

Prof Fred Hugo: a man for many challenges



Prof Fred Hugo was recognised as an honorary member of the SAAE.

Civil engineer, innovator and educator and founder of the TRAC SA school programme, Prof Fred Hugo, has left a tangible mark on so many terrains that an alumnus newsletter of the Faculty of Engineering once called him “the man who has completed five careers in six decades!”

On the eve of his 90th birthday, Prof Hugo recently reflected on his career as such: “It is a privilege to have seen so many of my plans come to fruition.”

Ethics tops his list of so-called “stepping stones” that he believes have helped him attain so many successes during his career. Also included are innovation, teamwork, good communication, mentorship, strong networks (especially ones built on trust), an understanding of the situation of others, community service and involvement and professional contact on a national and an international level. He believes one must know how to delegate and use a diary, but that these are not the solution to everything.

“Admit your mistakes. Don’t hesitate to accept specific criteria on which you base your life, and to stick to these. And be willing to be weighed according to the same criteria that you use to judge others. Constantly move laterally within your discipline, as this provides continuity to your career path,” he often advised his students.

Formative years

Prof Hugo was born on 7 June 1935 in Springs, the eldest of three children. He grew up in Brakpan, and in 1952 matriculated from Stoffberg High School. According to him, he inherited his strong work ethic from his father, Paul, who worked on East Rand mines.

A bursary from the Chamber of Mines allowed him to enrol at the University of the Witwatersrand, initially to study mechanical engineering. According to Prof Hugo he soon realised that his passion lay in “building, not mechanics”. He therefore switched to civil engineering, which at the time was still an emerging field at Wits, and received his BEng degree in 1958. In due course he completed a MEng degree (1969) from the then University of Natal, a PhD degree (1984) from the University of Texas in Austin, USA and a DEng degree (1997) at Stellenbosch University (SU). He was also registered as a professional engineer by the engineering boards of South Africa and Texas, USA.

He took his first practical steps when at the end of his third year he was asked to oversee a project at Winkelhaak Mine. Armed with only a cheque book and an order book, and driving a VW Beetle (according to a feature article written about him in 1993 in the *Civil Engineering* magazine) he managed the job successfully within three months.

After graduating, he received a permanent appointment at Rand Earthworks. Through its European parent company he worked for seven months at three Swiss construction companies in 1959. The experience instilled in him a lifelong belief in “quality first”, good planning, and the timeous and

thorough completion of projects. Upon his return to South Africa, he helped with construction work at Iscor in Vanderbijlpark and at the Western Deep Levels goldmine in Carletonville.

In 1962 Prof Hugo joined Van Wyk and Louw Consulting Engineers (now Aurecon) and helped to complete a concrete bridge over the Crocodile River near Malelane. He took his first steps in airport and pavement design, and geostructural design.

In 1965 he was a founding partners of Bruinette Kruger Stoffberg and Hugo (later known as BKS Eng; currently part of AECOM) and oversaw geotechnical, pavement and airport engineering projects. He helped to build Rand Afrikaans University (today the University of Johannesburg), and the Volkskas and Civitas buildings in Pretoria, major airports such as OR Tambo and Cape Town International, and smaller ones in Kimberley, at the Gariep Dam and Alexander Bay. In the 1970s he provided specialist advice to the then South African Army on the building of a road through the Caprivi, the George Airport and the Hoedspruit Airforce Base. He completed full-scale wheel load tests on desert sand at Alexander Bay – a field in which he became an expert and for which he developed new equipment.

Research years

After 19 productive years in industry, Prof Hugo accepted a position as professor in the Department of Civil Engineering at Stellenbosch University (SU). With that, Prof Hugo, his wife Marie (the couple has known each other since school, and have been married since 1956) and their three children relocated from Pretoria to Stellenbosch.

After retiring in 1995, Prof Hugo remained involved as emeritus professor in research projects until 2014. Thereafter he was appointed as research fellow of the Division of Construction Engineering and Management. After 20 years of service as fulltime director of the SU Institute for Transport Technology (ITT) he stepped down in 2010, but still served as vice director until 2012.

Most research projects and courses he was involved in centred on transport and pavement engineering and project management. His work as academic, researcher, contractor and consultant took him across Africa and Europe, and to the USA, Canada, and Israel.

