

**Proceedings of
2022 29th International Conference on
Nuclear Engineering
(ICONE29)**

Volume 10

**August 8-12, 2022
Shenzhen, China and Virtual, Online**

**Conference Sponsor
Nuclear Engineering Division**

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Two Park Avenue * New York, N.Y. 10016

© 2022, The American Society of Mechanical Engineers, 2 Park Avenue, New York, NY 10016, USA
(www.asme.org)

All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of the publisher.

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

ASME shall not be responsible for statements or opinions advanced in papers or . . . printed in its publications (B7.1.3). Statement from the Bylaws.

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

Requests for special permission or bulk reproduction should be addressed to the ASME Publishing Department, or submitted online at: <https://www.asme.org/publications-submissions/journals/information-for-authors/journalguidelines/rights-and-permissions>

ISBN: 978-0-7918-8645-8

CONTENTS

Proceedings of 2022 29th International Conference on Nuclear Engineering Volume 10

Advanced Methods of Manufacturing for Nuclear Reactors and Components

ICONE29-88884	V010T10A001
Local Damage to Reinforced Concrete Panels Subjected to Oblique Impact by Projectiles: Numerical Analysis on Test Results <i>Zuoyi Kang, Yukihiko Okuda, Akemi Nishida, Haruji Tsubota, and Yinsheng Li</i>	
ICONE29-89075	V010T10A002
The Effect of Nozzle Safe End Hot/Cold Wire Tungsten Inert Gas Buttering on Microstructure and Property <i>Chengdong Yang, Maolong Zhang, Xiangkun Ru, and Weibao Tang</i>	
ICONE29-89096	V010T10A003
Evaluation on Weldability of Nickel-Base Alloy Weld Materials With High Chromium Content <i>Yoshinori Katayama, Takahiro Hayashi, Daiki Tanaka, and Hidenori Takahashi</i>	
ICONE29-89321	V010T10A004
Research on Crack Resistance of Nuclear Grade Nickel-Based Alloy Welding Materials <i>Ying Ao, Changzheng Xu, Guo He, Zhanpeng Lv, Ping Zhu, Maolong Zhang, and Jiasheng Zou</i>	
ICONE29-90150	V010T10A005
Study on the Application of Electromagnetic Stepping CRDM at Tilted Environment <i>Zhaohui Lu, Zewen Li, Jianming Zhou, and Qingsong Liu</i>	
ICONE29-90280	V010T10A006
DFMEA Application in Rotor Design of Million-Kilowatt Nuclear Power Stream Turbine <i>Xue Binghan</i>	
ICONE29-90436	V010T10A007
Research on the Design Method of Nuclear Heat Exchanger Tube Based on Multi- Objective Optimization <i>G. M. Cao, L. Dai, Z. X. Zhao, and T. He</i>	
ICONE29-90504	V010T10A008
Microstructure and Hardness Investigation on 25Cr2Ni2MoV Steel Welding Joint of Nuclear Power Steam Turbine Low Pressure Welded Rotor and Engineering Applications <i>Xin Huo and Xia Liu</i>	
ICONE29-90741	V010T10A009
Research and Development of Wet Winding Motor Reactor Coolant Pump for Generation 3 Nuclear Power Plant <i>Li Tianbin and Ma Lin</i>	
ICONE29-90890	V010T10A010
Research on the Application of Cobalt-Based Alloy Laser Additive Manufacturing in Reactor Internals <i>Qingtian Wang, Rui Cao, and Xianjun Zhang</i>	
ICONE29-91200	V010T10A011
Numerical Study on Welding Deformation of Upper Support Structure in 600MW Sodium-Cooled Fast Reactor <i>Wenchao Dong and Shanping Lu</i>	

