



**INTERNATIONAL INSTITUTE OF WELDING**

**A world of joining experience**

**Doc.XII-2637-2023**

**Annual Assembly Singapore 2023**

**Agenda**

**Commission XII  
"Arc Welding Processes and Production Systems"  
July17 - 19, 2023**

**Maria Sands Expo and Convention Centre, Singapore**

**Chair: Prof. Satoru Asai (Japan)**

**Monday 17 July 2023, 8:30 – 18:00 @ Orchid Main 4202&4203**

**(Morning Session, 8:30-12:30)**

1. Opening (Prof. Satoru Asai, Chairman of Commission XII)
2. Agenda
3. Minutes of previous meeting
4. Brief report on intermediate meeting on February, 2023
5. Direction and topics of Comm.XII
6. Presentation of documents:

**Session1: Sensing & Monitoring**

**(Session chairman: Prof. Zengxi Pan, Chairman of Sub-Comm.A)**

- [1] Multi-Modal Learning for In-Line Welding Defect Detection in Gas Metal Arc Welding  
Keita OZAKI, Akira OKAMOTO (Japan)  
Doc.XII-2608-2023
- [2] In situ measurement of hydrogen concentration in steel using Laser Induced Breakdown Spectroscopy (LIBS)  
Lukas Quackatz, Axel Griesche, Jonathan Nietzke, Thomas Kannengiesser (Germany)  
Doc.XII-2592-2023
- [3] Development of Laser Ultrasonic Robotic System and Detection Method for Internal Flaw Detection of Sheet Joints  
Keiji Kadota, Seiya Nitta, Kazufumi Nomura, Tetsuo Era, Satoru Asai (Japan)  
Doc.XII-2621-2023

- [4] Anomaly detection technologies for automatic welding system in horizontal position by monitoring weld pool using vision sensor  
T.Yoshimoto,K.Ozaki,J.Kawata, N.Furukawa,T.Yano (Japan)  
Doc.XII-2611-2023
- [5] Time-shift Effects of Input Images in Weld Depth Estimation Model using CNN through Molten Pool Monitoring in GMAW  
Kazufumi NOMURA, Wataru TANAHARA, Takumi MATSUMURA, Tomokazu SANO (Japan)  
Doc.XII-2596-2023

**10:30-11:00 Coffee Break (30 min.)**

**Session2: Robot & Automation**

**(Session chairman: Prof. Sven-F. Goecke, Chairman of Sub-Comm.C)**

- [6] Augmented Virtuality Human-robot Interactive Welding: Principles and Applications  
Wenhua Jiao, Qiyue Wang, YuMing Zhang (USA) *Winner of Henry Granjon Award*  
Doc.XII-2622-2023
- [7] Robotic welding system for adaptive process control in gas metal arc welding  
U. Reisingen, R. Sharma, A. Biber (Germany)  
Doc.XII-2588-2023
- [8] Robotic welding position in vertical position up and/or down : Which quality level and performance can be expected?  
Olivier Cheminat, Alex Gutschmidt, David Plélan (France)  
Doc.XII-2594-2023
- [9] Improving TIG Welding Productivity with Automation and process advancement for aerospace grade exotic materials  
Hitesh Ashwin Narsia, Sureshkumar V (India)  
Doc.XII-2590-2023

**(Afternoon Session, 14:00-18:00)**

**Session3: Process I**

**(Session chairman: Dr. Stephan Egerland, Chairman of Sub-Comm. B )**

- [10] Comparative study between TIG-MIG Hybrid and MIG welding of 1.4462 duplex steel joints  
S. Weis, R. Grunert, S. Brumm, M. Halmaghi, U. Prank (Germany)  
Doc.XII-2585-2023
- [11] Calibrated power sources - and other ways to reduce process-related fluctuations in a production environment  
Stefan Rohleder (Germany)  
Doc.XII-2586-2023
- [12] Development of AC Synchro-feed welding process for High quality and productive welding of aluminum and its alloy  
Kento Takada, Shugo Hirota, Hisao Miyahara, and Tetsuo Era (Japan)  
Doc.XII-2597-2023
- [13] Joint welding of mild steel using a GMAW hot-wire process  
T. Ungethüm, P. Schilling, E. Spaniol, H.C. Schmale, U. Füssel (Germany)  
Doc.XII-2601-2023
- [14] Case Studies on Heat Input Control with enhanced weldability for thin sheet– larger diameter aerospace grade materials with advancing process parameters and fixture designs  
Hitesh Ashwin Narsia, Rohit Diwedi (India)  
Doc.XII-2591-2023
- [15] Development of Low Spatter MAG Welding Process using Periodically Changing Gas  
Kohei FUJIWARA, Tadahisa TSUYAMA, Masahiro OHARA, Takashi MIZUGUCHI (Japan)  
Doc.XII-2620-2023

