TECHNICAL PRESENTATIONS

Plant Engineering Trade Show
April 14, 2011

Advanced Plugging System for Heat Exchanger Tubing	Time: 11:00 AM	Room A

Tracy Sue (USA Industries)

Tube plugging has been used extensively in maintenance and repair of heat exchangers. Traditional tube plugging involves hammer driving the plug or welding it to the tube end. The installation procedure is not controlled which leads to uneven tube stress, tube damage and leaks. To remove the guess work and reduce the maintenance costs, we have designed special plugs called "Snap It Plugs"

"Snap It Plugs" are designed to provide uniform contact stress on the tube ID. The design provides controlled installation and removal of the plug. The design includes a stud that breaks (snaps) upon reaching the rating contact stress. "Snap It Plugs" eliminate welding and the installation is highly controlled using a hydraulic ram. These plugs are tested and rated to holding pressures up to 7000 psig. "Snap It Plugs" help the customers with controlled installation procedure and reduced operational cost.

Engineering Ethics Presentation	Time: 11:00 AM	Room B

C.W. Clark, P.E., Director of Compliance & Enforcement – Texas Board of Professional Engineers

Mr. Clark will discuss recent Board member changes and updates to the guidelines, policies and recent legislative changes to the statute and resulting rule modifications as well as an update from NCEES. He will also discuss the newest rule changes affecting the professional engineering community. He will share with the group some of the recent enforcement actions taken by the Board related to ethical and practice scenarios.

This presentation will meet the one-hour ethics requirement of the continuing education program. Mr. Clark will also be available to answer questions following his presentation.

Proper Grouting Techniques Promote Project Success	Time: 11:00 AM	Room C

Ward Lipscomb, Field Operations / E.I.T. (Adhesive Services Company)

An often overlooked piece of rotating machinery is the "system link" that lies between the foundation and the equipment. Improper installation techniques of grout can result in chronic rotating equipment problems. Proper grouting techniques improves the economical life of the equipment, reduces vibrations and equipment downtime, and should last the economical life of the equipment. Most grouting problems are caused by application mistakes, and are rarely caused by grout manufacturing deficiencies. A successful installation is the result of a mutual understanding of critical factors ranging from the design engineers to the grout applicators in the field. Standards exist for grouting quality control, but the lack of proper grouting techniques in the field is more prevalent. This presentation discusses some commonly encountered grouting deficiencies, and compares them to the recommended practices for machinery installation, as highlighted by API 686. Most commonly encountered grouting deficiencies could have been avoided with proper grouting techniques.

AC Electric Motor Anomalies Detection	Time: 12:15 PM	Room A

Michael Thevanh (GE Energy, Measurement and Control Solutions)

Three-phase electric motors have served as a continual work horse for many years across a variety of different industries. Oftentimes, these motors are run to failure. Bearing, rotor, and stator failures account for 75% of all electric motor failures. Rotor and stator related failures are very difficult to detect while the motor is in operation. Motor Current Analysis, Thermography, Partial Discharge, and Hi-Pot testing are some of the techniques that have traditionally been used to detect failures associated with the rotor and stator. Some of these tests require temporary installation of current transformers (CTs) on motor leads, which expose plant personnel to high voltages and increase the risk of electrical shock. GE Energy is introducing an innovative and advanced technology to provide simpler, more effective, and more affordable condition monitoring for electric motors. The solution is a model-based fault detection system. The advanced algorithms used in the solution were originally developed under a NASA contract and are subject to patent protection. Developing the mathematical process into a practical tool required a considerable development effort, which included tests on several hundred electric motors to ensure the accuracy and repeatability of the diagnostics.

High Pressure Screw Gas Compressors	Time: 12:15 PM	Room B

Takao Koga (KOBELCO EDTI COMPRESSORS, INC.)

