

# 机械工程与自动化

JIXIE GONGCHENG YU ZIDONGHUA

(双月刊·1972年创刊)

2015年第3期

(总第190期)

## 编辑委员会

委 员:(以姓氏笔划为序)

王文先 王守信 王守恒  
刘建成 许并社 池成忠  
张士宏 张建民 张建林  
张治民 张保国 李永堂  
李保成 李 桓 杨世春  
晋民杰 徐弘山 郭会光  
黄庆学 谢克明 韩 焱

主 编:申若虹

副 主 编:冯建友

梁秀春(常务)

主管部门:山西省机械电子工业行业管理办公室

主办单位:山西省机电设计研究院

山西省机械工程学会

编辑出版:《机械工程与自动化》编辑部

地 址:太原市胜利街228号

邮政编码:030009

电 话:(0351)3084269

发行范围:国内外发行

国内发行:山西省邮政报刊发行局

邮发代号:22-117

国外发行:中国国际图书贸易总公司

国外代号:BM8245

印 刷:山西省建筑科学研究所印刷厂

出版日期:双月中旬

封面设计:王 群

广告经营许可证号:1400004000080

刊 号:ISSN 1672-6413

CN 14-1319/TH

期 定 价:12.00元

http://www.meajournal.com

E-mail:jxgcbjb8@163.com

# 目 次

• 试验研究 •	
压下率对不锈钢/碳钢复合板界面剪切强度的影响 .....	
..... 陈少航,周存龙,马国财,杨天云,马江泽(1)	
机电产品绿色度评价方法研究 .....	曾志斌(3)
一种开架式水下机器人流体动力特性研究 .....	
..... 王志东,窦京,凌杰,凌宏杰,李洋,付佳,吴娜(7)	
基于倒拖法检测活塞环气密性的试验方法 .....	
..... 陈洋,赵丹平,冯强,赵文娟,韦丽珍(10)	
取样剪切机改进机构力能参数估算 .....	刘志强,王永刚(13)
基于 DEFORM-3D 的自封铆接影响因素正交试验研究 .....	
..... 闫强,周林蕾,刘钢(15)	
滑动轴承油膜承载力研究及试验验证 .....	
..... 陈磊,区庆培,张勇,张跃春,熊顺(18)	
• 计算机技术应用 •	
基于 ANSYS Workbench 14.5 的某客车架结构模态分析 .....	
..... 窦宝华,戴作强,张铁柱,盛建(21)	
基于 Altair-OptiStruct 的客车车身结构拓扑优化设计 .....	
..... 乌秀春,郑文强,赵倩,周盼(23)	
基于 UG 和 ADAMS 的机械手臂虚拟设计和仿真 .....	谢友增,霍利鹏(26)
基于有限元的嵌入式直驱刀架动态特性分析 .....	
..... 李小伟,邢济收,杨庆东,牟冰(28)	
基于 Pro/E 二次开发的微型行星齿轮快速设计系统 .....	邝杰灵,仲梁维(31)
六足机器人的运动仿真研究 .....	黄再辉,张文志(33)
小波在图像压缩中的应用 .....	程鹏举,陈西曲(35)
套筒连接机构的静力数值仿真分析 .....	
..... 井庆祝,刘祥,高士彦,付忠亮(37)	
基于优化驱动法的雷达天线结构设计与仿真优化 .....	胡峰,王志海(40)
基于产品模型树的装配序列规划技术研究 .....	牟小云(43)
基于基因工程的分液罐快速设计研究 .....	马艳,仲梁维(46)
基于 ANSYS 的高性能高压水压试验机机架疲劳分析 .....	
..... 李培力,隋健,马海宽,高尚晖,寇永乐,刘慧超,王冬梅(48)	
基于 MATLAB 的全自动插秧机机构运动仿真分析 .....	
..... 田洪强,张文志,戴源成,侯宾(51)	
非包容转子碎片撞击飞机增压舱的数值模拟 .....	
..... 白杰,张健,王伟(54)	
基于汽车座椅导轨试验模态的结合部刚度优化 .....	
..... 张晨,余慧杰,丁晓红(56)	
基于矩阵算法的平面四连杆机构的优化 .....	麦云飞,邵叶辉(59)
传感器优化布置下的移动部件试验台的模态研究 .....	
..... 陈子龙,钱炜,赵志良(61)	
基于 STAR-CCM+ 的发动机冷却风扇 CFD 仿真分析 .....	
..... 孟庆林,尹明德,朱朝霞(64)	
基于 ADAMS 的悬架运动学仿真及优化 .....	刘津,钱炜(67)
基于 ABAQUS 的压平机横梁结构改进模拟分析 .....	王涪玉,赵利平(70)
基于 CATIA 和 ANSYS 的某化工减速器输出轴的设计 .....	
..... 雒晓兵,许可芳,惠振亮(72)	
基于 FANUC 系统的数控综合实验装置的设计 .....	向倩,尹显明(74)
车间生产调度优化中改进微粒群算法的应用 .....	
..... 徐海波,仲梁维,龚文露(76)	
基于 ADAMS 的对心曲柄滑块机构的运动学分析 .....	潘鸣宇(78)
基于 ADAMS 某链式回转弹仓的仿真分析 .....	
..... 信义兵,高跃飞,徐凤军,刘海涛(81)	
基于 IIW 标准的矿山起重机主梁焊缝应力分析 .....	赵鹏飞(83)
液压支架立柱的三维参数化建模 .....	任洁,郝明锐(85)
机器人动力学模型在轨迹规划中的应用 .....	白云飞(87)
在数控铣床上编制螺纹的通用数控加工程序 .....	金廷威(90)
基于 ANSYS 的 9 m 天线静态特性分析 .....	
..... 孙江艳,蔡先续,周田,吴庆晨(93)	
高速压力机齿轮啮合强度分析 .....	
..... 王军领,詹俊勇,仲太生,张春祥,顾俊(96)	
基于 R 参数的数控刀具寿命管理程序开发 .....	赵国强,武迎迎,张春明(98)
低速重载下齿根弯曲强度有限元分析 .....	张金泉(101)
陀螺稳定动力学仿真分析 .....	乔梁,鲁飞,苗建松,孙也尊(103)

