VIATC2024
TECHNICAL PROGRAM SCHEDULE
TUESDAY PRE-CONFERENCE WORKSHOPS (August 6)

Pre-Conference Workshop 1 Meeting Room 5	8 am - Noon	"Digital Signal Processing: Understanding the Fourier Transform and How Filters Effect Our Data (Good and Bad)", John Hiatt, DEWESoft
Pre-Conference Workshop 2 Meeting Room 6	8 am - Noon	"Introduction to Forced Harmonic Analysis", Nelson Baxter, PE, ABM Technical Services
Pre-Conference Workshop 3 Meeting Room 5	1 – 5 pm	"Vibration Diagnostic Methods and Corrective Action Strategies to increase the Reliability of Mechanical Equipment", Robert J. Sayer, PE, Sr. Consultant, Mechanical Solutions, Inc.
Pre-Conference Workshop 4 Meeting Room 6	1 – 5 pm	"Vibration Analysis of Reciprocating Compressors", Stephen Plaisance, PE, Bently Nevada

ABSTRACTS:

"Digital Signal Processing: Understanding the Fourier Transform and How Filters Effect Our Data (Good and Bad)"

This workshop will cover some common digital signal processing techniques, transforming time data to the frequency domain with Fourier Transform and filtering techniques with the infinite and finite Impulse response filter types. The main purpose of this paper is to inform the reader about how these mathematical processes impact the data. Also, understanding why the same process is done with two different engineering tools can yield different answers.

“Introduction to Forced Harmonic Analysis”

The objective of this workshop is to introduce the participants into the subject of forced harmonic analysis. The workshop begins with the introduction of the single degree of freedom model. Both a mathematical and a graphical approach to this subject will be presented. The derivation of the Amplification Factor is then presented. The response of a dynamic system to a fixed force that operates below, at and above a natural frequency is discussed. This is followed by the response in all three frequency regions to an unbalance force where the force is not constant but varies with the square of the speed. The subject of eccentricity is covered and the derivation of eccentricity from the unbalance response equation is presented. The transmission of force and motion across a spring mass damper system is then presented. Example problems are presented on each of the above topics.

“Vibration Diagnostic Methods and Corrective Action Strategies to increase the Reliability of Mechanical Equipment.”

Vibration is the result of the dynamic response of a structure or machine to dynamic load. Diagnostic studies involve determining the source and nature of the dynamic force and the dynamic response. This workshop will introduce diagnostic techniques including time waveform and frequency spectral analysis, operating deflection shape (ODS), modal testing, and vibration video amplification. Once the root cause of excessive vibration has been diagnosed a corrective action strategy must be developed to address the vibration problem. This workshop will introduce many popular corrective action techniques including dynamic force attenuation, elimination or isolation, modal tuning, damping, and dynamic vibration absorbers.

“Vibration Analysis of Reciprocating Compressors”

Participants will get a brief introduction to instrumentation used for protection and condition monitoring of a reciprocating compressor, interpret data plots, and identify vibration signatures and patterns related to reciprocating compressor malfunctions.