



## **Plastics Product Design – Introductory & Advanced**

This course is recommended for designers, engineers and managers involved with product design, development and production. To design a high-quality injection molded part, the designer must select an appropriate plastic material formulation, develop a functional design and must work within the manufacturing limitations associated with the injection molding process. The emphasis of is on design formulas and how to calculate important values. The student should have some knowledge of plastic materials, injection molding and engineering principles However; the basics of plastics product design are covered. The course is also ideal for engineers and designers who are accustomed to working with metals and are faced with metal to plastic conversion concerns.

### Day 1 – Plastics Product Design - Introductory

- Polymer Chemistry Basics and Material Selection Process
- Concurrent Engineering, Plastics Part Design Process overview
- Prototyping and Testing
- Manufacturing Considerations - Design For Molding
- Design for Assembly and review of assembly techniques
- Use of Mold flow analysis to enhance part design
- Part Design considerations to prevent failures
- Fundamentals of product design

### Day 2 – Plastics Product Design - Advanced

- Plastics material behavior: stress-strain relationship. Short term and long-term loading. Creep and relaxation, I design.
- Design for stiffness: Beam theory in design. Ribs and gusset design. Unilateral ribbing design. Cross ribbing design. Design for torsion. Design safety factor.

- Issues in plastic part design.
- Effect of radius and sharp corners in stress analysis.
- Tolerance analysis: Tolerances on molded parts. Factors affecting tolerances (part design, materials, equipment, tooling, molding and environmental effects). Estimation of mold shrinkages.
- Snap-fit, press-fit design, threaded inserts, ultrasonic/vibration welding, adhesives
- Design calculations and exercises.

### **Instructors**

**Tuan M. Dao**, B.Ch.E., MSME, is a Senior Consultant at the Engineering Plastics Consulting Group. He was formerly with DuPont Company and has 25+ years' experience in Plastic Engineering with applications in various industries such as automotive, medical, electrical/electronics, irrigation, and consumer. His expertise includes product design, Finite Element Analysis (FEA), Computational Fluid Dynamics (CFD), mold design, runnerless technology, and optimum molding. He has been teaching Advanced Plastic Product Design classes at UCSD for past five years. He is a senior member, past president of So. Cal. SPE section and currently serving on board as a technical program director.

**Vishu H. Shah** is President of Consultek Consulting Group, a consulting firm specializing in Business Growth strategic planning and new product/Technology strategy development. His 35 years of extensive practical experience in plastics Industry includes positions as president and cofounder of Performance Engineered Products – a custom injection molder, Senior Plastics Engineer of Rain Bird Corporation and NIBCO Inc. His areas of expertise include product design, processing, automation, materials, rapid prototyping, tooling, failure analysis and testing. He is the author of Handbook of Plastics Testing and Failure Analysis and has taught various plastics related subjects throughout his career. Currently, he is teaching classes covering, Plastics Theory and Practice, Scientific Molding, Product Design and Tooling at CAL POLY, Pomona. An active, involved professional, he is a senior member, past president of So. Cal. SPE section, SPE Honored Service Member and a board member of SPI Western Moldmakers Division. Vishu is a graduate of UMass Lowell where he received B.S. and M.S. degree in Plastics Engineering.

He has worked extensively with legal community as expert witness and provided technical support with litigation.