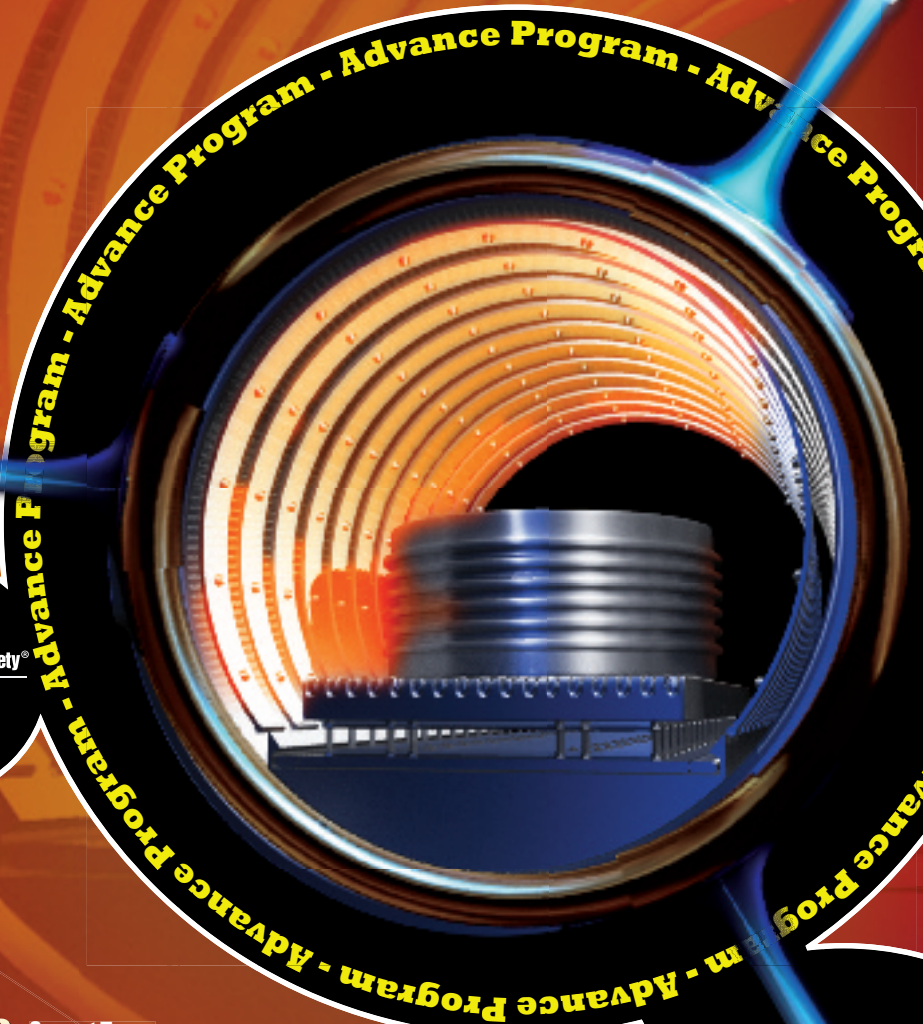


4th International **BRAZING AND SOLDERING**

Conference (**IBSC**)




Hilton in the
WALT DISNEY WORLD[®] RESORT
Orlando, Florida
April 26-29, 2009

You're Invited to Attend the World's Premier Event for the Brazing and Soldering Community

When you attend **Fourth International Brazing & Soldering Conference (IBSC 2009)**, you'll join hundreds of other professionals, scientists and engineers from around the globe involved in the research, development and application of brazing and soldering.

The three-day conference and one-day professional seminar event, in Orlando, Florida, April 26-29, 2009, is sponsored by the **American Welding Society (AWS) and ASM International**. This conference provides the most comprehensive technical program available to the brazing and soldering community, as well as valuable networking opportunities and exhibits where attendees can find out more about the latest trends, products, processes, and techniques available in the brazing and soldering industry.

What does IBSC 2009 have to offer?

- The world's only focused international technical conference on joining by brazing and soldering.
- Networking with scientists and engineers from around the globe involved in the research, development and application of brazing and soldering.
- In-depth discussions and review of joining process solutions and competitive/complementary braze and solder technologies.
- Reliable solutions to braze and solder problems.
- Educational and exhibit opportunities.
- More than 80 papers to be presented.
- Learn about advances made in brazing and soldering technology and applications.

Who should attend?

- Researchers dedicated to advances in braze and solder joining.
- Process engineers looking for reliable, state-of-the-art solutions that can be effective right away.
- Development personnel responsible for evaluating new applications and emerging markets.
- Engineers who would benefit from a basic understanding of braze and solder joining technologies.
- Students who need to understand the principles, applications and latest trends involving these technologies.
- Technical management interested in strategic partnering with other organizations.
- Exhibitors looking for a captive target audience with an interest and need for their products and services.

About the Professional Seminars on Sunday

- On Sunday, prior to the three days of Technical Sessions, two Professional Seminars will be offered on the fundamentals of brazing, and its processes and applications. These seminars require an additional registration fee, and a savings is provided for attendees taking both sessions.

About the Conference Chairs

Grayson Alexy, Chair, is the vice president of sales and marketing for The Prince & Izant Company, a manufacturer of brazing and soldering products in Cleveland, Ohio. He has spent his entire 17-year professional career working in the metal joining industry with the same firm. He has worked in a variety of positions, including sales management, technical field support, and vertical product integration. Mr. Alexy is an active member of the American Welding Society's C-3 committee and the chairman of the C3C subcommittee on Education and Safety. He is also the vice-chairman of the Brazing and Soldering Manufacturing Committee and was instrumental in the development and launch of an industry web-site www.brazingandsoldering.com in collaboration with Robert Peaslee. Mr. Alexy has been quoted and published in leading trade journals and business magazines and is very active in promoting industry interests. Mr. Alexy has recently earned his M.B.A. from the Weatherhead School of Management at Case Western Reserve University.

