

# METAL FORMING AND THE FINITE-ELEMENT METHOD

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# Metal Forming And The Finite Element Method

**Joong-Yeon Lim**



## **Metal Forming And The Finite Element Method:**

**Metal Forming and the Finite-Element Method** the late Shiro Kobayashi, Soo-Ik Oh, Taylan Altan, 1989-03-09 The application of computer aided design and manufacturing techniques is becoming essential in modern metal forming technology Thus process modeling for the determination of deformation mechanics has been a major concern in research In light of these developments the finite element method a technique by which an object is decomposed into pieces and treated as isolated interacting sections has steadily assumed increased importance This volume addresses advances in modern metal forming technology computer aided design and engineering and the finite element method *Metal Forming Analysis* R. H. Wagoner, J.-L. Chenot, 2001-05-07 The introduction of numerical methods particularly finite element FE analysis represents a significant advance in metal forming operations Numerical methods are used increasingly to optimize product design and deal with problems in metal forging rolling and extrusion processes *Metal Forming Analysis* first published in 2001 describes the most important numerical techniques for simulating metal forming operations The first part of the book describes principles and procedures and includes numerous examples and worked problems The remaining chapters focus on applications of numerical analysis to specific forming operations Most of these results are drawn from the authors research in the areas of metal testing sheet metal forming forging extrusion and similar operations Sufficient information is presented so that readers can understand the nonlinear finite element method as applied to forming problems without a prior background in structural finite element analysis Graduate students researchers and practising engineers will welcome this thorough reference to state of the art numerical methods used in metal forming analysis **Design and Development of Metal-Forming Processes and Products Aided by Finite Element Simulation** Ming Wang Fu, 2017 Computer-aided Preform Design in Metal Forming by the Finite Element Method Naksoo Kim, 1989 *Simulation of Metal Forming Processes by the Finite Element Method (SIMOP-I)* Kurt Lange, 2012-12-06 Process Sequence Design in Metal Forming by the Finite Element Method Joong-Yeon Lim, 1993 Analysis of Sheet Metal Forming Applying the Finite Element Method Arkadiusz Bogumil Kedzior, 1999 CAD/CAM & FEM in Metal Working S. K. Ghosh, A. Niku-Lari, 1988 Preform Design and Friction Evaluation in Metal Forming by the Finite Element Method Sang-Moo Hwang, 1985 *Analysis of Sheet Metal Forming by the Finite-element Method* Jae-Hak Kim, 1977 *On the Application of the Finite Element Method to Metal Forming Processes* Samuel W. Key, Raymond D. Krieg, Klaus-Jürgen Bathe, Sandia National Laboratories, 1978

**Finite-element Plasticity and Metalforming Analysis** Geoffrey W. Rowe, 1991 Finite Element Plasticity and Metalforming Analysis is specifically devoted to the finite element method and its use in plasticity problems It details the theoretical background assuming little previous knowledge and how it can be used to examine realistic metalforming processes Forging rolling and extrusion are typical processes covered in the text in addition to more specific problems It is the first text that describes in detail elastic plastic finite element theory and how it is used in forming analyses For the most

realistic problems large capacity computing facilities are required but the text describes simplified versions of the program that can be run on microcomputers and includes a full listing of a program that can be used for demonstration purposes A full bibliography of books and research papers with 700 entries is provided to aid those investigating the subject *Modelling of Metal Forming Processes* J.L. Chenot,E. Oñate,2012-12-06 The physical modelling of metal forming processes has been widely used both in University and in Industry for many years Relatively simple numerical models such as the Slab Method and the Upper Bound Method were first used and many such models are implemented in the industry for practical design or regulation of forming processes These are also under investigation in the University mainly for treat models ments which require low cost calculations or very fast answers for on line integration More recently sophisticated numerical methods have been used for the simulation of metal flow during forming operations Since the early works in 1973 and 1974 mainly in U K and U S A the applications of the finite element method to metal processing have been developed in many laboratories all over the world Now the numerical approach seems to be widely re cognized as a powerful tool for comprehension oriented studies for predic ting the main technological parameters and for the design and the optlmi zation of new forming sequences There is also a very recent trend for the introduction of physical laws in the thermo mechanical models in order to predict the local evolution of internal variable representing the micro structure of the metal To day more and more practitioners of the Industry are asking for compu ter models for design of their forming processes **The Role of the Finite Element**

**Method in Metal Forming Technology** S. Kobayashi,CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING.,1984 **Modeling of Metal Forming and Machining Processes** Prakash Mahadeo Dixit,U.S.

Dixit,2008-05-14 The use of computational techniques is increasing day by day in the manufacturing sector Process modeling and optimization with the help of computers can reduce expensive and time consuming experiments for manufacturing good quality products Metal forming and machining are two prominent manufacturing processes Both of these processes involve large deformation of elasto plastic materials due to applied loads In metal forming the material is plastically deformed without causing fracture On the other hand in machining the material is deformed till fracture in order to remove material in the form of chips To understand the physics of metal forming and machining processes one needs to understand the kinematics of large deformation dependence of deformation and its rate on displacement as well as the constitutive behavior of elasto plastic materials dependence of internal forces on deformation and its rate Once the physics is understood these phenomena have to be converted to mathematical relations in the form of differential equations The interaction of the work piece with the tools dies and other surroundings also needs to be expressed in a mathematical form known as the boundary and initial conditions In this book the first four chapters essentially discuss the physics of metal forming and machining processes The physical behavior of the work piece during the processes is modeled in the form of differential equations and boundary and initial conditions *Sheet Metal Forming Simulation Using Explicit Finite Element Methods* Karl Brian

Nielsen,1997      **A Finite Element Method for Simulations of 3-dimensional Sheet Metal Forming** Peter Theodoor Vreede,1992      **Application of the Finite Element Method to Metal-Forming Problems** Shiro Kobayashi,CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING.,1986 Applicability of the finite element method in metal forming process modeling has been expanded and the use of its capability for solving industrial problems has been demonstrated in the area of 1 spread analysis in three dimensional forming processes 2 perform design and 3 calculation of residual stresses involved in metal forming In the analysis of spread sideway spread in block compression between two parallel flat plates was analyzed using simplified three dimensional eight node elements The investigation has been extended to the development of general three dimensional finite element technique and the analysis of open die forging was conducted for producing two size bars A novel approach to preform design by tracing a loading path backward from a given final configuration was applied to precision preform design in plane strain rolling The technique was extended to include the temperature calculation in the scheme and applied to precision preform design in nosing at elevated temperatures For the investigation of residual stresses a comprehensive review on the subject has been made and the finite element program was developed for the determination of residual stresses for radial forging Keywords Plastic deformation Radial forging Open die forging Preform design Shell nosing      **Metal Forming Analysis Using the Finite Element Method** MARC Analysis Research Corporation-Europe,1998      *Applications of the Finite Element Method to Metal Forming Problems* Jong Jin Park,1982

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