**16:00-16:30 Coffee Break (30 min.)**

**Session4: Process II**

**(Session chairman: Prof. ChuanSong Wu, Chairman of Sub-Comm.E)**

- [16] Study of the influence of Al element on the arc and molten pool behavior during flux bands constricting arc welding (FBCA) process  
Lei Wang, Yongtao Liu, Yuechao Lia, Mengkun Zhu, Jisen Qiao (China)  
Doc.XII-2589-2023
- [17] Study on the active control of variable polarity plasma arc welding process based on the characterizable parameters of the molten pool  
Jingbo Liu, Fan Jiang, Shujun Chen, Shinichi TASHIRO, Manabu TANAKA (China)  
Doc.XII-2607-2023
- [18] Synergistic activation of TIG welding process  
KOVALENKO Dmytro, KRIVTSUN Igor, KOVALENKO Igor (Ukraine) : *Non-physical*  
Doc.XII-2626-2023
- [19] Progressive technologies of electrophysical treatment for regulation of stress-strain states of elements of welded structures  
L.M. Lobanov, M.O. Pashchyn, O.L.Mikhodui (Ukraine) : *Non-physical*  
Doc.XII-2625-2023

**Tuesday 18 July 2023, 08:30 -18:00 @ Orchid Main 4202&4203/4204**

**Joint Meeting of C-I, C-IV, and C-XII**

**“Welding/joining and additive manufacturing technology”**

**(Morning Session, 08:30-12:30)**

**Session I : Chair: Prof. Satoru Asai, Chairman of Comm.XII**

0830: Opening of Joint Meeting of C-I, C-IV, and C-XII – Prof. Satoru Asai

- [J1] Tailoring grain structure of laser powder bed fusion processed nickel alloy via layer-wised thermal gradient control strategies  
Jie Zhu, Kai Feng, Zhuguo Li (China)  
Doc. XII-2604-2023/ I-1549-2023/IV-1572-2023
- [J2] Microstructure control and strengthening of LaF<sub>3</sub> nano-particles reinforced CrCoNi medium entropy alloy fabricated by selective laser melting  
Yiwei Yu, Kai Feng, Zhuguo Li, Bolun Han, Chengcheng Zhang, Jie Zhu (China)  
Doc. XII-2605-2023/ I-1550-2023/IV-1573-2023
- [J3] Pore defect reduction technique based on direct observation of bubble generation processes during laser metal deposition  
Keigo Tanaka, Takuto Yamaguchi, Hideki Hagino (Japan)  
Doc. XII-2606-2023/ I-1551-2023/IV-1574-2023
- [J4] Dynamic keyhole behaviors in laser processing of a medium-entropy alloy  
Dongsheng Wu, Hisaya Komen, Manabu Tanaka, Ninshu Ma, Zihan Li, Yuan Li, Youxiong Ye, Tao Sun (China) *Winner of Henry Granjon Award*  
Doc. XII-2610-2023/I-1552-2023/IV-1575-2023
- [J5] Modification of microstructure and mechanical property of twin-wire directed energy deposition-arc fabricated TiAl-4822 alloy via process current  
Chen Shen, Wenlu Zhou, Yuelong Zhang, Lin Wang, Fang Li, Xueming Hua (China)  
Doc.XII-2598-2023/ I-1553-2023/IV-1576-2023

