

PROCEEDINGS OF SPIE

***Third International Conference
on Advanced Manufacturing
Technology and Manufacturing
Systems (ICAMTMS 2024)***

**Ke Zhang
Dailin Zhang**
Editors

**24–26 May 2024
Changsha, China**

Organized by
Central South University (China)
Shanghai Institute of Technology (China)

Sponsored by
AEIC—Academic Exchange Information Centre (China)

Published by
SPIE

Volume 13226
Part One of Two Parts

Proceedings of SPIE 0277-786X, V. 13226

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *Third International Conference on Advanced Manufacturing Technology and Manufacturing Systems (ICAMTMS 2024)*, edited by Ke Zhang, Dailin Zhang, Proc. of SPIE 13226, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510681804

ISBN: 9781510681811 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2024 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL
LIBRARY**

SPIDigitalLibrary.org

Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

xv *Conference Committee*

Part One

MECHANICAL DESIGN AND EQUIPMENT SIMULATION ANALYSIS

- 13226 02 **Research on calibration of the blood transfusion and infusion heating device** [13226-21]
- 13226 03 **Research on the design method of horn antenna for monitoring cracks in metal structures** [13226-215]
- 13226 04 **Design and verification of a feedforward controller of permanent magnet synchronous motors** [13226-212]
- 13226 05 **A new type of CNC boring and milling machine tool changer manipulator design and performance research** [13226-120]
- 13226 06 **Structural design and simulation of exterior louver shading devices of glass domes** [13226-18]
- 13226 07 **STM32-based intelligent ventilation system design for coal mines** [13226-207]
- 13226 08 **Heat dissipation design and research of all-solid-state DC circuit breaker based on IGCT** [13226-213]
- 13226 09 **Design of an automatic processing device** [13226-190]
- 13226 0A **A practical study of a broadband chip amplifier** [13226-160]
- 13226 0B **Mechanical design and analysis of 2400kV DC UHV test equipment without local discharge** [13226-202]
- 13226 0C **Design of brushless DC motor control system for electric vehicles based on microcontroller** [13226-151]
- 13226 0D **Design of automatic control system of self-leveling cement mixing device based on PLC** [13226-139]
- 13226 0E **Research on simulation of superalloy drilling processing based on DEFORM** [13226-143]
- 13226 0F **Design of permanent magnet discrete pole cluster adaptive manipulator** [13226-224]

- 13226 OG **Design and simulation of a multifunctional care bed** [13226-231]
- 13226 OH **The design of rail straightness detector based on the laser displacement sensor** [13226-177]
- 13226 OI **Optimization design of sea cucumber bait mixing device based on flow field analysis**
[13226-203]
- 13226 OJ **A wax-printed mold for prototyping microfluidic devices** [13226-210]
- 13226 OK **Blind interconnection design method based on subminiature push-on coaxial connector**
[13226-195]
- 13226 OL **Design and research of anti-squat bottom cushioning and braking device for elevator**
[13226-29]
- 13226 OM **Manufacturing inspection and improvement of automobile ignition devices based on
advanced 3D scanning technology** [13226-27]
- 13226 ON **Research on slicing and path generation method for conformal additive manufacturing of
curved multilayer circuits** [13226-42]
- 13226 OO **A design method of support equipment simulation software** [13226-100]
- 13226 OP **A design method of damage effect simulation platform** [13226-98]
- 13226 OQ **Indoor switchgear transport and assembly techniques for substation switchgear rooms**
[13226-60]
- 13226 OR **Variable structure soft gripper design for small fragile part gripping** [13226-25]
- 13226 OS **Optimization design of adjustable seat in narrow vessel control station based on ergonomics**
[13226-90]
- 13226 OT **Structure optimization of the main muffler in automobile based on the complex method**
[13226-72]
- 13226 OU **Structural optimization and reliability study of circular saw blade for shrub harvester** [13226-123]
- 13226 OV **Analysis of thermoplastic composite cap long truss hot stamping process** [13226-113]
- 13226 OW **Multi-objective design optimization of marine gyrostabilizer for improved anti-rolling and
power recovery performance** [13226-114]
- 13226 OX **Simulation design and optimization of industrial dust collector frame structure** [13226-109]
- 13226 OY **Conceptual design of automatic edamame harvester based on FBS model** [13226-39]
- 13226 OZ **GaN Schottky diode with composed trench MIS barrier and junction barrier** [13226-91]

