

- ✓ Are you experiencing stress in your structural design?
- ✓ Are you concerned about the application of weight to your specimen?
- ✓ Have you ever witnessed a residual stress failure?

The Micro-Measurements Technical Experts are available via several online platforms for webinars, training, and meetings!

**Below is a full list of topics available for a customized minimum 120 minute online StrainTalks session.**

This seminar will focus on the five topics of your choice from the list below:

- Understanding the strain gage—theoretical principles (how they work)
- Advanced Sensors strain gage technology
- The structural design of a strain gage (different layers and materials)
- Strain gage selection for: metals, composites, aggregate materials including concrete and asphalt, plastics, wood, cryogenic and high temperature applications
- Surface preparation for strain gage bonding
- Adhesive selection
- Mechanical issues/strain gage testing rigs (strain gage factor determination, creep, fatigue)
- Life expectancy (long-term stability, fatigue behavior, maximum strain, strain gage failure)
- Strain gage performance consideration (transverse sensitivity, strain sensitivity, upper frequency limits, maximum strain)
- Strain gage soldering techniques
- Influential environmental conditions: extreme temperatures including cryogenic and high temperature applications, outdoor, elevated humidity, water exposure, high vacuum and space flight
- Wheatstone bridge considerations. Quarter, half or full bridge, which is best for my application including quarter bridge, two versus three leadwires
- Solder and leadwire selection
- Temperature compensation—STC explained, how to use a dummy strain gage for bridge completion and temperature compensating gages for thermal compensation.
- Weldable strain gage selection and installation
- Techniques for checking strain gage installation quality
- Determination of unknown Coefficient of Thermal Expansion (CTE) using strain gage
- Reviewing IPC/JEDEC standards for Printed Circuit Assembly (PCA) testing using strain gages.
- Talk about how strain gages are used when testing components, sub-assemblies, printed circuit boards, Ball Grid Array (BGA) surface mount packaging and finished products
- PhotoStress: full-field optical strain measurement
- An overview of StrainSmart ("Digital data systems") capabilities including 7000, 7100, 8000 and 9000
- Excitation—grid self-heating, maximizing signal, minimizing noise
- Shunt calibration—proper scaling of the instrument independent of excitation, gain settings, or leadwire resistance
- Averaging—does the strain gage size matter?
- Which is the right resistance for my application?
- Complementary sensors: displacement sensors and LVDTs, thermocouples and bondable temperature sensors (RTDs)
- Strain gage transducers for torque, load, pressure measurements
- Is my measurement static or dynamic? Instrument selection and sampling rate
- Residual stress analysis by hole drilling method
- Determination of maximum and minimum principal strain magnitude and direction using rosette strain sensors
- Using strain gage in experimental stress analysis to validate Finite Element Analysis (FEA)

Also discussed: Static/Quasi static instruments: D4, StudentDAQ, P3 strain indicator and recorder.  
Dynamic/ Quasi dynamic instruments: 7000, 7100, 8000, 9000 DAQ.

RSVP with your selected topics at [mm@vpgsensors.com](mailto:mm@vpgsensors.com).

StrainTalks are brought to you by Micro-Measurements.  
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