

Patricio F. Mendez

Business Address: Department of Chemical and Materials Engineering
University of Alberta
Donadeo Innovation Centre for Engineering 12-332
Edmonton, AB T6G 2V4

Phone: (780) 248-1587
Cell: (780) 938-1587
Email: pmendez@ualberta.ca

Home Address: 5118 114B St.
Edmonton, Alberta
Canada T6H 3N5
Phone: (780) 435-7645

Education:

Ph.D.	(Materials Engineering)	Massachusetts Institute of Technology	1999
M.Sc.	(Materials Science and Engineering)	Massachusetts Institute of Technology	1995
Ing.	(Mechanical Engineer)	University of Buenos Aires	1992

Professional Experience

University of Alberta

Edmonton, AB

Professor, Department of Chemical & Materials Engineering

Jul. 2013 - Present

Associate Professor, Department of Chemical & Materials Engineering

Jan. 2009 – Jun. 2013

This position carries the mandate of research, teaching, and service. Research interests are in physics, mathematics, and metallurgy of metal processing operations, with a focus on the synthesis and generalization of experiments and models to be of use to practicing engineers.

Weldco/ Industry Chair in Welding and Joining

Jan. 2009 – Present

Director, Canadian Centre for Welding and Joining (CCWJ)

Jan. 2009 – Present

Responsible for developing a world leading research program in welding. Key task was the development from the ground up a world class welding research facility, involving facility design, fundraising, commissioning, training, development of a working structure, and interacting with worldwide welding organizations to ensure proper focus, relevance, and to avoid duplication of efforts. Currently a \$3M facility, the CCWJ opened in May 2010. Among the major initiatives is the development of a partnership with the federal government (Western Economic Diversification) that resulted in \$1.5M in funding for equipment. Other duties of this position are to represent welding and welding research in Alberta and Canada in front of industry, government, and international institutions, including participation in major policy roundtables with CEOs of manufacturing related companies and government representatives. As part of the outreach to industry, the AMFI program (Alberta Metal Fabrication Innovation program) was created together with the Government of Alberta and Alberta Innovates–Technology Futures (ATF). The goal of this program is to raise awareness of technology and to train Alberta's small and medium enterprises on basic concepts of welding and metallurgy, aiming at increasing global competitiveness. Recruitment of students into the program was especially successful. Manufacturing research requires both raw intelligence and ability to connect theoretical insight to the full complexity of practice. It also requires the ability to communicate to people from a broad spectrum of responsibilities and educational backgrounds. Success was accomplished through early recruitment of talent at the UofA and abroad (from 3rd semester of BSc and higher, 14 nationalities in 2014 alone) through open labs and undergraduate research projects. At open labs, interested engineering students experience welding first-hand. The goal of these open labs is to generate awareness and excitement promoting graduate studies and careers in manufacturing. There is also a constant involvement at the lab of 10 to 20 undergraduate engineering students to prepare them for possible graduate studies in Engineering. With the equipment base obtained and the large pool of worldwide talent trained, the CCWJ is ready to engage with the many companies worldwide interested in research partnerships with our welding program.

Colorado School of Mines (CSM)

Golden, CO

Assistant Professor, Department of Metallurgical and Materials Engineering

Aug. 2004 – Dec. 2008

This position carried the mandate of research, teaching, and service. Focus was on welding, casting, and modeling of materials processes. Appointed “Key Professor” by the Foundry Education Foundation (FEF) of the US. One of the major responsibilities was the reconstruction and commissioning of the second largest university foundry in the US. This was accomplished with much success, and students with foundry trained were highly sought after in industry and graduate programs. The foundry was operated and maintained by students, including a core of about 10 undergraduate students present every semester. The foundry program produced approximately 30 engineers with first-hand understanding of casting annually, more than any other university in North America. Technologies learned first hand included sand casting, investment casting, casting of aluminum, brass, steel, white and gray iron, and jewelry (this last, especially popular). Plant tours included a sculpture investment casting foundry, and a semi-solid die casting plant. Research included semi-solid casting and casting of MMCs, and the beginnings of ablative casting by the time moved to Canada.

Exponent/Failure Analysis

Senior Engineer

Engineer

Engineering consultant in process simulation, welding, materials issues, and biomedical devices, with a focus on coronary stents. Generated \$570K in consulting income involving more than 70 cases.

Natick, MA

Feb. 2004 – Aug. 2004

Sep. 2002 – Feb. 2004

Semi-Solid Technologies, Inc. (SST).

President

Vice-President, Co-founder, and Co-owner

Invented and commercialized semi-solid aluminum die-casting process used to make fuel rails for the Ford Focus under license to Gibbs Die Casting in Kentucky. In addition to licensing revenues, raised \$1M from government and industrial sources for development of casting and solid freeform fabrication processes.

Cambridge, MA

Aug. 2000 – Jan 2006

Feb. 1995 – Aug. 2000

Massachusetts Institute of Technology (MIT)

Research Affiliate

Investigated scaling techniques using statistics and welding trends in aeronautics. Co-advised M.S. student in the Department of Materials.

Cambridge, MA

Sep. 2002 – Sep. 2004

Postdoctoral Associate, Department of Materials Science and Engineering

Investigated tools for analysis of complex, multicoupled materials processes and welding trends in aeronautics. Focused on arc plasmas, weld pool fluid/thermal interactions, and metal transfer in GMAW.

Jun. 1999 – Aug. 2002

Graduate Research Assistant

Performed research on the physics and mathematics of high-speed welding defects for the MIT Welding and Joining Lab under sponsorship of DOE, Office of Basic Energy Sciences. Findings are incorporated into current industrial technologies.

Aug. 1993 – Jun. 1999

Teaching Assistant (3.081 Materials Structure Laboratory)

In charge of recitations, grading, and partial content development. Course contents included heat treatment, arc welding, optical and electron microscopy, and mechanical testing.

Feb. 1997 – May 1997

Tenaris

Junior Research Engineer at the CINI research center

Coordinated a team of manufacturing and research engineers working on tribology aspects of manufacturing and performance of steel tubing for the oil industry. Designed a ring-on-disc tribological tester used for the development of Tenaris Dopeless Technology which is still currently still in use. Completed year-long training program in management skills (IAESE Business school, Buenos Aires).

Campana, Argentina

Aug. 1991 – Aug. 1993

University of Buenos Aires (UBA)

Teaching Assistant of 41.05 Calculus III

Most advanced course offered by the Department of Mathematics at the School of Engineering of UBA. Partial differential equations, asymptotic behavior, improper integrals, Fourier and Laplace transforms, and complex calculus. Led School of Engineering student team to third place in Argentina's nationwide college-level mathematical competition, ahead of the Department of Mathematics at the School of Science (1989).

Buenos Aires, Argentina

March 1987 – April 1992

Research Assistant at Argentine Navy Research Lab (SENID)

Developed a stability criterion for non-linear mechanical control of speed in wind turbines. Assembled a 1kW wind turbine on site. Developed a numerical scheme for the prediction of wind-turbine dynamic behavior which included dry friction and contact.

