

## Acoustic Emission Testing Course

### Level III - Outline

- I. Basic Principles of AE – Review
  - a. AE Sources
  - b. AE Events characteristics
  - c. Stress wave characteristics
  - d. Source location
  - e. Load dependency
    - i. Kaiser and felicity effect
    - ii. Felicity ratio
  - f. Strength of materials and fracture mechanics
  - g. Review of and comparison with other NDT Methods
  
- II. Measuring and Recording AE
  - a. AE system components
    - i. System configurations
    - ii. Hardware
    - iii. Pre-amplifiers
    - iv. Analog and digital components
  - b. AE sensing
    - i. Piezoelectric transducers
    - ii. Transducer designs
    - iii. Design parameters
    - iv. Sensitivity
    - v. Couplant
    - vi. Transducer selection
    - vii. Transducer calibration
    - viii. Transducer attachment
    - ix. Cables
  - c. System set up
    - i. Hardware set up
    - ii. Software set up
    - iii. System calibration
    - iv. Trial run
    - v. Actual test
  
- III. Lab work (Sensor attachment, Simulated AE, Data acquisition, Source Location)
  
- IV. Applicable codes, procedures and standards
  
- V. AE Testing Procedure development
  - a. Designing a successful test
  - b. Preparation
  - c. Procedures
  - d. Stimulation
  - e. Data considerations
  - f. Load schedules
    - i. Initiation load

- ii. Maximum load
    - iii. Loading rates
    - iv. Holds
    - v. Excursions
  - g. Handling noise
    - i. Pre-test elimination
    - ii. In-test discrimination
    - iii. Post-test interpretation
- VI. Applications of AE Monitoring
  - a. Laboratory studies
  - b. Structural applications
    - i. Pressure vessels and piping
    - ii. Tube trailer recertification
    - iii. Fiber reinforced pressure vessels
    - iv. Aerial lift devices for personnel
    - v. Fracture critical members on bridges
    - vi. System and process monitoring
- VII. Lab work (Complete testing procedure demonstrations)
- VIII. Reporting