



PROGRAMME OF MEETING

会议日程

25th November 2025, 09:00-17:00 2025年10月25日 北京时间 09:00-17:00

The 43rd AWF Committee Meetings & Governing Council Meeting

The 18th Asian Welding Technology and Its Application Forum

第43届亚洲焊接联合会委员会会议和理事会会议暨第十八届亚洲焊接技术及应用国际研讨会

SECTION 1: OPENING CEREMONY OF MEETING

第一阶段：大会开幕式

Time 时间	Programme 议程	Speakers 主讲人
08:30-08:50	Group Photo 合影	
09:00-09:10	Opening Remarks and Introducing the Distinguished Guests 主持人致开幕词并介绍与会嘉宾	
09:10-09:25	Remarks by Distinguished Leaders and Guests 领导、嘉宾致辞	Prof. Li Zhuguo 李铸国 Vice President of Welding Institution of Chinese Mechanical Engineering Society (Chinese Welding Society) 中国机械工程学会焊接分会（中国焊接学会）副主任委员
		Dr. Liu Zhenying 刘振英博士 President of International Alliance of Skills Development for Belt & Road and BRICS, Vice President of China Welding Association 一带一路暨金砖国家技能发展国际联盟理事长和中国焊接协会副会长
		Representatives of Nanning Welding Association and Guangxi Technological College of Machinery and Electricity 南宁焊接协会和广西机电职业技术学院代表



SECTION 2: THE MAIN REPORT OF MEETING

第二阶段：大会主题报告

Time 时间	Programme 议程	Speakers 主讲人
09:25-09:50	<p>Development of Medium Entropy Brazing Filler Alloys for the Joining of Lightweight Materials</p> <p><i>轻质材料连接用中熵合金钎焊料的研究</i></p>	<p>PROF. HUAPING XIONG 熊华平</p> <p>Deputy Chief Engineer of AECC Beijing Institute of Aeronautical Materials. 中国航发北京航空材料研究院副总工程师</p>
09:50-10:15	<p>The BRICS+ Mechanism Promotes the Technological Innovation and Skill Development in Additive Manufacturing and Intelligent Welding</p> <p><i>金砖机制推动增材制造与智能焊接技术创新和技能发展工作</i></p>	<p>DR. LIU ZHENYING 刘振英博士</p> <p>Vice President of China Welding Association, Chairman of CWA Additive Manufacturing and Surfacing Division, President of International Alliance of Skills Development for Belt & Road and BRICS, and Chairman of AWF Welding Technology and Application Committee 中国焊接协会副会长、增材制造与表面工程工作委员会理事长、一带一路暨金砖国家技能发展国际联盟理事长、亚洲焊接联合会（AWF）焊接技术及应用委员会主席</p>
10:15-10:35	<p>Ultrafast laser micro/nanojoining for microdevices development</p> <p><i>超快激光微纳连接与微器件应用</i></p>	<p>Prof. LUCHAN LIN 林路禅教授</p> <p>Associate Professor of Shanghai Jiao Tong University 上海交通大学副教授</p>
10:35-10:45	Short Break 茶歇	

SECTION 3: DEVELOPMENT AND CHALLENGE IN WELDING INDUSTRY

第三阶段：焊接行业发展与挑战

Time 时间	Programme 议程	Speakers 主讲人
10:45-11:00	<p>NET ZERO GOALS- CHALLENGES FOR WELDING INDUSTRY</p> <p><i>零目标——焊接行业面临的挑战</i></p>	<p>MR. SM MAHAJAN 萨蒂延德拉·莫汉·马哈詹</p> <p>President of Asian Welding Federation and Secretary General & Head Nuclear Energy Group, India Energy Forum 亚洲焊接联合会主席，印度能源论坛核能集团秘书长及负责人</p>



11:00-11:20	<p>Hong Kong's Strategic Role in Asian Welding Quality: Leveraging International Standards for Infrastructure and Innovation</p> <p><i>香港在亚洲焊接质量中的战略角色:运用国际标准于基建与创新</i></p>	<p>MR. GUO LIYUAN 郭立原</p> <p>Welding & NDT Practitioners of Hong Kong Society for Applied Welding & Testing practitioners 香港應用焊接協會焊接及無損檢測專家</p>
11:20-11:40	<p>MWJS as Industrial Lead Body for National Human Resources Under Ministry of Human Resource Welding and Allied Processes Sector: Issues and Challenges</p> <p><i>马来西亚焊接和连接学会 MWJS 作为人力资源部下属的国家人力资源行业领导机构焊接及相关工艺行业: 问题与挑战</i></p>	<p>MR. AZRAF AZMAN 阿兹拉夫·阿兹曼</p> <p>Hon. TREASURER of MALAYSIAN WELDING AND JOINING SOCIETY (MWJS) 马来西亚焊接和连接学会司库</p>
11:40-12:00	<p>Empowering Enterprises and Advancing Vocational Education: Practical Pathways for the Welding and Non-Destructive Testing Professional Committee of International Alliance of Skills Development (IASDBR) to Enhance Teaching and Training Capabilities, Promote Technological Advancement in the Welding Industry, and Foster International Cooperation and Development</p> <p><i>为企业赋能 为职教助力” 一带一路暨金砖国家技能发展国际联盟焊接与无损检测专委会在促进教学培训能力提升、推动焊接行业技术进步、国际化合作与发展的工作思路</i></p>	<p>MS. CAO HONGXIA 曹红霞</p> <p>Secretary-General of the Welding Committee of China Petroleum Engineering Construction Association, Secretary-General of the Welding and Non-Destructive Testing Professional Committee of IASDBR, Vice Chairman the Training Committee of China Welding Technology Association 中国石油工程建设协会焊接专业委员会秘书长、一带一路暨金砖国家技能发展国际联盟焊接与无损检测专业委员会秘书长、中国职工焊接技术协会培训委员会副理事长</p>
12:00-12:08	<p>Issue Certificates for the 25th Batch of Member Units of the International Alliance of Skills Development</p> <p>颁发“一带一路暨金砖国家技能发展国际联盟”第二十五批会员单位证书</p>	
12:08-12:15	<p>Issue Certificates for Committee Members of the Welding and Testing Professional Working Committee of IASDBR</p> <p>颁发“一带一路暨金砖国家技能发展国际联盟焊接与检测专业委员会”委员证书</p>	
12:15-14:00	<p>Lunch 午餐</p>	



SECTION 4: ADVANCED TECHNOLOGY AND RESEARCH IN WELDING

第四阶段：先进焊接技术及研究

Time 时间	Programme 议程	Speakers 主讲人
14:00-14:20	Electromagnetic Pulse Technology and Applications <i>磁脉冲技术及应用</i>	MR. LIU YANLI 刘延利 Dean of the Sino-German Technical Department of Jinan Vocational College 济南职业学院中德技术系主任
14:20-14:40	Hybrid reinforced aluminum matrix composites fabricated by selective laser melting <i>多相混杂增强铝基复合材料的SLM成形研究</i>	MS. LU QINGHUA 卢庆华 Associate Professor of Shanghai University of Engineering Science 上海工程技术大学副教授
14:40-15:00	Development of IC chip bonding and soldering tray device based on TRIZ innovation method <i>基于TRIZ创新方法的IC芯片贴焊托盘装置研制</i>	MR. CHENG HU 程虎 Senior Expert of Wuhan Digital Engineering Institute 武汉数字工程研究所高级专家
15:00-15:20	Ultrasonic micro-forging post-treatment assisted laser directed energy deposition approach to manufacture high-strength Hastelloy X superalloy <i>哈氏合金X超声微锻压辅助激光增材制造和性能评价研究</i>	DR. SONG KAI 宋恺 Assistant Researcher of Tianjin University 天津大学助理研究员
15:20-15:35	One-Step Double-Acting Friction Stir Welding (ODFSW) <i>一步式双作用摩擦搅拌焊接 (ODFSW)</i>	PROF. TRIYONO Director of the Education and Academic Division of Indonesian Welding Society 印度尼西亚焊接学会教育与学术部门负责人
15:35-15:50	Short Break 茶歇	



