

1. Record Nr.	UNINA9910564693803321
Autore	Deng Lei
Titolo	Precision forging technology and equipment for aluminum alloy / / Lei Deng, Juchen Xia, and Xinyun Wang
Pubbl/distr/stampa	Singapore : , : Springer, , [2022] ©2022
ISBN	981-19-1828-7
Descrizione fisica	1 online resource (213 pages)
Collana	Springer Series in Advanced Manufacturing
Disciplina	669.722
Soggetti	Aluminum forgings Aluminum alloys - Metallurgy
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	<p>Intro -- Preface -- About This Book -- Contents -- 1 Introduction --</p> <p>1.1 Application of Aluminum Alloy Forgings -- 1.1.1 The Field of Transportation Vehicles -- 1.1.2 The Field of Military Weapons --</p> <p>1.1.3 Other Fields -- 1.2 Research on Aluminum Alloy Precision Forging Technology -- 1.2.1 The Demand for Lightweight Manufacturing -- 1.2.2 Flow Control Forming Technology -- 1.2.3 Combined Casting-Forging Forming Technology -- 1.2.4 Development of New Precision Forging Equipment -- References -- 2 Fundamental of Precision Forging Technology for Aluminum Alloy -- 2.1 Overview --</p> <p>2.2 Types of Aluminum Alloys -- 2.3 Aluminum Alloys and Their Mechanical Properties -- 2.4 Forging Process Performance and Specifications -- 2.4.1 Forging Process Performance Analysis --</p> <p>2.4.2 Heating Specification -- 2.4.3 Allowable Deformation Degree and Forging Velocity -- 2.5 Types of Aluminum Alloy Forgings -- 2.5.1 Long Shaft Forgings -- 2.5.2 Complex Revolving Forgings -- 2.5.3 Branch-Shaped Forgings -- 2.5.4 Large Rib-Web Forgings -- 2.6 Forming Process of Aluminum Alloy Forgings -- 2.6.1 Forming Process During Open Die Forging -- 2.6.2 Forming Process During Closed Die Forging -- 2.7 Calculation of Precision Forging Force -- 2.7.1 Theoretical Calculation of Forging Force of Cylindrical Forgings -- 2.7.2 Calculation of Forging Force During Small Flash Precision Forging --</p> <p>2.8 Deformation Mechanism of Aluminum Alloy -- 2.8.1 Basic</p>