Anatol Rabinkin, Co-chair, was born in Moscow. He received his M.S. degree in physics and chemistry of metallurgical processes from the Moscow Institute of Steel and Alloys and D.Sc. in materials science from the Institute of Physics of Metals of the Academy of Sciences of the USSR. From 1959 to 1963 he was working on hard magnetic materials development in the Central Institute of Basic Metallurgy of the USSR and from 1963 to 1973 on superconducting materials in the Institute of Chemical Physics of the Academy of Sciences of the USSR. In 1974 he immigrated to Israel where he became a professor at Technion-Israel Institute of Technology. Since 1980 he has been residing in the USA, currently working as Senior Scientist, Metglas Inc., Hitachi Metals, on amorphous metals technology and applications. He has authored more than 80 papers and book chapters and was granted 17 U.S. patents. He also supervised nine M.S. and four Ph.D. students in the USSR and Israel. He is a member of AWS C3 Brazing Committee and presently an American Delegate to the International Institute of Welding (Committee I-Brazing and Soldering and Subcommittee Automotive Joining).

Pre-Conference Professional Seminars

The Professional Seminars being held on Sunday before the regular conference proceedings require additional payment and registration.

Sunday, April 26, 2009 • 9 am–noon

Fundamentals of Brazing • 9 am–noon

Tom Sandin, Business and Applications Manager, WESGO Metals

This seminar presents the basics of brazing, including the fundamentals of wetting, spreading, contact angles, surface oxides and cleanliness. The advantages and disadvantages of brazing and its critical steps and manufacturing issues will be covered. Principles related to joint design, fixturing, joint clearance, and thermal-expansion mismatch will be presented, and cleaning, filler metal selection, and methods of applying will also be reviewed. Cleaning and protection of the joint and filler metal during brazing using fluxes and atmospheres will be described, as well as heating sources such as oxyfuel, induction, resistance, molten flux, radiant, convection, laser, and electron beam. Destructive and nondestructive inspection, codes and standards, and health and safety issues will be summarized.

“Fundamentals of Brazing” is intended for engineers and supervisors who need a basic knowledge of brazing for research, manufacturing and the planning, management, or supervision of these operations. Beginning practitioners and technicians who need to be introduced to braze joining and entry-level and supervisory personnel who are responsible for brazing will also benefit from the material that will be covered.

Tom Sandin has 32 years of braze industry experience, primarily in aerospace jet engines and related components, leading new product development for jet engine repairs and DER approval. Tom was also a general manager for a commercial braze shop serving the medical, semiconductor, power generation and marine industries. As Wesgo's Business & Applications Manager, he is developing opportunities for new alloys in braze and other applications. He holds two patents related to brazing processes and alloys.

Brazing Processes and Applications, Part 1: Ceramic Brazing • 1–2 pm

Dr. Toshi Oyama, Development Manger, WESGO Metals, Morgan Advanced Ceramics

This course presents the basics of brazing involving ceramic materials. After brief introduction of the history of ceramic brazing, a conventional process involving metallizing-and-brazing is described. The course then discusses active metal brazing process where ceramic material is directed brazed by using active brazing filler metals. Key parameters for reliable ceramic brazing are explained in detail, using technical data and application examples.

The material covered in this course enables you to understand the basic principles of ceramic brazing, and to use them to brazing ceramic applications. The “Ceramic Brazing” seminar is intended for engineers and supervisors who need a basic knowledge of ceramic brazing, and for engineers, supervisors, and operators who are involved in ceramic brazing.

Dr. Oyama received a M.S. and Ph.D. at Stanford University, where he studied creep deformation of metals, specifically on superplastic properties of ultra-high carbon steels. Since joining WESGO Metals in 1987, he has been involved in all aspects of technical activities. He plays a key role in new product and process developments. The process development involves casting, rolling, and powder metallurgy, as well as melt-spinning technologies. He is the author of over 30 technical papers and four patents. He lectured at many technical conferences. He is a member of the ASM International, American Welding Society, and Japanese Welding Society.

Brazing Processes and Applications, Part 2: Brazed Joint Design and Allowables • 2:00–4:15 pm

Dr. Yury Flom, Materials Engineer, NASA Goddard Space Flight Center

At the present time, an industry standard methodology for design and analysis of the brazed joints has not been developed. This seminar will address the strength of the brazed joints, the methods of mechanical testing, and our ability to evaluate the margins of safety of the brazed joints as it applies to the design of critical and expensive brazed assemblies. Mechanical engineers responsible for design and stress analysis of the brazed structures will benefit the most from attending the “Braze Joint Design and Allowables” seminar.

Dr. Yury Flom has over 23 years of experience working in the Materials Engineering Branch at NASA Goddard Space Flight Center. Prior to that, he was working in the power industry. Most of his career, Dr. Flom has been involved in failure analysis investigations, materials selection and testing, welding, and heat treatment. His experience includes the support of all major Goddard flight missions launched between 1985 and 2008, as well as evaluation and troubleshooting of the ground support equipment and the center facilities. He was responsible for the materials evaluations in over 19 Mishap and Close-Call Investigation Teams at Goddard and NASA. In 1999, he established a vacuum brazing laboratory at Goddard and has been providing brazing services to all Goddard flight projects and research activities. He designed and built an electron beam brazing system capable of brazing tubular assemblies. Dr. Flom represents NASA on the AWS C3 Brazing and Soldering Committee and is teaching a graduate course on brazing at Ohio State University. He obtained his B.S. in mechanical and welding engineering from Kiev Polytechnic Institute and M.S. and Ph.D. in Material Engineering from the University of Maryland.