<b>· 机械设计 ·</b>	
护栏清洗装置混合变型设计 .....	穆彬彬, 李小宁, 刘德仿 (106)
熄焦车开门机构气缸推力设计计算方法研究 .....	左 强 (109)
基于 RFID 技术的感应式汽车车位锁设计 .....	翟永杰, 李 冰, 伍 洋 (111)
带有新型机械密封的 T9-19-No6. 3D 钛材风机研制 .....	韩 峰 (114)
一种新型单向节流阀的设计与研究 .....	朱 建, 肖庭庭 (116)
铣水泵叶轮十字槽夹具设计 .....	杨 煦 (118)
深扁孔热冲模设计 .....	梁建平 (120)
基于活塞式解脱机构的回收装置设计与研究 .....	谭 华 (122)
DSJ120/150/2×200 型可伸缩带式输送机设计应用 .....	武振忠 (124)
一种新型摇摆机自动上箱装置的设计 .....	韩善朋, 徐媛媛 (126)
<b>· 材料研究 ·</b>	
残钛回收 TC4 铸锭成分研究 .....	袁鹏飞, 廖 强, 吴 华, 谢 强, 刘 华, 张 娜 (128)
微晶合金技术在机械传动中的应用 .....	祝瑞银 (130)
<b>· 工艺研究 ·</b>	
基于 Pro/E 的笔记本电源显示灯滑键注塑模具设计 .....	李耀辉, 李洪伟 (132)
小断面综掘工作面干式除尘器的设计及工艺布置 .....	郭成保 (135)
变径管与薄壁圆管轴向压缩过程研究 .....	徐龙江, 雷君相, 高贵杰 (137)
<b>· 质量监测与故障诊断 ·</b>	
民机系统部件维修间隔的确定方法研究 .....	刘 涛, 苏茂根 (139)
一种简易的数控机床圆度误差在线测量系统 .....	蒋 峰, 邓宇锋 (141)
一种在线测量卷烟圆周尺寸的方法 .....	袁 丽, 李居峰, 金洋洋 (145)
汽车变速器车载动态测试振动分析的研究 .....	王丽娟 (147)
<b>· 自动化技术 ·</b>	
温室大棚环境远程监控及自动灌溉系统的设计 .....	田 野, 徐保强, 于欣欣 (149)
基于模糊 PID 的助老助行机器人控制系统设计 .....	魏晓娟, 王耀武 (152)
纤维板生产线热压机电气系统的 PLC 改造 .....	姜 娟, 赵敏玲, 方官丽 (154)
水平下调式三辊卷板机自动控制系统研究 .....	李宏远, 刘 欢, 黄金鑫 (156)
风力发电变桨智能电池管理系统设计 .....	刘 道, 龙 辛, 庞 伟, 汪雅果 (158)
火箭发动机壳体衬层固化的温度控制系统设计 .....	赵永锋, 杜 娟 (160)
全自动洗衣机 PLC 控制系统设计 .....	胡小颖 (163)
基于 LabVIEW 的碟式分离机现场动平衡测试系统 .....	张琦萍, 贺小平 (165)
汽车试验台惯量模拟方法的研究 .....	葛友华, 倪 泉, 苏 磊, 刘 曼 (168)
大流量高精度热气源系统的设计与实现 .....	刘小安, 褚昌军, 张艳清 (170)
基于二维模糊控制的汽车智能限滑系统的研究 .....	李 骁, 骆艳洁, 贺 锐, 丁荣莉 (173)
一种基于 AVRUSB 的红外遥控键盘设计 .....	李如忠 (176)
PLC 与变频器在电镀生产线控制系统改造中的应用 .....	刘远娟 (179)
热轧带钢板形设定控制在莱钢的研究与应用 .....	赵 波 (182)
莱钢 CCGP 发电控制系统优化 .....	李金凤 (184)
<b>· 实用技术 ·</b>	
CZK300 型汽轮机连通管改造方案探讨 .....	高胜利 (186)
液体动压滑动轴承油膜压力分析 .....	刘宏伟, 杨 锐 (188)
适应晋煤集团的 6.2 m 大采高压支架开发 .....	赵喜增 (190)
油气润滑技术在湘钢高线轧机上的应用 .....	马运龙 (192)
甲带式给煤机实用性改进 .....	穆 浩, 胡雅琳, 郭祥东 (194)
电动拧紧系统在变速箱装配中的应用 .....	金海鸿 (196)
道路清扫车工作装置结构的改进 .....	赵 丽 (198)
基于 CAXA 制造工程师的典型板类零件铣削加工 .....	徐敬东 (200)
某旅游车专用变速箱设计 .....	马利东 (202)
高炉炉顶压力控制系统特殊故障的诊断研究 .....	亓 波 (204)
焦罐车旋转机构的改进 .....	宫文龙 (206)
高速列车项目给排水及卫生系统设计 .....	沈浦源 (208)
浅述多绳摩擦提升机首绳快速换绳装置的应用 .....	李红卫 (210)
煤基油示范项目蒸汽系统的回收利用 .....	李 芳 (212)
一种轻卡变速器脱档原因分析及改进 .....	吕 超 (214)
双中间轴变速器气路故障分析 .....	刘春雷 (216)
<b>· 专题综述 ·</b>	
忆阻在神经网络中的应用 .....	魏江涛, 宋卫平, 王清华 (218)
DELMIA 软件在数字化工厂中的应用 .....	黄腾辉, 孙绍泉, 彭宁涛, 周雨先 (220)
民航涡扇发动机的维修性设计 .....	李书明, 王凌云, 黄燕晓 (222)
关于制造业产销一体化的管理系统分析 .....	侯 强 (225)
来稿须知 .....	(226)
<b>· 机电新产品 ·</b>	
内蒙古第一机械集团有限公司第十分公司产品简介 .....	封面, 封二
太重技术中心简介 .....	封三, 封底
山西省机械产品质量监督检验站简介 .....	插一
山西省机械产品质量司法鉴定中心简介 .....	插二