Jul. 1988 – Jul. 1991

RESEARCH

Research Grants & Contracts:

Principal Investigator

Research Grant	Project Title	Start	End	Total
Lincoln Electric / Indalco	Effect of alloy, surface treatment and waveforms on aluminum metal transfer	2016	2016	\$30,000
NSERC CRD / Wilkinson Steel	Processing and Microstructural Development of Wear Protection Coatings Based in the Fe-Cr-C System	2014	2016	\$216,000
NSERC CRD / Apollo Clad	Heat and Mass Transfer Aspects of laser Deposition of Ni/WC Wear Resistant Metal Matrix Composites	2014	2018	\$252,000
NSERC Discovery	Innovation in Materials Processing using Synthesis and Generalization of Multiphysics, Multicoupled Systems	2014	2019	\$145,000
The Stoodly Company	Wear Protective Overlays for Oil Sands Applications	2013	2014	\$30,000
MITACS Accelerate	Systematic catalog of welding defects	2013	2014	\$22,000
UofA ISWSP	Modeling of heat transfer in welding	2013	2013	\$4,000
NSERC USRA	Torch Instrumentation in manual welding	2013	2013	\$4,500
NSERC USRA	Non-equilibrium issues in PTAW of Fe-Cr-C ternaries	2012	2012	\$4,500
NSERC CRD / Hitachi Canada Industries	Deposition of abrasion-resistant Ni-WC metal matrix composites using Hot Wire TIG Welding	2012	2014	\$85,000
Auto21	Tailor-Welded Blank Manufacturing of Mg Alloy Parts	2012	2015	\$66,400
Defence R&D Canada	Development of Friction Stir Processing for the fabrication of Metal Matrix Composites	2012	2013	\$64,575
The Stoodly Company	Wear Protective Overlays for Oil Sands Applications	2012	2013	\$25,000
NSERC CRD / Syncrude	Heat and Mass Transfer Phenomena in the Application of Wire-Based Nickel/Tungsten Carbide Overlays	2010	2013	\$133,000
NSERC Discovery	Innovation in Materials Processing Using Scaling Principles	2009	2015	\$100,000
<i>At Colorado School of Mines</i>				
Illinois Tool Works (ITW) / Miller Electric	Thermal Effects at the Contact Tip in GMAW	2008	2009	\$70,000
National Science Foundation (NSF)	REU Supplement for CAREER Award. Division of Manufacturing and Industrial Innovation	2008	2009	\$12,000
Tenaris/CONFAB (Brazil)	Filler Wire to Weld Tenaris Pipe	2007	2009	\$190,000
Tenaris/TAMSA (Mexico)	Microstructural Analysis of Welding	2007	2008	\$62,000
Cyco (Australia)	Durability of Titanium Equipment in the Manufacturing of Aluminum Matrix Composites	2007	2008	\$10,000
National Science Foundation (NSF)	CAREER: Innovation in Materials Processing Using Scaling Principles. Division of Manufacturing and Industrial Innovation	2006	2010	\$400,000
Novelis	Vertical Folds in Direct Chill Casting	2005	2008	\$75,000
American Welding Society (AWS)	Modified GMAW for Spray Transfer with pure CO ₂ shielding gas	2005	2008	\$75,000
American Society for Non-Destructive Testing (ASNT)	Real-Time Determination of Solid Fraction in Semi-Solid Metal Melts Using Ultrasound Techniques	2005	2006	\$15,000

Total: \$2,090,975

Co-PI

Research Grant	Project Title	Start	End	Total
NSERC Engage	Real-time monitoring of weld quality in flash-butt welding (PI Vinay Prasad)	2013	2013	\$24,500
NSERC CRD / Syncrude	Mitigation of Embrittlement in Aged Stainless Steels (PI Adrian Gerlich)	2010	2012	\$125,960
NSERC Engage	Development of Wire Consumables for Overlay Deposition by Hot-wire TIG Welding (PI Adrian Gerlich)	2010	2010	\$20,950
Hobart Brothers	Structure-Property Relationships in Advanced High Strength Steel Welds (PI Adrian Gerlich)	2009	2010	\$19,134
<i>At Colorado School of Mines</i>				
DARPA	Spark Processing Synthesis of Reactive Materials Defense Advanced Projects Agency (PI Reed Ayers)	2009	2010	\$200,000
				Total: \$420,544

Support for Research Tools and Service

(PI in all except the one marked)

Grant	Project Title	Start	End	Total
Government of Alberta	University/Industry Network for Welding and Joining	2016	2017	\$45,000
Government of Alberta	University/Industry Network for Welding and Joining	2015	2016	\$30,000
Canadian Foundation for Innovation (CFI) / Alberta Education and Technology (AET)	Development of Laser Processing Facility for Wear and Corrosion Protection Materials	2014	2019	\$465,000
Productivity Alberta	Productivity Improvement Fund	2013	2014	\$45,000
Government of Alberta	Operating funds for Alberta-Germany technology collaboration	2013	2015	\$30,000
Government of Alberta	Operating funds for Alberta Metal Fabrication Innovation (AMFI) Program – Round 2	2013	2014	\$20,000
Western Economic Diversification	Capital Equipment for Alberta Metal Fabrication Innovation (AMFI) Program	2011	2013	\$1,500,000
Government of Alberta	Operating funds for Alberta Metal Fabrication Innovation (AMFI) Program	2011	2013	\$210,000
Government of Alberta	University/Industry Network for Welding and Joining	2010	2011	\$50,000
NSERC RTI	A high accuracy analyzer for materials containing hydrogen, nitrogen, and oxygen	2010	2012	\$111,273
NSERC RTI	High Temperature Mechanical Tester (PI A. Gerlich)	2010	2012	\$87,212
Industrial Partners	Donations/Consignment of Welding Equipment	2010	2012	\$140,000
Government of Alberta	University/Industry Network for Welding and Joining	2009	2010	\$45,000
<i>At Colorado School of Mines</i>				
Illinois Tool Works	Welding Equipment	2006	2006	\$25,000
Colorado School of Mines	Safety Items for Foundry Education	2006	2006	\$4,000
Colorado School of Mines	Rapid Prototyping Machine (PI D. Munoz)	2006	2006	\$20,000
Colorado School of Mines	Safety Items for Foundry Education	2005	2005	\$8,000
				Total: \$2,805,485

Postdoctoral Fellows Supervised

1. **Chapuis, J.**, *Calorimetry for Metal Transfer in Gas Metal Arc Welding*, 8/2011-8/2012 (Sponsor NSERC/Syncrude). Now Head of Welding Processes Unit at AREVA NP, St Marcel, France.
2. **Madeni J. C.** *Physical Model of SAW of line pipe steel*, 8/2005-8/2008 (Sponsor NSF/Tenaris). Now Senior Research Engineer at Diamond Material Technologies, Colorado Springs, CO.

PhD Theses Supervised

1. **Kamyabi Gol, A.**, *Quantification of Phase Transformations Using Calorimetry as an Alternative to Dilatometry*. PhD, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor.
2. **Guest, S. D.**, *Depositing Ni-WC Wear Resistant Overlays with Hot-Wire Assist Technology*. PhD, Chemical and Materials Engineering, University of Alberta, 2014. P.F. Mendez advisor.
3. **Davis, L.**, *Wrinkling Phenomena to Explain Vertical Fold Defects in DC-Cast Al-Mg4.5*. Ph.D., Metallurgical and Materials Engineering, Colorado School of Mines, 2009. P.F. Mendez advisor. Now Production Technology Manager at Tri-Arrows Aluminum, Louisville, KY.
4. **Duman, U.**, *Modeling of Weld Penetration in High Productivity GTAW*. Ph.D., Metallurgical and Materials Engineering, Colorado School of Mines, 2009. P.F. Mendez advisor. Now Materials MQE at Apple Inc, Cupertino, CA.
5. **Soderstrom, E.**, *Gas Metal Arc Welding Electrode Heat and Mass Transfer Mechanisms*. Ph.D., Metallurgical and Materials Engineering, Colorado School of Mines, 2009. P.F. Mendez advisor. Now Director of Metallurgy at Ellwood Crankshaft Group, Sharon, PA.
6. **Tordonato, D. S.**, *A Novel Approach to the Design of Welding Consumables Using Computational and Physical Models*. Ph.D., Metallurgical and Materials Engineering, Colorado School of Mines, 2008. P.F. Mendez advisor. Now Researcher, US Bureau of Reclamation, Denver, CO.

In progress:

1. **Wood, G.**, *Synthesis and Generalization of Experiments and Models for Laser Cladding*. PhD, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor.
2. **Barnes, N.**, *Metallurgy of PTAW-Deposited Wear-Resistant Overlays*. MSc, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor.

