

Proceedings of the ASME

**INTERNATIONAL SYMPOSIUM ON FLEXIBLE
AUTOMATION
- 2020 -**

ISFA2020

presented at

ASME 2020 INTERNATIONAL SYMPOSIUM ON FLEXIBLE AUTOMATION

JULY 8-9 2020

ONLINE

sponsored by

DYNAMIC SYSTEMS AND CONTROL DIVISION, ASME

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Two Park Avenue * New York, NY. 10016

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Statement from By-Laws: The Society shall not be responsible for statements or opinions Advanced in papers. . . or printed in its publications (7.1.3)

INFORMATION CONTAINED IN THIS WORK HAS BEEN OBTAINED BY ASME FROM SOURCES BELIEVED TO BE RELIABLE. HOWEVER, NEITHER ASME NOR ITS AUTHORS OR EDITORS GUARANTEE THE ACCURACY OR COMPLETENESS OF ANY INFORMATION PUBLISHED IN THIS WORK. NEITHER ASME NOR ITS AUTHORS AND EDITORS SHALL BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR DAMAGES ARISING OUT OF THE USE OF THIS INFORMATION. THE WORK IS PUBLISHED WITH THE UNDERSTANDING THAT ASME AND ITS AUTHORS AND EDITORS ARE SUPPLYING INFORMATION BUT ARE NOT ATTEMPTING TO RENDER ENGINEERING OR OTHER PROFESSIONAL SERVICES. IF SUCH ENGINEERING OR PROFESSIONAL SERVICES ARE REQUIRED, THE ASSISTANCE OF AN APPROPRIATE PROFESSIONAL SHOULD BE SOUGHT.

For authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act, contact the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, Tel: 978-750-8400

Requests for special permission or bulk reproduction should be addressed to permissions@asme.org.

ISBN NO. 978-0-7918-8361-7

**© 2020 ASME
All rights reserved.**

Printed in U.S.A with permission by Curran Associates, Inc. (2020)

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

CONTENTS

ISFA2020

ADDITIVE MANUFACTURING SENSING AND CONTROL

ISFA2020-9611.....	V001T01A001
Closed-Loop Simulation Integrating Finite Element Modeling With Feedback Controls in Powder Bed Fusion Additive Manufacturing	
<i>Dan Wang, Xu Chen</i>	
ISFA2020-9615.....	V001T01A002
Online-Correction of Robot-Guided Fused Deposition Modeling	
<i>Gian Mewes, Alexander Fay</i>	
ISFA2020-9648.....	V001T01A003
Identifying the Cyber-Incidents in Additive Manufacturing Systems via Multimedia Signals	
<i>Wei Yang, Jialei Chen, Kamran Paynabar, Chuck Zhang</i>	
ISFA2020-9650.....	V001T01A004
Investigation of a Magnetic-Field-Assisted Stereolithography Process for Printing Functional Part With Graded Materials	
<i>Erina Baynojir Joyee, Yayue Pan</i>	

CUTTING AND MACHINE TOOLS

ISFA2020-9605.....	V001T02A001
On-Machine Diamond Tool Shaping to Realize Highly Efficient Ultraprecision Machining System	
<i>Meng Xu, Naoyo Yokoyama, Keiichi Nakamoto, Yoshimi Takeuchi</i>	
ISFA2020-9606.....	V001T02A002
On-Machine Measuring Instrument of Workpiece Compliance Using Laser Interferometer	
<i>Masataka Furusawa, Daisuke Kono</i>	
ISFA2020-9610.....	V001T02A003
Sensitivity Analysis of Error Motions and Geometric Errors in the Case of Sphere- Shaped Workpiece	
<i>Zongze Li, Ryuta Sato, Keiichi Shirase</i>	
ISFA2020-9619.....	V001T02A004
Machining Performance Evaluation of Robot Type Machine Tool Based on Forward Kinematics Model	
<i>Akio Hayashi, Masato Ueki, Keisuke Nagao, Hiroto Tanaka, Yoshitaka Morimoto, Nobuaki Fujiki, Hidetaka Yamaoka</i>	

ISFA2020-9629..... **V001T02A005**
Precise Cutting Force Estimation by Hybrid Estimation of DC/AC Components
Taiki Sato, Shuntaro Yamato, Yasuhiro Imabepu, Naruhiro Irino, Yasuhiro Kakinuma

ISFA2020-9633..... **V001T02A006**
Study on Adhesion With Stress and Temperature in Drilling of Aluminum Alloy
Takashi Matsumura, Satoshi Arakawa, Shoichi Tamura

FLEXIBLE AUTOMATION IN MANUFACTURING SYSTEMS

ISFA2020-9620..... **V001T04A001**
A Conflict-Free Routing Method for Automated Guided Vehicles Using Reinforcement Learning
Taichi Chujo, Kosei Nishida, Tatsushi Nishi