The Oil-Injected Screw Gas Compressor (API 619) has been considered as a middle pressure and middle capacity compressor, although it has also been recognized as more reliable and less maintenance required than the Reciprocating Compressor (API618).
However, now High Pressure (up to 100 barG = 1500 psig) Oil-Injected Screw Gas Compressor is available.
It is good news! This compressor creates great benefits for various process gas fields such as Oil Refinery, Petrochemical and Power etc., where Reciprocating Compressor has traditionally been used but the operators have been suffering from some difficulties due to less reliability and frequent maintenance of Reciprocating Compressor. The High Pressure and Reliable Screw Gas Compressor replaces the traditional services of Reciprocating Compressor with the operator's satisfaction.

Load Indicating Fasteners	Time: 12:15 PM	Room C

Joel Baulch (Lamons Gasket Company)

The most effective way to ensure bolted joint performance is to target and maintain accurate and uniform clamp load. Methods for targeting clamp load range from simple operator feel with hand wrenches to hydraulic tensioning. With hand wrenches, there is not a lot of investment to make and the time factor is greatly diminished. Impact wrenches increase the potential for speed, size and loading. Torque wrenches offer a greater degree of accuracy, and are traditionally emphasized as a great solution and better practice, but it is important to understand the shortcomings regarding friction. It is important to understand that once the wrench leaves the head of the fastener, torque is no longer present. All that remains is fastener stress and the resultant clamp load in the joint.

Non-integral systems have been typically used for determining bolt elongation. The concept is based on correlating stretch in the bolt to applied load. Strain gauges and Ultrasonic type require a higher degree of operator expertise, and are not necessarily well-suited for a field

environment.

Integrated systems to measure bolt extension are becoming more practical in concept usage. Mechanical Dial Type and Electronic Type indicating fasteners have even seen a wider usage for highly critical applications. Load Indicating Fasteners are specified under ASTM F-2482. They provide accurate initial flange make-up and a higher confidence factor of joint integrity. This method allows for accurate re-tightening after initial usage, and can provide data to quantify joint reliability. Load indicating fasteners have traditionally been customed designed to the assembly, but new techniques have evolved to allow for ease of universal application under a standardized format.

Wireless Condition Monitoring for Mid-to-Low Criticality Assets	Time: 1:30 PM	Room A

Michael Thevanh (GE Energy, Measurement and Control Solutions)

Increasing reliability in modern plants can be a challenging task for assets that are classified as mid-to-low criticality. Assets like motors, pumps, and fans have traditionally been monitored by a portable data collection program, and though wireless condition monitoring has existed for a number of years, many companies have avoided using wireless technology for a variety of reasons. Some of the main sources of concern include wireless information security, lack of standards and use of proprietary protocols, limited bandwidth (speed and information reliability), power requirements/battery life, and network reliability. This presentation will illustrate how the latest industrial wireless technology is addressing all the concerns listed above and show why wireless condition monitoring is an attractive option to enhance asset reliability.

Finite Element Analysis for Expanding Service Envelopes in Complex-Geometry	Time: 1:30 PM	Room B

Scott Bouse (Stress Engineering Services, Inc.)

This presentation will cover two case studies in pressure vessel rerating where conventional Code calculations did not provide accurate stress categorization. The attempted Code calculations grossly overestimated the stresses in the vessels and therefore provided unnecessary conservatism. In both cases, U-2(g) exemptions were permissible because the geometries of the vessels did not match Code rules. The exemptions used ASME VIII-2 Part 5 Limit Load Analyses to correctly rerate the complex geometries to Code-standard allowable stresses. Both vessels were returned to service.

Ground Conditions and Crane Placement: Loading Subsurface Hazards	Time: 1:30 PM	Room C

Todd Allen (Radarview LLC)

This paper discusses the methodology of using advanced geophysical survey technologies to examine subsurface ground conditions with respect to crane placement for the detection of voids, tanks, utilities, etc. Survey techniques include the use of Ground Penetrating Radar, Electromagnetic Induction, Electromagnetic Line Locators, Metal detection and Magnetometry. A few of the advantages of using this methodology include safer crane operations, reduced risk to the controlling authorities, and reduced downtime failures caused by unknown ground conditions.

