Dr. Schade (right) received the 2014 Fairless Award from the 2013–2014 AIST president, Terry G. Fedor II (left).

An Interview With

Dr. Johannes (Hans) Schade

2014 AIST Benjamin F. Fairless Award Recipient

Dr. Hans Schade is currently the manager of Research at AK Steel. After graduating with a B.S., M.S. and a Ph.D. in metallurgy from University of Toronto, Schade joined Armco Steel (later AK Steel) as a casting engineer in 1990. He progressed quickly through the technical ranks, becoming a principal research engineer, manager of primary process research, manager of specialty products research and lastly manager of electrical steel technology. During his career as a researcher and technical manager at Research, Schade received numerous awards, including the Charles W. Briggs Award, two Robert W. Hunt Silver Medals, and the Frank B. McKune Award. His most recent recognition was the 2014 AIST Benjamin F. Fairless Award. He has also authored 21 publications, including two books on casting technology. Schade has been an active member of AIST since 1983, served as the AK Steel representative on various AISI and AIST committees, and served as a member of the ASTM Subcommittee C08.11 on Metallurgical Fluxes. He has more than 20 years of industrial experience in steel primary processing operations. He recently took some time to be interviewed by *Iron & Steel Technology* about his career and his involvement with AIST.

J. Schade at AK Steel's Ashland caster when it set a new single-strand world sequence casting record in 1995.

Iron & Steel Technology (I&ST): How did you get started in the steel industry? Was there someone or something that sparked your interest in the steel industry?

Hans Schade: I knew at a fairly young age that I wanted to be a metallurgist and, like my father and grandfather before me, one who worked with steel. My grandfather had been in the sheet metal design and fabrication business for a large locomotive manufacturer in Germany, while my father received his Dipl.-Ing. degree in metallurgical engineering from the picturesque University of Clausthal-Zellerfeld in West Germany. When I was 11, my father took me on a tour of stamping and assembly plants, including Volkswagen Wolfsburg, as well as to some steel producers, where I watched open hearth and converter taps with great fascination.

Since I grew up in the Rhein-Ruhr river valleys of Germany, the heart of the steel producing industry of (then West) Germany, one could say that steelmaking was in my blood. The entire atmosphere of liquid steel production fascinated me, and it became my chosen field of graduate studies after completing my bachelor's degree at the University of Toronto.

I&ST: How did you get involved in AIST?

H.S.: In the mid-1980s, the University of Toronto had the Ferrous Metallurgy Research Group under the leadership of Prof. Alexander McLean, along with Profs. Ian Sommerville and Stavros Argyropoulos. When I was in my final year of metallurgical engineering studies in the fall of 1983, Prof. McLean walked into class holding a stack of blue papers. He proceeded to pass them around with the admonition, "If you want to pass this course, you'd better fill one of these out." They were applications for student membership in the Iron & Steel Society (ISS). Although the admonition was in jest, Prof. McLean, who would become ISS president in 1985, was quite serious about our involvement in this society.

This simple act of becoming a student member has led to innumerable professional contacts in both the supplier and producer industries and in academia, many of whom I am privileged to consider very good friends to this day.

I&ST: Have you had any mentors? What is the most remarkable thing they taught you?

H.S.: I have been blessed with several excellent mentors along my career path — first and foremost my father, who instilled great work discipline in me and who fostered critical thinking. I also am indebted in particular to Prof. Alexander McLean, my thesis advisor over three degrees, who opened my eyes to the many possibilities of research in the world of liquid steel production; to Mike Burns, who mentored me as young engineer in the skills required to succeed as an industrial researcher; and to Glenn Mikaloff, who schooled me in the finer points of management. There are many unnamed others with whom I worked who pushed me toward producing ever-better materials and processes, both in the end-product steel and in supporting technologies

A snowy day in the coil field, 1993.

Board of Directors tour at AK Steel Research, Middletown, Ohio, USA, in 2010.

such as refractories, slags and machinery. I know I would not be where I am today as head of a research organization without the support and fostering of these women and men.

I&ST: What do you consider to be your greatest accomplishment or the thing you are most proud of?

H.S.: There are a couple of things I will always be able to reflect upon with satisfaction. One is the completion of my graduate studies, as obtaining a Ph.D. had been a goal I'd set my sights on from the day I started my undergraduate engineering studies. The other is the opportunity to work with and mentor younger engineers in research and in production/quality control environments, and to follow their success.