SECTION 5: WELDING TALENTS CULTIVATION, CERTIFICATION AND STANDARDS

第五阶段：焊接人才培养、认证与标准

Time 时间	Programme 议程	Speakers 主讲人
15:50-16:10	<p>The Future of Welding Training: Efficient, Safe, and Green with AR & Simulation</p> <p><i>焊接培训的未来：高能、高效、高质量</i></p>	<p>MR. ANTONIO FERNANDEZ PEREZG 安东尼奥·费尔南德斯·佩雷斯</p> <p>Global Business & Partnerships Director of Seabery 西班牙 Seabery 全球业务与合作伙伴关系总监</p>
16:10-16:30	<p>JWES Welder Certification System and Welding Coordinators Certification System</p> <p><i>日本焊接工程学会 JWES 焊工认证体系和焊接协调员认证体系</i></p>	<p>MR. SHOICHI NOMURA 野村昭一</p> <p>Technical Advisor of The Japan Welding Engineering Society (JWES) 日本焊接工程学会技术顾问</p>
16:30-16:45	<p>Indonesia Aspires to Become a Global Resource of Welding Personnel</p> <p><i>印尼立志成为全球焊接人才资源大国</i></p>	<p>DR. MOCHAMAD ZAED YULIADI 穆罕默德·扎伊德·尤利亚迪博士</p> <p>Expert of Kampuh Academy Indonesia, Muhammadiyah Surabaya University 苏拉巴亚穆罕默迪亚大学印尼卡姆普学院专家</p>
16:45-17:00	<p>QUALITY CONTROL FOR PRESSURE PIPE WELDING AND RELATED STANDARDS</p> <p><i>压力管道焊接质量控制及相关标准</i></p>	<p>SELENGE BAIGALI-ENKH</p> <p>Member of Mongolian Material Science and Welding Society 蒙古材料科学与焊接学会会员</p>

INTRODUCTION OF SPEAKERS 报告人简介



DR. LIU ZHENYING
刘振英博士

Vice President of China Welding Association(CWA)
Chairman of CWA Additive Manufacturing and Surfacing Division
President of International Alliance of Skills Development for Belt & Road and BRICS
Chairman of AWF Welding Technology and Application Committee
中国焊接协会副会长、增材制造与表面工程工作委员会理事长
一带一路暨金砖国家技能发展国际联盟理事长
亚洲焊接联合会 (AWF) 焊接技术及应用委员会主席

报告题目 Topic:

BRICS+ Mechanism Promotes the Technological Innovation and Skill Development in Additive Manufacturing and Intelligent Welding

《金砖机制推动增材制造与智能焊接技术创新和技能发展工作》

报告人简介 Introduction of Speaker:

Graduated from Tsinghua University with a Doctor's Degree in Welding in 1989. Vice Chairman of China Welding Association, Vice President of China Building Materials Machinery Association, Chairman AWF Welding Technology & Application Committee, AWF Website and Marketing Committee and the Specification Development Subcommittee, Chairman and General Manager of Beijing Arc Xinxing Technology Co., Ltd. and Arc Xinxing Technology Inc. A senior expert in the field of wear-resistant additive manufacturing in China, he holds the title of Professor-level Senior Engineer. His technical expertise includes additive manufacturing, wear-resistant materials and anti-wear technology, welding technology (equipment, materials, and processes), and power electronics technology. He has been granted 42 patents and 9 software copyrights. Dr. Liu serves as the Chairman of China Section of BRICS Business Council Skills Development, Applied Technology and Innovation Working Group, President of the International Alliance of Skills Development for Belt & Road and BRICS, President of BRICS+ Alliance of Science and Technology Innovation, Chairman of BRICS Standardization Working Committee for Skills and Technology, he has long been dedicated to vocational education cooperation, international industry-education integration, scientific & technological innovation and exchanges between the Belt & Road and BRICS countries.

1989年毕业于清华大学焊接专业，获博士学位。北京嘉克新兴科技有限公司、嘉克科技股份有限公司董事长兼总经理、中国焊接协会副会长、中国建材机械工业协会副会长、亚洲焊接联合会(AWF)技术委员会主席、网站及市场开发委员会主席、标准制定分委员会主席，中国耐磨增材制造领域的资深专家，教授级高工，技术专长为增材制造、耐磨材料及抗磨损技术、焊接（设备、材料及工艺）技术、电力电子技术。获批42项专利，9项软件著作权。

刘博士担任金砖国家工商理事会技能发展、应用技术与创新中方工作组组长、一带一路暨金砖国家技能发展国际联



盟理事长、金砖+国家科技创新联盟理事长、金砖国家工商理事会技术和技能标准化工作委员会主席、一带一路暨金砖国家技能发展与技术创新培训中心主任、金砖国家技能发展与技术创新大赛组委会执委会主席、中国发明协会副秘书长/常务理事、厦门市金砖未来技能发展与技术创新研究院院长、厦门市金砖技术与技能标准化技术委员会主任委员，长期致力于一带一路和金砖国家间职业教育合作、国际产教融合及科技创新与交流活动。

报告摘要 Abstract:

Under the BRICS+ cooperation mechanism, promote the formulation of international group standards for technologies and skills in the field of additive manufacturing through the BRICS Standardization Working Committee of Skills and Technology, and promote the issuance of "Skills Passport" based on such standards, so as to The "Skills Passport" program helps build a vocational skills evaluation framework recognized by the BRICS+ countries and facilitates the flow of international talents; through the "BRICS Workshop", the "Belt & Road and BRICS Auditorium of Skills Development and Technology Innovation", "Belt & Road and BRICS Competition of Skills Development and Technology Innovation" and "BRICS Skills Competition", we will promote the cultivation of future technologies and skills in the field of additive manufacturing as well as the training of localized talents, so as to provide opportunities for "Through the BRICS+ Alliance of Science and Technology Innovation, we will promote the transformation and incubation of technological innovation achievements in the fields of additive manufacturing and intelligent welding; through the BRICS International Remote Employment Platform, we will build a digital channel for the cross-border flow of international talents in the fields of additive manufacturing and intelligent welding, and provide intelligent docking mechanism for enterprises and talents of different countries.

在金砖+合作机制下，通过“金砖技能和技术标准化工作委员会”，推进增材制造领域国际团体技术和技能标准制订，并基于此标准推广颁发“技能护照”，以“技能护照”计划助力构建金砖+国家认可的职业技能评价框架，助力国际人才流动；通过“金砖工坊”、“一带一路暨金砖国家技能发展与技术创新大讲堂”、“一带一路暨金砖国家技能发展与技术创新大赛”和“金砖国家职业技能大赛”，推动增材制造领域未来技术和技能以及属地化人才培养，为“走出去”的中国企业提供人才支撑服务；通过金砖+科技创新联盟，推动增材制造、智能焊接领域技术创新成果转化和孵化；通过“金砖国家国际远程就业平台”，搭建增材制造、智能焊接领域国际化人才跨境流动数字通道，为各国企业与人才提供智能化对接机制。



PROF. HUAPING XIONG

熊华平教授

Deputy Chief Engineer of AECC Beijing Institute of Aeronautical Materials

中国航发北京航空材料研究院 副总工程师

Topic 报告题目

Development of Medium Entropy Brazing Filler Alloys for the Joining of Lightweight Materials

《轻质材料连接用中熵合金钎焊料的研发》

Introduction of Speaker 报告人简介

Prof. Huaping Xiong, born in 1969, received his Ph.D. in Jilin University of Technology in June 1996. He did postdoctoral research work as a JSPS fellow in Tohoku University, Japan, during the period from September 2002 to March 2004. Currently, he serves as deputy chief engineer at the Beijing Institute of Aeronautical Materials (BIAM), deputy director of the Chinese Welding Society (CWS), and also the current chair of the 17th commission (Brazing, Diffusion Bonding and Soldering), International Institute of Welding (IIW).

His research interests are focused on joining of aeronautical materials; joining of dissimilar materials; development of advanced brazing filler metals. The total number of his publications is 200. He has been authorized with 70 patents. Five books have been published: "Joining Technologies of Advanced Aeronautical Materials", "High-temperature Brazing Filler Metals for Ceramic Joining and Interfacial Metallurgy", "Aeronautical Metal Material Additive Manufacturing Technology", "Aeronautical and Aerospace Brazing and Diffusion Bonding Technologies" and "Aeronautical and Aerospace Resistance Welding Technology".

熊华平，研究员，博士生导师。毕业于吉林大学，曾在武汉理工大学和日本东北大学从事博士后研究工作（JSPS资助）。任中国航发北京航空材料研究院副总工程师，兼任中国机械工程学会焊接分会副主任，国际焊接学会（IIW）钎焊扩散焊专委会主席。研究方向：焊接、增材制造、高熵合金。发表科技论文 200 余篇，获得专利授权 70 余项，出版专著和编著 5 部，包括《先进航空材料焊接技术》、《陶瓷用高温活性钎焊材料及界面冶金》、《航空金属材料增材制造技术》、《航空航天钎焊扩散焊技术》和《航空航天电阻焊技术》。

Abstract 报告摘要

TiAl-based alloys, as the representative of typical lightweight high-temperature structural materials, possess unique advantages of low density, high specific strength and excellent high-temperature performance, particularly within the service temperature range of 760-850 °C, thereby demonstrating significant potential for aerospace applications. However, TiAl alloys are recognized as challenging weldable materials, and their reliable joining should be one of the technical challenges that need to be addressed urgently in current engineering applications. In this study, based on the design combination of Ni-Nb binary alloy and Ti-Mn-Fe ternary alloy, and the calculated results of liquidus temperature for the quinary system alloys, a Ti-Mn-Fe-Ni-Nb eutectic medium-entropy alloy (MEA) brazing filler metal was proposed for joining TiAl intermetallic. Under the brazing condition of 1180 °C/45 min, the TiAl/TiAl joint



offered the tensile strength coefficient of 82% at 700 °C and 90% at 800°C, respectively. Meanwhile, to address the fabrication requirements of representative lightweight structures, such as titanium alloy honeycomb panels, tubular components, and heat exchangers, a Zr-Ti-Ni-Cu-Co system MEA filler metal was developed using a melting point calculation-based design approach. Under the brazing condition of 860 °C/30 min, the TA2/TA18 brazed joint exhibited a uniform microstructure and a tensile strength of 583 MPa. This study provides valuable insights into the methodology and practical application of quick screening design and optimization of MPEA filler materials.