Historically, common methodologies may include soil borings, reviews of existing utility maps, and visual surveys of the desired crane placement area. While this may seem sufficient at sites where failures have yet to occur, potentially hazardous conditions can easily go undetected. A

case study review of a procedure for detection of subsurface features/defects that may affect crane operations is presented.

Design, Engineering & Materials Rotating & Reciprocating Equipment	**Time: 2:45 PM**	**Room A**
Paul Raiford and Bob Rowan (Robert L. Rowan & Associates) **This presentation will educate the attendees on proper design and material selection for rotating and reciprocating equipment foundations for both new installations and the repair and upgrade of existing ones. The "Machinery Attachment System" will focus on the means and methods that compressors, turbines, pumps and many types of rotating/reciprocating equipment are attached to their reinforced concrete foundations through the proper selection and use of anchor bolts, machinery supports and grout. Attendees will learn about state of the art engineering for the reinforced concrete block or foundation, anchor bolt theories, different types of machinery supports (and how to select the right one) and "best practice" grouting techniques. Numerous case studies will highlight the right and wrong way to design and install these systems.**		

ASME B31.1 Power Piping Inspection & Repair Aspects	**Time: 2:45 PM**	**Room B**
Joe Frey, P.E., Chair B31.1 (Stress Engineering Services, Inc.) **ASME B31.1 Power Piping Code was a "new construction" Code until December 2007. A chapter on Operation and Maintenance chapter has been added and the Committee is considering adding references to the use of API 579 / ASME FFS-1 and PCC-2. The way this Code is being used is in transition. These changes affect inspectors during initial construction as well as during the inspection and evaluation of power piping additions, modifications, and repairs. This will outline what inspectors need to do during construction and maintenance of power plants. This presentation is geared towards engineers and inspectors with all levels of experience**.		

Asset Integrity Management- Maximizing Asset Life in Today's Environment	**Time: 2:45 PM**	**Room C**
Stephen Cooper, P.E. (Velosi America LLC) **While maintenance and reliability professionals have been pushing Asset Integrity Management (AIM) methodologies for years, often there was resistance to implementing the necessary changes without the proven track record of cost savings or increased reliability that the process purported to deliver. Because of this reluctance, AIM has long been a methodology that has been pushed from the bottom up, and only when positive results have been recognized has wider acceptance and full management support been attained.** **Budget cuts have resulted in less staff to cover more assets. Coupled with aging equipment and**		

longer run times, this has taxed existing capabilities/systems to their limits. This presentation focuses on how effective AIM strategies implemented on today's aging assets can effectively reduce risk and help to increase plant/facility availability in spite of the challenges often faced in today's operating environment.

Corrosion Modeling and Inspection Reporting	Time: 4:00 PM	Room A

Nathanael Ince and William Minter (Pinnacle AIS)

Per API 510 and 570, inspectors have standardized their inspections to a particular checklist, frequency, and overall routine. With little variation, every piece of equipment and piping circuit is treated similarly (barring different classes of piping circuits), and the relaxed reporting standards have given rise to vague inspection findings that relay little value in the inspection lifecycle.

Specifically, this presentation will focus on maximizing the effectiveness of two items in the inspection lifecycle: Corrosion Modeling and Inspection Reporting. Corrosion modeling allows an inspector to hone his resources and expectations to look for pertinent degradation, thereby making the inspection process much more efficient and effective. In addition, utilizing important, descriptive, and exact language to report an inspection remains vital to extracting the most value out of an inspection. This presentation will aim at defining each and then exploring their contributions toward the overall value of inspection.

Vibration Reduction Techniques	Time: 4:00 PM	Room B

Paul Dowdican, P.E. and Sathish Ramamoorthy, Ph.D., P.E. (Stress Engineering Services, Inc.)

Mechanical vibrations are present in varying degrees in all environments where machines and people function. In this presentation, basic vibration terminologies and some of the vibration reduction techniques will be discussed with examples.

Air Cooled Exchangers	Time: 4:00 PM	Room C

Doug Ballard (GEA Rainey)

This presentation will review the advantages and disadvantages of the various types of air cooled exchangers and how to arrive at a cost effective design. Also the steps on how to troubleshoot air cooled exchangers will be discussed.