1. Record Nr. UNINA9911019587603321

Autore	Kumar Ajay
Titolo	Handbook of Flexible and Smart Sheet Forming Techniques : Industry 4.0 Approaches
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2023 ©2023
ISBN	9781119986454 1119986451 9781119986430 1119986435
Edizione	[1st ed.]
Descrizione fisica	1 online resource (299 pages)
Altri autori (Persone)	KumarParveen (Professor of mechanical engineering) SinghHari GulatiVishal Kumar SinghPravin
Disciplina	671.823
Soggetti	Industry 4.0 Sheet-metal
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- About the Editors -- List of Contributors -- Preface -- Chapter 1 Incremental Sheet Forming - A State-of-Art Review -- 1.1 Introduction to Incremental Sheet Forming -- 1.2 Incremental Sheet Forming Process -- 1.2.1 Single-Point Incremental Sheet Forming (SPISF) -- 1.2.2 Two-Point Incremental Sheet Forming (TPISF) -- 1.2.3 Double-Sided Incremental Forming -- 1.2.4 Hybrid Incremental Forming -- 1.2.5 Thermal-Assisted Incremental Forming (TAIF) -- 1.3 Materials for Incremental Sheet Forming -- 1.4 Formability Limits with AI Implementation -- 1.5 Conclusions and Future Scope -- References -- Chapter 2 Classification of Incremental Sheet Forming -- 2.1 Introduction -- 2.1.1 History -- 2.2 Classification of ISF -- 2.2.1 Classification Based on Forming Methods of ISF -- 2.2.1.1 SPIF -- 2.2.1.2 TPIF -- 2.2.1.3 MPIF -- 2.2.1.4 Hybrid-ISF -- 2.2.2 Classification Based on Forming Tools of ISF -- 2.2.3 Classification Based on Forming Path of ISF --

2.2.4 Classification Based on Forming Machine of ISF -- 2.2.5 Classification Based on Hot Forming of ISF -- 2.3 Conclusion -- 2.4 Future Work -- References -- Chapter 3 A Review on Effect of Computer-Aided Machining Parameters in Incremental Sheet Forming -- 3.1 Introduction -- 3.2 Process Parameters -- 3.2.1 Effects of Process Parameters on Surface Roughness -- 3.2.2 Effect of Process Parameters on Forming Force -- 3.2.3 Effect of Process Parameters on Formability -- 3.2.4 Effect of Process Parameters on Thickness Distribution -- 3.2.5 Effect of Process Parameters on Dimensional Accuracy -- 3.2.6 Effect of Process Parameters on the Processing Time -- 3.2.7 Effect of Process Parameters on Energy Consumption -- 3.3 Conclusion -- 3.4 Future Work -- Funding Statement -- Conflicts of Interest -- Acknowledgment -- References.
Chapter 4 Equipment and Operative for Industrializing the SPIF of Ti-6Al-4V -- 4.1 Introduction -- 4.2 Materials and Methods -- 4.2.1 Original Equipment -- 4.2.2 Methodology -- 4.3 Results and Discussion -- 4.3.1 Hot SPIF System -- 4.3.1.1 Forming Temperatures Range -- 4.3.1.2 Concept -- 4.3.1.3 Heating Units and Control -- System Validation -- 4.3.1.4 Forming Tool -- 4.3.1.5 Costs Assessment -- 4.3.2 Hot SPIF of Ti-6Al-4V -- 4.3.2.1 Overview -- 4.3.2.2 Temperature Cycles -- 4.3.2.3 Practices for Higher Accuracy -- 4.4 Conclusion -- References -- Chapter 5 Texture Development During Incremental Sheet Forming (ISF): A State-of-the-Art Review -- 5.1 Introduction -- 5.2 Crystallographic Texture -- 5.2.1 Introduction to Crystallographic Texture -- 5.2.2 Texture Evolution During ISF -- 5.2.2.1 Texture Evolution During ISF of Aluminum Alloys -- 5.2.2.2 Texture Development in ISF of AA1050 Alloy in Three Stages of SPIF -- 5.3 Microstructure Evolution During ISF -- 5.3.1 Microstructures -- 5.3.2 Microstructure Evolution During ISF in Various Materials -- 5.3.2.1 AA5052 Aluminum Alloy -- 5.3.2.2 Dual Phase (DP590) Steel -- 5.4 Deformation Mechanism During ISF -- 5.4.1 Membrane Strain -- 5.4.2 Shear Deformation -- 5.4.3 Bending Under Tension (BUT) -- 5.5 Future Scope -- 5.6 Summary -- Abbreviations -- References -- Chapter 6 Analyses of Stress and Forces in Single-Point Incremental Sheet Metal Forming -- 6.1 Introduction -- 6.1.1 Classification of ISF Based on Forming Methods -- 6.2 Experimental Setup -- 6.2.1 Machining Parameters in ISF -- 6.2.2 Tool Path Strategies -- 6.3 FE Analysis of ISF -- 6.3.1 Analysis of Stress on Parts -- 6.3.2 Forces Behavior in ISF -- 6.3.3 Stress Effect on Thinning Part -- 6.3.4 Applications of ISF -- 6.3.5 Result and Discussion -- 6.3.5.1 Stress Behavior -- 6.3.5.2 Force Behavior -- 6.3.5.3 Thinning Characteristics. 6.4 Conclusion -- 6.5 Future work -- References -- Chapter 7 Finite Element Simulation Approach in Incremental Sheet Forming Process -- 7.1 Introduction -- 7.2 Finite Element Simulation -- 7.2.1 Definition -- 7.2.2 History of Finite Element Method -- 7.2.3 Various Software Used for Finite Element Simulation in Incremental Sheet Forming Process -- 7.2.4 Categories and Types of Finite Element Method Simulation -- 7.2.5 Application of Finite Element Simulation in Incremental Sheet Forming Process -- 7.2.6 Advantages of Finite Element Simulation in Incremental Sheet Forming Process -- 7.3 Conclusion -- References -- Chapter 8 Detection of Defect in Sheet Metal Industry: An Implication of Fault Tree Analysis -- 8.1 Introduction -- 8.2 Methodology -- 8.2.1 Data Collection -- 8.2.2 Problem Description -- 8.2.3 FMEA Analysis -- 8.2.4 Fault Tree Analysis -- 8.2.5 Fishbone Diagram -- 8.3 Result and Analysis -- 8.4 Discussion -- 8.5 Conclusion -- References -- Chapter 9 Integration of IoT, Fog- and Cloud-Based Computing-Oriented Communication Protocols in Smart Sheet Forming -- 9.1 Introduction -- 9.2 Background -- 9.3 Communication Protocol Overview -- 9.3.1