TiAl 合金作为一种轻质耐高温结构材料, 兼具低密度、高比强度、及优异的抗氧化性和抗蠕变性能优势, 服役温度可达 760-850 °C, 因此在航空航天领域展现出重要的应用潜力。然而, TiAl 合金的焊接性差, 解决 TiAl 合金自身的钎焊连接问题对推进 TiAl 合金的工程化应用具有极为重要的意义。本研究设计将 Ni-Nb 二元共晶合金加入 Ti-Mn-Fe 三元共晶合金中, 通过计算 Ti-Mn-Fe-Ni-Nb 五元合金熔点, 优选出具有较低液相线温度的 Ti-Mn-Fe-Ni-Nb 共晶中熵合金钎料, 在 1180 °C/45 min 条件下, 获得的 TiAl/TiAl 钎焊接头在 700 °C 和 800 °C 时强度系数分别达到 82% 和 90%。同时, 针对钛合金蜂窝结构、管接头以及热交换器等典型轻质结构制造应用需求, 基于熔点计算方法, 开发了 Zr-Ti-Ni-Cu-Co 系中熵合金钎料, 在 860 °C/30 min 条件下获得的 TA2/TA18 钎焊接头具有均匀的微观组织, 其抗拉强度达 583 MPa。本研究为多主元合金钎焊料的快速筛选设计与优化提供了重要研究方法与实践。



PROF. LUCHAN LIN

林路禅副教授

Associate Professor of Shanghai Jiao Tong University
上海交通大学副教授

Topic 报告题目

Ultrafast laser micro/nanojoining for microdevices development
《超快激光微纳连接与微器件应用》

Introduction of Speaker 报告人简介

Lin Luchan is an Associate Professor and doctoral supervisor at the School of Materials Science and Engineering, Shanghai Jiao Tong University. His primary research focuses on the mechanisms of ultrafast laser-matter interactions, additive and subtractive manufacturing technologies at micro/nano scales, as well as the design, development, and applications of micro/nano-structured materials. He has led two National Natural Science Foundation of China projects, published over 50 high-impact academic papers, and received the Second Prize of Natural Science Award from the Ministry of Education. 林路禅，上海交通大学材料科学与工程学院副教授，博士生导师。主要从事超快激光与物质相互作用机理，微纳尺度材料增材制造技术，微纳结构材料设计、开发与应用的研究。主持国家自然科学基金 2 项，发表高水平学术论文 50 余篇，获得教育部自然科学二等奖 1 项。

Abstract 报告摘要

With the increasing demand of high performance, multifunctional, and minimized micro/nano devices in optoelectronics or microfluidics system, materials integration at cross dimensions meets great challenge in energy input, materials degradation and materials compatibility. Plasmonic effect within heterogeneous nanostructures arised by ultrafast laser provides an alternative approach in joining small scale components, showing good controllability in energy distribution and materials damage in various materials combinations. Specially, hard brittle materials with large difference in material compatibility has been joined together by spatiotemporal tailored ultrafast laser irradiation. Strategy to manipulate energy input, further minimize materials damage during joining process will be discussed, considering the plasmonic effect in designed dielectric environment within expected heterojunctions. Two different setups of sapphire-silicon joining structures have been conducted for ultrafast laser irradiation. Related joining mechanism was attributed to the air-gap determined plasmonic effect, accompanied with intense energy input and materials responses in heterogeneous oxide-semiconductor structures. The shear strength of welded Si and Sapphire structures can be up to 10.7 ± 0.8 MPa. As-received heterostructures also show high chemical resistance to acid (pH=2) and alkaline (pH=12) solutions. Developed Si-based SERS optofluidic sensor by ultrafast laser microwelding of Si substrate and Sapphire window shows the reliable ability for high-sensitive detection of low-concentration chemicals (down to 10^{-12} mol L⁻¹).

随着微器件/系统对高性能、多功能、微型化需求日益增长，跨维度材料焊接/连接面临着能量输入、材料劣化与相容性等重大挑战。超快激光在异质纳米结构中诱导的等离子体效应为微纳元件连接提供了新途径，在不同材料组合中展现出优异的能量分布可控性与材料损伤控制能力。报告将重点讨论如何基于微纳异质结构中设计的介电环境等离子体效应，优化能量输入策略以进一步降低连接过程中的材料损伤。特别地，用两种不同的蓝宝石-硅连接结构进行超快激光焊接，发现其连接机制源于空气间隙决定的等离子体效应，并伴随着异质氧化物-半导体结构中强烈的能量输入与材料响应。焊接后的硅-蓝宝石结构剪切强度可达 10.7 ± 0.8 MPa，异质结构在酸性 (pH=2) 与碱性 (pH=12) 溶液中均表现出卓越的耐化学腐蚀性。通过超快激光微焊接硅基底与蓝宝石窗口开发的硅基 SERS 光流控传感器，实现了对低浓度化学品 (低至 10^{-12} mol L⁻¹) 的高灵敏度可靠检测。



MR. SM MAHAJAN

萨蒂延德拉·莫汉·马哈詹

President of Asian Welding Federation and Secretary General &
Head Nuclear Energy Group, India Energy Forum

亚洲焊接联合会主席，印度能源论坛核能集团秘书长及负责人

Topic 报告题目

NET ZERO GOALS- CHALLENGES FOR WELDING INDUSTRY

《目标——焊接行业面临的挑战》

Introduction of Speaker 报告人简介

Sh SM Mahajan is a Mechanical Engineer from DCE and M.Tech in Management & Systems from IIT, Delhi. He has attended Management Courses from Leeds University, Harvard and IIM, Ahmedabad. He served in BHEL for 39 years in various capacities, functions and units before superannuating as Executive Director. He handled Manufacturing Technology Up-gradation, Investment Planning, Modernization of manufacturing facilities in various BHEL units, Engineering and R&D Co-ordination, Material management & operation management, He has been involved in developing capabilities for manufacturing of nuclear power equipment in BHEL.

Post BHEL, he continued to engage with the manufacturing industry guiding them in business development and manufacturing capabilities- in fabrication industry for Power, Infrastructure and Aviation sectors. He has served as an Industry Expert with two banks for evaluation of Bank Investments and due diligence of the companies. He was associated with Ministry of Electronics and IT as Expert in evaluation and recommendation of R&D proposals in area of Electronic System Development and for Electric Vehicles. He has guided several projects for successfully completion.

He is associated with many professional associations and was President of Indian Welding Society. Currently he is President of Asian Welding Federation and Secretary General & Head Nuclear Energy Group, India Energy Forum.

SM Mahajan 先生是 DCE 的机械工程师和印度理工学院管理与系统硕士。他曾就读于哈佛大学利兹大学和印度管理学院艾哈迈达巴德分校的管理课程。他在 BHEL 担任了 39 年的各种职务、职能和单位。他负责 BHEL 各单位的制造技术升级，投资规划，制造设施现代化，工程和研发协调，物料管理和运营管理，并参与了 BHEL 核电设备制造能力的发展。在 BHEL 之后，他继续与制造业合作，指导他们的业务发展和制造能力-在电力制造行业，基础设施和航空部门。他曾担任两家银行的行业专家，负责银行投资评估和公司尽职调查。他是电子和信息技术部的专家，负责电子系统开发和电动汽车领域的研发提案的评估和建议。他指导了几个成功完成的项目。他与许多专业协会有联系，并曾担任印度焊接协会主席。目前，他是亚洲焊接联合会主席，印度能源论坛秘书长兼核能集团负责人。

Abstract 报告摘要

UNFCC – founded by UN in 1994 - for a global treaty for coordinating efforts for international response to climate changes has led to the Paris Accord during COP21 that aims to limit Global warming to 1.5 – 2.0 degree C. Subsequently in Glasgow meeting of COP26, a general consensus to achieve “NET ZERO” by 2050 was reached

Fossil fuel contributes – globally - around 85% of energy supply. Primary users being transportation, power and Industry section using coal, petro products etc. All these sections are increasingly developing and using alternate sources that are green i.e. have low or no emissions to reduce GHGs. Renewable Energy Sources, Blended Petro products etc are now exclusively being used.

