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June 19–24, Maui, Hawaii, USA

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Engineering Conference**

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- 2nd Renewable Energy & Environment
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- 3rd Nanotechnology
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- 9th High-Performance Materials
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- 9th (Deep) Ocean Mining (& Gas Hydrates)

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## ISOPE-2011 Maui Conference

This 21st annual conference features **149 technical and opening general sessions**, and **6 keynote presentations** with top experts from industry, academia and government. After **peer review of the manuscripts** selected from **1,350 abstracts**, some **750 papers** will be presented and discussed by researchers, engineers and managers from more than **51 countries**.

The conference proceedings of peer-reviewed papers in PDF files will be available in a set of 4 volumes on CD-ROM (**4,200 pp. est.**) — paginated within each volume — during the conference and later for worldwide post-conference mail order from ISOPE: **ISBN 978-1-880653-96-8; ISSN 1098-6189** and separately (deep) ocean mining symposium proceedings **ISBN 978-1-880653-95-1; ISSN 1946-0066**.

**All indexed by Engineering Index (EI).**

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\* Continue to next session.

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### ISOPE HIGH-PERFORMANCE MATERIALS SYMPOSIUM — HPM

**6. HPM I: Shipbuilding Steels (V. 4)**  
**Monday June 20 10:30 Room 5**

**Chair:** KB Kang, POSCO, Korea

**Establishment of Required Brittle Crack Arrest Toughness Kca Value with Actual Scale Model Tests**  
T Inoue, Nippon Steel; T Matsumoto, Nippon Kaiji Kyokai; H Yajima, Nagasaki Inst of Applied Sci; S Aihara, Univ of Tokyo, H Yoshinari, National Maritime Research Inst; K Hirota, Mitsubishi Heavy Industry; M Toyoda, IHI Marine United; T Kiyosue, Kawasaki Shipbuilding; T Handa, JFE Steel, Japan

**Development of Brittle Crack Arrest Steel Plates for Large Heat-input Welding for Very Large Containerships**  
M Kaneko, T Tani, Kobe Steel, Japan

**Application of New Structure and High Deformability Steel to Bulbous Bow for Reducing the Damage to the Other Ship during Collisions**  
K Kamita, Imabari Shipbuilding; Y Funatsu, J Otani, H Shirahata, Nippon Steel; Y Yamada, National Maritime Research Inst, Japan

**A Study on the Countermeasures against Unstable Fracture at the Hatch Coaming FCA Butt Weldment Having Embedded Cracks in an Ultra-large Containership**  
SB Shin, DJ Lee, WS Kim, Hyundai Heavy Industries; JS Lee, Univ of Ulsan, Korea

**Improvement of Fracture Toughness, Kc, of Welded Joint: Development of Higher Toughness YP47(460N/mm<sup>2</sup>) Class Steel Plate for Ultra-large Container Ships-2**  
H Shirahata, J Otani, Y Funatsu, T Inoue, Nippon Steel, Japan

**Improvement of Arrestability for Brittle Crack for Welded Jointed Development of Higher Toughness YP47(460N/mm<sup>2</sup>) Class Steel Plate for Ultra-large Container Ships-3**  
J Otani, Y Funatsu, T Inoue, H Shirahata, Nippon Steel, Japan

**Proposal for Brittle Crack Arrest Methods Using Various Weld Arrestors: Development of Higher Toughness YP47(460N/mm<sup>2</sup>) Class Steel Plate for Ultra Large Container Ships-4**  
T Inoue, Y Funatsu, J Otani, H Shirahata, T Ishikawa, Y Hashiba, Nippon Steel, Japan

**Increase of Brittle Crack Arrestability Using Arrest Welding of Thick Steel Plate in Large Container Ship**

GB An, KM Ryu, JS Park, POSCO; TD Park, Hyundai Heavy Industries; YT Shin, Samsung Heavy Industries; SK Kang, Shipbuilding & Ocean Research Inst; JS Lee, Hanjin Heavy Industries; BJ Chang, Korean Register of Shipping; Y Shim, ABS, USA; JS Lee, POSCO, Korea

