

# About the Authors

---

**Jean-Pierre Birat** earned his engineering degree from the Paris School of Mines in 1969 and his M.S. degree in metallurgical engineering from the University of California at Berkeley in 1970. He joined IRSID in 1971 as a Research Engineer in continuous casting, holding various managerial positions in R&D for continuous casting, steelmaking and the Myosotis Project from 1982 to 1990. He is now a member of Technical Direction of IRSID within the R&D Department of Arcelor, in charge of R&D related to the environment and exploratory research. He has authored more than 200 papers and conference communications.

**Cindy Chow** is currently a Research Engineer at the R&D facility at Ipsco Inc. in Regina, Saskatchewan. Her current research interests include steelmaking, slab and product quality, and mechanical properties of pipeline product. She obtained a B.A.Sc. degree in mechanical engineering from the University of Waterloo in 1999 and an M.A.Sc. degree in metals and materials engineering under the supervision of Dr. Indira V. Samarasekera in 2001 at the University of British Columbia.

**Toshihiko Emi** graduated from Osaka University in 1958, and then joined Kawasaki Steel (now JFE Steel), where he spent 35 years as Chief of the Steelmaking Lab, Manager of the Process Metallurgy and Research Planning Departments, and board member for corporate overseas steel projects, energy, environment and intellectual properties. He earned his Ph.D. in physical chemistry from Hokkaido University in 1967 and was a Postdoctoral Fellow at the University of Pennsylvania and the University of Michigan from 1967 to 1970. He moved to Tohoku University in 1993 as a professor at the Graduate School of Materials Science and Engineering and the Institute for Advanced Material Processing. After retiring in 1998, he was a Visiting Professor at McMaster, Melbourne, Royal Institute of Technology, Carnegie Mellon and Seoul National, and is now at Postech. He has published over 240 papers, books and patents; has received numerous awards and honors, including the Nishiyama Medal of ISIJ; and has been elected to the Engineering Academy of Japan.

**William H. Emling** is currently General Manager of Process and Product Development for Millcraft SMS Services, LLC. Mr. Emling began his career in 1978, working at Republic Steel in Warren, Ohio, prior to graduating from Case Western Reserve University in 1979 with a B.S. degree in materials science and metallurgical engineering. He worked at National Steel in Granite City, Ill., from 1979 to 1981, and for LTV Steel Co. from 1981 to 1999 in various operations, quality control and research management positions. In 1999, Mr. Emling joined his current employer, then known as Acutus Gladwin Industries. He served as Vice President of Maintenance Technology, Executive Vice President and Division President prior to the company being acquired. Bill is a member of the Iron and Steel Society and the Association of Iron and Steel Engineers. He has published more than 25 technical papers in steelmaking and continuous casting, winning several awards. He

is also a 1997 graduate of the Professional Fellows program of the Weatherhead Graduate School of Business.

**Herbert P. Fastert** earned his B.S. and M.S. degrees in mechanical engineering from Hamburg Polytechnical Institute in 1961. He joined Concast, the predecessor of SMS Concast Inc., in 1963 as a Design Engineer and became Vice President of Engineering in 1968. In 1970 he was promoted to the role of President of SMS Concast, and he remained so until the company was relocated to Pittsburgh, Pa., in 1994, when he became President and CEO of SMS Schloemann-Siemag Inc. In 1999 he was made CEO of SMS Demag Inc. He retired as CEO in 2000 and still serves as Chairman.

**Helmut Fitzel** earned a degree in mechanical engineering from the Technical College in Linz, Austria, in 1972. He joined VAI in 1972 as an Engineer for Fluid Systems Engineering for rolling mills and continuous casting plants. His field of discipline comprises cooling systems, hydraulics, lubrication, environmental engineering and water treatment plants. In 1995 he was promoted to General Manager of Fluid Systems Engineering for continuous casting plants.