- 13226 10 **Design of a tablet drug filling production line system based on S7-1200** [13226-121]
- 13226 11 **Design and simulation analysis of humanoid lower limb with a parallel compliant actuator** [13226-78]
- 13226 12 **Design and realization of a 6-rod 1-DOF robot** [13226-57]
- 13226 13 **Innovative interactive design of eco-friendly digital water lanterns based on emotional data** [13226-229]
- 13226 14 **Correction of manufacturability based on the slice for ceramic vat photopolymerization** [13226-44]
- 13226 15 **Design and CFD analysis of self-regulating pressure relief valves** [13226-93]
- 13226 16 **Intelligent reinforcement technology for metal roofs based on fiber optic sensors** [13226-36]

INTELLIGENT DEVICE DETECTION AND PARAMETER OPTIMIZATION

- 13226 17 **Prediction of stability lobe diagrams in milling based on deep learning method** [13226-136]
- 13226 18 **Prediction model for mechanism sand process parameters of vertical shaft impact crusher based on fuzzy-self-attention hybrid neural network** [13226-211]
- 13226 19 **Resonator defect detection based on single image generative adversarial network and YOLO** [13226-205]
- 13226 1A **Research on intelligent scheduling method for EMU train high-level maintenance** [13226-178]
- 13226 1B **Research on alien wheel spherical distance size measurement algorithm based on machine vision** [13226-146]
- 13226 1C **Optimal scheduling of glass substrate evaporation based on improved genetic algorithm** [13226-191]
- 13226 1D **Research on workshop self-inspection task scheduling based on bi-level genetic algorithm** [13226-192]
- 13226 1E **Application of 3d models in intelligent visual inspection of product anomalies** [13226-131]
- 13226 1F **Simulation and analysis on cutting soil with high-pressure water jet based on EDEM-fluent coupling** [13226-135]
- 13226 1G **Simulation study on temperature field of superalloy during electrical discharge machining** [13226-140]

- 13226 1H **Signal compensation study for damage detection in aluminium plates** [13226-175]
- 13226 1I **Application of advanced artificial intelligence visualization point cloud technology in application in AI detection scenarios** [13226-187]
- 13226 1J **An improved sand cat swarm optimization algorithm for flexible job shop scheduling problem** [13226-218]
- 13226 1K **The study of low-temperature plasma jet for simulating engine exhaust plume** [13226-230]
- 13226 1L **The strategy of formation flying for a cluster of unmanned aerial vehicles using pure position-based passive localization** [13226-196]
- 13226 1M **Error analysis and research of rail straightness detector based on laser displacement sensor** [13226-171]
- 13226 1N **Non-contact thickness measurement of coatings on metallic substrate using pulsed terahertz technology** [13226-126]
- 13226 1O **X-ray weld defect detection based on data augmentation and improved YOLO V7** [13226-62]
- 13226 1P **A calculation model of terminal ballistic parameters based on image variation** [13226-97]
- 13226 1Q **Analysis of infrasound measurement of liquid levels during drilling: a numerical study** [13226-48]
- 13226 1R **Parameter resonance analysis of pipes conveying fluid with shape memory alloy constitutive relation** [13226-16]
- 13226 1S **Simulation of GH4169 turning process based on the coupled SPG/FEM algorithm** [13226-9]
- 13226 1T **Research and optimization of airflow organization in passenger room of subway train** [13226-3]
- 13226 1U **Precision analysis and visual inspection in automatic assembly system for components with complex spatial structures** [13226-51]
- 13226 1V **Numerical simulation study on the process of mine detonation** [13226-86]
- 13226 1W **Research on the vibration characteristics and optimization of heavy truck transmission housing under complex environment** [13226-107]
- 13226 1X **Intelligent temperature and humidity detection device for watering flowers** [13226-96]
- 13226 1Y **Testing and research on acoustic characteristics of low small slow drones** [13226-119]
- 13226 1Z **Numerical simulation of a manual rebar shear based on ANSYS/LS-DYNA** [13226-6]
- 13226 20 **Research and application of a loosening device for pneumatic tobacco dryer based on fluent** [13226-77]

