Presenting Author: Debbie Aliya **Ser:** 1

Organization: Aliya Analytical/Leonardo's Place

Country:

Paper Title: **Elements of an Effective Systems Thinking Methodology**

Co Authors: Bryan Albers, Albers Engineering, and Member, Society of Manufacturing Engineers, Chapter 38, Grand Rapids, MI
Dave Kwiek, Kwiek Tech, and Member, Society of Manufacturing Engineers, Chapter 38, Grand Rapids, MI
Chris McCarty, Grand Rapids Spring and Stamping, Grand Rapids, MI
Peter P. Ried, Jr., Ried and Associates, LLC, Portage, MI

Abstract:

A new Systems Thinking methodology is proposed to develop better approaches to solving or managing problems and projects, large and small, including those usually addressed by Systems Engineering. The goals of this Systems Thinking tutorial are to examine how we might go about learning to 1) avoid becoming overwhelmed by complexity 2) avoid compromising core values for the sake of expediency and 3) use communications to promote clarity of thought while constructively navigating the inevitable conflict of competing interests.

This emerging Systems Thinking methodology builds upon three fundamental elements: 1) Understanding the nature of systems and their interactivity, 2) Embracing Leonardo da Vinci as a role model for creative problem solving, and 3) Learning to recognize and avoid thinking errors.

During the tutorial, participants will be challenged with entertaining and enlightening thinking exercises. We will review a practical case study on how to use these techniques for optimizing negotiation of an engineering project scope. An overview of systems thinking as practiced by various technical and soft disciplines will be provided, along with a brief look at the latest brain science illustrating why a new thinking methodology is needed.

Presenting Author: Rich Wurzbach **Ser:** 2

Organization: Maintenance Reliability Group, LLC

Country:

Paper Title: **Grease Sampling and Analysis: Applying New Sampling and Analysis Technologies for Improved Reliability**

Co Authors:

Abstract:

While oil analysis is a well-established diagnostic technology, equipment that is grease lubricated is generally overlooked for the important lubricant analysis function. Sampling and analysis with small lubricant quantities have generally provided barriers to routine performance of grease analysis. However, recent developments in technology are changing the approach to both sample collection, as well as expanding a broad range of tests to evaluate inservice equipment for the goal of improving reliability and reducing recurring failures. This tutorial will address the challenges in obtaining a representative sample, new tools for sampling consistency, methods of grease analysis with small sample quantities, and case studies for grease analysis for root-cause failure determination, optimization of greasing quantities and intervals based on analysis results, and applications for routine grease analysis for improving machinery reliability.

Presenting Author: John Judd **Ser:** 3

Organization: Dynamic Measurements LLC

Country:

Paper Title: **Relating Vibration Measurements to Reliability**

Co Authors:

Abstract:

Vibration measurement on rotating machinery has become a very important part of PdM program efforts to enhance system reliability. Unfortunately, methods of relating the vibration data to reliability are not always clearly understood.

This brief tutorial session is intended to help those of us who are not statisticians, to better understand the nature of machinery rolling element bearing life, condition and reliability by reviewing some common reliability terms and offering examples to illustrate how the vibration data may be related to these important factors. Sometimes in surprising fashion!

It will review elements that make up reliability assessment such as estimated life, condition, failure probability, financial impact as well as the importance of the measurement techniques and diagnostics used.