In memoriam

Jack R. Howard, 1926-2012

Dr. Jack Howard, Senior Lecturer at Aston University in Birmingham, England, United Kingdom, sadly died on 15th July 2012. He was a member of the International Advisory Board of the Journal *Thermal Science* from its launch in 1997.

I first met Prof. Jack Howard in 1975, in his laboratory at Aston University in Birmingham. This was a study tour, organized by the British Council. The aim was to view modern research at several Universities in England, which were carrying out R&D in the clean coal combustion technologies as an answer to the 2nd Energy Crisis. Going back to coal, the development of the clean coal technologies was the highest priority in developed countries and perceived global warming. The new and most perspective technology was combustion in fluidized beds, at that time only in bubbling fluidized beds.

Jack Howard was an authority and pioneer in fluidized bed combustion research and I came to the very fount of knowledge. From that day my research activity was totally committed to the fluidized bed combustion. Visiting Jack's laboratory was inspiring and the most important for starting R&D of fluidized bed combustion R&D technology in the Laboratory for Thermal Engineering and Energy, of the Vinča Institute of Nuclear Sciences, Belgrade, Serbia. This was the only R&D program of this combustion technology in former Yugoslavia. For me personally, this was the beginning of a new career, and a new research activity which lasted up until my retirement and even beyond. Even more, this was the beginning of the new friendship.

In those early days of the fluidized bed research in Jack's laboratory there were already several working experimental installations – gas combustion in shallow bubbling fluidized bed, and behaviour of the rotating fluidized beds. After that, his research was oriented to the batch combustion experiments of coal and char particles in bubbling fluidized beds.

The first starting step of the R&D program for development of fluidized bed coal combustion technology in Vinča Institute was to copy experimental installations found in Jack's laboratory and to repeat his batch combustion experiments.

After my visit to Aston, we invited Jack Howard several times to visit our Institute and Laboratory, and we become close friends. As a result of many meetings and mutual discussions, Jack's influence on the orientation and successful achievements of our FBC research and development program in Vinča Institute cannot be overestimated. We obtained advice from Jack on every aspect of research and development in the fluidized bed technology which we carried out in our laboratory. He also gave us invaluable advice when he visited our remote factories which were producing FBC boilers and furnaces in line with our own research of industrial boilers.

Jack was born on 5th January, 1926, and graduated from the University of London with a BS in Engineering before later undertaking a Ph. D. in heat transfer at the University of Aston. He was a Chartered Engineer, Member of the Institution of Mechanical Engineers and a Fellow of the Institute of Energy. After his early career in industry and short academic appointments at Technical Colleges and at Farnborough where he was teaching aeronautical engineering, he took up a position as a Lecturer, and later as Senior Lecturer in Mechanical Engineering and Chairman of Engineering Thermodynamics, at University of Aston, 1966-1982.

At Aston University, Jack Howard undertook pioneering research of the combustion processes of single coal particles in fluidized bed. His early papers (Chakraborty, R. K. and Howard, J.

R.: Burning rates and temperatures of carbon particles in a shallow FBC, Journal of the Institute of Fuel, 1978, 12, pp. 220-224; Chakraborty, R. K. and Howard, J. R.: Carbon combustion rates and temperatures in shallow fluidized beds, Chemical Engineering Communications, 1980, (4) pp. 705-719, and Chakraborty, R. K. and Howard, J. R.: Combustion of char in shallow fluidized bed combustors; influence of some design and operating parameters, J. Institute of Energy, March 1981, pp. 48-54), initiated a large number of experiments on single particle combustion in fluidized beds in many countries and scientific institutions. These papers fundamentally improved the understanding of combustion processes of solid fuel particles in fluidized beds.

His book, Fluidized Bed Technology: Principles and Applications (ISBN-10: 0852740557, Taylor and Francis, UK, 1989), was one of the first reviews of the industrial applications of fluidized bed technology, at that time a young and fast developing energy technology which promised to satisfy increasingly stringent requirements for environmental protection and efficient combustion of low quality coal and unusual fuels, such as municipal and industrial waste.

Prof. Jack Howard was highly respected in many countries for his work. He was Special Adviser to the School of Engineering, University of Sao Paulo, Sao Carlos, Brazil, 1980, 1982, 1986 and 2000. There, he supported the research in fluidized bed technology, an area in which Jack was a pioneer when at Aston. He made many overseas visits and gave seminars at Institutions in the United States, Japan, the former Yugoslavia, Turkey and Canada, where he was Rapporteur for the First International Conference on Circulating Fluidized Beds at Halifax, Nova Scotia, in November 1985. He also carried out assignments for European Union in Poland in 1992.

Jack was extremely sensible and unusually sensitive men. We will remember him, quite apart from his scientific achievements and influence on our research activity in fluidized bed combustion technology research and development, as an essentially good man, and a reliable and sincere friend.

In spite of the differences in age, culture, and the long distance between Belgrade and Birmingham, Jack will stay in our best memory as an extremely good friend and colleague, always happy to help everybody. Jack's humanity was rare and boundless. His letters, written during the difficult times of the wars in former Yugoslavia, were warm and encouraging, and helped us maintain optimistic view of the future. He supported us as an older and more experienced friend and urged us to look forward to a better time for our families as well as our research activity. He accepted, without hesitation, our invitation to be invited lecturer at the 1st South East European Symposium on Fluidized Beds in Energy Production, Chemical and Process Engineering & Ecology, held in 1998, on the lake Ohrid, Republic of Macedonia, supporting our idea of re-uniting scientific community of South-East Europe. Following this idea Jack Howard also accepted an invitation to participate in the launch of the journal *Thermal Science*, as a member of the founding International Advisory Board. We are grateful to Jack for his unselfish and great contribution to the quality of the journal *Thermal Science* in its early days.

In Laboratory for Thermal Engineering and Energy, at the Vinča Institute of Nuclear Sciences, and also in also in the small town in Serbia, Čačak, where FBC boilers were manufactured in former Yugoslavia, and in Macedonia where many researchers was involved in fluidized bed research, in my family and with everybody who met or listened to Jack even once, he will be remembered forever as an unusually generous and humane friend.

November 2012, Belgrade

Prof. Dr. Simeon Oka
Scientific Advisor at Vinča Institute of
Nuclear Sciences (retired)
Editor-in-chief of the journal *Thermal Science*