I&ST: How have you seen the industry change over the years? What do you foresee in the (near or distant) future for the steel industry?

C.W. Briggs Award recipients Dr. A. McLean (left), Dr. J. Schade (center) and Dr. S. Argyropoulos (right).

H.S.: When I completed my undergraduate degree in 1984, and ultimately left to pursue a job in industry after completing my graduate degrees in 1990, there were a large number of steel companies, many with their own research facilities: Inland, Bethlehem, U. S. Steel, Armco, LTV and Timken, to name but a few. There were dozens of steel producers, ranging from the smaller outfits such as Sharon Steel, Washington Steel and Acme Steel to the larger producers. Internationally, companies such as Canada's Dofasco and Stelco, Japan's Nippon and Kawasaki, Germany's Thyssen and Holland's Koninklijke Hoogovens, and many others were well-known entities who drove technology through research and development. The world was dominated by integrated production (blast furnaces and BOFs), and electric arc furnaces (EAFs) were only starting to make inroads.

Today, the landscape is quite different. The production facilities are still there, but many of the names have changed. ArcelorMittal is the world's largest steel producing company, and includes among others the old Bethlehem, Inland and LTV facilities. International producers of note include Tata Steel, Essar, the NLMK group, EVRAZ, JFE, Nippon-Sumitomo, Thyssen-Krupp and others — all names unfamiliar or non-existent 25 years ago. Production

J. Schade (left) outside the Ashland meltshop with his Kawasaki counterpart, Moto Sugizawa (right), 1992.

has shifted to be predominantly EAF-based, and thin-slab casters now are capable of producing many varieties of exposed-quality steel. Bessemer's dream of strip casting production also has been realized with the success of CASTRIP®. All this was virtually unexplored when I started in 1990 — thin-slab casting had just been put on the map by SMS and Nucor in Crawfordsville, Ind., USA. Strip casting of steel was being tested in the United States, Europe and Asia using belt, single-roll and twin-roll designs, with varying levels of success. Computer-based controls have improved substantially, largely driven by advances in both processor speed and available memory, and material processing has benefited from self-learning adaptive modeling programs as well as the development of mathematical models and virtual reality training environments.

The changes have been numerous, but plentiful challenges remain. Integration of smart technology into existing processes will demand engineers who are capable of growing with the technology. At the same time, there needs to remain a core of people who can train tomorrow's engineers in the fundamentals of steel — from both a process and a product perspective. It is easy for skills in fundamentals — such as heat and mass balances, thermodynamics, microstructural development, and calculating heats — to be lost in an age in which computers seem to be able to do just about anything. The ability to react to upset conditions in processing is just as vital a skill as being able to write Visual Basic programs to solve a production issue. Despite the visualization of the process through cameras, ultrasonic/x-ray/laser-based detection systems, and recording and microprocessing of data that are all highly evident in modern steel production, there still is no good substitute for the old adage of "go and take a look." The challenge will be to train and develop people who can operate in both the digital and the physical worlds of steel.

I&ST: How has AIST membership benefited you in your career? Why would you recommend AIST membership to new graduates?

H.S.: There are countless benefits that one enjoys in being a member of AIST. The first is ready access to a plethora of up-to-date and historical technology and production data. There are many books and periodicals that can provide assistance on any topic in this industry, from coke to ironmaking to steel production, refining, continuous casting of slabs, blooms, beam blanks and billets, hot and cold rolling, lubricants, metallic and non-metallic coatings…the list is long, and help can be found in all areas. While ready access to current technical information is invaluable on its own, the foremost benefit in my opinion is access to and communication with experts both nationally and internationally in the various fields we touch in our industry. These contacts have proved to be helpful time and time again as I have run into challenges in the production of steels. Being able to lean on others for advice, run ideas past them, and have them provide their input has helped solve many a problem. This is a two-way street, and I have been contacted often for my input on a variety of matters.

AIST is a platform to network with many of the best minds in the industry, a place where you can receive information, share ideas and get help when needed. It is a vast network of producers, suppliers, and research professionals from industry and academia who all are interested in keeping steel as the most desirable and most recycled material in the world. The industry may appear mature in terms of processing, but there are many frontiers that still need to be explored to the fullest. So, enroll in AIST — and encourage your colleagues to do the same! ✦