**Dynamic Measurement Analysis of Brittle Crack Propagation Behavior in Large-scale Structural Component Model Test for Large Container Ships**

T Handa, JFE Steel; T Matsumoto, Nippon Kaiji Kyokai; H Yajima, Nagasaki Inst of Applied Science; H Aihara, Univ of Tokyo; H Yoshinari, National Maritime Research Inst; K Hirota, Mitsubishi Heavy Industries; M Toyoda, IHI Marine United; T Kiyosue, Kawasaki Heavy Industries; T Inoue, Nippon Steel; T Kawabata, Sumitomo Metal Industries, T Tani, Kobe Steel, Japan

**16. HPM II: Non-Destructive Testing (V. 4)**  
**Monday June 20 14:00 Room 5**

**Chair:** DI Kwon, Seoul National Univ, Korea

**The Study of Engineering Critical Assessment Applications in Welding Flaw Acceptance Criteria for Offshore Pipeline Installation**

WB Ding, W Liu, SY Zhang, Offshore Oil Engineering, China

**Residual Stresses in Welded Steels with Longitudinal Stiffeners**

T Nitschke-Pagel, K Dilger, Univ of Braunschweig, Germany

**Laser Based Inspection Systems**

J Jennings, C Reichert LaMorte, A Channell, EWI, USA

**In-Service Safety Assessment of Industrial Facilities Using Instrumented Indentation**

WS Song, YC Kim, WJ Jo, DI Kwon, Seoul National Univ, Korea

**25. HPM III: Advanced Materials & Offshore Structures 1 (V. 4)**  
**Monday June 20 16:20 Room 5**

**Chair:** S Herion, Karlsruhe Inst of Technology, Germany

**Corrosion Protection - Robust Retrofit of a Gravity Based Production Structure in Frozen Arctic High Scour Conditions**

MB Surkein, JP LaFontaine, ExxonMobil Development, USA

**Strength of T-joint with Volumetric Surface Defect under Cyclic Inner Pressure**

P Yukhymets, EO Paton Electric Welding Inst, Ukraine

**Ferrite to Austenite Transformation Behavior of a Martensite and Bainite Microstructure with Various Heating Rate**

T Hara, G Shigesato, N Sugiyama, Nippon Steel, Japan

**Microstructure Evaluation of Arctic Steel during In-situ Deformation at Sub Zero Temperatures in High Resolution Scanning Electron Microscope**

SP Astad, Statoil; JH Pedersen, NTNU; M Karlsen, Statoil; J Hjelen, JK Solberg, NTNU; OM Akselsen, E Østby, SINTEF, Norway

**Microstructure Examination of Arctic Steel during In-situ Heat Treatment in High Resolution Scanning Electron Microscope**

SP Astad, Statoil; AJ Ensjø, NTNU; M Karlsen, Statoil; J Hjelen, JK Solberg, NTNU; OM Akselsen, E Østby, SINTEF, Norway

**Material Design Concept in Heavy Wall X100 High Strain Pipelines for Seismic Region**

J Shimamura, M Okatsu, N Ishikawa, K Nishimura, Y Murakami, JFE Steel, Japan

**High Strength Linepipes with Excellent Toughness for Corrosive Environments**

A Mannucci, P Novelli, Tenaris, Italy

**35. HPM IV: Advanced Materials & Offshore Structures 2 (V. 4)**  
**Tuesday June 21 08:00 Room 5**

**Chair:** P Jukes, MCS Kenny; USA

**The Research on Hysteretic Behavior of Rectangular Section Components of Cold-formed Thin-wall Steel**

YN Zhong, N Yang, Beijing Jiaotong Univ; QT Meng, Beijing Bidding for Construction Projects Management Office, China

**Dynamic Response Control of a Jacket Platform Using MR Dampers Based on an Inverse Dynamic Model**

XC Yu, HS, Kang, LQ Huang, Texas A&M Univ, USA; YH Xie, Zhejiang Ocean Univ, China; Q Zhai, Univ of Wisconsin Milwaukee, USA; GJ Chen, Shanghai Jiao Tong Univ, China

**Study on the Accuracy of Influence Factor Method when Applied to Surface Cracks in a Welded Joint of a Ship Structure**