Fabrication & welding industry also has to gear up to become Green. Reducing emissions levels arising from welding, developing process and consumables that reduce emissions coupled with technologies to develop



weldability of newer materials that need to be used by Power, Transport and industry. Higher efficiency coal plants need evolving materials that can withstand higher pressures and temperatures. Welding technologists have to ensure their weldability. Evolving technologies for these sectors to contain GHG through Challenges for the welding industry also.

In the brief presentation on the topic, the author will discuss this aspect and present supporting data.

联合国于 1994 年成立《联合国气候变化框架公约》(UNFCCC)，旨在通过全球条约协调国际社会共同应对气候变化。该公约推动第 21 次缔约方大会 (COP21) 达成《巴黎协定》，核心目标是将全球温升控制在 1.5-2.0°C 范围内。后续在格拉斯哥召开的缔约方会议 (COP) 进一步形成 2050 年前实现“净零排放”的全球共识。

当前，全球化石燃料在能源供应中占比约 85%，主要消费领域为交通运输、电力及工业部门使用的煤炭、石油制品等。这些领域正加速开发应用绿色替代能源，包括可再生能源、混合石油产品等低碳/零排放方案，以有效减少温室气体排放。装备制造与焊接行业也亟需向绿色化转型。这具体涉及：降低焊接工艺产生的排放水平；研发可减少排放的新工艺与新型焊材；同时发展确保电力、交通及工业领域所需新型材料可焊性的配套技术。随着高效燃煤电厂对耐高压高温新材料的持续演进，焊接技术专家必须确保这些材料的可焊性。此外，该行业还面临着为上述领域开发温室气体控制新技术的重大挑战。

在关于本议题的简短报告中，汇报人将围绕上述维度展开论述，并呈现相应的支撑数据。



MR. GUO LIYUAN

郭立原

Welding & NDT Practitioners of Hong Kong Society for Applied
Welding & Testing practitioners
香港應用焊接協會焊接及無損檢測專家

Topic 报告题目

Hong Kong's Strategic Role in Asian Welding Quality:
Leveraging International Standards for Infrastructure and
Innovation

《香港在亚洲焊接质量中的战略角色：运用国际标准于基建与创新》

Introduction of Speaker 报告人简介

Senior Consultant, Hong Kong Applied Welding Society.

Mr. Guo is a foremost authority in welding and NDT, uniquely positioned as a Chief Examiner for the PCN Accreditation Board (AQB)—a peer-appointed global role held by only a select few worldwide. He holds numerous ASNT NDT Level III and PCN Level III certifications and is a CSWIP Senior Welding Inspector. With extensive experience across aerospace, construction, and oil & gas sectors, he brings a critical perspective on implementing international standards for global project quality and cooperation.

郭先生是焊接与无损检测领域的顶尖权威。他担任 PCN 认证委员会首席考官，该职位由同行推举，全球仅寥寥数人获此殊荣，奠定了其行业领袖地位。他持有 ASNT 及 PCN 多项三级最高认证，同时也是 CSWIP 资深焊接检验师。凭借在航空航天、建筑及石油天然气等行业的丰富经验，他将就如何应用国际标准提升全球项目质量与合作分享其关键见解。

Abstract 报告摘要

This presentation will explore Hong Kong's unique position as a hub of excellence in welding inspection and quality assurance. Drawing from his extensive experience as a chief examiner for international certification bodies, Mr. Guo will illustrate how Hong Kong's demanding infrastructure landscape—from its iconic bridges and dense urban construction to its marine environment—has fostered a world-class, multi-standard approach to non-destructive testing (NDT) and welding inspection.

The speech will highlight specific local applications, demonstrating how the rigorous integration of standards like PCN, ASNT, and CSWIP has been critical to the success and longevity of major Hong Kong projects. Mr. Guo will argue that this hard-won expertise is a valuable asset for regional cooperation. He will position Hong Kong as the ideal partner and independent quality assurance hub for Belt & Road Initiative projects and within the Greater Bay Area, capable of de-risking complex constructions and uplifting regional skills. The presentation concludes with a call to action for deeper collaboration, positioning Hong Kong's proven quality blueprint as a foundation for a safer, more reliable future for Asian welding.

本次演讲由香港應用焊接協會资深顾问郭先生发表，将探讨香港作为焊接检测与质量保证卓越中心的独特地位。凭借其作为国际认证机构首席考官的丰富经验，郭先生将阐述香港极具要求的基建环境——从标志性大桥、高密度城市建筑到海洋环境——如何催生了一个世界级的、融合多标准的无损检测（NDT）与焊接检验方法。

演讲将重点介绍具体的本地应用案例，展示如何将 PCN、ASNT 和 CSWIP 等标准严格整合，并应用于香港大型项目中，这对项目的成功与持久性至关重要。郭先生将指出，这份来之不易的专业知识是推动区域合作的宝贵资产。他将把香港定位为“一带一路”项目和粤港澳大湾区内理想的合作伙伴及独立质量保证中心，能够有效管控复杂工程的风险，并提升区域技能水平。演讲最后将呼吁各方进行更深入的合作，将香港行之有效的质量方案作为基石，共同为亚洲焊接行业构建一个更安全、更可靠的未来。



MR. AZRAF AZMAN

阿兹拉夫·阿兹曼

Hon. TREASURER of MALAYSIAN WELDING AND JOINING SOCIETY (MWJS)

马来西亚焊接和连接学会司库

Topic 报告题目

MWJS as Industrial Lead Body for National Human Resources Under Ministry of Human Resource Welding and Allied Processes Sector: Issues and Challenges

《马来西亚焊接和连接学会 MWJS 作为人力资源部下属的国家人力资源行业领导机构焊接及相关工艺行业：问题与挑战》

Introduction of Speaker 报告人简介

Azraf Azman: Hon. Treasurer of MWJS (2008 – present). Vice President of Nuclear Society (2022-2025). More than 10 years of experience in Welding and Allied processes; also, in Nuclear Engineering application for peaceful uses. JWES welding engineer (personnel coordination) certification. Academic: Beng – Mechanical Engineering, Universiti Teknologi Malaysia; MSc – CFD – Universiti Kebangsaan Malaysia; PhD – currently PhD student University Tenaga Nasional (Uniten) – position – Research Officer involved in Nuclear, fabrication and materials engineering activities.

阿兹拉夫·阿兹曼：马来西亚焊接学会 (MWJS) 名誉司库 (2008 年至今)。核学会副会长 (2022-2025)。10 年以上焊接及相关工艺经验；此外，在核工程应用的和平用途。JWES 焊接工程师 (人员协调) 认证。学术：马来西亚科技大学机械工程学士；硕士- CFD -马来西亚 Kebangsaan 大学；博士-目前在读博士 Tenaga 国立大学(Uniten) -职位-研究官员，涉及核，制造和材料工程活动

Abstract 报告摘要

Recently, MWJS has been conferred to become Industrial Lead Body - Welding and Allied Processes Sector by the Ministry of Human Resources. This presentation will highlight information that has been endorsed to the Ministry. It covers Act / Policies / Legal; Mandate; Scope of Malaysian Standards Industry Codes field applicants (up to 5 digit); Record of involvement with the Ministry (other than MOH) and Industry; Certification prospects; Term planning short time and Long; Economic landscape; Job demographics; Applicant's commitment Want to become an ILB?; Green elements; IR4.0; Certification information; Stakeholders in Applicant's field; List of members registered/associated/affiliated; Cooperation information existing with Ministry of Human Resources /National Certification Department/agency at under Ministry of Human Resources.

近日，马来西亚焊接学会 (MWJS) 已被人力资源部正式授予“焊接及相关工艺行业工业领导机构”资格。本演示将重点汇报已获该部核准的下列内容：

法规/政策/法律依据，机构职权范围，马来西亚标准行业代码适用领域 (至多 5 位代码)，与人力资源部 (除卫生部外) 及工业界的合作记录，认证发展前景，短期与长期规划，行业经济格局，就业人口结构，申请成为工业领导机构 (ILB) 的承诺，绿色要素，工业 4.0 (IR4.0)，认证体系信息，相关领域利益攸关方已注册/合作/附属成员名录与人力资源部/国家认证司及其下属机构的现有合作情况



MS. CAO HONGXIA

曹红霞

中国石油工程建设协会焊接专业委员会秘书长、联盟焊接与无损检测专业委员会秘书长、中国职工焊接技术协会副理事长

Secretary-General of the Welding Committee of China Petroleum Engineering Construction Association, Secretary-General of the Welding and Non-Destructive Testing Professional Committee of IASDBR, Vice Chairman the Training Committee of China Welding Technology Association

Topic 报告题目

Empowering Enterprises and Advancing Vocational Education: Practical Pathways for the Welding and Non-Destructive Testing Professional Committee of International Alliance of Skills Development (IASDBR) to Enhance Teaching and Training Capabilities, Promote Technological Advancement in the Welding Industry, and Foster International Cooperation and Development

《为企业赋能 为职教助力》“一带一路暨金砖国家技能发展国际联盟焊接与无损检测专委会在促进教学培训能力提升、推动焊接行业技术进步、国际化合作与发展的工作思路》

Introduction of Speaker 报告人简介

Secretary-General of the Welding Committee of China Petroleum Engineering Construction Association; Secretary-General of the Welding and Non-Destructive Testing Professional Committee of IASDBR; Vice Chairman of the Training Committee of China Welding Technology Association; Vice Chairman of China Workers' Welding Technology Association; Expert Reviewer for Heilongjiang Provincial Education Science Research Projects. Senior Technician, International Welding Examiner (DVSWTE), German Welding Inspector, Chartered Inspector of Steel Structures (CISWIP), International Welding Engineer (IWE), Project Management Professional (PMP). Recipient of the Heilongjiang Province May 1st Women's Medal, May 1st Labor Medal, and National May 1st Women's Model Worker honorary titles.