IBSC 2009 Organizing Committee

- Mr. Grayson Alexy, General Chair
- Dr. Anatol Rabinkin, General Co-Chair
- Dr. Yury Flom, Technical Program Chair
- Mr. Ray McKinney, Exhibits Chair
- Ms. Robin Gourley, Proceedings Chair
- Mr. Chuck Walker, Proceedings Co-Chair
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- Dr. Don Bucholz, Technical Committee
- Mr. F. Michael Hosking, Technical Committee
- Dr. Toshi Oyama, Technical Committee
- Dr. Alexander Shapiro, Technical Committee
- Dr. Ronald W. Smith, Technical Committee
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- Dr. Manfred Boretius
- Prof. Dr. Tadashi Ariga
- Mr. Kotaro Matzu
- Prof. Dr. Mathieu
- Dr. Harold Krappitz
- Prof. Dr. Bernhard Weilage

Three-Day Technical Sessions

Monday, April 27, 2009

Conference Opening Remarks

Mr. Grayson Alexy, IBSC Chairman, Prince & Izant

Plenary Session 1

Development of New Brazing Filler Metals

8:20-9:00 am

Prof.-Dr. B. Wielage, Chemnitz University of Technology
Recently, growing restrictions for using alloys containing hazardous metals created an acute need to expand new brazing and soldering technologies. In this lecture, two examples will be presented on progress in developments of filler materials: one involves applications in which drinking water is present, and the second one describes new advantageous brazing filler metals containing magnesium. New filler metals which contain less nickel and more iron than conventional BNi classifications were developed for brazing operations involving pipes and lines carrying drinking water. As a result, the strictly controlled nickel content of the drinking water that flows in brazed piping was reduced below 20 µg/l. It is well known that brazing filler metals containing magnesium show several problems associated with the oxide surface layer formation. This layer should be removed, whereas the electrochemical corrosion due to direct contact between base and filler materials should be contained. New materials based on the Zn-Mg-Al compositions have also been developed. The relationships between their microstructure and mechanical properties will be presented as well.

Plenary Session 2

The Impact of "Green" Legislation Requirements on Soldering Technology Advancement

9:00-9:45 am

David D. Hillman, Rockwell Collins Inc

The pace of change for soldering technology advancements in the electronics industry was fundamentally impacted in the late 1990's by the influence of "Green" legislative requirements. The electronics industry began undergoing a rapid materials evolution due to the Restriction of Hazardous Substances (RoHS) European, the Registration, Evaluation, Authorization and Restriction of Chemical substances (REACH) and other legislative activities. Printed wiring board laminate suppliers, component fabricators, and printed wiring assembly operations are now engaged in multiple investigations to determine what lead-free material choices best fit their needs. This presentation will detail both the negative and positive aspects of the "Green" legislative requirement influence.

Technical Program – Day 1

Session 1: Solders and Soldering Technology

10:00 am-noon; 1:30-3:20 pm

Session Chairs: Dr. Ronald Smith (USA), Prof.-Dr. B. Weilage (Germany)

This session's presentations cover a range of topics from new soldering processes to understanding the effect of alloys and processing steps on the metallurgical interactions between joined components. Learn about lead-free solders, the solder interactions with nanoparticles, solder creep behavior, induction soldering, effect of metal plating layers, solder assembly of a printed circuits, fluxless ultrasonic soldering, and new solder developments.

- Fabrication of Maglev Vehicle Tract by Induction Soldering *Kenneth H. Holko, PE*
- Effect of Base Metal Plating Layers on the Mechanical Strength of Au-Sn Solder Bonds *P. Vianco*
- Fluxless Ultrasonic Soldering Using a Binary Sn-Al Lead-free Solder *Dr. Shankar Srinivasan*
- Pb-Free Solder Assembly of a Printed Circuit Based Multi-Chip Module – A University/Industry Design Project Collaboration *Mike Powers*

- Improving the Drop Impact Resistance of BGA Solder Joints by Use of SAC-Ti and SAC-Mn Solder Spheres *Weiping Liu*
- Low-Temperature Joining by Using Metallic Nanoparticles *Prof-Dr J. Wilden*
- Contribution to Creep Behavior of Al₂O₃-Particle-Reinforced SnAg-Solders *Sebastian Weis*
- Variation of Lead-free SnAgCu and SnCuNi Solders Influencing Morphology and Mechanical Properties *Thomas Lampke*
- Characterization of Very-Long-Term Aged 52In-48Sn (at.%) Solder Joints *Donald F. Susan*
- Alloy Design of Sn-Ag-Cu+X Solder to Promote Eutectic Solidification *Iver E. Anderson*
- Compression Stress-Strain Behavior of Sn-Ag-Cu Solder versus Sn-Pb Eutectic Solder *Edwin P. Lopez*
- Improvement on the Properties and Microstructure of Sn-Ag-Cu Solder Bearing Rare Earth Ce *Xue Songbai*
- Lead Free Joining in Electronic and Packaging Industries *Ajoy Kumar Ray*

Session 2: Ceramics, Composite and Glass Joining Soldering Technology

10:00 am-noon; 1:30-3:00 pm

Session Chairs: Dr. T. Oyama (USA), Dr. M. Boretius (Lichtenstein)

This session presents new development and research activities in brazing non-metallic materials. Industrial applications for non-metallic materials have been expanding rapidly because of their inertness, low dielectric constant, high temperature mechanical properties, etc. In most applications, there are needs to join those materials to metal or non-metallic materials to non-metallic materials. Brazing is one of the most economical methods for such joining applications. This session provides forefront technologies for brazing non-metallic materials. Engineers and students who are working on joining non-metallic materials will benefit by attending this session.

