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## in memoriam



Dr. Detlev Gustav Kröger, 1939–2014

Dr. Detlev Kröger, professor in the Department of Mechanical and Mechatronic Engineering at Stellenbosch University, passed away on 16 March 2014. He died at the age of 74 after a long illness, with his wife, Regine, the well-known painter, at his side. We had been expecting it for a long time, since Detlev was very weak. He is survived by his wife and three children, Anja, Alfred and Gregor, as well as five grandchildren. A memorial service was held for him in the German Lutheran Church in Stellenbosch on 25 March 2014.

In his long career as professor at Stellenbosch University, he established himself as a pioneer in heat transfer and specifically in the field of air-cooled heat exchangers and cooling towers. Many people say he was probably better known outside Stellenbosch than in Stellenbosch.

Detlev was born on 31 July 1939 in Cape Town, South Africa as the eldest of three children. He first attended the German School in Cape Town, but later grew up in Hermanus. He studied mechanical engineering at Stellenbosch University and was supposed to start working at the South African Iron and Steel Corporation (Isacor) on completion of his undergraduate degree, BSc BEng (Mechanical Engineering), in 1962.

He was, however, encouraged by a professor to further his studies. As he did not have the finances, he sold ice cream to

raise money, and without sufficient funding for his tuition fees, he flew to the US without the support and knowledge of Isacor. He rented a very small storeroom in the attic of a house with pigeons keeping him company and enrolled at MIT for post-graduate studies. It took a while before some of the professors at MIT discovered he had been attending class without being a registered paying student. However, by that time they had also noticed his good progress and assisted him in getting a scholarship, after which he received the Gerard Swope Fellowship from MIT in 1965 and 1966, for “Students of exceptional ability and promise, as a mark of highest distinction”. At MIT, he completed the following degrees in mechanical engineering: SM in 1965 and ScD in 1967. His supervisor at MIT was Prof. Warren Rohsenow.

After the completion of his studies at MIT, he returned to South Africa where he was appointed as a research engineer at Isacor in 1967. In 1968, he was appointed as a senior lecturer in the Department of Mechanical Engineering at Stellenbosch University and in 1971, he was promoted to the position of professor. He was also the Chairman of the Department in 1974 and 1983. He was a visiting professor at Lehigh University Bethlehem in 1978, as well as at three universities in Germany in 1984. From 1979 to 1992, he was a director of BMI at Stellenbosch University and from 1992 to 1999, he was Director of the Institute for Thermodynamics and Mechanics (ITM). From 2003, he was also an extraordinary professor at the University of Pretoria.

In terms of professional societies and committees, Detlev was very active and only a short summary is given. He was a fellow of ASME, a member of the South African Academy of Arts and Science, South African representative of the International Institute of Refrigeration on commission B2 and a member of the IIR working party “Saving of Energy in Refrigeration” from 1978 to 1986. He was a member of the Editorial Board of the International Journal of Multiphase Flow (1971), a member of the CSIR Working Group on Heat Mechanics (1982–1986), adviser to the Chemical Engineering Group at the CSIR (1978–1981), member of the Research Awards Committee of the CSIR (1978–1981), member of university committees including Research,

Bursaries and Stipendia, member of the Scientific Committee of the International Association for Hydraulics Research, member of the CSIR, FRD Committee (1987–1990), member of the FRD Collegium (1988–1990), officer and general member of the Assembly of World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics (1993–2001), member of the ASME Power Division Heat Exchanger Committee and associate editor of *Heat Transfer Engineering* (1997–2000).

He received a long and impressive list of awards and honours: the Thomas Price Award in 1970 and 1975 from the South African Institute of Mechanical Engineers, the South African Chemical Processing Award in 1971 from the South African Institute of Chemical Engineers, the Ernest Oppenheimer Fellowship in 1978 and 1984, the Dreosti Prize in 1981 from the South African Institute of Refrigeration and Air Conditioning, the Havenga Prize in 1986 from the South African Academy of Arts and Science, the Researcher of the Year award in 1987 and again in 1998 from the Faculty of Engineering, Stellenbosch University, the Campbell-Pitt award in 1990 and 2000 from the South African Institute of Mechanical Engineers, the Silver Medal award in 1994 from the South African Institute of Mechanical Engineers, the Faculty of Engineering Dean's Award for Lecturer of the Year in 1996. He became an A-rated researcher in 1997 based on the National Research Foundation (NRF) peer evaluation system. The A-category researchers are defined as researchers who without doubt are accepted by their international peers as being world leaders for the high quality of their recent research outputs. He also received the Rector's Award from Stellenbosch University for outstanding research in 1999. The 12th International Association of Hydraulics Research Symposium on Cooling Towers and Heat Exchangers in Sydney in 2001 was in honour of Prof. D. G. Kröger, "who has played a long and distinguished role, with substantial and significant contributions to the art and science of cooling towers and heat exchangers". He received the Bill Venter/Altron Literary Award for his book entitled "Air-cooled Heat Exchangers and Cooling Towers" in 2003. He received two honorary doctorates; one from the University of Johannesburg in 2002 and the other from Stellenbosch University in 2011. In China, he was honoured as "a friend of China for 10,000 years".