N Osawa, J Sawamura, Osaka Univ; S Okada, Nippon Kaiji Kyokai; K Shigeta, T Tsuji, Osaka Univ, Japan

**Finite Element Analyses on Fracture Toughness Demands in Butt Weld of Steel Box Column with Thick Plate**

YQ Wang, H Zhou, YJ Shi, H Chen, Tsinghua Univ, China

**Experimental Study on the Dynamic Behavior of Concrete under Tension-Compression Dynamic Stress States**

YP Song, Dalian Univ of Tech; HL Wang, Dalian Univ, China

**Polychloroprene Behaviour in Sea Water: Comparison between Accelerated and Natural Ageing**

PY Le Gac, IFREMER; V Le Saux, Y Marco, Laboratoire Brestois de Mécanique et des Systèmes, France

**Characterizing Oxygen Permeation of Polymer Materials Used for Infrastructure Repair**

R Sen, C Khoe, VR Bhethanabotla, Univ of South Florida, USA

**Comparison of Shell and Solid Elements for Hot Spot Stress Analysis of Complex Welded Joints**

G Liu, Y Huang, Dalian Univ of Tech, China

**Study on the Preciseness of Hot Spot Stress of Welded Joints Derived from Shell Finite Element Analyses**

N Osawa, Osaka Univ; N Yamamoto, Nippon Kaiji Kyokai; J Sawamura, S Maeda, H Nakajima, Osaka Univ, Japan

**Structural Optimization of Bridge Wing for Anti-Vibration Design using Genetic Algorithm**

J Noguchi, T Kiyosue, T Shimoda, H Nishikawa, N Izumi, Kawasaki Heavy Industries, Japan

Continue at 10:30

**53. HPM V: Fatigue & Fracture I (V. 4)**

**Tuesday June 21 14:00 Room 5**

**Chair:** HW Jin, ExxonMobil Research & Engineering, USA

**Numerical Simulation of Cleavage Crack Path in a Welded Joint**

S Aihara, N Hiroaki, Univ of Tokyo, Japan

**Drop Weight Tear Testing of Seamless Linepipe**

A Hasenhütl, M Erdelen-Peppler, Salzgitter Mannesmann Forschung; T Schmidt, V&M Deutschland, Germany

**Effect of Separation on Ductile Crack Propagation Behavior during Drop Weight Tear Test**

T Fujishiro, T Hara, Nippon Steel, Japan

**CO<sub>2</sub> Anthropogenic Pipeline Transportation**

A Lucci, G Demofonti, Centro Sviluppo Materiali; CM Spinelli, Eni Gas & Power, Italy

**CCTS (Carbon Capture Transportation & Storage) Transportation Issues**

A Lucci, G Demofonti, Centro Sviluppo Materiali; CM Spinelli, Eni Gas & Power, Italy

**63. HPM VI: Fatigue & Fracture II (V. 4)**

**Tuesday June 21 16:20 Room 5**

**Chair:** DP Fairchild, ExxonMobil Upstream Research Co, USA

**Application of BS7910 Fatigue Assessment Standard in Offshore Engineering**

CR Li, ZT Fang, CNPC, China

**Research Progress of Methods to Improve Fatigue Strength of Welded Structures**

ZT Fang, DY Tang, YH Hu, CR Li, CNPC, China

**Influence of Environmental and Mechanical Parameters on Fatigue Behavior of Metals: Implications on Fatigue life Assessments**

TM Ahmed, Wood Group Integrity Management, USA

**Effects of Post Weld Treatment and Loading Condition on the Fatigue Life of Ultra High Strength Steels**

T Ummenhofer, S Herion, R Puthli, P Weidner, Karlsruhe Inst of Tech, Germany

**Fatigue Crack Growth Behaviour of Steel Connections under Combined Actions Using Boundary Element Method**

HB Liu, XL Zhao, Monash Univ, Australia

**Low Cycle Fatigue Behaviour of High-strength Steel Butt Welds**

S Herion, J Hrabowski, T Ummenhofer, Karlsruhe Inst of Tech, Germany

**Dependency of Static and Fatigue Resistance of Steel Members on Wall Thickness and Temperature**

J Hrabowski, S Herion, Center for Competence for Tubes and Hollow Sections, Germany