HTTP: Hyper Text Transfer Protocol -- 9.3.2 CoAP: Constrained Application Protocols -- 9.3.3 MQTT: MQ Telemetry Transport -- 9.3.4 DDS: Data Distribution Services -- 9.3.5 AMQP: Advanced Message Queuing Protocol -- 9.3.6 XMPP: Extensible Messaging and Presence Protocol -- 9.4 Comparative Study of Communication Protocol for IoT Premise -- 9.5 IOT, FOG, and CLOUD (ITCFBC) Are Interrelated -- 9.6 Challenges and Related Issues -- 9.7 Conclusion and Future Scope -- References -- Chapter 10 Blockchain for the Internet of Things and Industry 4.0 Application -- 10.1 Introduction -- 10.2 Blockchain's Application in a Wide Range of Industries -- 10.2.1 Supply Chain -- 10.2.2 Financial Transactions.
10.2.3 Encryption of Data -- 10.2.4 Product Information -- 10.2.5 Peer-to-Peer Trading -- 10.3 Blockchain Plays in the Future of Our Economy -- 10.3.1 The End of Corruption -- 10.3.2 Integrity -- 10.3.3 Contracts Without the Middle Person -- 10.3.4 No Financial Stand -- 10.3.5 Easier Management Without Analytics -- 10.4 Changes in Society Using the Internet of Things and Blockchain -- 10.4.1 Changes Through Blockchain -- 10.4.2 Changes Through the Internet of Things -- 10.5 Blockchain Transform Industries and the Economy -- 10.6 Blockchain Support Swinburne's Industry 4.0 Strategy -- 10.7 Blockchain Technology's Impact on the Digital Economy -- 10.7.1 Changes in the Architecture -- 10.7.2 Networking and Verification Expenses Are Reduced -- 10.7.3 Automation -- 10.8 Chains Are Being Revolutionized by Blockchain Technology -- 10.8.1 Manual Procedures Are Being Replaced -- 10.8.2 Increased Traceability -- 10.8.3 Reliability and Trustworthiness Are Being Improved -- 10.8.4 Processing Transactions in a Timely and Effective Manner -- 10.9 Businesses That Use Blockchain Technology -- 10.9.1 Blockchain Can Boost Supply Chain Value -- 10.10 Real-World Use Cases for dApps and Smart Contracts -- 10.10.1 Financial Use Cases for Smart Contracts -- 10.10.2 Gaming Using Blockchain Technology: NFTs and Smart Contracts -- 10.10.3 Blockchain and Smart Contracts in the Legal Industry -- 10.10.4 Real Estate and Blockchain -- 10.10.5 Creating DAOs with Smart Contracts for Corporate Structures -- 10.10.6 Smart Contracts in Emerging Technology Applications -- 10.10.7 Smart Contracts' Potential Benefits in Other Industries -- 10.11 Blockchain Is About to Revolutionize the Courtroom -- 10.11.1 Enhanced Security Levels -- 10.11.2 Better Agreements -- 10.12 Conclusion -- References.
Chapter 11 Experimental Study on the Fabrication of Plain Weave Copper Strips Mesh-Embedded Hybrid Composite and Its Benefits Over Traditional Sheet Metal -- 11.1 Introduction -- 11.1.1 Composite Material: Overview -- 11.1.2 Classification of Composite Materials -- 11.1.3 Fiber-Reinforced Plastic (FRP) Composite Material -- 11.1.4 Advantages of Composites -- 11.1.5 Why Composites Are Replacing Traditional Sheet Metals -- 11.1.5.1 High Degree of Strength -- 11.1.5.2 Longer Life Span -- 11.1.5.3 Composites Allow New Design Possibilities -- 11.1.6 Applications of Hybrid Composites Over Sheet Metals -- 11.1.7 Failure Modes -- 11.1.8 Concerns About Disposal and Reuse -- 11.1.9 Problem Definition -- 11.1.10 Layout of the Project -- 11.1.11 Research Objectives -- 11.1.12 Research Application -- 11.2 Proposed Methodology -- 11.3 Experimental Procedure -- 11.3.1 Raw Materials -- 11.3.1.1 E-Glass Fiber (CSM) -- 11.3.1.2 Epoxy Resin (Araldite LY556) -- 11.3.1.3 Hardener (Aradur HY951) -- 11.3.1.4 Flat Copper Sheet -- 11.3.2 Mold Preparation -- 11.3.3 Releasing Agent -- 11.3.4 Plain Weave Copper Strips Mesh Preparation -- 11.3.5 Composite Preparation -- 11.3.6 De-Molding Process -- 11.3.7 Mechanical and Physical Studies of GFRP and Hybrid Composites --

