Prof Hansie Knoetze: a formidable university leader

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In 1977 Prof Hansie Knoetze became the first undergraduate student in chemical engineering at Stellenbosch University (SU) to receive his degree cum laude. He built on this achievement by becoming a researcher and lecturer of note, a dedicated university leader and in the mid-2000s also dean of the SU Faculty of Engineering.

At school, chemistry was by far his favourite subject. In 1971 he matriculated as top student of Andrew Rabie High and the greater Port Elizabeth (today Gqeberha). Because his family was financially stretched, he put his hopes on obtaining a study bursary, and to further allow fate to choose whether he should pursue a career in engineering or the sciences. Luck was on the side of this fellow of the South African Academy of Engineers: a bursary awarded to him by the Council for Science and Industrial Research (CSIR) allowed him to study chemical engineering at SU. As he was assigned to the National Institute for Defence Research as part of the bursary, he spent many a university holiday working in its propulsion laboratory in Somerset West.

Rocket science

By the time he returned to Somerset West in 1978 to take up a full-time position, the Institute had transformed into Kentron, a division of the then Armscor. During the sanction years he helped to develop rocket motors and a suitable propulsion system for a new South African anti-tank missile system and various types of rocket motors. Prof Knoetze soon moved through the ranks in the division for double-base propellants and worked as project manager for the development of ground-to-air missiles.

“I preferred working on the defensive side of things, for instance on anti-tank missiles and the likes,” Prof Knoetze explains.

About the world of propellants, rocket motor igniters, explosive technology, launch motors and ballistics, he says in jest: “I am one of only a few people who can really say that something is not really the proverbial ‘rocket science’, because I actually know what the real thing is about. I find ‘rocket science’ easy – it is all the rest that’s difficult!”

He has over the years imparted many of the valuable lessons that he learnt during those formative five years to the more than 70 postgraduate students that he subsequently supervised. Among these are that people should sometimes be allowed to make mistakes, without the interference of their supervisors. In Prof Knoetze’s case he was allowed to quite literally have rockets explode – and in the process he gained lasting insights into how these should be developed at best.

He was appointed in 1983 as lecturer in the SU Department of Chemical Engineering, while continuing research on internal ballistics and the prediction of the performance of solid rocket motors. He initially taught Chemical Engineering 214 (Mass and Energy Balances and Thermodynamics) and 244 (Flow Mechanics), as well as several modules of the now discontinued Postgraduate Diploma in Engineering in Rocket Science. In the process he could greatly influence many aspiring engineers.

“It was always important to me to help develop their problem-solving capabilities,” Prof Knoetze mentions.

Prof Knoetze received Rector’s Awards for Teaching in 1998 and 2008, and in 2004 was named as the Faculty’s best lecturer. He also counts as one of the first recipients of the Chancellor’s Awards when these honours were first introduced in 2014.

Thanks to his vast industry-related practical experience, he was allowed to pursue doctoral research without having obtained a master’s degree. Prof Knoetze received his PhD degree in 1990 for research that provided ways to better predict the performance of solid rocket motors. The work was part of plans by South Africa to launch satellites into space.

“My research was classified as “Extremely Secret” at the time. My supervisor only received the necessary security clearance so that he could have access to the technical details of my thesis some weeks after I had already completed it. Neither I nor the University could keep a copy of my work,” he reveals.

Other research fields

The SU Department of Chemical Engineering was launched in 1969. By the 1980s it was still a relatively small entity with only a handful of fulltime lecturers. According to Prof Knoetze student numbers grew impressively in the next decade, among others because of developments within the South African petrochemical industry through the construction of the Sasol 1 and Sasol 2 plants.

The decade also saw a gradual shift in Prof Knoetze’s own research interests. Along with his students he began developing paints and polymers, and studied the use of separation technology and the thermochemical processing of biomaterials through pyrolysis.

“Rocket propulsion and my work on double-base propellants prepared me for this work. Double-base propellants, for instance, is to a great degree actually high energy thermoplastics, because the main ingredient of nitrocellosis is a biomaterial. I was able to put my background in thermochemical processes and thermodynamics to good use,” says Prof Knoetze, who in 1994 was promoted to associate professor and in 1998 to professor.

He put the practical knowledge that he obtained while developing a vacuum resistant paint for satellites as part of the South African space programme to use when an industry focused applied research project was started at SU to develop commercial products for Plascon. It saw SU chemical engineers and polymer scientists collaborate for many years. Postgraduate students among others develop better and cheaper emulsions, scaled up the production of related products and worked on the prediction of the characteristics of paints.

In the early 2000s Prof Knoetze and colleague Prof Andre Burger (and later also Prof Cara Swartz) began with separation technology research using phase-equilibria, supercritical separation processes and distillation. Their work, which was among others funded by SASOL, Koch-Glitsch and through THRIP, led to the development of many unique pieces of equipment and the testing of pilot plants.

Prof Knoetze was also initially involved in the Redisa Project which set out to recycle usable material from used tyres. Collaboration with colleagues in France, Germany, Mozambique and the United Kingdom on projects funded by the National Research Foundation is part and parcel of this period in his career. From the late 2000s to 2013 he was also a member of the SANERI Chair in Biofuels, and as such helped to strengthen biofuels research at SU.

“I’m actually a bit of an all-rounder,” he summarises his research career.

University leader

His versatility stood him in good stead over the course of three decades in academia. In 1997 he became departmental chair, a position he would again fill between 2002 and 2004. During the 1990s he drove the greater alignment and focus of the undergraduate programme, in the process ensuring that a more reasonable workload awaited students.

Between 2006 and 2008 and between 2011 and 2012 Prof Knoetze served as vice dean: teaching in the Faculty of Engineering. In 2009 he was acting dean – a post that he eventually filled with distinction between 2012 and 2017. He rates these years as some of the most exciting yet daunting periods of his career, as this was the period of the #FeesMustFall student protests on university campuses nationwide.

The option of undergraduate classes in either Afrikaans or English were instigated during this time. He says he made it a priority to ensure that staff could expect a realistic workload and to care for their wellbeing. To this end he ensured that many vacant senior posts available at the time were rather filled by more than one junior appointment. Today these “juniors” are many of the leading lights in the Faculty.

Serving both the Faculty and the University on many levels afforded Prof Knoetze the opportunity to be part of many notable decisions made during these years. He was a member of numerous SU committees and task groups – from programme evaluation, academic planning, teaching and learning, examinations and programme accreditation to quality assurance and the management of SU’s three primary responsibilities. He was chair of the SU Timetable Committee and the First Year Academy, member of the SU Council (between 2012 and 2015, of which two years in the executive committee) and an executive committee member of the Institutional Forum. He was a member of the SU Senate for 20 years, from 1998 to 2018, and in 2009 and 2012 to 2017 an executive committee member.

This jack of all trades, as he often refers to himself, retired in 2018, but returned as emeritus professor in 2019 as acting departmental chair for one semester. He still supervises four part-time postgraduate students.

“I am one of those people who believes that it is possible to do more than one thing successfully, and that one does not have to focus on only one terrain,” he summarises the scope of his career.