
NUCOR STEEL
Hertford County

An Interview With 2019–2020 AIST President

Dr. Ronald J. O'Malley

By Sam Kusic

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 the 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 Inc.'s Technology Center in Middletown, Ohio, USA, which later became part of AK Steel, where he conducted steelmaking and casting research and development for a diverse mix of flat-rolled specialty steels, including developments in the thin-slab casting of stainless steels at AK Steel – Mansfield Works. He later served as chief metallurgist at Nucor Steel–Decatur LLC, where he was responsible for metallurgical development and for steelmaking and casting process support within Nucor. He now serves as the F. Kenneth Iverson Chair Professor of Steelmaking Technologies and director of the Kent D. Peaslee Steelmaking Manufacturing Research Center at the Missouri University of Science and Technology. O'Malley has published numerous papers in the fields of continuous casting and steel processing, has taught numerous short courses on the continuous casting of carbon and specialty steels, received the Charles H. Herty Jr. Award in 1999, was awarded AIST Distinguished Member and Fellow in 2012, and received AIST Presidential Citations in 2010 and 2013. He has served as the Conference Planning Committee chair for AISTech 2013, papers chair for the Continuous Casting Technology Committee (CCTC) in 2012, representative on the Material Advantage Committee for 2013, and is a lecturer for AIST Continuous Casting — A Practical Training Seminar and The Making, Shaping and Treating of Steel: 101. He has previously served on the AIST board of directors as a representative for the CCTC and the Ladle & Secondary Refining Technology Committee. He has also served on the selection committee for the FeMET and StEEL student scholarships and the selection committee for the Elliott Lectureship Award.

Iron & Steel Technology recently sat down with O'Malley to talk about his career path and get his perspective on the next generation of steelmakers.

As you think back over your career, what accomplishment are you most proud of?

It's so hard to say, but I'm very proud to have been a part of the team that started up the Mansfield, Ohio, thin-slab caster (at what's now AK Steel Corp.). It's a stainless steel, direct hot-charge thin-slab caster, and today, as I look around the world, it seems to be the only machine doing this.

What motivated you to serve on the AIST Executive Committee and now as president?

I'd say it's just a natural progression. AIST has given me so much, and I've reached a stage in my career where I feel like I can give back. I have always been active in AIST, originally on the Technology Committee side by giving presentations, teaching short courses, organizing technical conferences, and later serving on the board as a Technology Committee representative. But going forward, my rotation on the AIST executive committee gives me an opportunity to serve the larger AIST membership. And this also gives me the opportunity to help rally support for continued research and education in the steel industry.

The industry has talked a lot about the urgent need to recruit and develop the next generation of operational leaders. But the same could be said for academic leaders, too, couldn't it?

There is a lot of pressure out there on faculty, and that has a tendency to drive professors away from this field. If you are an academic, especially at an assistant professor level, your first goal is to get tenure, and to get tenure you have to do certain things: publish in peer-reviewed journals and secure sufficient amounts of money to support research. If you don't meet those goals, you don't stay in those positions.

Where do you think this pressure coming from?

It's driven by academic institutions' goals, which are aligned with attracting high-level government research funding that is hard to get these days. NSF and DOE funding is much more difficult to acquire for steel because of the strong focus on new "breakthrough" technology areas — everybody wants to pursue the hot new thing. If you're a junior faculty member, the temptation is high to go into today's hot areas of research, such as powder bed manufacturing or high-entropy alloys, because the visibility and support dollars are there. So it is easy to lose young faculty unless you can provide the means to support them in research related to steel.

What do you think AIST's role could be here?

AIST has provided some opportunities to help us support and maintain educators in our field. I'd like to see that bolstered and expanded. Through the Association, we already have the tools to do it. For instance, we have the Kent D. Peaslee Junior Faculty Award, which supports young faculty. However, the challenge is in figuring out how to develop funding sources within this industry to support new professors for the long term.

I love collaboration. And getting professors to interact with the producer and supplier world is a great thing. AIST is by far one of the best organizations at doing that. As someone who was once on the producer side, I interacted frequently with academics, and this interaction would often develop into a producer-supported research effort. So I think that anything that fosters this kind of exchange and interaction is a good thing.

