consistent with Semenov theory and kinetic reaction rate theory. Short discussion on heterogeneous versus homogeneous reaction and implications with general description of each Fire triangle is introduced and clarified. **Approach to Hazard Mitigation in Oxygen System:** Formal introduction to the hazard analysis process. Characterization of materials (metals and nonmetals) along with examples of data such as Oxygen Index, Heat of Combustion etc. used to determine a material's compatibility. Effects of pressure, temperature, humidity etc on OI and HoC. **Ignition Mechanisms:** (Thermal) ignition mechanism and the mitigation of each of them: Adiabatic Compression, External Friction, Mass Impact, Particle Impact, Static Electricity, Resonance in Cavities, Internal Friction etc. **Promoted Ignition/Kindling Chain**. **Selection of Materials**: Metals and Non-metals. **System or Component Design based on the Critical Operating Parameters:** Preceding information used to analyze components and systems. **Operating Conditions and System Compliance:** It is based on temperature, pressure, oxygen concentration, flow velocity, rubbing parameters, mechanical impact. Other factors: Factors affecting ignition, Factors affecting propagation and geometry of component. **Examples of Analyses of Designs of special components: Valves, Pipelines, Bends, Filters, regulator. International Codes and Safety Regulations.**

Faculty:

Dr. Kanchan Chowdhury, Professor of Cryogenic Engineering Centre at Indian Institute of Technology, Kharagpur will serve as the core faculty. Faculty from Industry may be involved.

Eligibility:

Engineers with degrees in any branch of engineering are eligible. Experience in industry or R&D laboratory is not essential for engineers. M. Sc.or Diploma holders with relevant experience may be allowed.

Venue of Lectures:

Visveswaraya Guest House Lecture Room, Indian Institute of Technology, Kharagpur 721302

Registration:
Intending participants are requested to send the required information for registration to the Course Coordinator latest by January 31, 2010, along with the course fee in the form of draft drawn on any bank at Kharagpur or at par cheque in favour of 'CEP-STC, IIT Kharagpur' in full. The course fee is INR 12000.00 (Indian Rupees Twelve Thousand only) or US$ 300.00 (US Dollar Three hundred only) for foreign participants paying in dollars. Drafts or cheques not drawn on Kharagpur or drawn any bank of India which are not at par have to add an extra Rs.400.00 (or US $ 10 only) per participant to the registration fees as collection charges. Cheques drawn on other countries would not be accepted.
Charges for the boarding and lodging should be paid by the participants directly to Guest House. The Course fee includes bound lecture notes, working lunch and tea/coffee provided during the course.

Accommodation:
Ashutosh Mukherjee Guest House: Single-bedded rooms (AC) (Rs. 200 / person per day as of Oct '09)
Depending on request, participants would be booked in Guest House on a first-come-first serve basis. If the number of participants exceeds 25, Guest House cannot be assured and hotel rooms outside the campus may be arranged for those whose requests would be received late.

Class Schedule:
Dates: March 26 – 27, 2010 (Friday and Saturday).
Timing : Classes will begin at 9 AM sharp. There will be breaks for lunch and coffee. Classes will end at 6 PM everyday. There will be net 8 hour interaction every day. The course is a 16-hour program.

General Information:
IIT is located about 6 km from the Kharagpur Railway Station. Kharagpur, 116 km from Calcutta, is conveniently connected to Howrah (Calcutta) by many local trains every hour and also by express trains. Kharagpur has direct rail links to most major cities in India. Those travelling by air may hire a taxi from Calcutta airport, which would bring you to IIT Campus at Kharagpur (150 km one way) within 2.5 hours. The minimum charge is about Rs. 2,000. Rickshaws (Rs.40), Autorickshaws (Rs.55) and Taxis (Rs. 80) are available to come from the Kharagpur Railway Station to IIT campus. Weather at Kharagpur may just begin to be warm by end-March. Contact Damodar Maity of Saraj Travels (+91 9434146359) for travel-related help.

Sponsors may please note:
a) Please inform the candidate that he/she should bring a scientific calculator to the classroom without fail.
b) Please give a photocopy of this brochure to the prospective participant as soon as he/she is nominated by the company and please tell them to contact the coordinator directly via e-mail.

Information Required for Registration:
Name, Designation/Responsibility, Name and Address of Company, Phone (Off), Phone (Res), Phone (Mobile), Fax, E-mail, Date of Birth, Highest Academic Qualification, Demand Draft details and Amount, Requirement for Guest House bed.

Please Fax/Mail/ E-mail the information to:

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LAST DATE OF APPLICATION: January 31, 2010