**10:20 Visit of WitW editor**

**Coffee Break (10:30– 11:00)**

## **Session II : Chair: Prof. Satoru Asai, Chairman of Comm.XII**

- [J6] Probing Build Profile in Gas Metal Arc Directed Energy Deposition  
Sanghamitra Das, Prashant Kumar Chaurasia, Amitava De (India)  
Doc. XII-2593-2023/I-1557-2023/IV-1577-2023
- [J7] Multi-physical modelling of element inhomogeneity phenomenon in TW-DED-Arc fabricated  $\gamma$ -TiAl Alloy  
Jianwen Xin, Dongsheng Wu, Chen Shen, Hisaya Komen, Manabu Tanaka, Xueming Hua, Fang Li (China)  
Doc.XII-2599-2023/ I-1558-2023/ IV-1578-2023
- [J8] Relieving anisotropy of mechanical properties by optimization of microstructure through ultrasonic vibration assisted laser direct deposition  
Chun Yu, Jijin Xu, Zhiyuan Yu, Junmei Chen, Hao Lu (China)  
Doc. XII-2600-2023/I-1559-2023/IV-1557-2023
- [J9] Probing Dimensional Consistency during Multi-track Multi-layer Gas Metal Arc Directed Energy Deposition of Aluminium Alloys  
Prashant Kumar Chaurasia, Birendra Kumar Barik, Atanu Das, Sven F Goecke, Amitava De (India)  
Doc. XII-2602-2023/ I-1560-2023/IV-1579-2023

**(Afternoon Session, 14:00-18:30)**

## **Session III: Chair: Dr. Herbert Staufer, Chairman of Comm.IV**

- [J10] Comparison new joining approaches of mixed materials for highly loaded light weight and high temperature application such as ceramics connected to metal among others  
Dirk Dittrich (Germany)  
Doc. XII-2627-2023/I-1554-2023/IV-1557-2023
- [J11] Towards Improving Computational Efficiency of Thermomechanical Model for Laser Powder Bed Fusion  
Neelima Patnaikuni, Kajal Khan, Amitava De (India)  
Doc. XII-2628-2023/ I-1555-2023/IV-1556-2023
- [J12] Development of Hot-wire Laser Additive Manufacturing for Dissimilar Materials of Stainless steel/Aluminum alloys  
Keita MARUMOTO, Takahiro HOURAI, Daiji MORITA, Chisako ODA, Takafumi FUJII, Takashi YUZAWA, Ryogo KOBAYASHI, Motomichi YAMAMOTO (Japan)  
Doc. XII-2629-2023/ I-1556-2023/IV-1458-2023
- [J13] Mechanical and microstructural investigation of Laser+Wire DED deposited thin walled stainless steel structures  
M. Ghasempour-Mouziraji, N. Helthuis, I. Gibson, D. Alonso, C. Goulas  
Doc. XII-2630-2023/I-1563-2023/IV-1562-2023
- [J14] Potential of thermography for the monitoring of the WAAM process  
Johanna Müller, Jonas Hensel (Germany)  
Doc. XII-2631-2023/I-1532-2023/IV-1580-2023
- [J15] Modelling tools and use for digital quality control in AM and welding  
Jialuo Ding, Yongle Sun, Xin Chen, Pradeeptta Taraphdar, Alireza Mosalman Haghighi, Stewart Williams, Murugaiyan Amirthalingam (UK)  
Doc.XII-2632-2023/ I-1535-2023/ IV-1581-2023

**Coffee Break (16:00 – 16:30)**

## **Session IV: Chair: Doug Kautz, Chairman of Comm.I**

- [J16] In-situ alloying with elementary powders in additive manufacturing  
Kevin Hoefler, Phillip Schmidt, Jonas Hensel (Germany)

Doc. XII-2633-2023/I-1533-2023/IV-1582-2023

- [J17] Analysis of resulting component properties of 3D-graded additive structures made of iron and nickel-based material by 3DPMD  
Rimpl, André Hälsig, Kevin Hoefler, Jonas Hensel (Germany)  
Doc. XII-2634-2023/ I-1534-2023/Doc. IV-1583-2023
- [J18] New processes and digitalisation for AM application to welding and rapid qualification  
Stewart Williams, Jialuo Ding, Wojciech Suder, Jian Qin, Shakirudeen Lasisi (UK)  
Doc. XII-2635-2023/ I-1536-2023/Doc. IV-1584-2023
- [J19] Superior quality and performance levels for aluminium wires for DED AM  
Lingling Ren, Zhenbiao Wang, Chengde Li, Shuai Wang, Jialuo Ding, Stewart Williams (China)  
Doc. XII-2636-2023/ I-1537-2023/Doc. IV-1585-2023