**Merton C. Flemings** is Toyota Professor of Materials Processing at the Massachusetts Institute of Technology (MIT). He has been a member of the MIT faculty since 1958. He established and was the first Director of the Materials Processing Center at MIT in 1979. He served as Head of the Department of Materials Science and Engineering from 1982 to 1995, and as MIT Director of the Singapore-MIT Alliance from 1998 to 2001. His field of research encompasses solidification science and engineering, foundry technology, and materials processing. Professor Flemings has received numerous awards and honors in his career, including election to the National Academy of Engineering.

**Henri R. Gaye** is currently Research Manager in the Physical Chemistry and Chemistry Department of IRSID, Arcelor's research and development facility in Maizières-lès-Metz, and part-time lecturer at the Nancy School of Mines. He graduated from the Paris School of Mines in 1966 and received a Ph.D. from Carnegie Mellon University in 1971 and a D.Sc. degree from the Institut National Polytechnique de Lorraine, France, in 1978. He joined IRSID in 1972 and has been working in the area of physical chemistry of iron and steelmaking and process modeling. He has authored over 100 papers and holds several patents. He has received several awards for his publications, including the Chaudron Medal of SF2M in 1991, the Sawamura Award of ISIJ in 1994 and the John Chipman Award of ISS in 1998. He is a member of the French Academy of Technology.

**Herbert L. Gilles** is currently a Research Consultant at Bethlehem Steel Corp.'s Homer Research Laboratories. He earned his B.S. and M.S. degrees in chemical engineering from Drexel University. His initial industrial experience was with Air Products and Chemicals, Inc., where he became Senior Process Engineer, responsible for the design of cryogenic plants. He joined the Bethlehem Steel Research Department in 1964 and worked on the development of new steelmaking processes for several years. In 1968 he earned a Ph.D. in chemical engineering at Lehigh University. Over the years he has been involved with the design, development and improvement of continuous casting. He specializes in thermal modeling, instrumentation and control, and he has published papers and received patents in these areas. He received the John Chipman award of ISS in 1994 and the Presidents Medal of the Operational Research Society in 1999.

**Peter C. Glaws** is currently a Senior Research Specialist at The Timken Co. Research Center in Canton, Ohio. He received his B.S. in metallurgical engineering at Lafayette College and both his M.S. and Ph.D. degrees in metallurgical engineering and materials science from Carnegie Mellon University. He was a Postdoctoral Fellow at the University of Newcastle in New South Wales, Australia, before joining The Timken Co. in 1987. His research interests include the physical chemistry of steelmaking and process modeling.

**Patrick J. Hanley** is Manager of Steelmaking Products at ABB Inc. in Brewster, N.Y. He received his B.S. in metallurgical engineering from Brooklyn Polytechnic Institute and his M.S. in metallurgy from New York University. He started his professional career in the steel industry with Allegheny Ludlum Steel Research Center, Brackenridge, Pa. (1959), where he was primarily involved in electric arc furnace development and the application of ladle refining for steelmaking. In 1965, he joined the International Nickel Co. in Sterling Forest, N.Y., conducting alloy development, solidification and casting research, and investigations to utilize advanced melting and refining processes (ESR, VAR and EB). Since joining ABB in 1970, he has been involved mostly in the implementation of electromagnetic processes for the melting, refining and continuous casting of steel.

**Andrew Harvey** is currently a Process and Commissioning Metallurgist working for VAI. He graduated from Newcastle University in 1989 with an honors degree in the science of engineering materials. He started work for Davy in the same year, and since then he has been involved in process and proposal work for bloom, billet and slab casters. Commissioning projects have taken him to the U.S., India and China.

**Peter Juza** is General Manager for Preprojects in Electrics and Automation for Iron and Steelmaking at Voest Alpine Industrieanlagenbau (VAI), Austria. He received a Ph.D. in physics from the University of Linz, Austria, in 1993. He joined VAI in the same year and was involved in several process optimization projects for continuous casting machines. In 2001 he joined the Preproject Department for Electrics and Automation in Iron and Steelmaking, which he has headed since 2002.