- The Life and Times of Dr. John J. Stephens Jr., Metallurgist Extraordinaire *F. Michael Hosking*
- An Alternative Method for Joining Metal to Ceramic with Brazing Filler Metals in Oxygen Containing Atmosphere *Michael Stefan Reichle*
- Joining of RCC (Carbon/Carbon) Composites Using Exothermic Assisted Techniques *Ronald Smith*
- Microstructural Characterization and Mechanical Testing of Rail Steel to Ceramics Active Brazed Joints *L. Nemeth-Wehrmann*
- Hybrid Metal Composite for Electrical Connections in Power Electronics *Lichun Leigh Chen*
- Physical-Chemical Basis for Brazing and Metallization of BaTiO₃ Ceramic *Dr. Sydorenko T.V.*
- Brazing of Copper-coated Carbon/Carbon Composites to Titanium Alloys *Toshi-Taka Ikeshoji*
- Active Solder Joining of Graphite and Ceramic Components *Ronald Smith*
- The Effect of the Porous Metal in Ceramics to Metal Brazed Joint *Tadashi Ariga*
- Brazing of Copper to Alumina by Reactive CuAgTi Alloys *M. Braccini*
- Brazing of Aluminum Nitride to Copper *Toshi Oyama*
- The Brazing of Alumina and Zirconia to Columbium: the Aid of the Nickel Interlayer *Dr. Durov O.V.*

Tabletop exhibits are open noon-7 pm.

Future Conferences

The 5th International Brazing and Soldering Conference will be held in spring 2012.

Session 3: Filler Metals

8:00 am–noon with refreshment break

Session Chairs: C. Walker (USA), Dr. A. Pashkov (Russia)

This session will discuss the development and use of new brazing filler metal compositions. The focus of first half of the session will be on the brazing of stainless steels and super-alloys using newly developed low-cost brazing filler metals. The remainder of the session will address recent developments using precious-metal-based brazing filler materials. Material properties and application information that will be beneficial for process engineers and brazing technicians will be presented.

- Design and Characterization of Filler Metal for In Situ Braze Repair of Wide Gap Blind Cracks in Cast Steel C. Wilkins
- New Amorphous Brazing Foils for Exhaust Gas Applications Thomas Hartman
- Study of Brazing Filler Metals with Low Nickel Contents Applied to the Austenitic Stainless Steel Joint by Brazing in Vacuum Furnace José Sotelo
- New Iron-Chromium Based Brazing Filler Metal for Demanding Stainless Steel Applications Ulrika Persson
- Development of Novel Fe-Cr Based Brazing Kotaro Matsu
- Effect of Gallium/Indium on Properties and Microstructure of Ag-Cu-Zn Filler Metals Xue Songbai
- Introduction of Low Cadmium Brazing Alloys Sumant Mathure
- Ductile Wide Gap Braze Repairs Using Precious Metals for Stationary Gas Turbine Engine Components Dr. W. Miglietti
- Alternative Air Braze Alloys Jens Darsell
- Properties of Cu-Zn-P-Ni Alloys Used as Brazing Filler Metals in the Mid-Range Brazing Temperatures Igor Pashkov
- Joining of Silicon Nitride with a Ag-Cu-Ti+SiCp Composite Filler J. Zhang

Session 4: Design, Testing and Reliability of Joints

8:00 am–noon with refreshment break

Session Chairs: Dr. Y. Flom (USA), Prof. W. Tilmann (Germany)

Despite the great advances made in the field of brazing, an industry standard methodology for the design and analysis of brazed joints has not been developed. This session will focus on our current understanding of the brazed joints strength allowables, margins of strength evaluation, testing methods, and definitions of the brazed joints failure and other aspects of the brazed joint design.

- Study of Brazing Process Variation Parameters Effects on the Copper-Beryllium Alloy Joints Quality M. Mazar Atabaki
- Development of Simulation Methods and Strategies for Joining of Tools with Complex Geometries by High Temperature Brazing J. Wilden
- Evaluation of Brazed and Soldered Joints After Thermal Cycling in Liquid Nitrogen Alexander E. Shapiro
- Testing and Prediction of Mechanical Properties of Brazed Joints Nils Kopp
- Nickel Brazed Re-design for Cost and Quality Improvement Terence Profughi
- Strength and Reliability of Cu-(Ni, Fe) Lead Free Solder Joints Ohad Ben-Yehuda
- Evaluation of Safety Margins in Brazed Joints Yury Flom
- Mechanical Evaluations of Tungsten Carbide/Nickel Joints Produced by Direct Diffusion Bonding and Using a Cu-Zn Alloy Jose Lemus-Ruiz
- Accuracy of Brazed Joints Characterization with Digital Radiography and Tomography Thomas Bonin
- Work in Progress for the Virtual Reality Solution to Speed-Up the Certification Process of Brazing Claude Choquet
- Quality Testing of Brazed Joints M. Strojczek
- Development of High Temperature Dissimilar Joint Technology for Fission Power Exploration Systems Dr. Ivan E. Locci

Session 5: Brazing Processing

1:30–5:40 pm with refreshment break

Session Chairs: R. Gourley (USA), Dr. H. Krappitz (Germany)

This session provides interesting and enlightening discussions and insights on various brazing methods and processes. We will hear about diffusion brazing of aluminum, direct brazing of sapphire to niobium, as well as laser brazing of various materials, torch brazing, ultrasonic brazing, and special mechanically alloyed braze powders for different brazing techniques. This session is a representation of the many brazing methods being used throughout various industries.

- Vacuum Brazing Janusz Kowalewski
- Solving the Two Most Significant Challenges of Torch Brazing Aluminum Thermal Transfer Devices Kenneth Allen
- Direct Brazing of Sapphire to Niobium Chuck Walker
- Joining of SiC/SiC Composites Ronald Smith
- Brazing Temperature Determines the Microstructure and Mechanical Behavior of Steel/Titanium Brazed Joints Ahmed Elrefaey
- Ultrasonic Soldering and Brazing Dan Hauser
- Novel Brazing Solutions for Aluminum Joints Prof-Dr. W. Tillman
- Development of Brazed Junctions between Silicon Carbide and Ni-based Alloy Tubes T. Baffile
- Interface Development in Laser Braze DP600 and TRIP Steels with Two Different Consumables M.H.E. Janssen
- Heterogeneous Laser Brazing of Small Parts on Big Components C.Cossu
- Brazing of Special Stainless Steel with Ni-Based Brazing Filler Metal Yasuyuki Miyazawa
- Features of Brazing with Mechanical Alloyed Powders of Cu-Mn-Ni Filler Metal Igor Pashkov
- Hazard Communication and Hazard Determination for Brazing and Soldering Jesse A. Grantham

Session 6: Brazing Fundamentals

1:30–5:20 pm with refreshment break

Session Chairs: Rajeew Aluru (USA), Prof. T. Ariga (Japan)

This session presents the basic fundamentals required for development and characterization of braze joints and braze processes. Scientists, R&D engineers and process engineers would benefit greatly by attending this session, where the latest developments and reviews of brazing will be discussed. Presentations include wettability studies, characterization of joints, diffusion modeling, effects of surface treatment and interlayer.