MS Theses Supervised

1. **Borle, S.**, *Deposition of Chrome Carbide Overlays Using Submerged Arc Welding*. MSc, Chemical and Materials Engineering, University of Alberta, 2013. P.F. Mendez advisor. Now Engineer, Group Six Technologies, Edmonton, AB.
2. **Dewar, M. P.**, *Characterization and Evaluation of Aged 20Cr32Ni1Nb Stainless Steels*. MSc, Chemical and Materials Engineering, University of Alberta, 2012. A.P. Gerlich and P.F. Mendez advisors. Now Engineer, Group Six Technologies, Edmonton, AB.
3. **Gajapathi, S. S.**, *Heat Transfer Analysis of Microwelding Using Tuned Electron Beam*. MSc, Mechanical Engineering, University of Alberta, 2011. P.F. Mendez and S.K. Mitra advisors. Now Process Development Engineer, Ulterra, Edmonton, AB.
4. **Scott, K. M.**, *Heat Transfer and Calorimetry of Tubular Ni/WC Wires Deposited with GMAW*. MSc, Chemical and Materials Engineering, University of Alberta, 2011. P.F. Mendez advisor. Now Arc Research Scientist, Miller Electric, Appleton, WI.
5. **Gibbs, J. W.**, *Quantification of Phase Transformations Using Cooling Curves*. M.S., Metallurgical and Materials Engineering, Colorado School of Mines, 2009. P.F. Mendez advisor. Now PhD Candidate, Northwestern University, Chicago, IL.
6. **Tello, K. E.**, *Coupled Model of Heat Transfer and Plastic Deformation for Friction Stir Welding Using Scaling Analysis*. M.S., Metallurgical and Materials Engineering, Colorado School of Mines, 2009. P.F. Mendez advisor. Now Assistant Professor, Federico Santa Maria University, Chile.
7. **Soderstrom, E.**, *Influence of Ar-CO₂ Mixtures and Thin Electrodes on Metal Transfer in Gas Metal Arc Welding*. M.S., Metallurgical and Materials Engineering, Colorado School of Mines, 2007. P.F. Mendez advisor. Now Metallurgical Engineer at Ellwood Group, Russell, PA.

8. **Nikou, V.**, *Welded Repair and Maintenance in the Space Environment*. S.M., Department of Materials Science and Engineering, Massachusetts Institute of Technology, 2003. K. Masubuchi, T.W. Eagar, and P.F. Mendez advisors. Now International Welding Engineer and Naval Architect, Greek Navy.

In progress

1. **Wang, Y.** *Gaussian heat sources in the modeling of welding*. MSc, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor
2. **Lu, Y.** *Synthesis and generalization of moving heat sources*. MSc, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor
3. **Grams, M.** *Residual stresses and hydrogen cracking in pipelines*. MSc, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor
4. **Foster, K.** *Spectroscopy of welding plasma*. MSc, Physics, University of Alberta, In progress. P.F. Mendez, R. Sydora, advisors
5. **Sengupta, V.**, *High Speed Imaging of SAW*. MSc, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor
6. **McIntosh, C.**, *Metal Transfer in GMAW*. MSc, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor.
7. **Bell, K.**, *Fatigue Properties of Laser Clad Rebuilt Downhole Oil Equipment*. MSc, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor.
8. **Bell, M.**, *Metallurgy of Welded Duplex Stainless Steel Pipes*. MSc, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor.
9. **Tsui, J.**, *Modeling and Verification of FSW in Aluminum and Magnesium*. MSc, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor.
10. **Duncan, S.**, *Wear Performance of Hardfacing for Mining Applications*. Mining Engineering, University of Alberta, in progress. P. F. Mendez and T. Joseph advisors.

MEng. Theses Supervised

1. **Choi, L.**, *Metallurgy and Characterization of Welding Processes*. MEng, Chemical and Materials Engineering, University of Alberta, In progress. P.F. Mendez advisor.
2. **Narayanan, V.**, *Issues with in-Service or Repair Welding of Aged Pipelines - a Literature Review*. MEng, Chemical and Materials Engineering, University of Alberta, 2014. P.F. Mendez advisor.
3. **Rollings, D.-a.**, *Electron Microscopy of Chrome Carbide Overlays*. MEng, Chemical and Materials Engineering, University of Alberta, 2013. P.F. Mendez advisor.
4. **Nadeem, S.**, *Literature Review on Overlay Welding by Using Fe-Based Materials*. Chemical and Materials Engineering, University of Alberta, 2012. P.F. Mendez advisor. Now Materials, Corrosion and Welding Engineer, Saipem, Calgary, AB.

BS Theses Supervised

1. **Lopetegi, M.**, *Design and Experimental Production of X80 Microalloyed Filler Metal*. B.S., Department of Industrial Mechanical Engineering, Mondragon University, 2007. P.F. Mendez advisor. Now Engineer at CAF, Spain.
2. **Sarasola, G.**, *Consumables Development for High Strength Steels in Arc Weldments*. B.S., Department of Industrial Mechanical Engineering, Mondragon University, 2006. P.F. Mendez advisor. Now Engineer at Bascotecnia Steel, Spain.

Significant Contributions to Research

A distinctive aspect of Prof. Mendez's research is the uncommon span from fundamentals to industrial applications. He has been recognized by academics, members of industry, government, and practitioners, and was inducted Fellow of the American Welding Society in 2014. Another distinctive aspect is his gift to engage and motivate talented students and staff into a diverse research team including a range from postdoctoral fellows to undergraduate and high-school students, and nationalities from all over the world. New Processes and Consumables for Wear Resistant Overlays: Generated significant understanding of process and consumable design for wear resistant overlays, which are of importance for the energy and natural resources sector. The scientific approach is unique in studying simultaneously the welding process

and metallurgy. A radically new technology for the deposition of Ni-WC overlays has shown much promise in wear tests. As part of early dissemination, Prof. Mendez co-organized in 2013 a conference on wear resistant overlays that attracted approximately 100 attendees from all across Canada, the US, and Germany, and a comprehensive review paper has been recently published in the J. of Manuf. Proc. This line of work has been recognized in 2013 with the AWS William Irrgang Memorial Award and the CWA Fellowship Award.

Physics of Welding: Contributed significantly to the characterization of metal transfer in GMAW. This work has a direct impact on productivity, fume generation, and design of equipment. Prof. Mendez led the design of a special calorimeter that identified directly for the first time a droplet temperature minimum at the globular-spray transition (WJ 2011 v90 p77s). This work has received much recent attention from the research community and is being replicated in Germany. Modeling efforts involved the first accurate generalization of the electrode extension considering variable thermophysical properties (Int J Heat Mass Transf 2011 v54 p2651). Current work on high-speed video at UofA has accomplished the best quality images to date of metal transfer in arc welding. These videos have been posted on the www.ccwj.ca website as a freely distributed contribution to the welding community worldwide.

Synthesis and Generalization of Experiments and Simulations: Pioneering deep work on mathematical modeling of welding. Seminal work on the mathematical techniques themselves, and on applying mathematical techniques to the physics of welding. Prof. Mendez's work on scaling and generalization has been given a place of prominence as a keynote plenary talks in Trends in Welding Research (2012) and 2nd International Symposium on Computer-Aided Welding Engineering (China), and numerous invited lectures (e.g. at Cambridge University, and Universite Montpellier 2). The techniques developed have raised considerable attention in the academic community resulting in a CAREER Award from the US National Science Foundation (NSF), two Discovery grants from NSERC, and the editing of two special issues of "Statistical Analysis and Data Mining" focusing on materials informatics. It has also been highlighted in editorials in Science and Technology of Welding and Joining (STWJ v15 p646, v16 p285). Most recently, this line of work received the IIW Easterling Award (2012), The MSc work on scaling of one of Prof. Mendez's students received the IIW Granjon Award (Gajapathi, 2013).