中国石油工程建设协会焊接专委会秘书长、一带一路暨金砖国家技能发展国际联盟焊接与无损检测专业委员会秘书长、中国焊接技术协会培训委员会副理事长、中国职工焊接技术协会副理事长、黑龙江省教育科学研究项目评审专家。高级工种师、国际焊接考官 (DVSWTE)、德国焊接检验师、英国注册检验师 (CISWIP)、国际焊接工程师 (IWE)、美国项目管理师 (PMP)。并荣获黑龙江省“五一”巾帼奖章、“五一”劳动奖章、全国“五一”巾帼标兵等荣誉称号。

Abstract 报告摘要

The report primarily outlines the efforts of the Welding and Non-Destructive Testing Professional Committee of International Alliance of Skills Development (IASDBR). Operating within the Alliance's organizational framework, the Committee integrates academic institutions, enterprises, educational bodies, and industry associations from Belt and Road countries and BRICS nations across welding, inspection, and metal processing manufacturing sectors. It aims to establish a multi-party cooperation platform to support the development of relevant programs and high-level institutions at universities and vocational colleges. The initiative also assists enterprises in upgrading technical skills and achieving international development.

报告主要介绍了一带一路暨金砖国家技能发展国际联盟焊接与无损检测专业委员会在联盟的组织框架下，整合“一带一路”沿线国家与金砖国家在焊接、检测、金属加工制造领域的院校、企业、教育机构、行业协（学）会资源，在凝聚产业技术力量，在会员间开展全方位、国际化的深度合作，推动智能制造技术的发展和应用方面的一些思考和作法。旨在搭建多方合作平台，助力各高等院校、职业院校的相关专业建设、高水平院校建设。助力企业技术技能升级，实现国际化发展。



MR. LIU YANLI

刘延利

Dean of the Sino-German Technical Department of Jinan Vocational College

济南职业学院中德技术系主任

Topic 报告题目

Electromagnetic Pulse Technology and Applications

《电磁脉冲技术及应用》

Introduction of Speaker 报告人简介

Professor, Ph.D. I hold concurrent positions as a Research Fellow in Vocational Education at the Shandong Academy of Education and Science, an Executive Director of the Shandong Association for Innovation Methods, and an expert on the Intelligent Manufacturing Expert Database of the Shandong Department of Industry and Information Technology.

With 25 years of experience, I specialize in teaching, research and administration in the field of mechatronics and higher vocational education. As the principal participant, I led a team that won a National Second Prize in the National Vocational College Teaching Ability Competition. I have also been awarded three Provincial Second Prizes for Teaching Achievements and have led three provincial-level teaching research projects. As the first author, I have been granted five national invention patents and have published numerous academic papers in core professional journals.

教授，博士。兼任山东省教科院职教研究员，山东省创新方法研究会常务理事，山东省工信厅智能制造专家库专家等职务。长期从事机电领域教学、研究和管理的工作，拥有 25 年的高等职业教育教学及管理工作经验。作为主持人获得全国职业院校教学能力比赛国家级二等奖，省级教学成果奖二等奖 3 项；作为主持人承担省级教研课题 3 项；作为第一授权人获得国家发明专利授权 5 件；在核心专业期刊发表学术论文多篇。

Abstract 报告摘要

Electromagnetic pulse (EMP) technology is a technique that releases high-intensity electromagnetic energy instantaneously to interfere with or damage targets such as damage electronic devices, communication systems, and power facilities. Electromagnetic pulse welding (EMP welding) technology is an advanced welding method that applies EMP technology to welding, using transient electromagnetic forces to achieve high-speed collisions and bonding of metal materials. It has advantages such as high energy density, no heat-affected zone, and environmental friendliness, making it particularly suitable for bonding dissimilar metals. This report will briefly introduce the process principles of electromagnetic pulse welding technology and its applications in major industries, with the aim of familiarizing audiences with this advanced welding technology and promoting its broader application across various fields to support the high-quality development of China's equipment manufacturing industry.

电磁脉冲技术是一种通过瞬间释放高强度电磁能量，对电子设备、通信系统或电力设施造成干扰或破坏的技术。电磁脉冲焊接技术是一种将电磁脉冲技术应用在焊接领域，利用瞬态电磁力实现金属材料高速碰撞结合的先进焊接方法，兼具高能量密度、无热影响区、环保等优势，尤其适用于异种金属连接。报告将简要介绍电磁脉冲焊接技术的工艺原理以及在主要产业中的应用情况，目的是让大家熟悉这种先进的焊接技术，并让其在更多的领域得到广泛的应用，来支撑中国装备制造产业的高质量发展。



MR. CHENG HU

程虎

Senior Expert of Wuhan Digital Engineering Institute
武汉数字工程研究所高级专家

Topic 报告题目

Development of IC chip bonding and soldering tray device
based on TRIZ innovation method
《基于 TRIZ 创新方法的 IC 芯片贴焊托盘装置研制》

Introduction of Speaker 报告人简介

Cheng Hu, a senior expert at Wuhan Digital Engineering Research Institute, has authored over 40 patents, papers, and scientific reports. He has been recognized with 15 provincial and ministerial-level honors, including the Hubei Jingchu Craftsman, Hubei Youth May Fourth Medal, and Hubei Technical Expert. Additionally, he has garnered over 20 provincial and ministerial-level awards, such as the first prize at the 7th Jia Ke Cup International Welding Technology Remote Competition, the special prize for innovative achievements from the China Workers' Technical Association, and the first prize in the Hubei division of the China Innovation Method Competition.

程虎，武汉数字工程研究所高级专家，撰写专利、论文、科技报告 40 余项，曾湖北省荆楚工匠、湖北青年五四奖章、湖北省技术能手等省部级荣誉 15 项；获嘉克杯第七届焊接技术远程国际大赛一等奖、中国职工技术协会创新成果特等奖、中国创新方法大赛湖北赛区一等奖等省部级及以上奖项 20 余项。

Abstract 报告摘要

With the increasing integration of electronic products, IC chips are widely used. The installation of IC chips is mainly completed by pick-and-place machines. In the industry, multiple devices are usually connected to work together. However, in the small-batch and multi-variety IC chip mounting of small enterprises, due to the limited number of devices and the lack of matching soldering trays for IC chips, there are many problems such as poor mounting accuracy and low product qualification rate. Based on the TRIZ innovation method, this paper conducts research on a dedicated soldering tray device, generates nine conceptual schemes, analyzes and evaluates the solutions, and finally determines an optimal solution. The device is equipped with multiple IC chip slots, each of which adopts an adjustable two-level movable platform to adjust the size, which can meet the soldering needs of several different sizes of IC chips at the same time, solving the problem of precise soldering of PCB small-batch and multi-variety IC chips.

随着电子产品集成度的提高，IC 芯片被大量使用。IC 芯片的安装主要是靠贴片机来完成的，在行业中一般是多台设备联机工作，但在小型企业小批量多品种 IC 芯片的贴装中，由于设备数量有限、IC 芯片缺少匹配的贴焊托盘装置，出现了大量 IC 芯片贴装精度差、产品合格率低的问题。本文基于 TRIZ 创新方法开展了专用贴焊托盘装置的研究，产生了 9 个概念方案，针对解决方案进行分析、评估，最终确定了一种最优解，并进行了装置研制。该装置设有多个 IC 芯片槽，每个芯片槽采用可调节的两级活动平台调节尺寸，可同时满足若干不同尺寸大小 IC 芯片的贴焊需求，解决了 PCB 小批量多品种 IC 芯片精准贴焊的问题。



Dr. SONG KAI

宋恺

Research Assistant of Tianjin University

天津大学助理研究员

Topic 报告题目

Ultrasonic micro-forging post-treatment assisted laser directed energy deposition approach to manufacture high-strength Hastelloy X superalloy

《哈氏合金 X 超声微锻压辅助激光增材制造和性能评价研究》

Introduction of Speaker 报告人简介

Dr. Song Kai has long been engaged in research on creep, fatigue, and creep-fatigue interaction of welded structures and additive structures under extreme environments. He conducted joint research at Joining and Welding Research Institute, Osaka University. In recent years, he has published 15 papers in international journals such as International Journal of Plasticity and International Journal of Fatigue. He holds 8 authorized invention patents, including 1 U.S. patent.