**73. HPM VII: Corrosion (V. 4)**  
Wednesday June 22 08:00 Room 5

Chair: KY Kim, POSTECH, Korea

**Design of a Cathodic Protection System for a Refurbished Jetty**

MB Surkein, JP LaFontaine, RE Tanner, ExxonMobil Development, USA

**Effect of Microstructure on Electrochemical Property and Hydrogen Diffusion Behavior of Pressure Vessel Steel**

KY Kim, SJ Kim, POSTECH; HG Jung, POSCO, Korea

**Steel Constructions Corrosion Wear Processes Modelling of Sea Hydraulic Engineering Structures**

AT Bekker, RG Kovalenko, VS Lyubimov, LV Kim, Far-Eastern National Tech Univ, Russia

**Phase-field Model for the Corrosion and Cracking of Metals in Aqueous Environments**

E Fried, McGill Univ, Canada; MN da Silva, FP Duda, COPPE/UFRJ, Brazil

**A Discussion of Relationship between Corrosion Ratio of Reinforcement and Crack Width**

ZQ Ying, H Lv, LW Su, CCCC Fourth Harbor Engineering, China

**Influence of Environmental Factors on Corrosion Fatigue Properties of Seamless Linepipes**

J Nakamura, K Kobayashi, T Omura, K Hitoshio, Sumitomo Metal Industries, Japan

**Condensing Corrosion Modelling, Reality and Design in Deep Water Wet Gas Pipelines**

C Selman, Wood Group Integrity Management, Australia

**The Corrosion Behavior of X70 Steel in the Supercritical CO<sub>2</sub> mixed with SO<sub>2</sub> and Saturated Water**

Y Xiang, Z Wang, XX Yang, WD Ni, Z Li, Tsinghua Univ, China

**Effect of Sour Service Environment on Sulfide Stress Cracking Resistance of X65 Reeled Linepipe and Girth Welds**

WH Van Geertruyden, L De Pari, CC Monahan, ExxonMobil Development, USA

**Corrosion-Sensing Coatings for Steel and Aluminum Alloys**

HG Wheat, G Liu, A Alonzo, K Johnson, Univ of Texas at Austin, USA

**82. HPM VIII: Advances in Welding Technology 1 (V. 4)**  
Wednesday June 22 10:30 Room 5

Chair: H Murakawa, Osaka Univ, Japan

**Control of the Excessive Welding Distortion during the Manufacturing of Aluminum SPB Type LNG Tank**

DJ Lee, HG Kim, SB Shin, Hyundai Heavy Industries, Korea

**Prediction of Welding Distortion of Thin Deck Plate Considering Assembly Boundary Condition**

TJ Kim, CD Jang, Seoul National Univ; HC Song, GH Lee, Mokpo National Univ, Korea

**Prediction and Control of Laser Welding Deformation of Sandwich Panel Using Shell Element**

JW Kim, CD Jang, Seoul National Univ; YT Kim, Daewoo Shipbuilding & Marine Engineering; SW Kang, Seoul National Univ, Korea

**Application of Inherent Strain Analysis Using Idealized Explicit FEM for Prediction of Welding Deformation in Ship Block Building**

S Itoh, M Hata, M Shibahara, M Mochizuki, Osaka Univ, Japan

**Prediction of Heat-induced Deformation due to Line Heating Using Inherent Strain Method**

A Vega, Tech Univ of Panama, Panama; H Murakawa, R Sheriff, N Osawa, Osaka Univ; Y Tango, IHI Marine United; M Ishiyama, IEM Co, Japan

**Measurement of Welding Deformation Using Digital Image Correlation Technique**

M Shibahara, S Tsuboi, Osaka Prefecture Univ; S Itoh, Osaka Univ; T Fukasawa, Osaka Prefecture Univ, Japan

**Investigation of Buckling Deformation of Thin Plate Welded Structures**

JC Wang, S Rashed, M Shibahara, H Murakawa, Osaka Univ, Japan

**Prediction of Longitudinal Bending Deformation of Ship Produced by Block Assembly**

H Murakawa, H Serizawa, Osaka Univ; T Uesugi, Mitsui Engineering & Shipbuilding; S Iwasaki, Osaka Univ, Japan