Phase transformations: Developed an experimental "combinatorial materials science" approach for pipeline welding consumables published in the Welding Journal (WJ 2010 v89 p201s), that received the AWS Spraragen Award. Additional work on pipeline consumables was sponsored by Hobart. Another approach to phase transformations pursued is the analysis of solid-state phase transformations using calorimetry aiming at the fast turnaround of CCT diagrams (Met Trans A 2010 v41A p2216, Scripta 2008 v58 p699). Work on semi-solid metals and casting resulted in 9 patents issued and 2 pending, commercialized through a startup (Semi-Solid Technologies) and licensed to a Ford supplier.

Invention of New Semi-Solid Metal Process: My collaborators and I achieved the first-ever commercially successful semi-solid die-casting process based on molten aluminum instead of the traditional preprocessed solid bar stock. This technology resulted in significant savings in fixed and variable costs, and it was licensed to manufacture the fuel rail of the Zetec engine of the Ford Focus between 1999 and 2003. The breakthrough was the invention of an effective mechanical stirring arrangement. This innovation has been influential; currently, all major players in the semi-solid aluminum industry are using or investigating alternatives to switch from preprocessed bar stock to molten metal feed. To commercialize our inventions, my collaborators and I founded Semi-Solid Technologies, Inc. Based on this expertise on semi-solid processing, my research group has explored the use of semi-solid processing for graded metal-matrix cast composites, for low-pressure extrusion of copper alloys, for high-deposition welding, and for the direct freeform fabrication of metallic components.

Academic Awards

- 2016 AWS Charles H. Jennings Award, for most valuable contribution to the welding literature ("Primary Chromium Carbide Fraction Control with Variable Polarity SAW." Welding Journal. 94(1). pp. 1s-7s)
- 2015 AWS Warren F. Savage Memorial Award to the "best paper on metallurgical principles related to welding" published in the Welding Journal Research Supplement ("Characterization of High Strength Weld Metal Containing Mg-Bearing Inclusions." Welding Journal, 2014. 93 (1): p. 15s-22s.)

- 2015 Undergraduate Research Initiative University of Alberta Award for Outstanding Mentorship in Undergraduate Research & Creative Activities for “(having) gone above and beyond to help support the development of undergraduate researchers.”
- 2014 ASM M. Brian Ives Lectureship Award to “an individual who has made distinguished and significant contributions to the Canadian materials community.”
- 2014 AWS Fellow for a “career of significant achievements in the technical and research arenas.”
- 2014 AWS Adams Memorial Membership Award for “outstanding teaching activities in undergraduate and postgraduate engineering.”
- 2014 University of Alberta Student Union Award for Leadership in Undergraduate Teaching for “excellence in teaching by faculty members who make outstanding contributions in their roles as undergraduate instructors.”
- 2013 CWA Fellowship Award for “exemplary reputation and service to advancements of welding sciences, technology application, research, education, publication of papers, books, journal articles and peer recognition.”
- 2013 AWS William Irrgang Memorial Award “to the individual who had done the most to enhance AWS’s goal of advancing the Science and Technology of Welding over the last five years.”
- 2013 AWS Image of Welding: Educational Facility Award to “an educational facility that conducts welding education or training that has demonstrated an exemplary commitment to furthering the Image of welding”
- 2012 IIW Kenneth Easterling Best Paper Award to “the best contribution made over the three years proceeding on the advancement of knowledge or practice in respect of mathematical modelling of weld phenomena.” (OMS: A Computer Algorithm to Develop Closed-Form Solutions to Multicoupled, Multiphysics Problems in Proceedings of 10th International Seminar Numerical Analysis of Weldability, p. 219-254. Graz-Seggau, Austria)
- 2011 AWS William Spraragen Award to the best paper published in the Welding Journal Research Supplement (“A New Method for the Design of Welding Consumables”. Welding Journal, 2010. 89 (10): p. 201s-209s).
- 2006 NSF CAREER Award “NSF’s most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research”
- 2006 TMS Early Career Faculty Fellow Award, Certificate of Honorable Mention
- 2004 AWS Charles H. Jennings Award, for most valuable contribution to the welding literature (“Penetration and Defect Formation in High Current Arc Welding.” Welding Journal. 82(10). pp. 296s-306s)
- 2002 AWS Silver Quill Award, for best original welding paper in non-welding journal (“Welding Processes for Aeronautics”. Advanced Materials & Processes, 2001. 159 (5): p. 39-43).
- 1997 Sigma Xi honor society, MIT chapter
- 1996 Alpha Sigma Mu honor society, MIT chapter
- 1993 MIT Rocca Fellowship
- 1993 CONICET (Argentine National Research Council) Fellowship
- 1989 Argentine Construction Chamber Excellence Award (also in 1991)
- 1990 Argentine-American Cultural Institute Scholarship (also in 1991)
- 1988 University of Buenos Aires Research Fellowship, for studies on Wind Energy (also in 1989, 1990, 1991)

Other Awards

- 2004 Exponent Failure/Analysis Excellence Award
- 1994 First Place, Bridge Design Contest, MIT
- 1991 “Sportsman of the Year,” Archery Team Captain (School of Engineering, UBA)
- 1987 First Place, UBA Intramural Archery (also in 1989, 1991)
- 1984 First Place, “Elab” nationwide computer programming competition in Argentina involving more than 2,500 entries

Student Awards

The tenure of students under my advice has resulted in important recognitions for many of them. This list includes chosen advisee's competitive awards related to work under my supervision:

- Eddie Alvarez Rocha (UG), CWA Edmonton Undergraduate Annual Award for Excellence in Welding Engineering (2015)
- Ata Kamyabi (G): UofA Queen Elizabeth II Scholarship (2014), UofA Profiling Alberta's Graduate Students Award (2014), CWA Edmonton Graduate Annual Award for Excellence in Welding Engineering (2015)
- Gentry Wood (G): AWS District Scholarship (2014), AWS Leadership Symposium Scholarship (2013), CWA Welding Research Scholarship (2014), GSA Teaching Award (2014), UofA Neil McEwen Memorial Graduate Scholarship (2014), AWS District Scholarship (2015).
- Nairn Barnes (UG): 1st Place, Oral Presentation Competition, Faculty of Engineering (2014), 1st Place, ASM Design Competition (2013), Queen Elizabeth II Scholarship (2014), District Award, AWS (2013), Capt. T. F. Greenhalgh Memorial Graduate Scholarship, UofA (2013), UofA Neil McEwen Memorial Graduate Scholarship (2014), YPAC Best Presentation Award (2015)
- Satya Gajapathi (G), IIW Henry Granjon Prize in Category A "Joining and Fabrication Technology," (2013), J Gordin Kaplan Graduate Student Award (2010)
- Jordan Tsui (G): NSERC PGS-M (2013), Queen Elizabeth II Scholarship (2013), Walter H. Johns Scholarship (2013), Best in Theme award (Materials and Processing), AUTO21 conference (2013)
- Matthew Bell (G): Queen Elizabeth II Scholarship (2013, 2015), Capt. T. F. Greenhalgh Memorial Graduate Scholarship, UofA (2013), Alberta Advanced Education Graduate Student Scholarship (2015)
- Goetz Dapp (Staff) UofA Information Technology Unsung Hero Award (2015)
- Stuart Guest (G): "Top 20 Under 40" in Metalworking Production & Purchasing magazine (2013), Welding Hero, Miller Electric (2012), Student Leadership Symposium Representative, AWS (2013), CWA Welding Research Scholarship (2012, 2013)
- John Andreiuk (UG): K. Sabol Memorial Award (2013), APEGA Scholarship (2013), George A. Roberts Scholarship, ASM, (2013), Extraction and Processing Division Scholarship, TMS (2013), AIST Willy Korf Memorial Scholarship (2013).
- Steven Borle (G): CWA Welding Research Scholarship (2013)
- Julien Chapuis (PDF): CWA Welding Research Scholarship (2012)
- Karem Tello (G): Henry DeWitt Smith Scholarship, TMS (2012), International Scholarship, AWS, (2008), Doctoral Fellowship from the CONICYT (Chilean counterpart to the NSERC, 2007)
- John Gibbs (G, UG): DOE NNSA Stewardship Science Graduate Fellowship (2011), George A. Roberts Scholarship, ASM International (2007), Light Metals Division Scholarship, TMS (2007), Undergraduate Research Leaders Scholarship, CSM (2007)
- Kevin Scott (G, UG): Captain Thomas Farrell Greenhalgh Memorial Graduate Scholarship, UofA (2010), Neil McEwen Memorial Graduate Scholarship, UofA (2009), E-days representative for Metallurgical and Materials Engineering, CSM (2009), Arsham Amirikian Engineering Scholarship, AWS (2008)
- Greg Lehnhoff (G, UG): Tau Beta Pi Fellowship, 2009, NSF and DOE Graduate Fellowships (2010), Metallurgy Scholarship, Ellwood Group Inc., (nationwide search for single awardee), 2007
- Erik Soderstrom (G): Graduate Research Fellowship, AWS (2005, 2006, 2007), District Award, AWS (2008)
- Myra Dyer (UG): District Scholarship, AWS, 2007
- Gaizka Sarasola (UG): Memorial Félix Sopelana Award, Spain, 2007
- Mike Sanders (UG): Undergraduate Research Leaders Scholarship, CSM, 2006
- Josh Jackson (G): Graduate Research Fellowship, ASNT, 2005