# MECHANICAL ENGINEERING & AUTOMATION

(Bimonthly, Started Publication in 1972)

No. 3, 2015

(Series No. 190)

## Contents

Effect of Rolling Reduction Rate on Interface Shearing Strength of Stainless Steel/Carbon Steel Composite Plate .....	
..... CHEN Shao-hang, ZHOU Cun-long, MA Guo-cai, YANG Tian-yun, MA Jiang-ze	(1)
Electromechanical Products Green Degree Evaluation Method .....	ZENG Zhi-bin (3)
Hydrodynamic Performance of Open-shelf Underwater Vehicle .....	
..... WANG Zhi-dong, DOU Jing, LING Jie, LING Hong-jie, LI Yang, FU Jia, WU Na	(7)
Detecting Piston Ring's Air Tightness by Motoring Test Method .....	
..... CHEN Yang, ZHAO Dan-ping, FENG Qiang, ZHAO Wen-juan, WEI Li-zhen	(10)
Force Parameter Estimation of Improved Sampling Shear .....	LIU Zhi-qiang, WANG Yong-gang (13)
Orthogonal Experiment Research on Factors Affecting Self-sealing Riveting by DEFORM-3D .....	YAN Qiang, ZHOU Lin-lei, LIU Gang (15)
Research and Test Verification of Bearing Capacity of Oil Film for Journal Bearing .....	
..... CHEN Lei, OU Qing-pei, ZHANG Yong, ZHANG Yue-chun, XIONG Shun	(18)
A Bus Frame Structure Mode Analysis Based on ANSYS Workbench 14.5 .....	
..... DOU Bao-hua, DAI Zuo-qiang, ZHANG Tie-zhu, SHENG Jian	(21)
Topology Optimization Design of Coach Body Structure Based on Altair-OptiStruct .....	
..... WU Xiu-chun, ZHENG Wen-qiang, ZHAO Qian, ZHOU Pan	(23)
Virtual Design and Simulation of Mechanical Arm Based on UG and ADAMS .....	XIE You-zeng, HUO Li-peng (26)
Dynamic Characteristics Analysis of Embedded Direct-drive Tool Holder by Finite Element Method .....	
..... LI Xiao-wei, XING Ji-shou, YANG Qing-dong, MU Bing	(28)
Rapid Design System Based on Pro/E Secondary Development for Micro Planetary Gear .....	KUANG Jie-ling, ZHONG Liang-wei (31)
Kinematics Simulation of Six-legged Robot .....	HUANG Zai-hui, ZHANG Wen-zhi (33)
Application of Wavelet Analysis in Image Compression .....	CHENG Peng-ju, CHEN Xi-qu (35)
Static Numerical Simulation of Sleeve Connecting Mechanism .....	JING Qing-zhu, LIU Xiang, GAO Shi-yan, FU Zhong-liang (37)
Structure Design and Simulation Optimization of Radar Antenna by Optimized Drive Design Method .....	HU Feng, WANG Zhi-hai (40)
Assembling Sequence Planning Technology Based on Model-tree of Product .....	MU Xiao-yun (43)
Research on Rapid Design of Knockout Drum Based on Genetic Engineering .....	MA Yan, ZHONG Liang-wei (46)
Fatigue Analysis of High Performance and Pressure Hydraulic Testing Machine Frame by ANSYS .....	
..... LI Pei-li, SUI Jian, MA Hai-kuan, GAO Shang-hui, KOU Yong-le, LIU Hui-chao, WANG Dong-mei	(48)
Mechanism Motion Simulation Analysis Based on MATLAB for Automatic Insert Paper Machine .....	