- 13226 21 **Research on the application of composite charge structure in axial premade fragment warhead** [13226-76]
- 13226 22 **Research on 3D annular coding marker recognition algorithm in blade measurement process based on visual tracking** [13226-94]
- 13226 23 **Fine alignment of blade profile measurement data considering probe radius** [13226-53]
- 13226 24 **Prediction of cure-induced deformation of carbon fiber reinforced polymer composites based on transfer learning** [13226-81]
- 13226 25 **Compensation method for metal defect detection based on deep learning and ultrasonic wave** [13226-84]

INTELLIGENT FAULT DIAGNOSIS AND MECHANICAL CONTROL

- 13226 26 **Vector control of PMSM based on fuzzy PI with improved bat optimization algorithm** [13226-172]
- 13226 27 **Simulation and experimental study on erosion wear of hydraulic valve spool based on CFD** [13226-148]
- 13226 28 **Model of microstructure field of grinding metamorphic layer** [13226-176]
- 13226 29 **Research on predictive control strategy of PMSM model based on torque change rate** [13226-182]
- 13226 2A **Fault diagnosis of pitting corrosion for gears under variable loads based on multidimensional features and grey wolf algorithm with support vector machine** [13226-153]
- 13226 2B **Analysis and compensation method of temperature characteristics for resistive heating element under environmental temperature variations** [13226-67]
- 13226 2C **Research on grinding flow field and grinding fluid jet simulation optimization** [13226-134]
- 13226 2D **Research on fuzzy PID control of direct drive volume control braking system with particle swarm optimization** [13226-133]
- 13226 2E **Study of coal mill vibration faults based on SVD-VMD and LSSVM** [13226-129]
- 13226 2F **Discrete sliding mode control for nonlinear systems with unknown inputs and random noise** [13226-158]
- 13226 2G **Multi-agent system fault-tolerant cooperative control based on finite time observer** [13226-150]
- 13226 2H **Failure analysis and repair suggestions for cracks in the runner chamber of a power plant unit** [13226-69]

Part Two

- 13226 2I **Analysis of anti-pinch failure of window glass lifting system of a car** [13226-163]
- 13226 2J **A digital twin modeling method of atmospheric pressure control system for manned space docking** [13226-226]
- 13226 2K **Research on multicomponent transmission line anti-breakage device based on coupling capacitor voltage** [13226-130]
- 13226 2L **Construction and research of forecasting method of electrical fault based on machine learning and decision tree** [13226-198]
- 13226 2M **Overcoming constant ocean current disturbances in underactuated AUV path tracking control** [13226-209]
- 13226 2N **Research on track fault diagnosis method of mechanical parking equipment based on deep learning** [13226-183]
- 13226 2O **Research on the control of magnetorheological semiactive suspension using sliding-mode backstepping control** [13226-214]
- 13226 2P **TAN calibration algorithm based on wave parameters** [13226-22]
- 13226 2Q **Multitask learning enhanced fault diagnosis based on multimodal feature with adaptive weight fusion** [13226-80]
- 13226 2R **Ball mill fault detection system based on autoencoder neural network** [13226-122]
- 13226 2S **Control and application of uniform speed indirect heating device in dishwasher system** [13226-40]
- 13226 2T **Tobacco cigarette machinery and equipment maintenance based on IOT remote technology** [13226-118]
- 13226 2U **Failure analysis and improvement of brake accumulator pressure drops fast for certain type of aircraft** [13226-127]
- 13226 2V **Experimental study on the influence law of the number of processing cycles and abrasive concentration on the polishing effect of abrasive flow** [13226-32]
- 13226 2W **Numerical simulation and analysis of leakage signal characteristics of different leakage holes in gas pipelines** [13226-79]
- 13226 2X **Analysis of internal flow characteristics of geometrically compensated jet control valve** [13226-95]

- 13226 2Y **Surface roughness of microfabrication and its influence on integrated interconnect transmission loss** [13226-7]
- 13226 2Z **Fault detection based on EWDKPCA-LSSVM** [13226-105]
- 13226 30 **Simulation analysis of spur gear injection lubrication based on different injection angles** [13226-112]
- 13226 31 **Research on motor thermal control in hybrid vehicles** [13226-2]
- 13226 32 **Optimization of pipeline with elliptic section based on ansys workbench** [13226-10]
- 13226 33 **Research on non-destructive helium pressure of TVS-2M fuel rods** [13226-87]
- 13226 34 **Research on clutch thermal control during mode transition in hybrid vehicles** [13226-15]