ISFA2020-9627..... **V001T04A002**
A Production Planning Based on Shipping Record for Food Company
Hiroya Uematsu, Tatsuhiko Sakaguchi, Naoki Uchiyama, Daichi Hiramatsu, Kensuke Hiramatsu

ISFA2020-9639..... **V001T04A003**
Scheduling-Based Adaptive Operations of Handling Manipulators to Reduce Downtime in Manufacturing Systems
Ryo Yonemoto, Haruhiko Suwa

ISFA2020-9657..... **V001T04A004**
A Real-Time Receding Horizon Sequence Planner for Disassembly in a Human-Robot Collaboration Setting
Meng-Lun Lee, Sara Behdad, Xiao Liang, Minghui Zheng

ISFA2020-9659..... **V001T04A005**
Human-Robot Collaboration: A Predictive Collision Detection Approach for Operation Within Dynamic Environments
Gabriel Streitmatter, Gloria Wiens

INDUSTRIAL ROBOTICS

ISFA2020-9621..... **V001T05A001**
Modeling Force Fluctuations in Incremental Sheet Forming
Michael Prize, Douglas Bristow, Robert Landers

ISFA2020-9631..... **V001T05A002**
Development of Sensorless Force-Control-Based End-Effector for Automated Robot Polishing
Takuhiro Tsukada, Shotaro Ogawa, Katsuki Koto, Yasuhiro Kakinuma

ISFA2020-9655..... **V001T05A003**
Identification of a Kinematic Model of a 6DOF Industrial Manipulator With Angular Positioning Deviation "Error Map" of Rotary Axes
Md Moktadir Alam, Soichi Ibaraki, Koki Fukuda, Sho Morita, Hiroshi Usuki

ISFA2020-9656..... **V001T05A004**
Measurement of 2D Positioning "Error Map" of a SCARA-Type Robot Over the Entire Workspace by Using a Laser Interferometer and a PSD Sensor
Masatoshi Tomita, Soichi Ibaraki

ISFA2020-9660..... **V001T05A005**
Combining Motion Primitives and Image-Based Visual Servo Control
Ghananeel Rotithor, Ashwin P. Dani

MANUFACTURING CONTROLS AND MACHINE AUTOMATION

ISFA2020-9604..... **V001T06A001**
Application of Scatter Search With Path Relinking for Scheduling Problems With Crane Interference
Takashi Tanizaki, Yuto Masuda, Hideki Katagiri

ISFA2020-9608..... **V001T06A002**
Improved Accuracy of a Machining Tool With a Constant Cutting Speed Vector and Outside Approach Path
Takamaru Suzuki, Shoya Iwama, Toshiki Hiroyaki, Eiichi Aoyama, Takakazu Ikegami, Takayuki Akai

ISFA2020-9622..... **V001T06A003**
Kinematic Calibration and Data-Based Error Compensation of a Parallel Robot-Based Incremental Sheet Forming Machine
Shuheng Liao, Kornel Ehmann, Jian Cao

ISFA2020-9635..... **V001T06A004**
Fractional-Order Variable-Gain Super-Twisting Control With Application to Wafer Stages of Photolithography Systems
Zhian Kuang, Liting Sun, Huijun Gao, Masayoshi Tomizuka

ISFA2020-9653..... **V001T06A005**
Exact H₂ Optimal Solutions to a SDOF System With Electromagnetic Tuned Inerter Damper for Vibration Control
Yifan Luo, Hongxin Sun, Xiuyong Wang, Anhua Chen, Lei Zuo

DIGITAL DESIGN AND MANUFACTURING

ISFA2020-9612..... **V001T07A001**
Design of a Two-Piece Brassiere Cup From its Data Points Toward its Automation
Kotaro Yoshida, Hidefumi Wakamatsu, Eiji Morinaga, Takahiro Kubo