..... TIAN Hong-qiang, ZHANG Wen-zhi, DAI Yuan-cheng, HOU Bin	(51)
Numerical Simulation on Pressurized Aircraft Cabin Impacted by Uncontained Rotor Debris .....	BAI Jie, ZHANG Jian, WANG Wei (54)
Car Seat Rail Joint Stiffness Optimization Based on Experimental Mode .....	ZHANG Chen, YU Hui-jie, DING Xiao-hong (56)
Planar Four-bar Linkage Optimization Based on Matrix Algorithm .....	MAI Yun-fei, SHAO Ye-hui (59)
Modal Study on Moving Part Experiment Platform Based on Optimized Placement of Sensors .....	
..... CHEN Zi-long, QIAN Wei, ZHAO Zhi-liang	(61)
CFD Simulation Analysis of Engine Cooling Fan by STAR-CCM+ .....	MENG Qing-lin, YIN Ming-de, ZHU Zhao-xia (64)
Kinematics Simulation and Optimization of Suspension Based on ADAMS .....	LIU Jin, QIAN Wei (67)
Improved Flattening Mill Crossbeam Structure Simulation Analysis Based on ABAQUS .....	WANG Fu-yu, ZHAO Li-ping (70)
Design of Output Shaft of A Chemical Reducer by CATIA and ANSYS .....	LUO Xiao-bing, XU Ke-fang, HUI Zhen-liang (72)
Design of CNC Comprehensive Experimental Device Based on FANUC System .....	XIANG Qian, YIN Xian-ming (74)
Application of Improved Particle Swarm Optimization Algorithm to Job Shop Scheduling .....	
..... XU Hai-bo, ZHONG Liang-wei, GONG Wen-lu	(76)
Standard Crank Mechanism Dynamics Simulation Based on ADAMS .....	PAN Ming-yu (78)
Dynamic Simulation of Chain Type Circulatory Magazine Based on ADAMS .....	XIN Yi-bing, GAO Yue-fei, XU Feng-jun, LIU Hai-tao (81)
Welding Seam Stress Analysis of Mine Hoist Girder Based on IIW Standard .....	ZHAO Peng-fei (83)
Three-dimensional Parametric Modeling of Hydraulic Support Column .....	REN Jie, HAO Ming-rui (85)
Application of Dynamic Model of Robot in Motion Planning .....	BAI Yun-fei (87)
General NC Program for Machining Thread in CNC Milling Machine .....	JIN Ting-wei (90)
Static and Dynamic Characteristics Analysis of 9 m Antenna Based on ANSYS .....	
..... SUN Jiang-yan, CAI Xian-xu, ZHOU Tian, WU Qing-chen	(93)
Engagement Strength Analysis of Gears in High Speed Press .....	
..... WANG Jun-ling, ZHAN Jun-yong, ZHONG Tai-sheng, ZHANG Chun-xiang, GU Jun	(96)
Development of NC Tool Life Management Program Based on R Parameters .....	
..... ZHAO Guo-qiang, WU Ying-ying, ZHANG Chun-ming	(98)
Finite Element Analysis of Tooth Root Bending Strength under Low Speed and Heavy Load .....	ZHANG Jin-quan (101)
Dynamic Simulation Analysis for Gyro Stabilization .....	QIAO Liang, LU Fei, MIAO Jian-song, SUN Ye-zun (103)
Hybrid Variant Design of Guardrail Cleaning Device .....	MU Bin-bin, LI Xiao-ning, LIU De-fang (106)
Design and Calculation Methodology Research of Cylinder Thrust on Door-opening Mechanism of Coke Quenching Car .....	
..... ZUO Qiang	(109)