**Experimental Analysis and Modelling of the Thermomechanical Behaviour of Field Joint of Thermally Insulated Pipeline**

D Choqueuse, INFREMER; T Phan, J-Y Cognard, ENSIETA; L Sohier, Univ de Bretagne Occidentale, France

**Reduction of Welding Distortion based on Theoretical Prediction Using Inherent Deformation Method**

H Murakawa, Y Okumoto, Osaka Univ; M Sano, Naikai Zosen; S Rashed, Osaka Univ, Japan

**92. HPM IX: Advances in Welding Technology 2 (V. 4)**

Wednesday June 22 14:00 Room 5

**Chair:** N Osawa, Osaka Univ, Japan

**Properties of Non-load-carrying Welds of Structural Steel with Yield Strength 960 MPa**

I Valkonen, J Kuoppala, Rautaruukki OYJ, Finland

**Compression Behavior of Girth-welded Steel Pipes**

CH Lee, KH Chang, Chung-Ang Univ, Korea

**Guidelines for use of Hybrid Laser-arc Welding in Building of Ships and Offshore Structures**

PW Lohne, J-O Nøkleby, Det Norske Veritas, Norway

**The Study of Engineering Critical Assessment Applications in Welding Flaw Acceptance Criteria for Offshore Pipeline Installation**

**Computational Scheme for Large-scale Transient Problems in Welding Mechanics Using Explicit FEM**

K Ikushima, Osaka Prefecture Univ; S Itoh, Osaka Univ; M Shibahara, T Fukasawa, Osaka Prefecture Univ, Japan

**E-Training System of Welding Work**

Y Okumoto, Osaka Univ; K Murase, Kinki Univ; K Hiyoku, IHI Marine United, Japan

**Intelligent Recognition of Trajectory Deviation and Seam Tracking of Underwater Rotating Arc Welding**

YH Shi, GR Wang, JH Du, CX Liu, South China Univ of Tech, China

**Influence of Heat Input during GMAW on the Mechanical Properties of Seamless Line Pipe Steels up to X80**

J Wiebe, W Scheller, Salzgitter Mannesmann Forschung; C Bruns, T Schmidt, V&M Deutschland, Germany

**Impact of FCAW on the Mechanical Properties of Seamless Line Pipe Steels of Grades X65 and X80**

J Wiebe, Salzgitter Mannesmann Forschung; C Bruns, V&M Deutschland; W Scheller, Salzgitter Mannesmann Forschung; T Schmidt, V&M Deutschland, Germany

**102. HPM X: Composites (V. 4)**

Wednesday June 22 16:20 Room 5

**Chair:** HG Wheat, Univ of Texas at Austin, USA

**Co-Chair:** RH Knapp, Univ of Hawaii, USA

**Modeling of Composite Ocean Current Turbine Blades under Fatigue Loading**

H Mahfuz, MW Akram, Florida Atlantic Univ, USA

**Microstructural Examination and Compressive Properties of Replicated Aluminum Composite Foams**

S Asavavisithchai, E Wichianrat, Y Boonyongmaneera, Chulalongkorn Univ, Thailand

**Tension Softening Behavior Obtained by 4-point Bending Tests on Ductile-Fiber-Reinforced Cementitious Composites Using 3 Kinds of Fine Aggregate**

K Watanabe, M Nakamura, H Kato, M Fujii, Tokai Univ, Japan

**Material Properties of Ductile-Fiber-Reinforced Concrete Using Recycled Aggregate**

M Nakamura, K Watanabe, H Kato, Tokai Univ, Japan

**Fundamental Study on the Pile-tip Protection Using DFRCC**

H Kato, K Watanabe, Tokai Univ; Y Asai, Toyoasano Foundation; M Fujii, M Nakamura, Tokai Univ, Japan

**The Flexural Behavior of Offshore Concrete Structures Reinforced with Anti-corrosive FRP Composites**

YC Wang, National Central Univ, Taiwan, China