Microstructure Concepts of Aluminum Alloy -- 2.8.2 Deformation Characteristics -- 2.8.3 Mechanism of Hot Deformation -- 2.8.4 Microstructure Changes During Hot Deformation -- 2.9 Quality Control of Aluminum Alloy Forgings -- 2.9.1 Quality Control Before Forging -- 2.9.2 Quality Control During Forging -- 2.9.3 Quality Control After Forging -- References -- 3 Finite Element Simulation of Precision Forging -- 3.1 Overview.
3.2 Basic Theory of Finite Element Simulation -- 3.2.1 Rigid Viscoelastic Finite Element Method -- 3.2.2 Thermal-Mechanical Coupling Finite Element Method -- 3.3 Key Technologies of Finite Element Simulation -- 3.3.1 Calculation of Contact Friction -- 3.3.2 Meshing Technology -- 3.3.3 Choice of Solver and Iterative Algorithm -- 3.4 Examples of Material Modeling for Finite Element Simulation -- 3.4.1 Constitutive Modelling of 2024 Aluminum Alloy -- 3.4.2 Dynamic Recrystallization Modeling of 2024 Aluminum Alloy -- References -- 4 Precision Forging Technology for Long Shaft Parts -- 4.1 Overview -- 4.2 Design of Final Forgings and Die Cavity -- 4.2.1 Design of Hot Forgings -- 4.2.2 Design of Flash Groove -- 4.3 Small Flash Precision Forging Process -- 4.3.1 The Influence of Flash Bridge Size on the Stress -- 4.3.2 The Relationship Between Flash Bridge Size and Flash Volume -- 4.3.3 Optimized Design of Small Flash Groove -- 4.4 Design of Pre-forging Process and Die Cavity -- 4.4.1 The Role of Pre-forging Process -- 4.4.2 Design of Pre-forging Die Cavity -- 4.5 Billet-Making Process for Long Shaft Forgings -- 4.5.1 Selection of Billet-Making Process -- 4.5.2 Calculation of Billet Size -- 4.6 Roll Forging -- 4.6.1 Principles and Characteristics of Roll Forging -- 4.6.2 Die Design of Roll Forging -- 4.6.3 Selection of Roll Forging Machine -- 4.7 Die Design -- 4.7.1 Structural Design of Forging Die Used on Hot Die Forging Press -- 4.7.2 Structural Design of Forging Die Used on Screw Press -- 4.7.3 Design of Trimming Die and Punching Die -- 4.7.4 Design of Sizing Die -- 4.8 Examples of the Precision Forging Process for Typical Parts -- 4.8.1 Multi-step Precision Forging of 2014 Aluminum Alloy Connecting Rod -- 4.8.2 Die Forging of 6061 Aluminum Alloy Branch-Shaped Control Arm -- 4.8.3 Die Forging of 6082 Aluminum Alloy Wingspan Control Arm.
4.8.4 Multi-directional Precision Forging of 7075 Aluminum Alloy Casing -- 4.8.5 Small Flash Precision Forging of 6082 Aluminum Alloy Curved Control Arm -- References -- 5 Precision Forging Technology for Complex Revolving Parts -- 5.1 Overview -- 5.2 Closed Precision Forging of 7075 Aluminum Alloy Gland and Housing -- 5.2.1 Design of Forging Process -- 5.2.2 Design of Flow Control Chamber -- 5.2.3 Calculation of Forging Force -- 5.2.4 Finite Element Simulation of Forming Process -- 5.2.5 Die Design and Process Test -- 5.3 Closed Precision Forging of 4032 Aluminum Alloy Scroll with Back Pressure -- 5.3.1 Comparison of Forming Methods of Scrolls -- 5.3.2 Finite Element Simulation of Forming Process -- 5.3.3 Process Test -- 5.4 Closed Precision Forging of 7075 Aluminum Alloy Tailstock -- 5.4.1 Process Analysis -- 5.4.2 Finite Element Simulation of Forming Process -- 5.4.3 Die Design -- 5.5 Closed Precision Forging of 6061 Aluminum Alloy Wheels -- 5.5.1 The Forged Aluminum Alloy Wheels -- 5.5.2 Closed Precision Forging with a Vertically Separable Die -- 5.5.3 Closed Precision Forging with an Integral Die -- 5.6 Isothermal Precision Forging of Aluminum Alloy -- 5.6.1 Isothermal Precision Forging -- 5.6.2 Isothermal Forging of 7075 Aluminum Alloy Piston -- 5.7 Cold Precision Forging of 2024 Aluminum Alloy Driving Wheel -- 5.7.1 Process Analysis -- 5.7.2 Process Design -- 5.7.3 Die Design -- References -- 6 Combined Casting-Forging Process for Branch-Shaped Parts -- 6.1 Overview -- 6.2 Precision Forming Process of Swash Plate

-- 6.2.1 Squeeze Casting Process -- 6.2.2 Closed Precision Forging Process -- 6.2.3 Comparison of Squeeze Casting and Closed Precision Forging -- 6.3 Precision Forging Process of the Compressor Piston -- 6.3.1 Precision Forging Process -- 6.3.2 Finite Element Simulation of the Closed Pre-Forging Process -- 6.3.3 Process Test. 6.4 Combined Casting-Forging of A356 Aluminum Alloy Steering Knuckle -- 6.5 Combined Casting-Forging of A356 Aluminum Alloy Wheel [9] -- 6.5.1 Process Plan -- 6.5.2 The Effect of Process Parameters on the Wheel Forming -- 6.5.3 Process Test -- References

-- 7 Precision Forging Presses for Aluminum Alloy -- 7.1 Overview -- 7.1.1 The Requirements of Precision Forging on Equipment -- 7.1.2 Types of Precision Forging Equipment -- 7.1.3 Selection of Precision Forging Equipment for Aluminum Alloy -- 7.1.4 Force and Energy Characteristics of General Die Forging Equipment -- 7.2 Hot Die Forging Press -- 7.2.1 Characteristics of Hot Die Forging Press -- 7.2.2 Basic Structure and Working Principle of Hot Die Forging Press -- 7.2.3 Calculation of the Nominal Force of Hot Die Forging Press -- 7.2.4 Toggle Type Press -- 7.3 Precision Forging Hydraulic Press -- 7.3.1 Characteristics of Precision Forging Hydraulic Press -- 7.3.2 Requirements of Precision Forging on the Hydraulic Press -- 7.3.3 Isothermal Precision Forging Hydraulic Press -- 7.3.4 New Medium and Small Precision Forging Hydraulic Press -- 7.3.5 Servo Hydraulic Press -- 7.3.6 Large Hydraulic Press -- 7.4 Screw Press -- 7.4.1 Screw Presses for Aluminium Alloy Forging -- 7.4.2 Direct Drive Electric Screw Press -- 7.4.3 Calculation of the Nominal Force of Screw Press -- References.