11.3.7.1 Tensile Strength Testing -- 11.3.7.2 Flexural Strength Testing -- 11.3.7.3 Izod Impact Strength Testing -- 11.3.7.4 Shore D Hardness Testing -- 11.3.7.5 Density Testing -- 11.4 Results and Discussions -- 11.4.1 Tensile Strength -- 11.4.2 Flexural Strength -- 11.4.3 Izod Impact Strength -- 11.4.4 Shore D Hardness -- 11.4.5 Density -- 11.5 Conclusions -- 11.6 Future Scope -- References -- Chapter 12 Application of Reconfigurable System Thinking in Reconfigurable Bending Machine and Assembly Systems -- 12.1 Introduction: Background and Overview -- 12.1.1 Definition of Key Terms. 12.2 Description of Machining, Bending, and Assembly Processes.

Sommario/riassunto

This handbook offers an in-depth exploration of flexible and smart sheet forming techniques, emphasizing Industry 4.0 approaches. It covers various aspects of incremental sheet forming (ISF), including single-point, two-point, and hybrid methods, with a focus on materials, formability limits, and machining parameters. The book also explores finite element simulations and analyses stress and force behaviors in sheet metal forming. Additionally, it discusses the integration of IoT and cloud-based communication protocols, fault tree analysis for defect detection, and the application of blockchain technology in Industry 4.0. Geared towards engineers and researchers in mechanical engineering, the book aims to provide comprehensive insights into advanced manufacturing processes.