Induction Parking Lock Based on Radio Frequency Identification .....	ZHAI Yong-jie , LI Bing , WU Yang	(111)
Development of T9-19-No6. 3D Titanium Fan with A New Mechanical Seal .....	HAN Feng	(114)
Design and Research of A New Type of Checked Throttling Valve .....	ZHU Jian , XIAO Ting-ting	(116)
Design of Fixture Used in Milling Pump Impeller's Cross Slot .....	YANG Xu	(118)
Design of Hot Punching Die for Deep-flat Hole .....	LIANG Jian-ping	(120)
Design and Research of A Ballonet Reclaim Equipment Based on Piston-type Pneumatic Disentangle Mechanism .....	TAN Hua	(122)
Application of Extensible Belt Conveyor Typed DSJ120/150/2×200 .....	WU Zhen-zhong	(124)
Design of A New Feeding Device of Swing Machine .....	HAN Shan-peng , XU Yuan-yuan	(126)
Chemical Constituents of Residual Material Recovered Ingot TC4 .....	YUN Peng-fei , LIAO Qiang , WU Hua , XIE Qiang , LIU Hua , ZHANG Na	(128)
Application of Crystallite Alloy Technology in Mechanical Transmission .....	ZHU Rui-yin	(130)
Design of Injection Mold for Sliding Key of Notebook PC Power Supply Display Lamp by Pro/E .....	LI Yao-hui , LI Hong-wei	(132)
Design and Process Layout of Dry Dust Collector in Small-sectional Comprehensive Tunneling Working Face .....	GUO Cheng-bao	(135)
Study on Axial Compression of Thin Wall Cylinder Tube and Variable-diameter Tube .....	XU Long-jiang , LEI Jun-xiang , GAO Gui-jie	(137)
Determining Maintenance Task Interval of Civil Aircraft System Components .....	LIU Tao , SU Mao-gen	(139)
A Simple Roundness Error Online Measurement System for CNC Machine Tools .....	JIANG Feng , DENG Yu-feng	(141)
Method of Measuring Circumference of Cigarette .....	YUAN Li , LI Ju-feng , JIN Yang-yang	(145)
Vibration Analysis of Automobile Transmission in Dynamic Measurement .....	WANG Li-juan	(147)
Design of Remote Environment Monitoring and Automatic Irrigation System of Agricultural Greenhouse .....	TIAN Ye , XU Bao-qiang , YU Xin-xin	(149)
Design of Control System for Elderly-assistant & Walking-assistant Robot Based on Fuzzy PID Method .....	WEI Xiao-juan , WANG Yao-wu	(152)
PLC Based Transformation of Electrical System for Hot Press Making Hardboard .....	JIANG Juan , ZHAO Min-ling , FANG Guan-li	(154)
Study on Automatic Control System for Three-roll Bending Machine with Horizontal Adjustment .....	LI Hong-yuan , LIU Huan , HUANG Jin-xin	(156)
Design of Battery Management System for Variable-pitch of Wind Power Generation .....	LIU Dao , LONG Xin , PANG Wei , WANG Ya-guo	(158)
Design of Temperature Control System of Lining Curing of Rocket Engine Shell .....	ZHAO Yong-feng , DU Juan	(160)
Design of PLC Control System of Full-automatic Washing Machine .....	HU Xiao-ying	(163)
Field Dynamic Balance Test System Based on LabVIEW for Disc Separator .....	ZHANG Qi-ping , HE Xiao-ping	(165)
Inertia Simulation Method of Automobile Test-bed .....	GE You-hua , NI Quan , SU Lei , LIU Man	(168)
Design and Implementation of Large Flow and High Precision Hot Air Supply System .....	LIU Xiao-an , CHU Chang-jun , ZHANG Yan-qing	(170)