1750: Close Out of Joint Meeting of C-I, C-IV, and C-XII

## **Wednesday 19 July 2023, 8:30– 18:00@ Orchid Main 4202&4203**

**(Morning Session, 8:30-12:30)**

### **Session5 Arc Physics I**

**(Session chairman: Prof. ChuanSong Wu, Chairman of Sub-Comm.E)**

#### **8:30 Visit of the Secretariat**

- [20] Numerical simulation of a coupled GMAW process model  
F. Weigelt, M. Trautmann, T. Ungethüm, S. Manzke, U. Füssel, H. C. Schmale (Germany)  
Doc.XII-2603-2023
- [21] Three-Dimensional Simulation of Molten Metal Behavior in Wire Arc Additive Manufacturing Process Using Rotary Torch by Particle Method  
Hisaya KOMEN, Manabu TANAKA, Shuhei KANEMARU, Soichiro NOMOTO, Katsunori WADA, Tomoaki SASAKI, Eiji TABATA (Japan)  
Doc.XII-2609-2023
- [22] Combined MHD-SPH Modelling of Wire Arc Additive Manufacturing  
Yun H. Kim, Paul W. Cleary, Anthony B. Murphy (Australia)  
Doc.XII-2615-2023
- [23] CFD-based and experimental investigation of cooling gas nozzle sets for in-situ component cooling for DED-Arc  
Sebastian Manzke, Maximilian Gierth, Simon Wolf, Stefan Eichler, Tim Ungethüm, Hans Christian Schmale and Jean Pierre Bergmann (Germany)  
Doc.XII-2617-2023
- [24] Modelling of molten pool behavior for GMAW CMT process  
Dae-Won Cho, Sang-Hyun Ahn, Degala Venkata Kiran (Korea)  
Doc.XII- 2618-2023

#### **10:30-11:00 Coffee Break (30 min.)**

### **Session6: Arc Physics II**

**(Session chairman: Prof. Sven-F. Goecke, Chairman of Sub-Comm.C)**

- [25] Influence of the temperature dependence of the wire surface tension on the metal transfer phenomena in MIG welding process  
Yosuke Ogino, Tomokazu Sano (Japan)  
Doc.XII-XII-2612-2023
- [26] Metal Transfer Process Control of Underwater Wet FCAW Based on the Negative Pulse Current

Chuanbao Jia, Chuansong Wu (China)

Doc.XII- 2587-2023

[27] Role of material properties on metal transfer dynamics in gas metal arc welding

Yuriko SATO, Yosuke OGINO, Tomokazu SANO (Japan)

Doc.XII- 2613-2023

[28] Elucidation of droplet detachment mechanism in metal-cored arc welding

Shinichi TASHIRO, Ngoc Quang TRINH, Tetsuo SUGA, Tomonori KAKIZAKI, Kei

YAMAZAKI, Anthony B Murphy, Ackadech LERSVANICHKOOL, Hanh Van BUI, Manabu

TANAKA (Japan)

Doc.XII- 2619-2023

**(Afternoon Session, 14:00-16:00)**

**Session7: Arc Physics III**

**(Session chairman: Dr. M.J.M. Hermans, Vice-chairman of Comm.XII)**

[29] Visualization and control of free-flight transfer phenomenon in wire feed control process

Toshiki MARUYAMA, Yosuke OGINO, Tomokazu SANO (Japan)

Doc. XII-2614-2023

[30] Physical Mechanisms Affecting Deposition Rate in Aluminum Alloys

Rishiekesh Ramgopal, Zhaoyang Yan, Shujun Chen, Patricio F. Mendez (Canada)

Doc.XII-2623-2023

[31] Effect of hydrostatic pressure on arc and bubble transport phenomena during underwater wet flux-cored arc welding

Ji Chen, Xuefei Cui, Chuansong Wu (China)

[32] Evaporation Rate of Alloying Components in GMAW

Patricio F. Mendez, Vicente Nunez Sanchez, Zhaoyang Yan, Shujun Chen (Canada)

Doc.XII-2624-2023

[33] Using of software methods to study the materials structure properties with inclusions

Olha Shtofel, Viktor Holovko, Ihor Krasikov, Irina Krasikova (Ukraine) : *Non-physical*

Doc.XII- 2638-2023

7. Recommendation of submission to IIW Journal "Welding in the World"

8. Miscellaneous

9. Date and place of next meeting

10. Closure (Prof. Satoru Asai, Chairman of Commission XII)