宋恺博士长期从事焊接结构与增材结构在极端服役环境下的蠕变、疲劳等性能研究，曾赴大阪大学结合科学研究所进行联合培养，在 Int J Plast, Int J Fatigue 等期刊上发表 15 篇论文，获授权发明专利 8 项(美国专利 1 项)。

Abstract 报告摘要

Ultrasonic micro-forge treatment (UMT) assisted laser directed energy deposition (LDED), was developed to print Hastelloy X components with improved mechanical properties. In this study, the residual stress and mechanical properties of the non-UMT- and UMT-treated samples are compared, and the microstructure was examined to reveal the root cause. During additive manufacturing, the sample structure recrystallized from columnar grains to equiaxial grains, which exhibited much finer structures after UMT. The impact toughness, ductility, tensile strength, and microhardness of the superalloy increased after UMT. During the UMT process, the dislocation pileups appeared and offered hinderance to the dislocations moving within it, thereby improving the mechanical strengthening of the Hastelloy X superalloy.

超声波微锻处理 (UMT) 辅助激光定向能量沉积 (LDED) 技术被开发用于打印具有改进机械性能的哈氏合金 X。本研究对比了未经 UMT 处理与经 UMT 处理样品的残余应力及机械性能，并通过微观结构分析揭示根本原因。增材制造过程中，样品组织从柱状晶粒重结晶为等轴晶粒，经超声波微锻后显现出更细致的组织结构。该超合金经超声波微锻处理后，冲击韧性、延展性、抗拉强度及微硬度均有所提升。超声波微锻过程中形成的位错堆积阻碍了位错在内部移动，从而增强了哈氏合金 X 的机械性能。



PROF. TRIYONO

特里约诺

Director of the Education and Academic Division of Indonesian Welding Society

印度尼西亚焊接学会教育与学术部门负责人

Topic 报告题目

One-Step Double-Acting Friction Stir Welding for Joining Aluminum Extrusion Panels

《一步式双作用摩擦搅拌焊接 (ODFSW) 》

Abstract 报告摘要

This study investigates the influence of tool rotational speed and joint configuration on the microstructural and mechanical performance of extruded AA6061-T6 aluminum panels joined using the One-Step Double-Acting Friction Stir Welding (ODFSW) process. Panels were joined in both butt and lap configurations at rotational speeds of 1200, 1500, and 1800 rpm. Macroscopic observations revealed that higher rotational speeds improved material flow and joint consolidation, reducing surface and internal defects. Microstructural analysis showed refined equiaxed grains in the stir zone due to dynamic recrystallization, accompanied by the characteristic W-shaped hardness distribution, with minimum values in the heat-affected zone (HAZ) resulting from thermal softening. Mechanical testing demonstrated that increasing rotational speed enhanced both tensile load capacity and bending strength. The butt joints exhibited superior performance, achieving a maximum load capacity of 25.3 kN and bending strength of 10.8 MPa at 1800 rpm, compared to 18.5 kN and 6.3 MPa for lap joints. Fracture analysis revealed open-mode failure in butt joints and shear-mode failure in lap joints, consistent with differences in interface bonding and stress distribution. Overall, ODFSW proved effective for joining aluminum extrusion panels, with optimized rotational speed and joint configuration playing key roles in achieving defect-free welds and enhanced mechanical integrity.

本研究探讨了工具旋转速度和接头配置对采用一步双动搅拌摩擦焊 (ODFSW) 工艺连接的 AA6061-T6 铝板的微观结构和机械性能的影响。在 1200、1500 和 1800 转/分的旋转速度下，将板材以对接和搭接两种配置进行连接。宏观观察表明，较高的旋转速度改善了材料流动和接头的致密性，减少了表面和内部缺陷。微观结构分析显示，搅拌区由于动态再结晶形成了细化的等轴晶粒，并伴有典型的 W 形硬度分布，热影响区 (HAZ) 硬度最低，这是由于热软化所致。机械测试表明，旋转速度的提高增强了拉伸承载能力和弯曲强度。对接接头表现出更优的性能，在 1800 转/分时，其最大承载能力达到 25.3 千牛，弯曲强度为 10.8 兆帕，而搭接接头的相应值分别为 18.5 千牛和 6.3 兆帕。断裂分析表明，对接接头出现开裂模式失效，搭接接头出现剪切模式失效，这与界面结合和应力分布的差异相符。总体而言，ODFSW 证明了其在连接铝挤压板方面的有效性，优化的旋转速度和接头配置在实现无缺陷焊接和增强机械完整性方面发挥了关键作用。

Aluminum is one of the most abundant metals on Earth and is widely utilized in combination with other materials to enhance its mechanical performance, particularly in the automotive and aerospace industries [1–3]. In recent years, aluminum alloys have become a primary material for vehicle frames and body structures due to their lightweight, high strength, and excellent corrosion resistance [4]. However, the inherent ductility of aluminum requires structural designs that can improve stiffness, one of which is through panel constructions. These panels are generally manufactured by extrusion, yet in many cases, extruded products require additional joining processes to achieve the desired dimensions and complex geometries. Conventional fusion welding has been widely applied for this purpose but often leads to defects such as porosity, which compromises joint integrity [5].

铝是地球上含量最丰富的金属之一，常与其他材料结合使用以增强其机械性能，尤其是在汽车和航空航天工业中[1–3]。

近年来，由于铝合金具有重量轻、强度高和出色的耐腐蚀性等特点，已成为汽车车架和车身结构的主要材料[4]。然而，铝固有的延展性要求结构设计能够提高刚度，其中一种方法是采用板件结构。这些板件通常通过挤压制造，但在许多情况下，挤压产品需要额外的连接工艺才能达到所需的尺寸和复杂几何形状。传统的熔焊工艺已被广泛用于此目的，但往往会导致诸如气孔之类的缺陷，从而影响接头的完整性[5]。

Friction Stir Welding (FSW) has emerged as an effective solid-state joining technique that eliminates porosity-related issues by generating heat through friction between the rotating tool and the workpiece [6,7]. The rotating shoulder produces localized heating, softening the material, while the rotating pin stirs the plasticized material to form a metallurgical bond [8]. Despite its advantages, conventional FSW presents certain limitations, such as the need for sequential welding from both sides of the panel, which increases processing time. To overcome this drawback, One-Step Double-Acting Friction Stir Welding (ODFSW) was developed as an innovative variant of FSW capable of joining both sides simultaneously in a single pass [9,10]. Similar to FSW, the quality of ODFSW joints is significantly influenced by process parameters, particularly tool rotational speed.

搅拌摩擦焊接 (FSW) 已成为一种有效的固态连接技术，它通过旋转工具与工件之间的摩擦产生热量，从而解决了与气孔相关的问题[6, 7]。旋转的肩部会产生局部加热，使材料软化，而旋转的销子则搅拌塑化的材料，从而形成冶金连接[8]。尽管其具有诸多优点，但传统的搅拌摩擦焊接仍存在一些局限性，例如需要从面板的两侧依次进行焊接，这会增加加工时间。为了克服这一缺陷，一种名为一步式双作用搅拌摩擦焊接 (ODFSW) 的创新变体被开发出来，它是搅拌摩擦焊接的一种变体，能够在单次操作中同时连接面板的两侧[9, 10]。与搅拌摩擦焊接类似，ODFSW 接头的质量受工艺参数的影响很大，尤其是工具的旋转速度。

Previous studies have reported that increasing the tool rotational speed in ODFSW of AA6061-T6 plates leads to higher tensile strength of the joints [11]. Comparable results were obtained in ODFSW of extruded AA6061-T6 panels using different tool rotation speeds on both sides [12]. However, these investigations primarily focused on the influence of tool speed, while the role of joint configuration in aluminum panels has not been extensively examined. This factor is critical, since panel configurations in structural applications vary widely depending on their intended load-bearing function.

先前的研究表明，在 AA6061-T6 板材的 ODFSW 工艺中提高刀具旋转速度会提高接头的抗拉强度[11]。在使用不同刀具旋转速度对两侧进行挤压的 AA6061-T6 板材的 ODFSW 中也获得了类似的结果[12]。然而，这些研究主要关注了刀具速度的影响，而关于铝板接头的结构在实际应用中的作用却尚未得到充分探讨。这一因素至关重要，因为结构应用中的面板结构因预期的承载功能而差异很大。

Therefore, the present study not only investigates the effect of tool rotational speed but also emphasizes the influence of joint configuration on the physical and mechanical properties of ODFSW joints in extruded AA6061 aluminum panels. Specifically, this work evaluates the performance of joints fabricated with identical tool rotational speeds on both sides while comparing two distinct panel joint configurations.