- Effect of Solute Solubility on Processing Time during Transient Liquid Phase Bonding of a Nickel Based Superalloy M. Abdelfattah
- Nanotechnology Bird's-Eye View on the Effect of the Flux on Soldering and Brazing Mike Reda
- Role of Valence Electron of Vanadium Carbide in Metallizing of Diamond Surface Takahisa Yamazaki
- TEM Study of Infrared Braze Joints of Ti Alloys Using Ti-Cu-Ni-based Fillers Z.Y. Wu
- Role of Coincident Site Lattice Boundaries on the Diffusion Characteristics of Melting Point Depressants during TLP Bonding Muhammad A. Arafin
- Structural Characterization of a Fe-Based Glassy Foil Interlayer Used to Join an AISI 316L Stainless Steel J. A. Verduzco
- Effect of Ion Implantation Upon Interaction Between the Melt and the Solid Surface Igor Pashkov
- Reactive Diffusion Between Ni and Sn-Pd Alloys at 473K Masanori Kajihara
- Effect of Initial Surface Roughness and Thickness of Inserted Cu on Al Bonding in Air Hiroshi Kawakami
- The Influence of Surface Topography on Wetting Kinetics of Solders and Brazes Dr. Dusan P. Sekulic
- Investigations of Contact Angles of Active Brazing Fillers on Diamond-Layers by Optical 3D-Microscopy Prof.-Dr. Wolfgang Tillmann

Tabletop exhibits are open 9:00 am–3:30 pm.

Session 7: Light Metals Joining

8:00–11:00 am with refreshment break

Session Chairs: Dr. A. Shapiro (USA), Dr. S. Mücklich (Germany)

New processes in brazing, soldering, and diffusion welding of aluminum, titanium and magnesium alloys will be presented in this session. Use of TLP process to braze aluminum alloy 5083, diffusion bonding of titanium to steel, and thermal spray application of filler metal on parts of titanium heat exchangers will demonstrate industrial applications of new joining technologies. Two presentations are devoted to flux-free soldering magnesium with the assistance of ultrasonic vibration.

- Evaluation of the Use of Pure Aluminum Layer on 304L Stainless Steel to Join to 5083 Aluminum by Transient Liquid Phase Bonding *J.C. Madeni*
- Comparisons of Al/Si, Zn/Al, and Zn/Al/Si Alloys for Joining of Aluminum *Creed F. Darling*
- Study of Thermal Spraying as a Method for Applying Aluminum Filler Metals for Brazing Titanium Heat Exchangers *Alexander E. Shapiro*
- New Possibilities in Diffusion Welding Using Different Thermal Expansion Coefficients of Titanium and Steel *J. Wilden*
- Fluxless Soldering of Magnesium Alloy with Ultrasonic Aided using a New Type of Mg-Al-Zn-RE Intermediate Temperature Filler Metal *Hong Li*
- Investigations on Microstructural Optimization at Magnesium Soldered Joints *S. Mücklich*
- Soldering Aluminum *W. Avery and Philip A. Baskin*

Session 8: New Brazing Applications

8:00–11:00 am with refreshment break

Session Chair: M. Lucas

Attendees will learn about advanced brazing applications utilizing braze foils and nanomaterial braze filler metals, as well as the process evaluations for brazing cellular materials. Reactive air brazing will be described with an analysis of the reaction mechanism. An industrial application for joining titanium to steel will be described. The results of a study on the effects of alloying additions in filler brazing on stainless steel will be presented. Also, methods on reducing the operating cost of atmosphere furnaces will be described. Attendees to this session will gain valuable practical application and braze mechanics knowledge that will be useful in their daily activities.

- New Brazing Development in the Automotive Industry *Dr. Anatol Rabinkin*
- Brazing of Hot-Runner Nozzles Made of Dissimilar Materials *Dr. Manfred Boretius*
- Exothermic Reactions and Scale Effects for Effective Brazing at Low Temperatures *Prof-Dr. J. Wilden*
- Reactive Air Brazing – Optimizing Parameters and Analyzing of Reaction Mechanisms *Nils Kopp*
- Brazing of Cellular Metals *D. Schnee*
- Effect of Filler Metal Alloying Additions in Filler Metal Flow, Evaluation of Pure Copper and BNi-2 Filler Metals Applied to 304 Stainless Steel Base Metals *J.C. Madeni*
- Atmosphere Brazing Furnace Optimization– Reducing Operational Cost *Stephen L. Feldbauer, Ph.D.*

Special Events

Photographic Exhibition

While visiting the exhibition area, you'll want to take time to browse through the photographic exhibition. The exhibition will include a display of over 100 photos demonstrating a huge variety of brazing and soldering applications in our civilization — from eyeglasses to jet engines and nuclear reactors, from hollow silver ware to spacecrafts and electronics. The photos exemplify the outstanding achievements of brazing and soldering colleagues, industrial companies, and universities both in the U.S. and around the world.

Photo exhibition compliments of Alex Shapiro, Titanium Brazing, Inc.

Evening Reception

In addition to the formal technical sessions, attendees are encouraged to attend the Evening Reception on Monday, April 27, 2009, from 6 PM to 7 PM, where you will have additional time to talk to exhibitors, as well as network with other conference participants.