TEACHING

University of Alberta

Term	Course		% taught	Size	Median Q221	Eng. 50% percentile	Eng. 75% percentile
W15	CHE 314	Heat Transfer	100%	106	2.6	4.3	4.6
	MATE 466	Adv. Manuf.	50%	13	4.4	4.3	4.6
	MATE 630	Adv. Manuf.	50%	8	4.4	4.3	4.6
	CME 483	Colloquium II	100%	22	4.4	4.3	4.6
F14	MATE 466	Fund. Weld	50%	30	4.1	4.3	4.6
	MATE 630	Fund. Weld	50%	2	N/A	4.3	4.6
W14	CHE 314	Heat Transfer	100%	69	3.8	4.3	4.6
F13	MATE 466	Fund. Weld.	100%	26	4.7	4.3	4.6
	MATE 630	Fund. Weld.	100%	6	4.7	4.3	4.6
W13	MATE 202	Mat. Sci. II	100%	108	4.6	4.3	4.6
F12	MATE 630	Fund. Weld.	100%	9	5.0	4.3	4.6
	CME 481	Colloquium I	100%	24	4.9	4.3	4.6
W 12	MATE 202	Mat. Sci. II	100%	68	4.6	4.3	4.6
	CME 481	Colloquium I	100%	26	4.8	4.3	4.6
F 11	MATE 630	Fund. Weld.	100%	13	4.7	4.3	4.6
W 11	MATE 630	Weld. Met.	50%	11	4.3	4.3	4.6
	MATE 454	Weld. Met.	50%	11	4.0	4.3	4.6
	MATE 202	Mat. Sci. II	100%	82	4.6	4.3	4.6
F 10	MATE 335	Phase Trans I	50%	52	4.2	4.3	4.6
W 10	MATE 630	Weld. Met.	50%	12	3.9	4.4	4.7
	MATE 454	Weld. Met.	50%	12	4.7	4.3	4.7
	CME 483	Colloquium II	100%	26	4.8	4.3	4.6

Q221: Overall, this instructor was excellent

Colorado School of Mines

Term	Course		% taught	Size	Rating Q14	Dept. Average
F 08	MTGN 587	Phys. of Weld	100%	5	N/A	N/A
	MTGN 300/2	Foundry Met.	100%	11	3.8	3.0
S 08	MTGN 548	Phase Trans	100%	11	3.0	3.2
	MTGN 300/2	Foundry Met.	100%	13	3.9	3.2
F 07	MTGN 300/2	Foundry Met.	100%	14	3.1	2.9
	MTGN 499	Indep. Studies	100%	5	N/A	N/A
S 07	MTGN 556	Transp. Solids	100%	26	2.8	3.0
	MTGN 300/2	Foundry Met.	100%	14	3.3	3.0
	MTGN 499	Indep. Studies	100%	4	N/A	N/A
F 06	MTGN 300/2	Foundry Met.	100%	13	3.6	3.0
S 06	MTGN 548	Phase Trans	100%	18	2.7	3.2
	MTGN 300/2	Foundry Met.	100%	18	2.4	3.2
	MTGN 498	Intr. Foundry	100%	6	N/A	N/A
F 05	MTGN 300/2	Foundry Met.	100%	18	3.0	3.3
S 05	MTGN 556	Transp. Solids	100%	11	3.4	3.1
F 06	MTGN 498	Adv. Casting	100%	6	N/A	N/A

Q14: Overall would you consider this instructor A-Superior, C-Average, E-Poor

Educational Initiatives

One of the responsibilities as the Weldco/Industry Chair is to develop two welding courses. Those two courses have been developed (Welding Metallurgy and Fundamentals of Welding), and a comprehensive and cohesive welding curriculum is currently being developed to service both depth and breadth. The Fundamentals of Welding course is a radical new teaching experiment in which the lectures are taught in the welding lab in addition to using traditional photos or videos, thus the theory and other knowledge are demonstrated on actual equipment. Equipment is already instrumented to highlight the points of theory that

are not visible in normal practice. Prof. Mendez has given on-site lectures and courses for personnel training at many companies in Canada, Tenaris (US, Brazil), Plymouth Pipe, Novelis, and Los Alamos National Laboratory in the US, and have advised the research work of many visiting students from around the world.

The welding lab counts with a larger than usual number of undergraduate students participating in research activities (typically 10-20 per semester, from 2nd year and above). The large involvement of undergraduates resulted in a more productive group: graduate students have assistance, “veteran” undergraduates can develop investigations on their own, and future graduate students can be evaluated and prepared. Through open labs and research involvement, more than 1000 people were first exposed to welding and 200 to casting. Hands-on open labs occur regularly at the UofA, and they were well developed at Colorado School of Mines through the Friday Free Pour (FFP) initiative. The FFP was an Informal Science Education activity where students were trained on the safety aspects and basic rules of mold making and casting, and they had the freedom of casting shapes of their choice. The goal of open labs is to engage students in manufacturing operations from the point of view of excitement, yet industrial recruiters are very appreciative of this unique experience in their hires. The CCWJ typically has two high-school student performing research, and hosts open labs specifically for High and Junior High schools.

SERVICE

Professional Memberships

- Professional Engineer, APEGA since 2013
- Professional Mechanical Engineer with federal jurisdiction in Argentina since 2005
- Member of CWA, AWS, ASM, ASME, CSME, ASEE

Reviewer

- Principal Reviewer Welding Journal (2005-current)
- Principal Reviewer Welding in the World (1/2012-12/2013)
- Editorial Board of Science and Technology of Welding and Joining (2010-current)
- Associate Editor Journal of Manufacturing Processes (2014-current)
- Board of Review of AIST Transactions (Assoc. for Iron & Steel Technol., 2008-current)
- Metallurgical and Materials Transactions A
- Metallurgical and Materials Transactions B
- Journal of Physics D: Applied Physics
- Journal of Heat Transfer
- International Journal of Heat and Mass Transfer
- Journal of Applied Mechanics
- Materials Science and Engineering A
- International Materials Reviews
- Journal of Materials Processing Technology
- Journal of Engineering Materials and Technology
- Surface Coatings and Technology
- Modelling and Simulation in Materials Science and Engineering
- Engineering Computations
- Statistical Analysis and Data Mining
- Ocean Engineering
- IEEE Transactions on Components and Packaging Technologies
- NSERC
- MITACS
- NSF (USA)
- CIMAT (Chile)
- International Copper Association

Committees and Other Service

At the University of Alberta

- Weldco/Industry Chair in Welding and Joining (2009–present)
- D.B. Robinson Distinguished Speaker Series (9/2010-12/2013)
- Founder and Faculty Advisor for AWS and CWA Student Chapters (2010, both are the first University Chapters in Canada).
- Judge for Great Northern Concrete Toboggan Race hosted at UofA (2011)
- Assisted students from the formula SAE team with their welding needs
- Host CCWJ Open Labs, which happen regularly four times a year exposing 40 students to hands-on welding each time (Since 2010).
- Host section of Engineering Expo which happens every year exposing ~150 high school students/parents per event (Since 2010).
- Host section of UofA Open House which happens every year exposing ~150 high school students/parents per event (Since 2010).