**Frank L. Kemeny** is President of Nupro Corp. and Vice President of Nuflux, LLC. He graduated from the University of Toronto in 1977 with a B.A.Sc. in engineering science and is a licensed professional engineer. After holding engineering positions at Firestone Canada and Crucible Steel, he returned to the University of Toronto and received a Ph.D. from the Department of Metallurgy and Materials Science in 1987. After completing research and consulting assignments with Tibur-Howden and Hatch Associates, Dr. Kemeny cofounded Nupro Corp. in 1989. He has authored numerous publications and patents in his areas of interest, which include steel refining and casting technology development, process optimization, slag practice development, plasma processing, and PC-based instrumentation. In 1999 he cofounded Nuflux, LLC, a metallurgical flux manufacturing company offering PC-based intelligent application technologies.

**Sten G. Kollberg** is Sales Manager of the Metallurgy Department at ABB Automation Systems, Sweden. He received his M.S. degree in electrical engineering from Chalmers University of Technology, Sweden, in 1966. Upon graduation, Mr. Kollberg began his career at ABB Power Systems, and for several years he was involved in the development of the first thyristor valve for high-voltage direct current transmissions. From 1970 to 1976, he developed statistical methods and programs for reliability within ABB Corporate Research in Sweden. After moving into the Sales Department in 1976, he invented the EMBR principle for continuous casting. Since then, he has been a top salesman of electromagnetic products for ABB Industrial Systems. Mr. Kollberg earned his M.B.A in international marketing from Uppsala University, Sweden, in 1987.

**Gerrit J.W. (Jan) Kor** received a Ph.D. in metallurgical engineering from the University of London, Imperial College of Science and Technology in 1967. He started his career in the steel industry with Hoogovens in the Netherlands. In 1968 he joined U. S. Steel Corp.'s Edgar C. Bain Laboratory for Fundamental Research in Monroeville, Pa. His work there resulted in a number of papers in the areas of physical chemistry of iron and steelmaking, casting and solidification, as well as processing of ferroalloys. In 1986 he became a scientist at the Technology Center of The Timken Co., where he was primarily involved in the application and implementation of basic technologies in steelmaking, ladle refining and casting. He retired from The Timken Co. in 1997.

**Toshihiko Koseki** received his B.S. and M.S. degrees in metallurgy from the University of Tokyo, and his Sc.D. degree in materials engineering from MIT. He worked as a Senior Researcher for the Welding and Joining Research Center at Nippon Steel Corp. in Japan and is currently Chief Researcher in the Plate Research Div. at their Steel Research Laboratories. Dr. Koseki's research covers a wide range of topics in metallurgy of steels, including solidification and casting, phase transformation, and welding and joining.

**Roger L. Maddalena** earned his B.S. and M.S. degrees in materials science and engineering from Carnegie Mellon University (CMU) in 1999. During that academic period he also worked with the Center for Iron and Steelmaking Research at CMU and J&L Specialty Steel. His master's thesis examined the formation of titanium nitride inclusions during casting of stainless steels. After graduation, he worked in both the Steelmaking and Ironmaking Departments of Republic Technologies International. He returned to the field of continuous casting with a position at Vesuvius Research. The main focus of his work encompasses the interactions between steel and refractories and their effect on the castability of steel. He won the Leo F. Reinartz award of ISS in 1995 and was an ISS Young Leader in 2001.

**Kenneth C. Mills** graduated in chemistry from the University of Newcastle and obtained his Ph.D. and subsequent D.Met. from the University of Sheffield. He worked as a Research Investigator and then as an Assistant Professor at Carnegie Institute of Technology in Pittsburgh. In 1963 he returned to the U.K. and worked at the National Physical Laboratory, Teddington, until 1999 and has been a Visiting Professor at Imperial College, London, since 1994. His principal interest is the measurement of properties of slags and alloys at high temperatures and their influence on high-temperature processes. He has published two books and over 180 papers. In 2003 he was awarded honorary membership to both the Iron and Steel Society of Japan and the Japanese Institute of Metals.