Tuesday Evening Networking Dinner – Backyard Barbeque

Come join us for a relaxing backyard barbecue around the pool area of the Walt Disney Hilton. Take in the beautiful, tropical scenery and network with your colleagues as you enjoy a delicious meal.

To properly plan and to ensure a memorable experience for all of our IBSC delegates, we need to anticipate total attendance for this dinner. A \$10 reservation fee will be required by April 20, 2009, for everyone planning to attend. There will be no onsite sales; therefore, if you are planning to register for the conference onsite, you will need to send in a registration form with payment for this event before April 20, in order to confirm your reservation for the event.

Closing Conference Award Presentation

The "Best Paper of IBSC 2009" is awarded during this presentation (Wed., April 29, 11 am) and is given to the author of the outstanding paper selected for the brazing category and for the soldering category. This award honors the authors and recognizes their technical contributions to the fields of brazing and soldering. The award is based on a review by a panel of experts and organizers of the 2009 International Brazing & Soldering Conference, judging on technical merit, technical innovation, relevance of work, and clarity of the paper in presenting the technical work.

Hotel Information

The Hilton, located in the Walt Disney World Resort, is an official hotel of Walt Disney World in Orlando, Florida. The Hilton is in the heart of the Downtown Disney area, home of the Downtown Disney Marketplace and Downtown Disney Westside. The Hilton Resort is 25 minutes from Orlando International Airport. Resort guests will enjoy exceptional facilities at AAA's longest-running Four Diamond Resort in Central Florida.

The resort features in-room coffee, 27-inch flat screen TVs, high speed internet access, in-room oversized safe, mini-bar, 24-hour housekeeping, in-room dining, seven delectable restaurants and lounges, 24-hour Gourmet Marketplace, 24-hour self-service Business Centers, two outdoor heated swimming pools, outdoor spa, children's spray pool, and complimentary 24-hour Hilton Fitness by Precor Center.

As a guest of the Hilton, you will also receive exclusive privileges to Walt Disney theme parks with complimentary and continuous transportation to Walt Disney World Theme Parks.

Housing Reservations

To make your hotel reservations at the Hilton Walt Disney

- Book online at:
<http://www.aws.org/education/ibsc/hotel.html>
- Call the Hilton Walt Disney reservation desk at (407) 827-4000

Mention your attendance at the AWS/ASM International Brazing and Soldering Conference for the special conference hotel rate of \$209/single or double. All room rates are subject to a 12.5% tax. Please note that all reservations require a credit card guarantee or deposit for first night's room and tax.

- Check-in time is 3:00 pm and check-out time is 11:00 am
- All reservations must be made by April 2, 2009 to receive the special event rate. Reservations after this date will be taken on a space-available basis only.
- Please be aware that you may be charged an "early departure" fee if you depart prior to the date reserved. Be sure to plan your stay accordingly.

Amenities and Attractions

The Hilton Walt Disney World hotel is only steps away from some of Walt Disney World's most popular amenities and attractions, including:

- Extra Magic Hours — Each day one of the theme parks is open an hour early or stays open up to three extra hours in the evening.
- Disney's Magic Kingdom
- Disney's Animal Kingdom Theme Park
- Disney's Hollywood Studios
- Disney's Epcot
- Disney's Typhoon Lagoon Water Park
- Disney's Blizzard Beach Water Park
- Downtown Disney Marketplace
- Downtown Disney Westside

Exploring Orlando

The Hilton Walt Disney World Hilton is close to a number of Orlando's best attractions, beaches, and shopping such as:

- Orlando/Orange County Convention Center
- SeaWorld
- Universal Studios and Islands of Adventure
- Kennedy Space Center
- Daytona Beach
- Cocoa Beach
- Clearwater Beach
- Orlando Premium Outlets
- Mall at Millenia
- Prime Outlets International

General Information

Proceedings of the 4th International Brazing & Soldering Conference will be available at the event. Each full conference registrant will receive a copy of the proceedings. If you are not a full conference registrant, you may purchase a copy of the proceedings by completing the appropriate section on the registration form and.

Language. All presentations at the conference will be presented in English. Simultaneous translation will not be provided.

Travel to the United States. As a service to our conference attendees, ASM International has established an ongoing relationship with the U.S. Department of State, Visa Services Division to assist you in obtaining a visa in order to attend an ASM event. We provide them with a detailed description of each of our events by dates and location which are then added to their Intranet Listing of Conferences being held throughout the United States where foreign attendance is expected. This intranet listing – where our events are clearly listed – is made available to all U.S. embassies and consulates worldwide to use in processing visas. It is our hope that this will help expedite your visa application. However, we must still issue a strong caution that visa applications should be submitted for processing as early as possible (but absolutely no later than 60 days prior to travel). Please visit our website for additional information.

Policy on Audio and Video Recording of Technical Paper Presentation/Sessions. The event organizers reserve the right to any audio and video reproduction of presentations at every AWS/ASM technical session. Recording of

sessions (audio, video and still photography, etc.) intended for personal use, distribution, publication, or copyright without the express written consent of AWS, ASM and the individual authors is strictly prohibited

Photo Release. Photographs will be taken at the 2009 IBSC. By registering for this conference, you agree to allow the American Welding Society and ASM International to use your photo in any IBSC-related publications or website.

Policy on Cellular Phone Usage. In consideration of fellow event attendees and presenters, the American Welding Society and ASM International kindly request your cooperation in minimizing disturbances which may occur during technical sessions. We ask that cellular phones or other electronic devices be placed in "silent mode" while you are in the meeting rooms. Please step outside the meeting room for cell phone conversations.

Attendees with Disabilities. In accordance with the Americans with Disabilities Act (ADA) of 1990, the American Welding Society, ASM International and the Walt Disney Hilton are striving to accommodate all of our guests with special needs. If a disability requires that you have access to modified housing, transportation or have other needs, please inform the hotel when making your reservation and contact AWS at (800) 443-9353 ext 455.