At the Colorado School of Mines

Service involve an intense schedule of welding and foundry dissemination activities:

- “Key Professor” Foundry Educational Foundation (2006-2009)

- Founder and Faculty Advisor for Welding Club and Friday Free Pour Club at CSM, an Informal Science Education approach where students are exposed to engineering aspects of welding and casting outside a classroom setting (2006).
- Founder of the Undergraduate Research Leaders Scholarship, the first funded school-wide undergraduate research program at CSM (2006).
- Head of Selection committee for Undergraduate Research Leaders Scholarship (URLS) scholarship (2006-2007)
- CSM/MME Undergraduate Affairs Committee (2004-2008)
- Reported to the Technology Transfer Advisory Board on the development of a Business Plan Competition (2007)
- Host in Discover CSM (two 3h metal casting demos for ~50 students)
- Host in CSM 101 (1h welding and metal casting ~50 students, three days per semester, 2004-2008)
- Host in Preview Mines (4h metal casting demos for ~50 students every semester, 2004-2008)
- Hosted foundry demo for Creighton Middle School (4h metal casting demo for ~30 students, 2007)
- Hosted foundry demo for President Scoggins (2007)

Professional Leadership

- Alberta Metal Fabrication Innovation (AMFI) Program: This is a \$3.85M initiative in partnership with the Government of Alberta, Western Economic Development, and Alberta Innovates. This initiative aims to revolutionize the metal fabrication industry in Alberta by providing engineering training and assistance to small and medium enterprises on insightful choices of the latest available productivity technologies. Ongoing program started in Jan 1, 2011. This program consists of a series of four 10-hour modules in which people involved in the metals industry in Alberta receive training in steel metallurgy, high alloys, heat treatments, welding defects, heat affected zone, and testing and characterization techniques. This teaching also involves hands-on labs.
- Scientific Advisory Committee, International Institute of Welding (IIW) Annual Conference, July 2015, Helsinki, Finland.
- Scientific Committee, 11th International Seminar Numerical Analysis of Weldability, Sep. 2015 Seggau, Austria
- Chair, Integrity of Pipelines Seminar, May 28, 2015. Edmonton, AB.
- Co-Chair (with Dan Tadic, CWA), Duplex and Super Duplex Stainless Steels Seminar, May 27, 2014. Edmonton, AB. More than 100 attendants from Canada, US, Germany, Sweden.
- Co-Chair (with Dan Tadic, CWA), Weld Overlays for Wear Protection Seminar, May 16, 2013. Edmonton, AB. More than 100 attendants from Canada, US, Germany.
- Scientific Committee, 10th International Seminar Numerical Analysis of Weldability, Sep. 2012 Seggau, Austria
- International Advisory Committee, 2nd International Symposium on Computer-Aided Welding Engineering, Aug. 2012, Jinan, China.
- Canadian Delegate to the International Institute of Welding (Comission XII: Welding Processes, 2011, 2012)
- AWS Roundtable in Welding Education (Sep. 2011). I was the only University-level educator invited to participate in this high-level roundtable with 11 corporate directors and 3 directors of other educational and training institutions. Conclusions were published in “Strategies for Developing Tomorrows Welding Professionals” by AWS in 2012.
- Government of Alberta (Alberta Finance and Enterprise) Manufacturing Competitiveness and Productivity Roundtable (Nov. 2010). Represented university education at a roundtable including an MLA.
- AWS A5G Subcommittee on Hard Facing Filler Metals– (7/2014-current)
- AWS EC Education Committee, Higher Education – Engineering Subcommittee (2/2014-current)
- ASME HTD K-15 Committee on Transport Phenomena in Manufacturing and Materials Processing (2009-current)
- CWA Edmonton Executive Committee (2011–current)
- AWS Alberta Section Education Co-Chair (2009-current)

- AWS Welding Research & Development Committee (2008-current)
- AWS A9 Computational Weld Mechanics Committee (2007-current)
- AWS Technical Papers Committee (2005-current)
- TMS Computational Materials Science and Engineering Committee (2005-2009)
- TMS Process Modeling Analysis and Control Committee (2005-2009)
- Guest editor for special issue on Materials Informatics in “Statistical Analysis and Data Mining” (with K. Rajan, 2008)
- Lead organizer of symposium “Numerical, Mathematical, and Physical Modeling Tools for Materials Processes,” sponsored by TMS Process Modeling Analysis and Control Committee, MS&T 11/19-20/07
- Co-founder and first President of the Rocca Fellowship Association at MIT (1998)
- President of Edgerton House (MIT most modern graduate residence. Elected 1996, re-elected uncontested 1997)
- Treasurer, Argentinean Club at MIT (1997, 1998)

Professional event organization

Organized visits of distinguished guests in the context of professional meetings

- **Rick Hutchison:** September 24, 2009. ASM/AWS joint meeting, UofA Faculty Club, attendance: 28 industry, 17 UofA, 25 NAIT. Topic: Reducing Heat Input through Use of Complex Weld Current Waveforms: A Historical Perspective
- **Tarasankar DebRoy:** October 30, 2009. AWS seminar on “High Productivity Welding Processes and Automation for the Energy Industry,” ARC, attendance 62 industry, 5 UofA, 1 NAIT. Topic: Models and Animations in Welding: Better Practice with Video Games
- **YuMing Zhang:** March 17, 2010, AWS dinner meeting, UofA Faculty Club, attendance 30 industry, 7 UofA, 1 NAIT. Topic: Sensing and Control of Welding Processes
- **Harry Bhadeshia,** September 23, 2010, DB Robinson Distinguished Speaker Series, Mackiw lecture, Topic: The First Bulk Nanostructured Metal, attendance: ~300 people from university and industry. Date: September 24, 2010, AWS Fall Seminar, AITF, Topic: Design of Welding Consumables for the Mitigation of Residual Stress, attendance: ~50 people from industry
- **Horst Cerjak,** Date: March 3, 2011, ASM/AWS joint meeting, UofA Faculty Club, Topic: Aspects on the Joinability for Advanced Designs, attendance: ~75 from, UofA, and NAIT.
- **Bill Krantz,** Nov. 15-19, 2010. DB Robinson Distinguished Speaker Series, Schlumberger Lecture, Topic: Semi-permeable membranes, attendance: ~200 people from university. Date: Nov. 18, 2010, Week-long course on “Scale-up and simplification in multiphysics systems” attendance: 27 students.
- **Mildred S. Dresselhaus** Apr. 21, 2011, School of Energy and the Environment Distinguished Lecture/D. B. Robinson Distinguished Speaker Series. Topic: The Promise of Nano-Materials for Energy Related Applications. Attendance ~300 people from university and industry
- Essen 2009: Largest welding show in the world, led a small delegation of 5 welding professionals from Alberta
- Fabtech 2010: With sponsorship from the Gov. of Alberta, coordinated Alberta reception for 50 people to showcase welding in Alberta and expand professional networks

Consulting Service:

The CCWJ is structured to provide consulting services based on equipment and expertise in addition to its research goal. Very many local companies in Canada and the US have been serviced including fabricators for the oil sands, equipment, and consumable manufacturers