A Study on Vehicle Skid Control System Based on Intelligent Fuzzy Control .....	LI Xiao , LUO Yan-jie , HE Rui , DING Rong-li	(173)
Design of An Infrared Remote Control Keyboard Based on AVRUSB .....	LI Ru-zhong	(176)
Application of PLC and Frequency Converter in Electroplating Production Line Control System Transformation .....	LIU Yuan-juan	(179)
Research and Application of Shape Set-up for Hot-rolled Strip Steel in LaiGang .....	ZHAO Bo	(182)
Optimization of CCPG Generator Control System in LaiGang .....	LI Jin-feng	(184)
Modification Scheme of Connecting Pipe of CZK300 Steam Turbine .....	GAO Sheng-li	(186)
Experimental Analysis of Dynamic Pressure on Sliding Bearing .....	LIU Hong-wei , YANG Rui	(188)
Development of 6.2 m Large Mining Height Hydraulic Support Adapt to Jincheng Anthracite Mining Group .....	ZHAO Xi-zeng	(190)
Application of Oil-air Lubrication Technology in High Speed Wire Rod Mill for Xiangtan Steel Corporation .....	MA Yun-long	(192)
Practical Improvements in Shell Belt Coal Feeder .....	MU Hao , HU Ya-lin , GUO Xiang-dong	(194)
Application of Electric Tightening System in Gearbox Assembly .....	JIN Hai-hong	(196)
Structure Improvement of Working Device of Road Sweeper .....	ZHAO Li	(198)
Typical Plate Part Milling Based on CAXA Manufacturing Engineer .....	XU Jing-dong	(200)
Design of A Special Gearbox for Tourist Bus .....	MA Li-dong	(202)
Special Fault Diagnosis of Blast Furnace Top-pressure Control System .....	QI Bo	(204)
Improvement of Rotary Device of Coke Tank Truck .....	GONG Wen-long	(206)
Design of Supply & Drainage Water and Waste Collection System for High Speed EMU .....	SHEN Pu-yuan	(208)
Brief Introduction to Rapid Rope Replacement Device of Multi-rope Friction Hoist .....	LI Hong-wei	(210)
Steam Recycle System in Coal-based Compound Fuel Oil Project .....	LI Fang	(212)
A Light Truck Transmission Desynchronization Gas Analysis and Structure Improvement .....	LV Chao	(214)
Analysis of Twin Countershaft Transmission Gas Path Faults .....	LIU Chun-lei	(216)
Application of Memristor in Neural Networks .....	WEI Jiang-tao , SONG Wei-ping , WANG Qing-hua	(218)
Application of DELMIA Software in Digitalized Factory .....	HUANG Teng-hui , SUN Shao-quan , PENG Ning-tao , ZHOU Yu-xian	(220)
Maintainability Design of Turbofan Engine in Civil Aviation .....	LI Shu-ming , WANG Ling-yun , HUANG Yan-xiao	(222)
Analysis of Management System of Production and Marketing Integration in Manufacturing Industry .....	HOU Qiang	(225)

**Sponsored by** Shanxi Design and Research Institute of Mechanical and Electrical Engineering  
Machine Engineering Society of Shanxi Province

**Edited and Published by** Editorial Department of Magazine MECHANICAL ENGINEERING & AUTOMATION

**Add No.** 228 Shengli Street, Taiyuan, Shanxi, China

**Postcode** 030009 **Tel** (0351) 3084269

**Chief Editor** Shen Ruohong **Deputy Editor** Feng Jianyou, Liang Xiuchun

**E-mail** jxgcbjb8@163.com

**Unified Number of Print** ISSN 1672-6413  
CN 14-1319/TH