Airport Transportation. Taxi from the airport is around \$45. An \$20 shuttle is available at the transportation level of the airport. Reserve at (407) 843-2404.

SUNDAY

MONDAY

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Pre-conference Professional Seminar:
"Fundamentals of Brazing"
9:00 am–noon

Refreshment break
10:00–10:15 am

Lunch (included)

Pre-conference Professional Seminar:
"Brazing Process and Applications"
Part 1: "Ceramic Brazing"
1:00 pm–2:00 pm

Part 2: "Brazed Joint Design and
Allowables"
2:00 pm–4:15 pm

Refreshment break 2:45–3:00 pm

On-Site Registration

If your registration form and payment have not been mailed to the American Welding Society by April 10, 2009, you will be required to fill out a registration form and pay onsite by cash, check, or traveler's check (made payable to the American Welding Society), or by credit card (VISA, MasterCard, American Express, Diner's Club, Discover, or Carte Blanche).

Registration will be held during the following hours at the Walt Disney Hilton, Orlando, Florida:

Sunday, April 26	5:00 pm – 7:00 pm
Monday, April 27	7:00 am – 4:00 pm
Tuesday, April 28	7:00 am – 4:00 pm
Wednesday, April 29	8:00 am – 10:00 am

Opening Remarks
8:00 am

Plenary Session 1: "Development of
New Brazing Filler Metals"
8:20 am

Plenary Session 2: "The Impact of
'Green' Legislation Requirements on
Soldering Technology Advancement"
9:00 am

Refreshment break 9:45–10:00 am

Technical Session 1:
"Solders and Soldering Technology"
10:00 am–3:20 pm

Technical Session 2:
"Ceramics, Composite and Glass
Joining Soldering Technology"
10:00 am–3:00 pm

Lunch (included)

Technical Sessions 1 and 2
continued
"Solders and Soldering Technology"
and
"Ceramics, Composite and Glass
Joining Soldering Technology"

*Exhibits open
Noon–7:00 pm*

Evening Reception
6 pm–7 pm

TUESDAY

Technical Session 3:
"Filler Metals"
8:00 am–noon

Technical Session 4:
"Design, Testing and Reliability
of Joints"
8:00 am–noon

Refreshment break 9:20–10:00 am

*Exhibits open
9:00 am–3:30 pm*

Lunch (included)

Technical Session 5:
"Brazing Processing"
1:30–5:40 pm

Technical Session 6:
"Brazing Fundamentals"
1:30–5:20 pm

Refreshment break 2:50–3:30 pm

Backyard Barbeque
Networking Dinner
(pre-registration required)

WEDNESDAY

Technical Session 7:
"Light Metals Joining"
8:00–11:00 am

Technical Session 8:
"New Brazing Applications"
8:00–11:00 am

Refreshment break 9:45–10:00 am

Best Paper Award Ceremony
11:00–11:30 am



American Welding Society

The American Welding Society is the largest organization in the world dedicated to advancing the science, technology, and application of welding and allied processes including joining, brazing, soldering, cutting, and thermal spray. AWS provides a variety of industry services, including welding certifications, educational programs, scholarships and workforce development through its foundation and publications. Visit the society's Web site at www.aws.org



ASM International, the Materials Information Society, is the premier resource for information and networking for materials engineers, scientists, researchers, teachers and students. ASM's mission is to benefit the materials community by providing scientific, engineering and technical knowledge, education, networking and professional development. Through our membership, our conferences, our chapters, our affiliate societies, our seminars and symposia, our partnering with other societies, our reference collections and our communications media, ASM makes this information available and usable worldwide. Visit the society's Web site at www.asminternational.org.

Looking for a cost-effective way to reach your prospects and gain visibility?

Sign up as an IBSC 2009 Exhibitor/Sponsor

IBSC 2009, co-sponsored by the American Welding Society and ASM International, attracts the innovators, influencers and decision makers in the brazing and soldering industry. IBSC provides a forum to showcase the latest trends, products, processes and techniques in the industry. The exposition features exhibitors from all sectors of the brazing and soldering community and draws decision makers with purchasing power from around the world. There is no better opportunity to conduct business with the brazing and soldering community than to have a presence at this conference.

TABLETOP RENTAL \$1,200

You need not be present at the event to rent a tabletop. If you will not be at the event let us know and we will place your literature on your table. Any materials you send will not be returned to you.

Includes:

- One Technical Session Pass (please provide name of the person selected from your group)
- Listing in the Final Conference Program (company name, contact information, description of product/services)
- List of Conference Attendees
- Conference Proceedings
- 6' x 8' skirted table
- 2 side chairs

RECEPTION SPONSORSHIP \$750

Includes:

- Your company's name prominently displayed on signage during the Evening Reception held on the first day of the Tabletop Exhibit, Monday from 6 p.m. to 7 p.m.
- Listing in the Final Conference Program (company name, contact information, description of product/services)

BEST VALUE! TABLETOP EXHIBIT & RECEPTION SPONSOR \$1,800

Includes:

- One Technical Session Pass (please provide name of the person selected from your group)
- Listing in the Final Conference Program (company name, contact information, description of product/services)
- Your company's name prominently displayed on signage during the Evening Reception held on the first day of the Tabletop Exhibit
- List of Conference Attendees
- Conference Proceedings
- 6' x 8' skirted table
- 2 side chairs

A Special Thank You to Our Exhibitors and Sponsors

(as of 1/16/09)

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FOR MORE INFORMATION OR TO MAKE YOUR EXHIBITOR/SPONSOR RESERVATION, CONTACT

Kelly Thomas, ASM National Account Manager
(440) 338-1733, e-mail: kelly.thomas@asminternational.org
or visit www.aws.org/education/ibsc

Exhibit Dates and Times:

Monday, April 27: Noon–7 p.m.
Lunch: Noon–1:30 p.m.
Evening Reception: 6–7 p.m.

Tuesday, April 28: 9:00 a.m.–3:30 p.m.
Lunch: Noon–1:30 p.m.