**Shozo Mizoguchi** has been a Professor at Tohoku University since 1998. He was awarded his B.Sc. degree in 1964 and his M.Sc. degree in 1966 by Osaka University. He received his DIC from Imperial College and his Ph.D. from London University in 1972, and then his D.Eng. from Tokyo University in 1996. He has worked as a researcher for Nippon Steel Corp. for more than 30 years. His major research field is the continuous casting process, and his current interest is nonmetallic inclusions as a catalyzer for heterogeneous nucleation.

**Karl Mörwald** studied mechanical engineering at the Technical University in Vienna. He obtained his Ph.D. *sub auspiciis presidentis* in 1988. In 1990 he joined VAI. His current position is Head of Technology for continuous casting. During his early days with VAI, Mr. Mörwald was responsible for the development of process models and the metallurgical design of continuous casting machines. Later he concentrated on the definition, realization and marketing of "technological packages" (e.g., Dynacs, Smart, Dynaflex, ASTC). Currently he is coordinating the development works for caster mechanics, process technology and metallurgy. Mr. Mörwald is coauthor of numerous technical publications and patents.

**Ronald J. O'Malley** received B.S. and M.S. degrees in materials engineering from Drexel University in 1978, and a Ph.D. in metallurgy from Massachusetts Institute of Technology in 1983. In 1984, he joined Alcoa's research center to work on casting and refining technologies in aluminum. In 1988, he joined Armco's Technology Center in Middletown, Ohio, which later became part of AK Steel, where he conducted a wide range of work on steelmaking and casting technology and practice development for a diverse mix of flat rolled specialty steels, including development work for the thin-slab casting of specialty steels. He is currently employed at Nucor Steel Decatur, LLC, where he is responsible for metallurgical development. Dr. O'Malley has published numerous papers on casting, has taught several short courses in continuous casting and was the recipient of the 1999 Charles Herty Jr. Award.

**Mustafa R. Ozgu** is currently a Senior Research Consultant at Bethlehem Steel Corp.'s Homer Research Laboratories. He earned B.S. and M.S. degrees in mechanical engineering from the Middle East Technical University in Turkey. He continued his graduate studies at Lehigh University, where he earned his Ph.D. in mechanical engineering in 1971. He spent the next two years at Lehigh University as a Postdoctoral Fellow and Assistant Professor of Mechanical Engineering. In 1973 he joined Bethlehem Steel's Research Department, where he was assigned to the Primary Processes Research Div. From 1974 to 1988 he served as Adjunct Professor of Mechanical Engineering at Lehigh University. He has published numerous papers and was awarded several U.S. patents in continuous casting. He won the ISS Steelmaking Conference Award in 1983 and the ISS Robert Woolston Hunt Award in 1985.

**Harold W. Paxton** is U. S. Steel University Professor Emeritus of Materials Science and Engineering at Carnegie Mellon University (CMU). He is a graduate of the University of Manchester and the University of Birmingham (Ph.D., 1952). He has been a faculty member at CMU since 1953, taking time out to found the Materials Div. at NSF in 1971 and to serve as Vice President of Research at U. S. Steel from 1974 to 1986. His interests are broadly in processing and properties of steel.

**Ravi Rastogi** is currently a Development Engineer with the Electronic Materials Div. of Honeywell, working in the area of thermomechanical processing of alloys used in the semiconductor industry. Prior to this position, Dr. Rastogi was with the Metglas business unit of Honeywell and was involved with optimizing planar flow casting for rapid solidification processing of ferrous and nonferrous alloys. Dr. Rastogi received his M.S.(1996) and Ph.D. (2000) degrees in materials science and engineering from Carnegie Mellon University, and his undergraduate degree in materials and metallurgical engineering from the Indian Institute of Technology, Kanpur, in 1995.