How do we bring universities around to the importance of metallurgy in materials science curricula?

You have to have the right infrastructure to support it. The successful model that I see out there that allows universities to keep metallurgy in the curriculum and in their research programs is consortia. The schools that are doing research in steel are those that have active consortia interacting directly with industry. They're not trying to get money out of the government. The industry support is critical.

At Rolla, we've been fairly successful. [Former AIST president and Missouri S&T professor] Kent Peaslee brought a core industry support group together, and we have been able to keep the Steel Manufacturing Research Center growing and doing well since its inception six years ago. This tells me that people want interaction with academia and students, and want to support research in the industry. However, I think that it is difficult for a professor to do this kind of work in isolation and get support for it.

What about on the student end? Do you find that the steel industry is a hard sell for a student who is studying materials science?

It depends on the student. Rolla is a rural college. A lot of the students who attend are from rural communities. I think they're used to working with their hands, and that doesn't scare them. But there are students from more urban regions who have never held a wrench. At Rolla, you're building things that you will need to do your research and working as a team — I think that's a great educational experience that I would never drop from our curriculum. But that's also sometimes intimidating. Some students do want to wear a white lab coat and not get dirty. However, you would be surprised to see how many students get excited about pouring steel.

How did you get started on your steel career path?

I started my life as a civil engineer. But after my first co-op — it was with the Army Corps of Engineers — I decided that I didn't want to be a civil engineer. My perception was that a lot of the work involved applying known cookbook formulas. I worked on a paint estimate for a bridge and pump designs for a dam project. It just wasn't that interesting. If I hadn't done that co-op, I might still be a civil engineer today, and perhaps not a very happy man.

Anyway, I took an introductory course in materials at Drexel University, and I thought that the subject was really exciting and interesting. It seemed like there was less application of existing knowledge from the textbooks and more investigation and research. So I switched my major.

What kept you going down that path?

At about the same time I changed majors, a young professor by the name of Diran Apelian joined the faculty at Drexel and I got linked up with him. He was doing a lot of aluminum-based research involving liquid metal processing and I got molten metal in my blood. He took me out in the field on a couple of consulting trips. We visited Alcoa's research labs and worked on molten metal filtration as a side project. In the end, I did a thesis with him on injection alloying of molten aluminum with manganese powders.

At the time I switched majors, Drexel was offering a program that allowed you to do a master's degree and bachelor's degree at the same time. So I signed up for that, and I graduated with my bachelor's and master's degree in five years with a year-and-a-half's worth of co-op work experience. I burned the candle hard. I would go to classes during the day, and then I would go to night classes for grad school. Then I would go out on co-op and come back for night classes.

The winning combination for me was the interesting work in high-temperature processing; a professor and a department that were very dynamic and made classes interesting; and a lot of personal attention. We were a small group of students — I think there were eight engineers in my graduating metallurgy class. I also had excellent mentorship during my co-op experience. I was able to work with knowledgeable industry people who taught me a lot at a young age and who trusted me.

It sounds like the mentoring you've received through the years has been highly influential on you. How has that influenced your career?

I think it's absolutely key. So I have vowed to be that same sort of person for the next group of students. Even when I was in industry, I worked a lot with interns and co-ops at Nucor and, before that, Armco. I've always found great joy working with and mentoring students.

As a researcher, what in metallurgy and the steel industry is exciting to you?

The area that most excites me right now is the application of new sensor technologies. Sensors have become incredibly cheap. They've become highly networked. And they've allowed us to begin collecting data in resolutions and in time scales that you never could before. And that means new opportunities to learn new things.

I am at heart an experimentalist. I use models, but I don't rely on modeling as the sole source of investigation. My view of the world is that you need to prove that the model is correct, and that's not always easy to do.

Had you envisioned one day transitioning from industry to academia?

After I earned my Ph.D., I thought that I might work industry for five years, and then move to academia to teach and conduct research. So I was a little short on that objective — it only took 30 years. This move to academia has proven to be my dream job, but what really made it great is that I get to interact with so many good people that I know in our industry. They're truly supportive of our work, and I feel very comfortable speaking with them in the language of steel. It makes the job an easy and enjoyable one. ✦