Course ID
MPPC
Course Duration
1 day

Course Title
Metal Parts and Process Capabilities: A Comprehensive Workshop

Related Courses

- Cost Reduction: Opportunities and Strategies (COSTRED, 2 days)
- Quality Management (QUALMGT, 3 days)
- Delivery Performance Improvement (DPI, 2 days)
- Statistical Process Control (SPCON, 3 days)

Aimed At

This course is aimed at engineers, project engineers, design engineers, process engineers, program managers, purchasing managers, buyers, quality assurance personnel, and others responsible for designing, buying, and manufacturing metal parts.

Group Size

5-25

Prerequisites

While there are no formal prerequisites, the course assumes an engineering or industrial background.

Course in a Nutshell

Numerous metal parts technologies have evolved over thousands of years for producing reliable components, with the pace of new technology emergence increasing in recent years. The *Metal Parts and Process Capabilities* course is an intense training program focused on selecting appropriate metal parts designs, technologies, and suppliers from operations, quality, economic, and product performance requirements perspectives. The course provides an overview of key metal parts technologies and provides a framework for selecting optimal approaches. It includes numerous practical examples and case studies to provide an experiential, practical, and theoretical basis for making these determinations. The course is focused on the needs of systems integrators who must be smart buyers when selecting materials, technologies, and suppliers.

Customize It!

Whatever the nature of your systems, products, and objectives, we will customize the course to meet your specific needs and concerns. Here are some of the ways in which we can tailor the course to help you get more out of it:

- Additional "workshop days" to allow the participants to work together to discuss in depth the issues of specific interest to your organization. The workshop day can be scheduled a few weeks after the course to allow time for applying the ideas presented in class under an experienced engineer.
- Schedule post-class follow-up consultation for continuing in-house implementation of the concepts taught in this course.

Learn How To

- Work together to select appropriate metal parts technologies and management approaches from design, supplier selection and management, and quality perspectives.

Course Outline

- **Introduction and Metal Processes Overview.** The structure of metals. Deformation and strength considerations. The S-N curve and repetitive stress cycling. Mechanical properties testing. Typical material and process selection criteria.

- **Casting and Molding.** Die casting. Investment and sand casting. Permanent molds. Injection molding. Near net shape considerations. Advantages and disadvantages of each process. Process capabilities. Defects and defect prevention. Casting and molding design considerations. Producibility considerations. Economics of casting and molding.

  Case studies.

- **Sheet Metal Forming and Stamping.** Sheet metal characteristics. Shearing, cutting, and common bending operations. Stamping operations. Stretch forming. Deep drawing. Rolling. Hydroforming. Other sheet metal forming processes. Sheet metal design considerations. Spot welding, conventional welding, rivets, adhesives, and other fastening methods. Process capabilities. Producibility considerations. Economics of forming and stamping operations.

  Case studies.

- **Extrusion and Drawing.** Hot and cold extrusion. Impact extrusion. Extrusion equipment. The extrusion process. Residual stress considerations. Process capabilities. Producibility considerations. Common extruded parts. Economics of extrusion and drawing.

  Case studies.

- **Machining and Abrasion-Based Processes.** Basic cutting considerations. Machining versus other metal working operations. Turning processes. Milling processes. Broaching processes. Sawing. Grinding processes. Ultrasonic, electrical discharge, laser, and other non-conventional machining processes. Process capabilities. Producibility considerations. Common machined and ground parts. Economics of machining and grinding.

  Case studies.

- **Powder Metallurgy and Metal Injection Molding.** Production of powdered metal parts. Sintering. Secondary and finishing operations. Design considerations. Binders. Selective laser sintering. Economics of powdered metallurgy parts. Powder metallurgy process capabilities. Powdered metal

producibility considerations. Common powdered metal parts. Powdered metal parts economic considerations.

Case studies.

- **Surface Treatment, Coating, and Cleaning. Surface hardening.** Vapor deposition. Electrochemical and electroless plating. Anodizing. Painting and powder coating. Cleaning technologies. Environmental considerations.

  Case studies.

- **Other Metal Parts Comparisons and Considerations.** Process capability and yield comparisons. Reliability and strength comparisons. Lead time considerations. Cost estimation approaches. Make versus buy approaches. Supplier evaluation approaches. Other supplier management considerations.

  Case studies.

- **Course Wrap-Up.** Course review. Questions and answers. Plans for future actions. Course critique.

How You Will Learn

- A seasoned consulting engineer-instructor will present this course in interactive lecture/workshop format.
- Along with the lectures, we use exercises, puzzles, case studies, and interesting group activities to enrich the instruction and drive home the essential points.
- You will receive a printed Participant Handbook that includes all materials presented in class, which will help you remember and retain what you learned and apply it on your job.
- You will learn metal parts and process capabilities, quality assurance, and supplier management concepts from theoretical and practical perspectives.

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