PUBLICATIONS

HQP (Highly Qualified Personnel) supervised in **boldface**

PAPERS IN ARCHIVAL JOURNALS

1. **Kamyabi-Gol, A.** and Mendez, P.F., *The Evolution of the Fraction of Individual Phases During a Simultaneous Multiphase Transformation from Time-Temperature Data.* Material Transactions A, 2015. **46A** (2): p. 622-638.
2. **Wood, G.** and Mendez, P.F., *Disaggregated Metal and Carbide Catchment Efficiencies in Laser Cladding of Nickel-Tungsten Carbide.* Welding Journal, 2015. **94** (11).
3. **Barnes, N.**, Joseph, T., and Mendez, P.F., *Issues associated with welding and surfacing of large mobile mining equipment for use in oil sands applications.* Science And Technology Of Welding And Joining, 2015. **20** (6): p. 483-493.
4. **Borle, S.D.**, **Gall, I.L.**, and Mendez, P.F., *Primary Chromium Carbide Fraction Control with Variable Polarity SAW.* Welding Journal, 2015. **94** (1): p. 1s-7s.
5. Mendez, P.F., Goett, G., and **Guest, S.D.**, *High-Speed Video of Metal Transfer in Submerged Arc Welding.* Welding Journal, 2015. **94** (10): p. 325s-332s.
6. **Gibbs, J.W.**, Schlachter, C., Mayr, P., **Kamyabi-Gol, A.**, and Mendez, P.F., *Cooling Curve Analysis as an Alternative to Dilatometry in Continuous Cooling Transformations.* Materials Transactions A, 2015. **46A** (1): p. 148-155.
7. **Kamyabi-Gol, A.**, Clark, S.J., Gibbs, J.W., Seetharaman, S., and Mendez, P.F., *Quantification of multiple simultaneous phase transformations using dilation curve analysis (DCA).* Acta Materialia, 2016 **106**: p. 231-240.
8. **Wood, G.**, **Islam, S.A.**, and Mendez, P.F., *Calibrated expressions for welding and their application to isotherm width in a thick plate.* Soldagem & Inspecao, 2014. **19** (3): p. 212-220.
9. Gerlich, A.P., **Izadi, H.**, Bundy, J., and Mendez, P.F., *Characterization of High Strength Weld Metal Containing Mg-bearing Inclusions.* Welding Journal, 2014. **93** (1): p. 15s-22s.
10. **Guest, S.**, **Chapuis, J.**, **Wood, G.**, and Mendez, P.F., *Non-Wetting Behavior of Tungsten Carbide Powders in a Nickel Weld Pool: A New Loss Mechanism in GMAW Overlays.* Science And Technology Of Welding And Joining, 2014. **19** (2): p. 133-141.
11. **Barnes, N.**, **Borle, S.**, **Dewar, M.**, **Andreiuk, J.**, and Mendez, P.F., *3D Microstructure Reconstruction of Chrome Carbide Weld Overlays.* Science And Technology Of Welding And Joining, 2014. **19** (8): p. 696-702.
12. Mendez, P.F., **Barnes, N.**, **Bell, K.**, **Borle, S.**, **Gajapathi, S.S.**, **Guest, S.D.**, **Izadi, H.**, **Gol, A.K.**, and **Wood, G.**, *Welding Processes for Wear Resistant Overlays.* Journal of Manufacturing Processes, 2014. **16**: p. 4-25.
13. Mendez, P.F. and Eagar, T.W., *Order of Magnitude Scaling: A Systematic Approach to Approximation and Asymptotic Scaling of Equations in Engineering.* Journal of Applied Mechanics, 2013. **80** (1): p. 011009-1 to 9.
14. **Gajapathi, S.S.**, Mitra, S.K., and Mendez, P.F., *Part 2: Application of Kanaya-Okayama heat source in modelling micro electron beam welding.* Science and Technology of Welding and Joining, 2012. **17** (6): p. 435-440.
15. **Gajapathi, S.S.**, Mitra, S.K., and Mendez, P.F., *Part 1: Development of new heat source model applicable to micro electron beam welding.* Science And Technology Of Welding And Joining, 2012. **17** (6): p. 429-434.
16. Mendez, P.F., *Synthesis and generalisation of welding fundamentals to design new welding technologies: status, challenges and a promising approach.* Science And Technology Of Welding And Joining, 2011. **16** (4): p. 348-356.
17. **Lehnhoff, G.** and Mendez, P.F., *Scaling of non-linear effects in heat transfer of a continuously fed melting wire.* International Journal of Heat and Mass Transfer, 2011. **54**: p. 2651-2660.
18. **Gajapathi, S.S.**, Mitra, S.K., and Mendez, P.F., *Controlling heat transfer in micro electron beam welding using volumetric heating.* International Journal of Heat and Mass Transfer, 2011. **54** (25-26): p. 5545-5553.

19. **Soderstrom, E., Scott, K.M.,** and Mendez, P.F., *Calorimetric Measurement of Droplet Temperature in GMAW.* Welding Journal, 2011. **90** (4): p. 77s-84s.
20. **Marcano, D.,** Mendez, P.F., **Gibbs, J.W.,** and Kannengiesser, T., *Martensite fraction determination using cooling curve analysis.* Solid State Phenomena, 2011. **172-174**: p. 221-226.
21. Mendez, P.F., *Characteristic Values in the Scaling of Differential Equations in Engineering.* Journal of Applied Mechanics, 2010. **77** (6): p. 061017 (12 pages)
22. Mendez, P.F., **Tello, K.,** and Lienert, T.J., *Scaling of Coupled Heat Transfer and Plastic Deformation Around the Pin in Friction Stir Welding.* Acta Materialia, 2010. **58** (18): p. 6012-6026.
23. **Tello, K.E.,** Gerlich, A.P., and Mendez, P.F., *Constants for hot deformation constitutive models for recent experimental data.* Science and Technology of Welding and Joining, 2010. **15** (3): p. 260-266.
24. Gerlich, A.P., Yue, L., Mendez, P.F., and Zhang, H., *Plastic deformation of nanocrystalline aluminum at high temperatures and strain rate.* Acta Materialia, 2010. **58** (6): p. 2176-2185.
25. **Gibbs, J.W.,** Kaufman, M.J., Hackenberg, R.E., and Mendez, P.F., *Cooling Curve Analysis to Determine Phase Fractions in Solid-State Precipitation Reactions.* Materials Transactions A, 2010. **41** (9): p. 2216-2223.
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27. Rajan, K., Suh, C., and Mendez, P.F., *Principal component analysis and dimensional analysis as materials informatics tools to reduce dimensionality in materials science and engineering.* Statistical Analysis and Data Mining, 2009. **1** (6): p. 361-371.
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29. Mendez, P.F. and Powell, A.C., *Influence of heat transfer on the application of solid lubricant on hot dies.* Scripta Materialia, 2008. **59** p. 784-787.
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31. Mendez, P.F., Furrer, R., **Ford, R.,** and Ordóñez, F., *Scaling Laws as a Tool of Materials Informatics.* JOM, 2008. **60** (3): p. 60-66.
32. Mendez, P.F. and Lienert, T.J., *Non-adiabatic shearing in Friction Stir Welding.* TMS Letters, 2006. **3** (2): p. 43-44.
33. **Soderstrom, E.** and Mendez, P.F., *Humping mechanisms present in high speed welding.* Science And Technology of Welding And Joining, 2006. **11** (5): p. 572-579.
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41. Mendez, P.F. and Eagar, T.W., *Welding processes for aeronautics.* Advanced Materials & Processes, 2001. **159** (5): p. 39-43.
42. Mendez, P.F. and Eagar, T.W., *Modeling of Materials Processing Using Dimensional Analysis and Asymptotic Considerations.* Journal of Materials Processing Technology, 2001. **117** (3): p. CD-ROM, Section B9: Modeling.
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Keynote

1. Mendez, P. F., Tello, K. E., and Gajapathi, S. S. *Generalization and Communication of Welding Simulations and Experiments Using Scaling Analysis*. *Trends in Welding Research*. June 4-8, 2012. Chicago, IL. p. 249-258.
2. Mendez, P. F. *Advanced Scaling Techniques for the Modeling of Materials Processing*. Keynote paper *Sohn Symposium*. August 27-31, 2006. San Diego, CA. p. 393-404.