ISFA2020-9613.....	V001T07A002
Bending Simulation of a Shielding Braid Toward its Lifespan Prediction <i>Shuhei Narita, Hidefumi Wakamatsu, Eiji Morinaga</i>	
ISFA2020-9614.....	V001T07A003
Behavior Modeling for Product Design Support Focusing on Topological Information of Components <i>Itsuki Hatano, Hidefumi Wakamatsu, Eiji Morinaga</i>	
ISFA2020-9624.....	V001T07A004
3D Shape Prediction of a Paper Model for a Brassiere Cup Consisting of Multiple Polygonal Patterns <i>Hidefumi Wakamatsu, Kyosuke Shirai, Eiji Morinaga, Takahiro Kubo</i>	
ISFA2020-9626.....	V001T07A005
Rapid Estimation of Die and Mold Machining Time Without NC Data by AI Based on Shape Data <i>Hiroki Takizawa, Hideki Aoyama, Song Cheol Won</i>	
ISFA2020-9628.....	V001T07A006
Development of CAM Software to Achieve Automated NC Program Generation: Application to Machining From Near Net Shape Material <i>Isamu Nishida, Keiichi Shirase</i>	
ISFA2020-9640.....	V001T07A007
Material Model Calibration by Deep Learning for Additively Manufactured Alloys <i>Zihan Wang, Hongyi Xu, Yang Li</i>	
ISFA2020-9642.....	V001T07A008
Microstructure Comparison Using Dissimilarity Metric for Additive Manufacturing of Metals <i>Umar Farooq Ghumman, Sourav Saha, Lichao Fang, Wing Kam Liu, Gregory Wagner, Wei Chen</i>	
ISFA2020-9644.....	V001T07A009
3D Printing Collembola Cuticle Inspired Superhydrophobic Microstructures for Potential Deicing Application <i>Xiangjia Li, Yang Yang</i>	
ISFA2020-9649.....	V001T07A010
A Data Fusion Framework for Fracture Toughness Modeling Using Multiple Sources of Data <i>Shancong Mou, Jialei Chen, Chuck Zhang, Ben Wang</i>	
ISFA2020-9651.....	V001T07A011
Effects of Curing-Induced Residual Stress on Composite Strength <i>Haotian Sun, Dianyun Zhang</i>	

ISFA2020-9652..... **V001T07A012**
A Digital Twin of Multi-Axis Machine Tool for Micro Process Planning
Fumiki Tanaka

ISFA2020-9658..... **V001T07A013**
Tool Path Generation Method for High-Quality Machining of Free-Form Surfaces
Yuki Takanashi, Hideki Aoyama

SENSING AND INFORMATION EXTRACTION

ISFA2020-9607..... **V001T08A001**
On Classification and Quantification of Sensory Parameters in Judging Mirror Surface:
Appearance of a Turned Aluminum Alloy Surface
Motohiro Ihara, Iwao Yamaji, Atsushi Matsubara

ISFA2020-9616..... **V001T08A002**
Change Detection in Drilling Process Based on Temperature Nearby Cutting Edge by
LSTM Neural Network
*Punnawit Methuenopanant, Haruhiko Suwa, Shogo Tokumura, Koji Murakami, Yoshiaki
Nonaka*

ISFA2020-9632..... **V001T08A003**
Fuzzy Classification of Gear Fault Using Principal Component Analysis-Based Fuzzy
Neural Network
Kai Zhou, J. Tang

ISFA2020-9636..... **V001T08A004**
Feature-Based Transfer Learning for Bearing Fault Recognition Without Available
Fault Data
Clayton Cooper, Dongdong Liu, Jianjing Zhang, Robert X. Gao

ISFA2020-9637..... **V001T08A005**
Strain Transfer Analysis for Surface Bonded Fiber Sensor Considering Temperature
Influence
Xiaochen Hu, Zhaoyan Fan

ISFA2020-9646..... **V001T08A006**
Application of MOSA Algorithm in Gleeble Testing Model Updating
Dong Xu, Kai Zhou, J. Tang

SMART/SUSTAINABLE MANUFACTURING

ISFA2020-9609..... **V001T09A001**
Dynamic Gesture Design and Recognition for Human-Robot Collaboration With
Convolutional Neural Networks
Haodong Chen, Wenjin Tao, Ming C. Leu, Zhaozheng Yin

ISFA2020-9617.....	V001T09A002
Comprehensive Scheduling Method in Project Management Under Uncertain Environment	
<i>Daisuke Morita, Haruhiko Suwa</i>	
ISFA2020-9630.....	V001T09A003
An Automated Image Analysis and Cell Identification System Using Machine Learning Methods	
<i>Keiko Itano, Koji Ochiai, Koichi Takahashi, Takahide Matsushima, Hiroshi Asahara</i>	
ISFA2020-9638.....	V001T09A004
A Proposal of Resource Allocation Method Based on Combinatorial Double Auction Technique in Crowdsourced Manufacturing	
<i>Daisuke Kokuryo, Yoshiaki Harada, Toshiya Kaihara, Nobutada Fujii</i>	
ISFA2020-9641.....	V001T09A005
Smart Production System Modeling: Bernoulli Serial Line Case	
<i>Yuting Sun, Tianyu Zhu, Liang Zhang</i>	
ISFA2020-9643.....	V001T09A006
Transferable Deep Learning for In-Situ Tool Wear Diagnosis	
<i>Matthew Russell, Peng Wang</i>	
ISFA2020-9654.....	V001T09A007
Active Interlayer Heating for Sustainable Selective Laser Sintering With Reclaimed Polyamide 12 Powders	
<i>Feifei Yang, Tianyu Jiang, Xu Chen, Greg Lalier, John Bartolone</i>	