MECHANICAL MECHANICS ANALYSIS AND PERFORMANCE RESEARCH

- 13226 35 **Gaussian reconstruction algorithm for under-sampling atomic force microscopy images based on Cassini elliptical scanning** [13226-142]
- 13226 36 **Performance analysis of the system composed of electric motor, variable-displacement pump, and constant-displacement motor** [13226-201]
- 13226 37 **Data-model driven nonlinear dynamic modeling method for rolling linear guideway** [13226-188]
- 13226 38 **Research on wave transmissivity through bumper based on transmission line model** [13226-154]
- 13226 39 **Influence mechanism of the layout attributes on the effects of the eye-gaze interaction** [13226-185]
- 13226 3A **Dynamic analysis of motorized spindle under axial disturbance of ceramic bearing inner ring** [13226-147]
- 13226 3B **Air-gap and mass eccentricity on dynamics of magnetic bearing rotor system** [13226-222]
- 13226 3C **Research on effects of thrust reverser exhaust flows on aerodynamic characteristics of wing-mounted civil aircraft** [13226-170]
- 13226 3D **Social learning in self-organizing manufacturing networks based on opinion dynamics** [13226-189]
- 13226 3E **Influence and analysis of installation gap on mechanical test of servo actuator** [13226-225]
- 13226 3F **Research on ore sorting manipulator based on improved YOLOv7 algorithm** [13226-145]

- 13226 3G **Research on dynamic performance optimization of three-axis precision drilling and milling machining center based on spindle system structure** [13226-70]
- 13226 3H **Multi-AGV path planning for yarn cone delivery in twisting workshop** [13226-63]
- 13226 3I **Investigating the performance of MPC semi-active suspension control in autonomous vehicle trajectory tracking** [13226-124]
- 13226 3J **Simulation of motion of charged particles in inhomogeneous electromagnetic field based on Matlab** [13226-68]
- 13226 3K **Structural parameter analysis of integral elastic centralizer based on response surface method** [13226-26]
- 13226 3L **Parameter optimization of slit width for fiber laser cutting of polyethylene films** [13226-75]
- 13226 3M **Finite element simulation analysis of static stiffness of bushing rubber mount** [13226-30]
- 13226 3N **Thermal simulation and optimization of tec hot end heat pipe radiator** [13226-83]
- 13226 3O **Dynamics characterization of a class of custom slide model piezoelectric energy harvester** [13226-35]
- 13226 3P **Parametric modeling and simulation of unknown ADCs via MATLAB SIMULINK** [13226-11]
- 13226 3Q **Virtual simulation of nuclear radiation based on improved ray casting** [13226-55]
- 13226 3R **Analysis and optimization of solder joint stress of bus bar under random vibration and temperature cycle** [13226-14]
- 13226 3S **Modeling and stress study of gantry crane boom based on multibody dynamics** [13226-61]
- 13226 3T **Dynamic and static modeling of extruder thermodynamics and linear programming of extruder power consumption** [13226-223]
- 13226 3U **Optimization of vibration isolation structure and experimental study on vibration-isolation thrust bearing** [13226-104]
- 13226 3V **Analysis of heat transfer characterization of heated rolls based on conjugate heat transfer calculations** [13226-5]
- 13226 3W **Molecular dynamics simulation of SiC oxide layer mechanical polishing** [13226-50]
- 13226 3X **Simulation of vegetable lubricant electrowetting** [13226-117]
- 13226 3Y **System dynamics-based whole life cycle energy consumption and cost analysis of a typical cable project with near-zero consumption construction project** [13226-13]

- 13226 3Z **Simulation of electrodynamics for nanofluid composite droplet electrowetting** [13226-116]
- 13226 40 **Attitude analysis of automobile steering gear based on Monte Carlo algorithm** [13226-111]
- 13226 41 **Enhanced hole performance efficiency in tungsten metal via electrochemical discharge machining** [13226-56]
- 13226 42 **Contact stress analysis of cycloidal pin wheel of RV reducer** [13226-82]
- 13226 43 **Interior ballistic modeling and experimental study of a supercritical carbon dioxide gas gun based on a real gas equation of state** [13226-31]
- 13226 44 **Research on point cloud simplification method for retaining sharp features of turbine blades** [13226-108]