**Tim Reynolds** graduated with an honors degree in mechanical engineering from the University of Bradford. After joining British Steel, working in Melt Shop Engineering, he has worked for over 30 years in the field of continuous casting. He was initially with Distington Engineering Co., then with Davy/Kvaerner Metals; and, since 1999, he has been with Voest Alpine Industrieanlagenbau (VAI). Over the years he has worked in the fields of mechanical design, process engineering, site construction and commissioning, as well as sales. His current position is General Manager of Continuous Casting, Iron and Steel Div., VAI U.K.

**Yogeshwar Sahai** is a Professor at the Ohio State University, Columbus, Ohio. He obtained his Ph.D. from Imperial College of Science and Technology, University of London, England, in 1979. His professional interests include developing and applying computer and mathematical modeling techniques at reactor design optimization and improvement in metals and materials processing. He is actively interested in primary and secondary steelmaking processes; ladle, tundish and continuous casting systems; secondary remelting of aluminum scrap; and chemical vapor deposition processes. He is particularly interested in environmental, waste management and recycling issues related to steel and aluminum production and processing industries. Dr. Sahai has published over 120 technical papers in peer-reviewed journals and refereed proceedings, and has published four books and five patents. Professor Sahai has been a consultant with many steel companies in the U.S., Canada and other countries in the area of continuous casting. He has received several awards for his teaching, research and leadership, including the 1999 Light Metals Best Paper Award; the 1993 Electric Furnace Best Paper Award; ISS Process Technology Div. Awards for leadership in 1986, 1988 and 1990; and the Extractive Metallurgy Science Award of TMS in 1984.

**Indira V. Samarasekera** is Vice President of Research at the University of British Columbia and Dofasco Chair in Advanced Steel Processing. She has been a professor in the Department of Metals Engineering and the Centre for Metallurgical Process Engineering at the University of British Columbia since 1980. She obtained a B.S. degree in mechanical engineering from the University of Ceylon in 1974 and spent the following year as a mechanical engineer at the Refinery of the

Ceylon Petroleum Corp. She then traveled to the U.S. as a Hays-Fulbright Scholar, obtaining an M.S. degree in mechanical engineering from the University of California in 1976. In 1977 she moved to Canada and became a candidate for her Ph.D. degree under the supervision of J. Keith Brimacombe, obtaining her doctorate in 1980. Dr. Samarasekera's expertise in heat transfer and stress analysis has led her to research a number of processes, with a major emphasis on the continuous casting and hot rolling of steel and the growth of single crystals for electronic devices. To facilitate knowledge transfer to the industry, Dr. Samarasekera has participated in short courses on the continuous casting of steel at companies around the world.

**Johannes (Hans) Schade** is presently a Principal Engineer at the research facilities of AK Steel in Middletown, Ohio. Dr. Schade received his B.S. and M.S. degrees in metallurgical engineering from the University of Toronto in 1984 and 1986, respectively. He then completed his Ph.D. in steelmaking technology as a member of Professor Alexander McLean's ferrous metallurgy research group at the same university. In February 1990, he joined the casting group at the Armco Research and Technology Center, where his duties included casting practice development for both carbon steel and stainless steel meltshops. In 1993, he was transferred to AK Steel, where he continues to focus on casting technology. He has held research and operating management positions within AK Steel. Dr. Schade has authored numerous papers and has received the Briggs, Hunt, McKune and Steelmaking Awards of ISS. He has taught courses on clean steel topics and continuous casting and has authored two volumes on tundish metallurgy.