因此，本研究不仅研究了刀具旋转速度的影响，还强调了接头结构对挤压 AA6061 铝板的 ODFSW 接头的物理和机械性能的影响。具体而言，本研究评估了在两侧使用相同刀具旋转速度制造的接头的性能，并对两种不同的面板接头结构进行了比较。



MR. SHOICHI NOMURA

野村昭一

Technical Advisor of The Japan Welding Engineering Society (JWES)

日本焊接工程学会技术顾问

Topic 报告题目

JWES Welder Certification System and Welding Coordinators Certification System

《日本焊接工程学会 JWES 焊工认证体系和焊接协调员认证体系》

Introduction of Speaker 报告人简介

Mr. Shoichi Nomura, Master Degree of Metallurgical Engineering from Nagoya University. Now he is a) the Senior Welding Engineer (SWE) certified by JWES, b) International Welding Engineer (IWE) qualified by IIW, c) Former IIW-IAB Peer Assessor certified by IIW, d) QMS Auditor certified by JRCA, e) AWF Auditor certified by AWF.

During Apr. 1976- Mar.2011, he worked as Welding Engineer and Quality Assurance Personnel at Nippon Kokan Corp. and JFE Engineering Corp..

Since Apr. 2011, he is working as Expert for the following jobs at JWES:1) Expansion of JWES Welding Coordinators Certification System, 2) AWF (Asian Welding Federation) Activities, 3) IIW (International Institute of Welding) Activities.

Shoichi Nomura 先生, 获得名古屋大学冶金工程硕士学位。现担任 a)日本焊接工程学会 JWES 认证的高级焊接工程师 (SWE), b) IIW 认证的国际焊接工程师(IWE), c) 经 IIW 认证的前 IIW- iab 同行评审员 d)经 JRCA 认证的质量管理体系审核员, e)经 AWF 认证的 AWF 审核员

曾在 1976 年 4 月- 2011 年 3 月在日本 Kokan 公司和 JFE 工程公司担任焊接工程师和质量保证人员。2011 年 4 月至今: 在日本焊接工程学会 JWES 担任以下工作的专家: 1)扩大日本焊接工程学会 JWES 焊接协调员认证体系, 2)AWF (亚洲焊接联合会) 的活动, 3)国际焊接学会 (IIW) 活动。

Abstract 报告摘要

JWES has conducted JWES Welder Certification System (JWCS) for 75 years and JWES Welding Coordinators Certification System (JWCCS) for 52 years in Japan. In this forum, I would like to explain the details of these certification systems.

Regarding JWCS, JWES has conducted Welder Qualification Tests based on Japanese Industrial standards for abt.110,000 applicant welders annually all over the Japan.

The applicants have come from Steel structures for architectural building, Boiler & Pressure vessel, Steel & Metal manufacturers, Transportation & Construction machines industries. JWCS consists of the written examination and practical examination. The written exam consists of 20 multiple-choice questions written in Japanese, English, Chinese, Indonesian, Vietnamese, Thai, Korean, Portuguese and its acceptance criteria is more than 60%. The practical examination consists of visual test and bending test.

The acceptance criteria of bending test is that bend-test specimens shall not reveal any discrete discontinuity ≥ 3 mm in any direction. and the sum of the discontinuities less than 3 mm in any direction one bend specimen shall not exceed 7 mm and others.

Regarding JWCCS, JWES has concluded the cooperation agreement with 8 Asian countries to implement WCCS from 2005. As a result, as of April 2025, the total number of SWE (Senior Welding Engineer) level' s/WE (Welding Engineer) level' s /AWE (Associate Welding Engineer) level' s certificate holders is 1526. From 2019,



under this certification system, the access conditions of candidate have been revised, so that students who do not have the required years of welding job experience can take the written examination now. In addition, the candidates can take remote lectures instead of physical ones now.

In Japan, there is a need to obtain IIW (International Institute of Welding) qualifications such as IWE (International Welding Engineer), IWT (Technologist), and IWS (Specialist) diplomas. These diplomas have been awarded to SWE/WE/AWE certificate holders if they make the application for the Alternative Route specified by IIW, pass the detailed document assessment, the Technical Interview (2 hours for IWE), and the final examination.

日本焊接工程学会在日本实施日本焊接工程学会焊工认证体系 (JWCS) 已有 75 年的历史, 实施日本焊接工程学会焊接协调员认证体系 (JWCCS) 已有 52 年的历史。在本论坛上, 我将详细介绍这些认证体系。关于日本焊协工程学会焊工认证体系, 日本焊接工程学会每年在日本各地为约 11 万名申请焊工进行基于日本工业标准的焊工资格测试。申请者主要来自建筑钢结构、锅炉及压力容器、钢铁及金属制造商、交通及工程机械等行业。日本焊接工程学会焊工认证体系分为笔试和实考两部分。笔试包括 20 道选择题, 用日语、英语、汉语、印尼语、越南语、泰语、韩语、葡萄牙语作答, 通过率在 60% 以上。实践考试包括目测和弯曲试验。

弯曲试验的验收标准是弯曲试样在任何方向上不出现任何 $\geq 3\text{mm}$ 的不连续现象。在任何方向上的不连续性总和小于 3mm, 一个弯曲试件不得超过 7mm。

关于焊接协调员认证体系方面, 日本焊接工程学会与 8 个亚洲国家签订了合作协议, 从 2005 年开始实施焊接协调员认证体系, 因此, 截至 2025 年 4 月, 持有 SWE (高级焊接工程师) /WE (焊接工程师) /AWE (副焊接工程师) 证书的总人数为 1526 人。从 2019 年起, 在这一认证制度下, 对考生的准入条件进行了修订, 没有达到规定年限焊接工作经验的学生现在可以参加笔试。此外, 考生现在可以远程授课, 而不是实体授课。

在日本, 需要获得 IIW (国际焊接学会) 资格证书, 如 IWE (国际焊接工程师)、IWT (技术员) 和 IWS (专家) 文凭。如果 SWE/WE/AWE 证书持有者申请 IIW 规定的替代途径, 并通过详细文件评估、技术面试 (IWE 为 2 小时) 和最终考试, 则可获得这些文凭。



MR. ANTONIO FERNANDEZ PEREZ

安东尼奥·费尔南德斯·佩雷斯先生

Global Business & Partnerships Director of Seabery

西班牙 Seabery 全球业务与合作伙伴关系总监

Topic 报告题目

The Future of Welding Training: Efficient, Safe, and Green
with AR & Simulation

《焊接培训的未来：高能、高效、高质量》

Introduction of Speaker 报告人简介

Antonio Fernandez brings extensive experience in the digitalization of vocational training through the implementation of cutting-edge AR simulation technologies. Over the past five years, he has been deeply involved in the global TVET ecosystem, actively addressing the challenges faced by key industries—such as the metal sector—in securing qualified labor (e.g., welders). He strongly advocates for the modernization of vocational education as a means to attract new generations to skilled trades, helping economies respond to the worldwide shortage of qualified professionals, which traditional education systems alone cannot meet.

In his current role as Global Business & Partnerships Director at Seabery, Antonio leads strategic collaborations with governments, institutions, and industry stakeholders worldwide. Seabery is a pioneering company in developing Skills Training Solutions powered by Augmented Reality, transforming vocational training by making it more efficient, safe, engaging, and environmentally sustainable.

Antonio's work is closely aligned with national and regional strategies across the globe, such as China's commitment to digital education reform, strengthening vocational capacity, and promoting green development. His leadership fosters partnerships that enhance the adaptability of vocational education systems to meet evolving social and economic needs, ensuring that AR-based training solutions contribute to both workforce development and sustainable growth.

Antonio Fernandez 通过实施尖端的 AR 仿真技术，在职业培训数字化方面拥有丰富的经验。在过去的五年里，他深入参与了全球职业技术教育与培训生态系统，积极应对金属行业等关键行业在获得合格劳动力（如焊工）方面面临的挑战。他强烈主张职业教育现代化，以此吸引新一代从事技术行业，帮助经济体应对全球合格专业人才短缺的问题，而仅靠传统教育体系无法满足这一问题。Antonio 目前担任 Seabery 的全球业务与伙伴关系总监，负责领导与全球政府、机构和行业利益相关者的战略合作。Seabery 是一家开发基于增强现实的技能培训解决方案的先驱公司，通过提高效率、安全性、参与性和环境可持续性来改变职业培训。Antonio 的工作与全球的国家地区战略密切相关，例如中国对数字教育改革、加强职业能力和促进绿色发展的承诺。他的领导力促进了伙伴关系，增强了职业教育系统的适应性，以满足不断变化的社会和经济需求，确保基于 AR 的培训解决方案有助于劳动力发展和可持续增长。

Abstract 报告摘要

The welding sector suffers from a growing lack of qualified professionals all over the world, with many industries being impacted by this skills shortage (e.g. automotive, railway, shipbuilding, heavy machinery, construction, etc.)