ADVANCED MANUFACTURING SYSTEM AND INFORMATION TECHNOLOGY

- 13226 45 **Systematic quantification and analysis of multi-joint robotic arms based on deep learning** [13226-23]
- 13226 46 **Construction and research of industrial production line simulation platform based on digital twin** [13226-228]
- 13226 47 **Trajectory constraint method and verification of teleoperation master manipulator based on virtual fixture** [13226-168]
- 13226 48 **Construction and implementation of remote visual guidance system based on embedded hardware** [13226-164]
- 13226 49 **Research and application of speech assisted modeling technology based on .NET framework** [13226-219]
- 13226 4A **Research of real-time monitoring system for mooring bollard structure safety** [13226-200]
- 13226 4B **Fiber Bragg grating sensing-based torsional performance monitoring system for carbon fiber reinforced plastic drive shafts** [13226-179]
- 13226 4C **Research on the loading system of large-caliber micronano optical structure lithography machine** [13226-180]
- 13226 4D **An online customization platform for headphones based on additive manufacturing** [13226-174]
- 13226 4E **Research on the influence of annular flow on critical speed of integrated motor pump rotor system** [13226-166]
- 13226 4F **Research on discharge detection system of electric discharge machining based on neural network** [13226-197]

- 13226 4G **Conception of lunar surface mobility and operation platform** [13226-204]
- 13226 4H **High-precision closed-loop motion chassis system for intelligent logistics trolley** [13226-159]
- 13226 4I **A section heating system of direct-expansion solar-assisted heat pump for crude oil heating performance simulation study** [13226-161]
- 13226 4J **Research on the demoulding system of ceramic winding pipe based on PLC control** [13226-165]
- 13226 4K **Research on aggregate weighing system of stabilized soil mixing station based on STM32 embedded single chip microcomputer** [13226-137]
- 13226 4L **The enhanced modeling method of industrial Internet manufacturing resource** [13226-89]
- 13226 4M **Intelligent manufacturing systems for on-line tool wear monitoring under cross conditions: a brief review** [13226-173]
- 13226 4N **Research on OTA-based automotive bootloader remote data update technology** [13226-181]
- 13226 4O **Research on automatic gear-shift strategy of heavy truck downhill based on geographic information prediction** [13226-167]
- 13226 4P **Data analysis of three-point bending deformation based on finite element method** [13226-220]
- 13226 4Q **Design of special pipeline helix angle measurement system based on orifice suspended guide rail** [13226-64]
- 13226 4R **Research on business process modeling of the home appliance manufacturing value chain** [13226-106]
- 13226 4S **A reference source for use in the SOI RF process** [13226-33]
- 13226 4T **A multiobjective grey wolf algorithm for stock cutting resource combination optimization under cloud manufacturing environment** [13226-37]
- 13226 4U **Research on modeling and adaptation algorithms for reconfigurable production line systems in discrete workshops** [13226-8]
- 13226 4V **Design and simulation of methanol fuel supply system based on MWORKS** [13226-52]
- 13226 4W **Research and simulation of adaptive routing mechanism in InfiniBand network** [13226-12]
- 13226 4X **Research on NVH optimization of automotive engine intake system** [13226-71]
- 13226 4Y **An intelligent microwave defrosting system design** [13226-66]

- 13226 47 **Localized mode in one-dimensional anharmonic electronic circuit system** [13226-24]
- 13226 50 **An integrated software platform for ship CAE complex scenes** [13226-128]
- 13226 51 **Design and experiment of human-robot collaborative intelligent riveting system based on compliant control technology** [13226-115]
- 13226 52 **Deep reinforcement learning-based orders splitting method for the wire bonding process in semiconductor chip packaging and testing workshops** [13226-73]
- 13226 53 **Research on industrial park production system based on big data** [13226-45]
- 13226 54 **Design and simulation of intelligent cross-border e-commerce logistics pathway system for intelligent manufacturing enterprises based on improved genetic algorithm** [13226-28]
- 13226 55 **Calculation and analysis of structural strength of a certain type of fire extinguishing bomb** [13226-92]