



# Cold and Hot Forging: Fundamentals and Applications

Edited by T. Altan, G. Ngaile and G. Shen • 2004  
• Approx. 350 pages • ISBN: 0-87170-805-1 • ASM Publication

Among all manufacturing processes, forging technology has a special place because it can be used to produce parts of superior mechanical properties with minimum waste of material. Process selection and optimization are important because of the ever-increasing costs of material, energy, and labor. This reference book reviews the fundamentals

of forging technology, the principal variables of the forging process and their interactions, and computer-aided techniques such as finite element analysis (FEA) for forging process and tooling design.

Topics addressed include the flow behavior of the forged material under processing conditions; die geometry and die materials; friction and lubrication; the mechanics of deformation (strains and stresses); the characteristics of forging equipment; the geometry, tolerances, surface finish and mechanical properties of forgings; and the effects of the process on the environment. A major emphasis is on the latest developments in the design of forging operations and dies, and process modeling using FEA is discussed in all of the relevant chapters.

Several chapters of the book have appendices that consist of computer animations showing the results of FEA simulations for various forging operations. The appendices are provided in Microsoft PowerPoint on the CD-ROM included with the book.

**Contents:** Metal Forming Processes in Manufacturing • Forging Process-Variables and Descriptions • Plastic Deformation: Strain and Strain Rate • Flow Stress and Forgeability • Deformation: Complex State of Stress and Flow Rules • Temperatures and Heat Transfer • Friction and Lubrication • Simultaneous Determination of Flow Stress and Friction • Methods of Analysis for Forging Operations • Principles of Forging Machines • Presses and Hammers for Forging • Special Machines for Forging • Billet Separation • Process Design in Impression Die Forging • A Simplified Method to Estimate Forging Load in Impression Die Forging • Process Modeling in Impression Die Forging using FEA • Cold and Warm Forging • Process Modeling in Cold Forging using FEA • Microstructure Modeling in Forging • Isothermal and Hot Die Forging • Die Materials and Die Manufacturing • Die Failures in Cold and Hot Forging • Near Net Shape Forging and New Developments • Index

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