**Klaus J. Schwerdtfeger** is University Professor Emeritus of Metallurgical Engineering at Technical University Clausthal in Germany. He earned his Dipl. Ing and Dr. Ing. degrees from Technical University Clausthal in 1959 and 1962, respectively. He had positions with U. S. Steel and Mannesmann before becoming a Department Head and Director at Max Planck Institut für Eisenforschung in 1971. In 1980 he joined Technical University Clausthal and became Director of Institut für Allgemeine Metallurgie. He has authored or coauthored about 180 scientific publications in various fields of metallurgy. He is also an honorary member of the Iron and Steel Institute of Japan and a Distinguished Member and Fellow of ISS.

**Sridhar Seetharaman** is currently an Assistant Professor with the Department of Materials Science and Engineering at Carnegie Mellon University. His research interests include experimental and computational work on high-temperature phenomena in metals processing, physical properties of molten slags and fluxes, and electrochemical phenomena at high temperatures. He obtained his undergraduate degree from the Royal Institute of Technology in Stockholm, Sweden, and his Ph.D. from the Massachusetts Institute of Technology. He spent one year as a Research Associate at the Imperial College of Science, Technology and Medicine in London. Seetharaman has received several awards, including the Herty Award from ISS and the Friedrich Wilhelm Bessel Research Prize from the Alexander von Humboldt Foundation.

**Brian G. Thomas** is a Professor of Mechanical Engineering at the University of Illinois at Urbana-Champaign, where he is Director of the Continuous Casting Consortium. He received his B.S. in metallurgical engineering from McGill University (Montreal, Canada) in 1979 and his Ph.D. in metallurgical engineering from the University of British Columbia in 1985. Between earning these degrees, he worked for Algoma Steel (Sault Ste. Marie, Ontario). His recent research efforts focus on fluid flow, heat transfer and stress modeling of metals processes, particularly of the continuous casting of steel. He has coauthored over 100 technical publications and has received numerous research and best paper awards from NSF, SME, Xerox, AFS, AIME, ISS, TMS and ASM International.

**Eddie Winder** is currently the Process Engineering Manager within the Continuous Casting Department of the Iron and Steel Div. of VAI U.K. based in Sheffield. He joined British Steel in 1977 and earned his B.S. degree in mechanical engineering from Loughborough University in 1983. Since then he has been involved in continuous casting with Distington Engineering Co.,

Davy, Trafalgar House, Kvaerner Metals and, since 1999, VAI. His main interest during this time was the development of process design computer models for slab, bloom, billet and strip casting processes. His role in the last few years has been preproject technical sales.

**Manfred M. Wolf** was an independent consultant and President of Wolftechnology in Zurich, Switzerland. After graduation in 1961 from Montan-University in Leoben, Austria, he joined Schoeller-Bleckmann Specialty Steel Works in Ternitz, Austria; Atlas Steel Co. in Lausanne, Switzerland in 1965, and in Welland, Ontario, Canada, in 1967; and then Climax Molybdenum Co. in Zurich, Switzerland, in 1970. During those 10 years, he worked as a Development, Quality Control and Service Metallurgist; a Bar Mills Metallurgist; a Pipe Mill Metallurgist; and a Pipe Mill Superintendent, respectively. Between 1972 and 1988, he was employed with Concast AG in Zurich, first as Service and Commissioning Metallurgist; later he became Manager of Process Technology (1980), then Vice Director of Technology (1985). He received a Ph.D. from the Federal Institute of Technology in Lausanne, Switzerland, in 1978. Mr. Wolf started an independent consultancy in 1989 for continuous casting and related fields, and he lectured until his passing as an Extramural Associate Professor at Montan-University and at Technical University Bergakademie, Freiburg, Germany. He authored or coauthored about 130 papers and six books on continuous casting.

**Donald J. Zacharias** is currently Design Manager for Foseco Inc., based in Cleveland, Ohio. In 1985, he received his B.S. degree in mechanical technology from Cleveland State University. Mr. Zacharias has worked at Foseco for more than 20 years in various product design positions related to the fields of ingot and continuous casting. For the past nine years, he has designed and managed the water modeling area in Foseco's Center of Excellence. Mr. Zacharias holds several patents in the area of tundish flow controls.