COMPLIMENTARY FULL CONFERENCE REGISTRATION IS INCLUDED WITH YOUR TABLETOP!

The Evening Reception and all refreshment breaks are held in the exhibitor area, providing ongoing exposure to your tabletop exhibits. Choose from three levels of exhibitor/sponsor opportunities.

4th International Brazing & Soldering Conference — April 26-29, 2009

Hilton Walt Disney Resort, Orlando, Florida

Four easy ways to register:

1. Go online: <http://www.aws.org/education/ibsc>
2. Call: 1-800-443-9353, Ext. 455, (305-443-9353 outside North America) between 8 am and 5 pm EST. Please have your AWS membership number, a purchase order number or credit card ready.
3. FAX form to 305-648-2396 (fax one copy per registrant)
4. Mail registration/order form to:

American Welding Society
Attn: Natalia Lopez
550 NW LeJeune Road, Miami, FL 33126

Advance Registration Deadline: April 10, 2009*

Conference Fees:

Technical Seminars fee includes lunches (Mon. and Tues.), refreshment breaks, and the Mon.–Wed. Conference proceedings. Pre-conference Professional Seminar fees include Sunday lunch and one or two seminars. Registration fees do not include hotel accommodations. Please make checks payable to the American Welding Society. The AWS Education Department will issue a registration confirmation. On-site registration is available throughout the conference.

Type of Business (Check ONE only)

- A Contract construction
- B Chemicals & allied products
- C Petroleum & coal industries
- D Primary metal industries
- E Fabricated metal products
- F Machinery except elect. (incl. gas welding)
- G Electrical equip., supplies, electrodes
- H Transportation equip. — air, aerospace
- I Transportation equip. — automotive
- J Transportation equip. — boats, ships
- K Transportation equip. — railroad
- L Utilities
- M Welding distributors & retail trade
- N Misc. repair services (incl. welding shops)
- O Educational services (univ., libraries, schools)
- P Engineering & architectural services (incl. assns.)
- Q Misc. business services (incl. commercial labs)
- R Government (federal, state, local)
- S Other

Job Classification (Check ONE only)

- 01 President, owner, partner, officer
- 02 Manager, director, superintendent (or assistant)
- 03 Sales
- 04 Purchasing
- 05 Engineer — welding
- 20 Engineer — design
- 21 Engineer — manufacturing
- 06 Engineer — other
- 10 Architect designer
- 12 Metallurgist
- 13 Research & Development
- 22 Quality control
- 07 Inspector, tester
- 08 Supervisor, foreman
- 14 Technician
- 09 Welder, welding or cutting operator
- 11 Consultant
- 15 Educator
- 17 Librarian
- 16 Student
- 18 Customer

Technical Interests (Check all that apply)

- A Ferrous metals
- B Aluminum
- C Nonferrous Metals except aluminum
- D Advanced Materials/ Intermetallics
- E Ceramics
- F High Energy Beam Processes
- G Arc Welding
- H Brazing and Soldering
- I Resistance Welding
- J Thermal Spray
- K Cutting
- L NDT
- M Safety and Health
- N Bending and Shearing
- O Roll Forming
- P Stamping and Punching
- Q Aerospace
- R Automotive
- S Machinery
- T Marine
- U Piping and Tubing
- V Pressure Vessels and Tanks
- W Sheet Metal
- X Structures
- Y Other
- Z Automation
- 1 Robotics
- 2 Computerization of Welding

(Please print clearly. For multiple registrations, complete this form for each registrant.)

Name _____

Organization _____ Title _____

Address _____ City/State/Zip _____

Daytime Phone _____ Cell Phone _____

E-mail: _____ FAX _____

AWS Member ASM Member Member No. _____

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Check Money Order VISA MasterCard American Express Diners Club Discover Carte Blanche

Your Account Number: _____ Expiration Date (mm/yy): _____

Signature: _____

Code		Member	Non-Member
	CONFERENCE REGISTRATION (Monday – Wednesday)		
CF22209	Attendee Registration	<input type="checkbox"/> \$625	<input type="checkbox"/> \$675
CF22809	Attendee Registration and Networking Dinner (Tues.)*	<input type="checkbox"/> \$635	<input type="checkbox"/> \$685
CF22709	Full-Time Student Registration	<input type="checkbox"/> \$195	<input type="checkbox"/> \$225
CF23709	Full-Time Student Registration and Networking Dinner (Tues.)	<input type="checkbox"/> \$205	<input type="checkbox"/> \$235
	PRE-CONFERENCE PROFESSIONAL SEMINARS REGISTRATION (Sunday)		
CF25409	Professional Seminar: Fundamentals of Brazing	<input type="checkbox"/> \$195	<input type="checkbox"/> \$225
CF25509	Professional Seminar: Brazing Process & Applications Part I: Ceramic Brazing Part II: Brazed Joint Design & Allowables	<input type="checkbox"/> \$195	<input type="checkbox"/> \$225
CF25609	Professional Seminars – Full Day (both Sunday seminars)	<input type="checkbox"/> \$325	<input type="checkbox"/> \$385
	TOTAL		

* Additional networking dinner tickets will be sold onsite (for non-attendees) at \$65 each.

Additional workbooks will be sold onsite for \$61 each. AWS and ASM membership packages will also be available onsite.

*On-Site Registration: If your registration form and payment have not been mailed to the American Welding Society by April 10, 2009, you will be required to fill out a registration form and pay onsite by cash, check, or traveler's check (made payable to the American Welding Society), or by credit card (VISA, MasterCard, American Express, Diner's Club, Discover, or Carte Blanche).

4th International Brazing & Soldering Conference

Conference & Exposition

April 26-29, 2009

Orlando, Florida USA

The premier event for the brazing and soldering community covering everything from the latest in research and development to best practices in applied technologies. In the time since the last IBSC, significant advances have been made in brazing and soldering technology and applications. This progress will be embodied in the more than 80 papers to be presented at this year's IBSC.

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