Other Refereed Papers in Conference Proceedings

1. Kamyabi Gol, A., Gibbs, J.W., and Mendez, P.F. *Advanced mathematical treatment of dilatometry and calorimetry to discriminate and quantify multiple phase transformations*. in *International Conference on Solid-Solid Phase Transformations in Inorganic Materials*. June 28 - July 3, 2015. Whistler, BC. p. 1199-1206.
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INVITED TALKS

1. Mendez, P.F. *Deep Physics and Concrete Needs. Welding as the Gateway of Science, Engineering, and Excitement*. in *Brian Ives Award Lecture Series*. Jun. 9, 2015. Calgary, AB.
2. Mendez, P.F. *Engineering as a Career Path*. in *Career Day, Grandview Heights* May 19, 2015, 2015. Edmonton, AB.
3. Mendez, P.F. *Modeling of welding for engineering applications*. in *Yonsei University*. Jul. 16, 2014. Seoul, Korea.
4. Mendez, P.F. *Transferrable Skills and Links with the Private Sector*. in *Joint CALDO-CRUCH Seminar*. May 14-16, 2014. Pucon, Chile.
5. Mendez, P.F. *Support Strategies for PhD Success*. in *Joint CALDO-CRUCH Seminar*. May 14-16, 2014. Pucon, Chile.
6. Mendez, P.F. *B.SC. Program in Materials Engineering*. in *Grant McEwan University*. Jan. 31, 2014. Edmonton, AB.
7. Mendez, P.F. *Modeling of welding for engineering applications*. in *Materials Science and Engineering*. Jul. 17, 2014. Seoul, Korea.
8. Mendez, P.F. *Modeling of welding for engineering applications*. in *Beijing University of Technology, Harbin Institute of Technology, Jiaotong University*. July 15, 16, 17, 2013. Beijing, Harbin, Xi'an.
9. Mendez, P.F. *The Joy of Welding, and why it is much deeper than it seems*. in *Materials Engineering Technical Society (METS)*. Mar. 14, 2013. Edmonton, AB.
10. Mendez, P.F., **Guest, S.D.**, and Gilbank, J. *A systematic approach to procedure development*. in *Calgary Lecture Series*. Mar. 17, 2013. Calgary, AB.
11. Mendez, P.F., **Guest, S.D.**, and Gilbank, J. *A systematic approach to procedure development*. in *Edmonton Lecture Series*. Feb. 19, 2013. Edmonton, AB.
12. Mendez, P.F. *Asymptotic Analysis of Coupled Phenomena in FSW*. in *Materials Science and Engineering*. Aug. 22, 2012. Jinan, China.

13. Mendez, P.F. *Humping in High Speed GTAW*. in *Materials Science and Engineering*. Aug. 21, 2012. Jinan, China.
14. Mendez, P.F. *Modeling using asymptotic scaling*. in *Laboratoire de Mécanique et Génie Civil de Montpellier*. Jul. 13, 2011. Montpellier, France.
15. Mendez, P.F. *Coupled heat transfer and deformation in FSW*. in *Materials Joining Group*. Jun. 9, 2011. Oak Ridge, TN.
16. Mendez, P.F. *Generalisation and communication of findings using scaling analysis*. in *Phase Transformations & Complex Properties Research Group*. July 7, 2011. Cambridge, UK.
17. Mendez, P.F. *NSERC Strategic Network on Pipeline Materials Reliability - Theme 5: Welding*. in *Mechanical Engineering*. April 8, 2011. Calgary, AB.
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19. Mendez, P.F. *Welding Research, Education and Technologies*. in *PeRMA Welding & Manufacturing Information Sharing Session*. Dec. 10, 2010. Grande Prairie, AB.
20. Mendez, P.F. *Scaling Techniques for Multiphysics, Multicoupled Engineering Problems*. in *Theoretical and Applied Mechanics Seminar, University of Alberta*. Nov. 25, 2009. Edmonton, AB.
21. Mendez, P.F. and Gerlich, A.P. *Canadian Centre for Welding and Joining. An interdepartmental research and educational effort*. in *CISC Alberta Region / University of Alberta Annual Meeting*. Apr. 20, 2009. Edmonton, AB.
22. Mendez, P.F. *Welding Innovation: Applications, fundamentals, and a modeling approach to link them*. in *Department of Chemical and Materials Engineering*. June 20, 2008. Edmonton, AB.
23. Mendez, P.F. *Scaling Laws in Manufacturing Involving Materials Processing*. in *Department of Mechanical Engineering*. April 25, 2008. Lexington, KY.
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25. Mendez, P.F. *Modeling of Materials Processing Using Scaling Laws*. in *Department of Metallurgical and Materials Engineering*. November 29, 2007. Tuscaloosa, AL.
26. Mendez, P.F. *Seed Grants for Tech Transfer: MIT Example*. in *Technology Transfer Advisory Board*. September 7, 2007. Golden, CO.
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29. Mendez, P.F. *Reconstructing Physical Laws from Statistical Data*. in *Department of Physics*. October 24, 2006. Golden, CO.
30. Mendez, P.F. *Parametric Modeling In Materials Processing*. in *Department of Metallurgical and Materials Engineering*. February 9, 2006. Golden, CO.
31. Mendez, P.F. *Innovations in Metallurgical Manufacturing: From concept to implementation*. in *Department of Industrial Engineering*. January 6, 2005. Los Angeles, CA.
32. Mendez, P.F. and Liu, S. *Consumable Development for High in Welding Department*. Sep. 14, 2005. Pindamonhangaba, Brazil.
33. Mendez, P.F. *Temas de avanzada en soldadura (Leading trends in welding)*. Dec. 9, 2004. Ordizia, Spain.
34. Mendez, P.F. *Scaling Laws for Manufacturing, Design, and Beyond*. in *Department of Mechanical Engineering*. March 3, 2003. Austin, TX.
35. Mendez, P.F. *Tackling welding complexity: A new approach and new results*. in *Department of Metallurgical and Materials Engineering*. July, 2003. Golden, CO.
36. Mendez, P.F. *Order of Magnitude Scaling*. in *Similarity Mechanics Group, Institute for Statics and Dynamics of Aerospace Structures*. November, 2001. Stuttgart, Germany.
37. Mendez, P.F. *Novel Techniques for Understanding Complex Materials Processes*. in *Department of Materials Science and Engineering*. November, 2001. Cambridge, MA.
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POSTER PRESENTATIONS

1. Hiscocks, J., Knight, S., **Tsui, J.**, Diak, B., Daymond, M., Gerlich, A., and Mendez, P.F., *Friction Stir Welding of Magnesium Alloy Wheels*, in *AUTO 21 Annual Meeting*. 2014: Niagara Falls, ON.
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14. Cairney, R., *Flashes of brilliance. New welding chair addresses and economic hot spot*. U of A Engineer, 2009 (27): p. 5.
15. Journal Business Staff, *Research chair aims to revolutionize welding*. The Edmonton Journal, May 13, 2009. Edmonton, AB
16. Kamath, C., *Editorial: Application-driven Data Analysis*. Statistical Analysis and Data Mining, 2008. **1** (5): p. 285.
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18. Arizmendi, R., *Un sensacional fin de curso*. Diario Vasco, June 24, 2007. Tolosa-Goierrri
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21. Ehrenman, G., *The Past - And Future*. Mechanical Engineering, 2004. **126** (Design Supplement): p. 2.
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