Vincennes University Metrology 15 Week Program Course Modules

Industrial Safety

Presents an introduction to occupational health and safety and its application in the workplace. Emphasizes industrial safety standards and the Occupational Safety and Health Act (OSHA), personal protective equipment (PPE) and Material Safety Data Sheets (MSDS).

Applied Technical Mathematics

Presents a review of arithmetic, basic algebra, geometry and trigonometry. Includes specific applications to metrology applications. Includes typical mathematical and inspection problems requiring the use of reference standards such as the machinery's Handbook for solution. Includes conversion of English, SI and metric measurement systems.

Introduction to Geometric Dimensioning and Tolerancing (GD&T)

Presents basic topics in Geometrical Dimensioning and Tolerancing (GD&T.) Explains internationally recognized GD&T symbols. Explains the importance of a feature control frame. Covers the Cartesian coordinate system in relation to precision components. Covers theoretical and practical concepts of geometric controls relative to design, tooling, production, and inspection.

Blueprint Reading

Introduces interpreting of various blueprints and working drawings. Applies basic principles and techniques such as visualization of an object, orthographic projection, technical sketching and drafting terminology.

General Machine Shop Processes

Presents an overview of precision machining processes and equipment and provides a working knowledge of treating ferrous and non-ferrous metals. Includes an introduction to heat treatment and basic metallurgy.

Quality Concepts / Q.C. Principles / Statistical Processes

Provides an overview of basic quality concepts including the seven basic quality tools, Lean concepts, SPC, Six Sigma, problem solving tools and techniques and communication. Introduces industrial statistical measures and their relationship to quality, inspection and precision manufacturing. Provides an overview of industry quality management system standards and their requirements on inspection and calibration functions. Topics also include sampling, inspection planning, inspection errors, handling of non-conforming material and measurement system analysis.

Dimensional Inspection

Presents instruction in the proper selection, use and care of basic precision measuring instruments and provides techniques required for accurate and reliable inspections. Demonstrates the importance of inspection processes in a precision manufacturing environment. Presents visual inspection tools and techniques. Demonstrate proficiency using the computer assisted optical comparator to measure circles, arcs, and angles. Demonstrate proficiency when using surface finish gauges. Understand the techniques for establishing part alignments, centerlines, rotation, and elevation. Provides for hands-on inspection of various industrial products using a variety of inspection methods.

(Over)

Calibration

Provides instruction to understand instrument calibration processes and to perform instrument calibrations on basic hand measuring instruments. Understand and conduct measurement system analysis studies. Understand and apply temperature considerations to measurements. Introduces the concept and application of measurement uncertainty as it relates to calibration and inspection.

Coordinate Measuring Machine (CMM) Operation and Programming

Focuses on inspection using a Coordinate Measuring Machine (CMM). Includes CMM and part setup, initialization and operation. Covers the essential aspects of the software and CMM operation, using a sample part for hands-on practice. Understand coordinate measuring machine programming and operation. Apply CMM programming to inspect complex components. Create graphical reports based on CMM measurement results. Generate inspection reports based on geometrical dimensioning. Import CMM measurement data into a statistical process control database. Includes use of both stationary and portable CMM machines.

Basic Non-Destructive Testing (NDT)

Provides instruction and hands on activities for Ultrasonic, Magnetic Particle and Penetrant inspections. Select and apply the proper NDT process to meet inspection requirements. Understand the use and hazards of chemicals used in the NDT inspection process.