

The 2013 AIST
**JOHN F. ELLIOTT
LECTURESHIP:**
Five Countries and 13 Universities

BY PROF. GEOFFREY BROOKS



ABOUT THE SPEAKER

Brooks is a professor of engineering at Swinburne University of Technology in Australia, where he heads up the High Temperature Processing group. His research, with his co-workers, has concentrated on fundamental aspects of steelmaking, aluminum and magnesium production, and he has published extensively on these topics, as well as working closely with many metallurgical companies around the world. He has previously held academic positions in materials science and engineering at McMaster University and the University of Wollongong, and was a senior principal research scientist at Commonwealth Scientific and Industrial Research Organization, where he led a team in developing a new process for producing magnesium. Prof. Brooks completed his Ph.D. at the University of Melbourne, and he has degrees from the Royal Melbourne Institute of Technology and Swinburne University of Technology.

It was a tremendous thrill when I learned that I had won the 2013 AIST John Elliott Lectureship Award. After the initial excitement, I realized that the award also carried a heavy responsibility. The lectureship is designed to inspire and encourage engineering students toward the steelmaking industry. I had already seen some excellent Elliott lectures delivered by Alex McLean, Gordon Irons and David Gaskell, so I had some good role models to guide me, but the challenge to inspire young people was still daunting.

After discussing a few ideas with my colleagues, I settled on the idea of basing the lecture on the development of oxygen steelmaking. I chose this topic because it would enable me to show students how steelmaking technology has developed at an exciting pace since the first commercial LD furnace started operation in 1951. Also, the topic of oxygen steelmaking would allow me to demonstrate that, even though such technologies can be regarded as mature, there is still a great deal that we don't understand about their operation. If we can overcome some key issues (e.g., understanding how the slag chemistry develops in the early part of the blow), the technology can be still be improved and optimized. Another major reason I chose the theme of oxygen steelmaking was that it is a very exciting technology — with supersonic injection of gases, extreme temperatures, simultaneous chemical reactions and even foaming above 1,600°C. As I said to the students, you don't know the meaning of the word "exothermic" until you have stood near an oxygen steelmaking vessel in the middle of the blow! To capture this excitement, I decided to call my lecture "Steelmaking at the Speed of the Sound."

The first group of lectures I delivered were in Canada during March 2013, where

I was privileged to speak to the final-year materials students at McMaster University, Toronto University and McGill University. During each lecture, I would challenge the students with basic questions about steelmaking that followed the lecture material. I enjoyed sparking some good-natured competition between colleges by telling the students how their peers at other universities had done with the same question. "The fellows at Toronto got this one in 30 seconds!" I would say. The lectures at all three of these universities were well attended (more than 80 students at each), and the material was well received. One of the highlights was Prof. Rod Guthrie debating with me how droplets behave in the emulsion during steelmaking; this gave the students a chance to see how there is still an ongoing debate about how the process actually works.

The next leg of my tour was in May 2013 in the United States, where I gave the lecture at Missouri University of Science and Technology and Carnegie Mellon University. Both lectures were also very well attended and received. The late Ken Peaslee was my host at Missouri, and his untimely death soon afterward was sad for me and our community. The students from Missouri S&T gave me a t-shirt with an oxygen steelmaking motif. While I was at Carnegie Mellon, Prof. Richard Fruehan debated with me the prospect for continuous steelmaking, once again an excellent opportunity for the students to witness important debates about the technology.

Over the next six months in Australia, I delivered the lecture to the final-year mechanical students in my own university, Swinburne University of Technology; to final-year chemical engineering students at the University of Melbourne; to final-year materials students at the University

of Queensland; to metallurgy students at the University of Ballarat (Victoria); and at Curtin University in Kalgoorlie, West Australia. Delivering the lecture to such a range of students was a great challenge, but also illuminating. Some of the most perceptive questions I was asked during the year came from the chemical engineering students at University of Melbourne, who had only limited exposure to steelmaking technology. It was also a joy to meet bright, enthusiastic students from so many different institutions. The students in the mining town of Kalgoorlie found “competing” with students from distant Montreal and Pittsburgh in answering my questions both stimulating and fun. It is hard to imagine more different places than Montreal and Kalgoorlie!

The final three lectures of this world tour were given at three Asian institutions. When I received the award, I asked AIST whether they would like me to take the lecture to Indonesia, where there is a growing and dynamic steel industry. After getting support for the idea, I gave the lecture at the University of Indonesia and I.T. Bandung during September 2013. Both institutions were pleased to have the John Elliott Lectureship come to their institution; and at I.T. Bandung, my lecture was advertised by six-foot-long banners all across campus! At both lectures, the interest and enthusiasm of the students were overwhelming. The topic of my talk could not have been better timed, as the giant new POSCO-Krakatau Steel integrated steel works was close to completion and all steel in Indonesia had previously been made via the EAF, so the students were keen to hear about oxygen steelmaking technology. I was able to coordinate my lecture tour with a visit to the new plant

and also delivered a keynote lecture at the Indonesian Iron and Steel Conference.

During my visit to Indonesia, I was fortunate enough to meet up with Prof. Youn-Kae Bang from POSTECH, and he invited me to give the lecture in Korea. This trip took place in December 2013, where once again I was treated wonderfully by my hosts and combined my trip with a visit to the impressive POSCO steel plant in Pohang and the research facilities at POSTECH.

After delivering 13 lectures in five countries, flying around the globe twice and having the chance to share my love of steelmaking with more than 800 engineering students, I find myself eternally grateful to AIST for giving me this opportunity. I am also very appreciative of my friends from the steel industry and academia for nominating me in the first place for this award. The kindness and goodwill from all the hosts and students at these institutions were also memorable. I am happy to report to the members of AIST that there are many clever young people with an interest in steelmaking all around the world.

ABOUT THE AIST ELLIOTT LECTURE

The AIST John F. Elliott Lectureship was established in 1990 to perpetuate the memory of the late professor John F. Elliott, MIT, for his outstanding career as an educator in the field of chemical process metallurgy. This honorary lectureship is designed to acquaint students and engineers with the exciting opportunities in chemical process metallurgy and materials chemistry. It is presented in recognition of distinguished contributions in chemical process metallurgy and materials chemistry to the iron and steel industry. ♦



Lauri E.K. Holappa, professor emeritus at Aalto University School of Chemical Technology and 2012 Elliott Lecturer, will be conducting his lecture circuit this month at the following universities:

CARNEGIE MELLON UNIVERSITY
Pittsburgh, Pa., USA
7 April

MCGILL UNIVERSITY
Montreal, Que., Canada
8 April

QUEEN'S UNIVERSITY
Kingston, Ont., Canada
9 April

UNIVERSITY OF TORONTO
Toronto, Ont., Canada
10 April

Holappa received his D.Sc. from the Helsinki University of Technology in 1970 and then spent nine years within the steel industry conducting and managing research, with his last years as chief metallurgist. In 1979, he was appointed professor of metallurgy at the Helsinki University of Technology, and beginning in 1980 he acted as head of the department for six years. His research and teaching have been focused on physico-chemical principles of metallurgical processes and how to apply fundamental knowledge in the development of industrial processes.



Prof. Geoffrey Brooks (center) and Prof. Sri Harjanto (front, right) with metallurgy and materials students from the University of Indonesia in September 2013.

FOR MORE INFORMATION ON THE ELLIOTT LECTURESHIP, VISIT AIST.ORG AND CLICK ON “ABOUT AIST” THEN “AWARDS & RECOGNITION.”