ICONE29-91237	V010T10A012
Analytical and Experimental Research on Reactor Coolant Pump Mechanical Seals With Hydrodynamic Deep-Grooves <i>Liming Tang, Yongchun Pan, Xin Tan, Le Jin, and Yan Wang</i>	
ICONE29-91474	V010T10A013
Study on Multi-Objective Optimization Design of LP Section for 1000MW Class Nuclear Turbines <i>Yifeng Hu and Zhiqiang Hu</i>	
ICONE29-91521	V010T10A014
Manufacturing Process of Fuel Salt Discharge Tank for 2Mwt Liquid Thorium Based Molten Salt Reactor <i>Yan Wang and Hong Shi</i>	
ICONE29-91595	V010T10A015
Modal Simulation and Verification on Stator End Winding of Large Nuclear Power Turbine Generator <i>Xike Yang and Jian Zhang</i>	
ICONE29-91618	V010T10A016
Application and Prospect of Additive Manufacturing Technology in Nuclear Fuel Assembly Fabrication <i>Jie Ding, Yixiong Zheng, Chen Ye, and Cong Li</i>	
ICONE29-91711	V010T10A017
Manufacturing Technology of Mn-Ni-Mo Alloy Steel Heavy Forgings for HPR1000 Nuclear Power Plant <i>Zhang Zhifeng, Li Xiang, and Wang Xiaofang</i>	
ICONE29-91786	V010T10A018
Research on Martensitic Stainless Steel Used on the Latch Housing of European Pressurized Reactor (EPR) Control Rod Drive Mechanism (CRDM) <i>Cuizhu He and Yinhui Lan</i>	
ICONE29-91791	V010T10A019
Study on the Manufacturing Process of Large Super Alloy X-750 Forgings for Nuclear Equipment <i>Mei-fang Chen, Sheng-qiang Cao, and Kai Dong</i>	
ICONE29-91816	V010T10A020
Application of Vacuum Hot Helium Leak Examination Technology for ITER Blanket Shield Blocks <i>Weiping Li, Guoyan Jiang, Wei Luo, and Renjun Fang</i>	
ICONE29-92037	V010T10A021
The Research on Welding Procedure and Performance of Zr-3 Thick Plate <i>Yu Gao, Xiaoru Liang, Yuxin Wang, and Lifeng Guo</i>	
ICONE29-92123	V010T10A022
High-Temperature Deformation Constitutive Relationship of Zr-Sn-Nb Alloy for Nuclear Power <i>Yingqi Gao, Ben Wang, Jianguo Cao, Qianqian Luo, Yuan Cao, Zhihao Zhang, Lian Wang, and Bo Gao</i>	
ICONE29-92130	V010T10A023
Research on Key Assembling Technology of Tube Bundle Assembly of Hualong-1 Type Steam Generator <i>Ye Wanbing, Liu Yuanbin, Chen Yaomao, Zhang Sanjun, and Wang Aili</i>	
ICONE29-92165	V010T10A024
Research of the Standards Compilation of Welding Material for Carbon Steel in Pressurized Water Reactor Nuclear Power Plants <i>Bai Lin and Liang Xiaoru</i>	

ICONE29-92166	V010T10A025
Investigation on Irradiation Resistance of Anti-Galling Lubricant for High Temperature Fasteners of Nuclear Power Plant <i>Xiao Qiang Liu, Ming Jiao, Xiu Qiang Shi, and Yichen Bao</i>	
ICONE29-92252	V010T10A026
The Crown Predictive Model of Cold-Rolled Zirconium Alloy Strip Sheet Based on Machine Learning Algorithm <i>Yuan Cao, Jianguo Cao, Yingqi Gao, Ben Wang, Pengfei Zhang, Fang Li, and Bo Gao</i>	
ICONE29-92283	V010T10A027
Microstructure, Texture and Mechanical Properties in Different Deformation Regions of the Compressed Zr-4 Alloy With Lamellar Structure <i>Jie Ren, Geping Li, Fusen Yuan, Ben Wang, Fuzhou Han, Muhammad Ali, Yingdong Zhang, Wenbin Guo, and Bo Gao</i>	
ICONE29-92302	V010T10A028
Manufacturing Technology of Thick-Walled Integrated Cylinder With Large-Sized Side Nozzles for Nuclear Pressure Vessel <i>Shaofei Li</i>	
ICONE29-92313	V010T10A029
Root Cause Analysis of Nonrelevant Indication of Magnetic Particle Test on 18MND5 Steel Welded Joints in the Steam Generator of a Nuclear Power Project <i>Yanbing Guo, Yanhong Lu, Wang Zhang, Miaosen Yang, Xiyang Liu, and Binfeng Lu</i>	
ICONE29-92321	V010T10A030
Optimizing Material/Component Fabrication Processing for Improving Service Performance in Nuclear Power Plant Coolants <i>Zhanpeng Lu</i>	
ICONE29-92329	V010T10A031
Research and Development of SA508Gr.4N Steel Ultra-Thick Forgings With High Strength and Toughness for Nuclear Engineering <i>Dongxu Du, Deli Zhao, Liguo Ren, Wenhui Zhang, Jiaju Li, and Xikou He</i>	
ICONE29-92344	V010T10A032
Finite Element Analysis and Prediction of the Cross-Section Morphology of Grid Strips <i>Jianzhong Mao, Zhi Cheng, Jun Su, Ben Wang, Pengfei Zhang, Zezhi Mei, Jiajian Yuan, and Bo Gao</i>	
ICONE29-92415	V010T10A033
Experimental Study on the Feasibility of Dry Grinding of MOX Core Blocks <i>Jianzhong Mao, Xin Liu, Ben Wang, Pengfei Zhang, and Bo Gao</i>	
ICONE29-92535	V010T10A034
Research on Laser Welding Process and Deformation Control of Irradiated Sample Holder <i>Shouyi Luo, Baochao Guo, and Dawei Mi</i>	
ICONE29-92711	V010T10A035
Research on Fatigue Analysis Method of Nuclear Equipment Under Ocean Conditions <i>Guangdong Liu, He Zhu, Zhui Zhang, Guoxun Zhang, Guitao Cao, Lin Tan, and Jing Qi</i>	
ICONE29-92754	V010T10A036
Investigation on the Inspection Technology of GH3535 Alloy Butt Weld With Linear Array Probe <i>Xiaodan Yuan and Zhijun Li</i>	

