MECHANICAL SNUBBER FAILURE EVALUATION AND SERVICE LIFE MONITORING

- *DEGRADATION INDICATORS*
- *FAILURE MECHANISMS & CAUSES*
- *LUBRICANT DEGRADATION*
- *SYSTEMATIC FAILURE EVALUATION*
- *DIAGNOSTIC TESTING*
- *POST-DISASSEMBLY/PARTS EXAMINATION*
- *REPAIR/REPLACE DECISIONS*

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SAN ANTONIO, TEXAS
JANUARY 31 & FEBRUARY 3, 2020

COURSE DESCRIPTION

Inservice testing is designed to statistically verify the quality of the snubber population. Unfortunately, such testing does little to identify trends. Some utilities, after several outages with few problems, have unexpectedly had to test an entire population of snubbers in order to meet ISI requirements.

The most effective approach to stabilizing the snubber population quality is preventative maintenance based on monitored snubber degradation (service life monitoring). This course includes an in-depth review of documented degradation mechanisms in Pacific Scientific mechanical snubbers. The course presents a practical and logical approach to failure evaluation, that minimizes unnecessary diagnostic activities. Step-by-step failure evaluation methods are discussed in the order of their effectiveness and simplicity.

Participants will examine actual failed parts and will observe the systematic disassembly of snubbers for failure evaluation purposes. A practical assessment of the so-called "lubricant degradation issue" is presented, along with an overview of the feasibility of scheduled relubrication programs. The course provides a sound basis for making cost-effective decisions pertaining to refurbishment or replacement.

COURSE INSTRUCTOR

David P. Brown, P.E., is President of Lake Engineering Co. in Greenville, Rhode Island. He has been a technical consultant on snubbers since 1984 and has authored numerous technical papers and presentations on snubber design, testing, and service aging. He is a co-author of two NUREG publications on snubber service aging in nuclear power plants. Mr. Brown was the principal investigator for the EPRI sponsored study on Snubber Test Methodology. He is a member of the Subsection ISTD Subgroup of the ASME O&M Code in which he is chairman of the Service Life Monitoring Task Group and the Test Parameters Task Group.

For a period of ten years prior to his present position, Mr. Brown was Manager of the Snubber Section at ITT Grinnell Corp. He was technically responsible for Grinnell's standard line of hydraulic and mechanical snubbers. He was also responsible for the design and testing of large bore hydraulic snubbers used in the restraint of steam generators and RC pumps. During this period, Mr. Brown was extensively involved in research and development of various seal alternatives, including Tefzel, metallic and elastomeric seals. He has been a regular attendee/speaker at SNUG meetings since 1986.

WHO SHOULD ATTEND

This course is intended for Engineering, Quality Assurance, ISI, and Maintenance personnel involved in failure or root cause evaluation, refurbishment, and/or service life monitoring of Pacific Scientific mechanical snubbers.

COURSE LOCATION

The course will be presented at:

DoubleTree by Hilton Hotel
San Antonio Airport
37 NE Loop 410 at McCullough
San Antonio, TX 7216
Tel: (210) 366-2424

Room reservations should be made by contacting the hotel directly. A discounted room rate is available. Please ask for the **SNUG** room block to get this special rate.

COURSE SCHEDULE
FRIDAY, JANUARY 31

Description and Principles of Operation
- Small Capacity Snubber (PSA 1/4 & 1/2)
- Intermediate Capacity Snubber (PSA 1, 3, & 10)
- Large Capacity Snubber (PSA 35 & 100)

Failure Mechanisms and Degradation Indicators
- High Drag Force or Jamming Failure Mechanisms Actual Hardware & Photos)
- High Acceleration Threshold Failure Mechanisms (Actual Hardware & Photos)
- Indicators of Potential Degradation (Actual Hardware & Photos)

Systematic Determination of The Cause of Failure
- Failure Evaluation - A Process of Elimination
- Useful Shortcuts
- Cost-effective Sequencing of Steps in the
- Evaluation Process
- Failure Evaluation Equipment Requirements

Evaluating Snubber Service History
- Relevant Historical Data
- Relevant Information in ISI Data
- Information Available By Hand-Stroking
- Relevant Information in IST Data

Diagnostic Testing
- Repeat Testing
- Test Parameter Variation
- Diagnostic Test by Parts Removal or Replacement

COURSE SCHEDULE
MONDAY, FEBRUARY 3

Disassembly and Post-disassembly Evaluation
- Tools Required
- Critical Inspection Points in the Disassembly Process
- Post-disassembly Evaluation Methods
- When, Where, and How to Measure Parts
- Laboratory Analysis Methods
- Confirmation Testing

Degradation of NRRG-159 Lubricant
- Technical Overview of NRRG-159
- Parts Typically Lubricated in Production
- Facts Pertaining to Lubricant Degradation
- Field Observations (Samples/Photos)
- Effects of Lubricant Degradation on Snubber Performance
- The Role of Vibration in Lubricant Degradation

Documentation of Failure Evaluation Findings
- Failure Evaluation Data Sheets
- Photographic Documentation
- Failure Evaluation Report

Disassembly/Inspection Demos and Practice
- Small Capacity Snubber (PSA 1/4 & 1/2)
- Intermediate Capacity Snubber (PSA 1, 3, & 10)
- Large Capacity Snubber (PSA 35 & 100)

ENROLLMENT, REGISTRATION AND FEE

Enrollment should be completed by January 17, 2020. Course participants may enroll by completing the attached registration form and emailing it to: info@lakeengineeringri.com. Alternatively, participants may enroll by phone by calling 401-949-4733.

The course fee is $1,500. The fee includes all course materials as well as breakfast, lunch, and coffee (tea) breaks for each course day.

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We accept all major credit cards.

Alternatively, payment may be made by check payable to:

Lake Engineering Company
P.O. Box 296
Greenville, RI 02828

It is requested that the course fee be paid on, or prior to, the first course day.

SNUBBER TECHNICAL & ISI REVIEW COURSE

*This two-day course shall be presented on January 24 & 27, 2020 at the same location. Course fees listed shall be reduced by **20%** for personnel who attend **both** courses.*