Virtual Training Systems have proven to be a solution to attract and train the new generation of welders in a much more efficient, safe and green way, becoming the standard of welding training in countries like Germany, USA or Australia. This technology is already recommended by IAW ANBs such as the German DVS, the American AWS or the Weld Australia. This technology has evolved during the last 5 years to such a level that it now allows the training & upskilling of experienced professionals, enjoying the benefits of the mentioned technology: efficient, green and safe, increasing the quality and speed of the training considerably.

During this presentation we will showcase the latest development of this technology with special focus on welding simulation realism and quality analysis.

焊接行业在世界各地越来越缺乏合格的专业人员，许多行业都受到这种技能短缺的影响（如汽车、铁路、造船、重型机械、建筑等）。虚拟培训系统已被证明是一种更高效、安全和绿色的方式吸引和培训新一代焊工的解决方案，成为德国、美国或澳大利亚等国家焊接培训的标准。该技术已被 IAW ANB 推荐，如德国 DVS、美国 AWS 或焊接澳大利亚。在过去的 5 年里，这项技术已经发展到了这样的水平，现在可以培训和提高经验丰富的专业人员，享受上述技术的好处：高效、绿色和安全，大大提高了培训的质量和速度。

在本次演示中，我们将展示该技术的最新发展，特别关注焊接模拟的真实性和质量分析。



DR. MOCHAMAD ZAED YULIADI

穆罕默德·扎伊德·尤利亚迪

Expert of Kampuh Academy Indonesia, Muhammadiyah Surabaya University 苏拉巴亚穆罕默迪亚大学印尼卡姆普学院专家

Topic 报告题目

Indonesia Aspires to Become a Global Resource of Welding Personnel 《印尼立志成为全球焊接人才资源大国》

Introduction of Speaker 报告人简介

EDUCATION :

2000 : Dr. Marine Technology Department, The University of Newcastle upon Tyne--United Kingdom NE1 7RU

1995 : M.Sc Welding and Adhesive Bonding Engineering Materials, Brunel The University of West London - United Kingdom UB8 3PH

1986 : B.Eng Naval Architecture, 10 November Surabaya Technology Institute - Indonesia

WORK:

1987 - 2017 : Shipyard Employee

2017 - recent : Kampuh Academy Indonesia Staff

2017 - recent : Muhammadiyah Surabaya Univedrsity

ORGANIZATION : Indonesian Welding Society (API-IWS) - Chairman of API/IWS = JWES Collaboration Committee. Asian Welding Federation (AWF) - Chairman of Training and Education Committee

学历 :

2000 : 海洋技术系博士, 泰恩河畔纽卡斯尔大学--英国 NE1 7RU

1995 : 焊接与粘合工程材料理学硕士, 西伦敦布鲁内尔大学--英国 UB8 3PH

1986 年: 11 月 10 日, 泗水技术学院--印度尼西亚, 海军建筑工程学学士

工作:

1987 - 2017 : 船厂员工

2017 -近期 : 印尼坎普学院员工

2017 -近期 : 泗水穆罕默迪亚大学

组织 : 印度尼西亚焊接协会 (API-IWS) - API/IWS = JWES 合作委员会主席。亚洲焊接联合会 (AWF) 培训与教育委员会主席

Abstract 报告摘要

The world is experiencing a shortage of skilled workers in the construction field, including welders, welding supervisors, welding inspectors, and welding engineers. The situation worsens when the labour force of the young generation is not interested in, working in a hot, dirty, and dangerous environment, as well as only a few vocational schools and training centres that run welding as a major subject. Moreover, welding education, training, and certification are very costly. On the other hand, the number of unemployed young people in Indonesia is 7.2 million in February 2024/ This presentation will discuss the challenges of preparing welding personel and the strategy to increase their number.

世界正面临着建筑领域技术工人短缺的问题, 其中包括焊工、焊接主管、焊接检验员和焊接工程师。如果年轻一代的劳动力对在高温、肮脏和危险的环境中工作不感兴趣, 而且只有少数职业学校和培训中心将焊接作为主修科目, 情况就会更加恶化。此外, 焊接教育、培训和认证费用非常昂贵。另一方面, 到 2024 年 2 月, 印度尼西亚的失业青年人数将达到 720 万。



MS. SELENGE BAIGALI-ENKH

Member of Mongolian Material Science and Welding Society
蒙古材料科学与焊接学会会员

Topic 报告题目

QUALITY CONTROL FOR PRESSURE PIPE WELDING AND
RELATED STANDARDS 《压力管道焊接质量控制及相关标准》

Introduction of Speaker 报告人简介

1. Academic Career:

Master Degree of Metal Science and Technology in Mongolian University of Science and Technology
Bachelor Degree of Engineering Physics in Mongolian University of Science and Technology

2. Qualification:

- a) Quality Management System - Auditor
- b) NDT – Inspector Level II - Ultrasonic Test, Magnetic Particle Test, Penetrant Test.

3. Job History:

- a) 2022 – Present : Member of Mongolian Material Science and Welding Society
- b) 2012 - Present : Worked as Quality Assurance and Quality Control Lead Engineer at Hasu Dayan LLC

1. 学历:

蒙古科技大学金属科学与技术硕士
蒙古科技大学工程物理学学士

2. 资质:

- a) 质量管理体系--审核员
- b) 无损检测--二级检查员--超声波检测、磁粉检测、渗透检测。

3. 工作经历:

- a) 2022 年至今 : 蒙古材料科学与焊接学会会员
- b) 2012 年至今 : 在 Hasu Dayan LLC 担任质量保证和质量控制主任工程师亚焊接协会 (API-IWS) - API/IWS = JWES 合作委员会主席。亚洲焊接联合会 (AWF) 培训与教育委员会主席

Abstract 报告摘要

In recent years, urbanization has rapidly increased, leading to a significant rise in the number of construction projects. Consequently, installation works for district heating pipelines and boiler systems have been actively carried out across the country. Welding plays an essential role in metal structure fabrication and pipeline installation. Properly executed welded joints are critical to ensuring the reliability, safety, and stable operation of heating and piping systems.

近年来, 城市化快速发展, 导致建设项目数量大幅增加。因此, 区域供热管道和锅炉系统的安装工作在全国范围内积极开展。焊接在金属结构制造和管道安装中起着至关重要的作用。正确执行焊接接头对于确保供暖和管道系统的可靠性、安全性和稳定运行至关重要。



MS. LU QINGHUA

卢庆华

Associate Professor of Shanghai University of Engineering Science
上海工程技术大学副教授

Topic 报告题目

Hybrid reinforced aluminum matrix composites fabricated by selective laser melting
《多相混杂增强铝基复合材料的 SLM 成形研究》

Introduction of Speaker 报告人简介

Lu Qinghua, female, graduated from Shanghai Jiao Tong University in 2008 with a Doctor of Engineering degree. Associate Professor at Shanghai University of Engineering Science, Quality Director and Authorized signatory of the Laboratory for Reliability Testing and Analysis of Materials and Components (CNAS/CMA), and Chief Researcher of the Shanghai Collaborative Innovation Center for Laser Advanced Manufacturing Technology. The research direction is the interaction between laser and materials under complex process conditions, the characterization of mechanical behavior of materials, and the control of welding stress and deformation.

卢庆华，女，2008年毕业于上海交通大学，工学博士。上海工程技术大学副教授，材料及构件可靠性测试分析实验室（CNAS/CMA）质量负责人、授权签字人，上海市激光先进制造技术协同创新中心首席研究员。研究方向为复杂工艺条件下激光与材料的交互作用，材料力学行为表征，焊接应力和变形控制。

Abstract 报告摘要

This study systematically investigated the effects of SiC and TiB₂ particles on the phase composition, microstructure evolution, grain crystallization, and mechanical properties. The mechanisms of potential strengthening and fracture mechanisms were revealed. The tribological behaviors of the hybrid particle reinforced AlSi10Mg composites under different friction conditions were explored as well.

本研究系统地研究了 SiC 和 TiB₂ 颗粒对合金相组成、显微组织演变、晶粒结晶和力学性能的影响。揭示了潜在强化机制和断裂机制。研究了混杂颗粒增强 AlSi10Mg 复合材料在不同摩擦条件下的摩擦学行为。



Hosts 主办单位:

Asian Welding Federation (AWF)

亚洲焊接联合会

International Alliance of Skills Development for Belt & Road and BRICS (IASDBR)

一带一路暨金砖国家技能发展国际联盟

China Welding Association (CWA)

中国焊接协会

BRICS + Alliance of Science and Technology Innovation

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南宁市焊接协会

Guangxi Technological College of Machinery and Electricity

广西机电职业技术学院

BRICS Academy of Skills Development and Technology Innovation (Xiamen)

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Welding and Testing Professional Working Committee of IASDBR

一带一路暨金砖国家技能发展国际联盟焊接与检测专委会

Additive Manufacturing and Surfacing Division of CWA

中国焊接协会增材制造与表面工程工作委员会

Welding Division of China Building Materials Machinery Association

中国建材机械工业协会焊接专委会

Nanning Branch of Beijing ARC Xinxing Science & Technology Co., Ltd.

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