ICONE29-92837	V010T10A037
Research of Dissimilar Steel Welding for HTR-PM SG Heat Exchange Tube	
<i>Mingtao Zheng and Li Wang</i>	
ICONE29-92905	V010T10A038
Optimization Configuration and Design Considerations of Spent Fuel Storage and Transport Casks for Nuclear Power Plants in China	
<i>Fengwu Liu, Shiyuan Li, Lijun Wang, Shunping Jing, Chao Liu, and Xiaoqing Li</i>	
ICONE29-92956	V010T10A039
High Temperature Gas Cooled Reactor Steam Generator Research on Stress-Rupture Test of High Temperature Materials and Welded Joints	
<i>Shimei Bao</i>	
ICONE29-92958	V010T10A040
Radiographic Examination of Electric Heater Tube Weld for HPR1000 Pressurizer	
<i>Jintao Yu, Dandan Lu, and Jianlei Zhang</i>	
ICONE29-92961	V010T10A041
Die Design and Process Study of Zr-4 Alloy Profile Extrusion	
<i>Peng Qi, Bo Gao, Zhihao Zhang, and Jianming Yin</i>	
ICONE29-92963	V010T10A042
Numerical Simulation on the Flow-Induced Vibration of Two Square Cylinders in Staggered Arrangement	
<i>Yidong Wu, Li Shi, Xinxin Wu, and Xiaoxin Wang</i>	
ICONE29-92966	V010T10A043
Study on Forging Technology of Integrated Topcover Forging for AP1000 Reactor Pressure Vessel	
<i>Zhaoyin Li, Kai Dong, and Zhiyong Tao</i>	
ICONE29-92974	V010T10A044
Performance Evaluation of Boron Doped NMCP Used in Neutron Radiography	
<i>Jinhao Tan, Jianrong Zhou, Yushou Song, Wenqin Yang, Jianjin Zhou, Yuanguang Xia, Hui Liu, Shulin Liu, Baojun Yan, Songlin Wang, Zhijia Sun, and Yuanbo Chen</i>	
ICONE29-92978	V010T10A045
Non-Destructive Examination of PWR Steam Generator Tube-Tube Plate Welds After Repairing Melting Damage	
<i>Yan Zhang, JianLei Zhang, and Zhonghe Cheng</i>	
ICONE29-93045	V010T10A046
Research on Measurement Method of a Device for Measuring the Perpendicularity of Tubesheet Hole	
<i>Xianghua Xu and Guihong Hu</i>	
ICONE29-93870	V010T10A047
Analytical Study for Low Ground Contact Ratio of Buildings Due to the Basemat Uplift Using a Three-Dimensional Finite Element Model	
<i>Byunghyun Choi, Akemi Nishida, Tadahiko Shiomi, Manabu Kawata, and Yinsheng Li</i>	