Under his leadership as a supervisor, more than 75 master's and doctoral students graduated at Stellenbosch University, and from his pen, more than 200 scientific publications appeared. The aim of his research was to investigate the fundamentals of many of the still not adequately understood phenomena that determine the performance of wet-, dry- and hybrid cooling systems. These systems find application in the power, petrochemical, process, refrigeration, air-conditioning, automotive and many other industries. He also worked on the refinements or changes to improve the performance of such systems under various operating conditions. He used fundamental theoretical and numerical analysis, laboratory experimentation and full-scale performance tests. Much of his work was summarised and coherently put together in his book that was published in 2004

with the title "Air-cooled Heat Exchangers and Cooling Towers" (2 volumes). This book is the most detailed and comprehensive scholarly book presenting modern practice and theory relevant to the thermal-flow design, evaluation, performance and optimisation of air-cooled heat exchangers and cooling towers.

His research finds application, among others, in mine cooling plants, thermal processes in the process and steel industries, solar energy and dry-cooling power plants. In the latter field, he was responsible for the design of the power station at dry-cooling plants at the Matimba and Kendal power plants, and most recently at Medupi and Kusile, as well as power plants in the USA, Europe, Russia, Australia, India, the Middle East and China.

With reference to the authors below: I (J.P. Meyer) was inspired by Detlev's work ethic, thoroughness and his absolute passion for his work. He was focused and happy in his work and it gave him much satisfaction and happiness. As we have a lack of academic mentors in South Africa, he became my informal academic mentor and we had long discussions on my research and heat transfer research in general. His contributions to my research were always constructive and encouraging of nature. We made one or two attempts to conduct research together but it was not successful, as although both our research foci were on heat transfer, we concentrated on different aspects of heat transfer. One of my best memories with Detlev was when Prof. Art Bergles and his wife, Penny, visited me and we were invited for dinner by Detlev at his house in Stellenbosch. The combination of the hospitality of Detlev and Regine, the good food and wine and the conversations we had over dinner was so extraordinary. What is unusual is that both my dear friends Detlev and Art passed away within a few days of each other. To me, two of the biggest trees in the international heat transfer community have fallen. Detlev, I will always remember you as I will continuously be exposed to your presence with your book on my bookcase, all your articles that are so visible in terms of impact and the good postgraduate students you have delivered.

My (B. Skews) main contact with Detlev was when I was in charge of research at Eskom, the South African Electricity Supply Commission, at the time it was seriously looking at dry cooling for its power stations. Detlev contributed his considerable scientific understanding, as well as his personal integrity and approach to the final decisions and implementation to the building of some of the largest dry-cooled power stations in the world. My association with him in our subsequent contact as academics, although in somewhat different fields, was always stimulating and enriching. I was honoured to be invited by him to attend the Bill Venter/Altron Literary Award function for his outstanding book, recognising the major contributions to the field that it represented.

I (S. Saha) remember Prof. Kröger as the research adviser of Dr. J. P. du Plessis. The PhD thesis of Dr du Plessis came to my own PhD thesis adviser, Prof. A. W. Date, for adjudication and I had the privilege of going through the thesis since I also worked on twisted tapes for my PhD thesis. The thesis work of Dr. du

Plessis advised by Dr. Kröger was an original contribution. I will always remember Dr. Kröger for his work.

I (P. Stehlik) was very sorry to hear about Detlev's passing away this year. We were very good friends, and many years ago when I was a relatively young guy, I appreciated so much that Detlev noticed me and made contact with me. I fully agree with what was written above by Josua – he was an excellent researcher and an even better human.

Detlev Kröger was a towering figure as a university professor. He spoke openly about the importance of freedom. He was fiercely proud of his American education, MIT, professors and ideas. I (A. Bejan) first met him in 1986, and his example has stayed with me.

My (von Backström) best career move was to do my PhD under Detlev's supervision in the nineteen seventies. Later, I was privileged to be his colleague for 30 years up to his death, and I have never stopped learning from him.

Detlev Kröger was a remarkably focused and interesting person to meet and to have as a colleague for almost 20 years. He was a deep thinker with an instinct for asking the right questions. When applying for a lectureship in our now Mechanical and Mechatronic Engineering Department, he roped me (T. Harms) into his thermodynamics division, of which I became the head upon his retirement. His engineering thoroughness, discipline and capacity for work will continue to inspire all those who were enriched by working with him.

I (H. Reuter) had the privilege of working closely with Detlev Kröger, an undisputed leader in his field. I will always cherish his patience and wisdom and everything he taught me over the years.

He introduced me to many interesting people worldwide, many of whom have become friends. We organised the 14th IAHR Cooling Tower and Air-cooled Heat Exchanger Conference in Stellenbosch and published various research papers together. We collaborated on a number of consulting projects for the top companies in the world and ultimately were partners in developing and patenting new cooling tower and heat exchanger products. He has left us with a treasure of knowledge and novel ideas, which I will help to develop and try to implement in the years to come. The legacy of his quality teaching and excellent research is immense and will live on at Stellenbosch University and in the larger air-cooled heat exchanger and cooling tower community. As written by Josua above, a truly big tree has fallen.

Contributed by:

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