Through relationships he cemented during his PhD years in the USA, he worked as a part time research fellow of the Centre for Transport Research at the University of Texas, Austin between 1989 and 2002. The Americans nicknamed him “Hurricane Hugo”, because of his energetic ability to do as much as possible in a day while making use of the different time zones he worked in.

Pavement testing

His doctoral research into the reasons why asphalt cracks become the focus of intensive studies at the ITT on accelerated pavement testing (APT) methods. Although mobile load simulators already existed, Prof Hugo set out to design more commercially viable and easily transportable models that could deliver accelerated road surface testing of the impact of vehicles on all terrains and in all weather conditions.

In this regard a quote by Louis Pasteur, which Prof Hugo has often used, comes to mind: “A prepared mind is favoured by chance”.

A patent for a unit that moves along wheels similar to that of an army tank was registered in 1991. The Texas Department of Transport was the first to order a full-scale model. Five years of intensive research and testing followed in the USA, after which the first commercial small-scale model, MLS3, was launched in 1997.

MLS Test Systems company was launched in 1998 in Stellenbosch to drive commercialisation efforts. In all of this he could not have asked for a better partner, Prof Hugo still says about his relationship with co-designer and mechanical engineer Johan Müller, the company's first president.

In 2005 and 2009 the full-scale MLS10 and MLS66 models were completed in Cape Town. More than 30 MLS units have since been sold and used in South Africa, China, Europe and the USA. The MLS10 model was for instance used in 2004 to evaluate main roads in Mozambique as part of a project funded by the World Bank, and later also in Switzerland.

Prof Hugo says that it has been one of the highlights of his career to have seen how the equipment of which he was co-designer was tested and put into practice across the world. Four laboratories were for instance built in China as part of related testing and experimentation. An MLS users alliance was established in 2017 at the first Beijing World Transport Convention, while the International Society for MLS (ISMLS) followed in 2018 in Pretoria.

After MLS Test Systems was sold in 2014 to a British company, PaveTesting, Prof Hugo remained in South Africa as its technical director and worked to well into his eighties to help develop further models. In 2017 in an article in *Engineering News* he described the technology behind the various models as a "great testament to South African ingenuity and skills".

Honorary doctorate

Prof Hugo is an honorary member of SAICE and the South African Academy of Engineers, a lifelong member of the Association of Asphalt Paving Technologists (AAPT), and a member of the American Society for Civil Engineers. In 2005 he received a Gold Medal in recognition of his work from the South African Academy for Science and Arts (also known as the "Suid-Afrikaanse Akademie vir Wetenskap en Kuns").

Of all the accolades that he has received over the years, he counts the honorary doctorate that SU bestowed on him in 2014 as "greater than the combined whole of all other awards". He says this is because it acknowledged the multi-dimensional nature of his work, and as such acknowledged his professional career as a whole.

Impact on young people

It is said that the telephone call that he received in 2014 with the news that he would be receiving the honorary doctorate left him speechless – not something that often happened! The citation read out at the ceremony did not highlight only that Prof Hugo produced leading products and entities, but also that at his core he is an educationalist who believes strongly that civil engineering "should ultimately be about people".

Prof Hugo for instance managed the Construction Management Programme (CMP) from 1987 to the mid-2010s, for which he received the President's Award for Exceptional Service from SAICE in 1994. The three-week long programme hones the management and other skills of future industry leaders and middle managers in the construction sector. After handing the baton over to Prof Jan Wium in the mid-2010s, Prof Hugo still served as CMP's advisory director until 2021. It was based at SU between 1984 and 2023, and is now organised by the University of the Witwatersrand.

With outside-the-box thinking Prof Hugo enthused and supported many young people to consider a career in engineering. He founded the then Southern Transport Centre of Development, which financed and mentored students in transport engineering at various tertiary institutes in the southern parts of South Africa.

In 1993 he was the first professor ever at Stellenbosch University (SU) to lead the South African Institute for Civil Engineering (SAICE) as president. During his term he initiated a television drama focusing on the profession. In a news article in the *Eikestadnuus* newspaper at the time he explained how he wanted to improve the image of engineering in this way and "introduce the citizenry and technology to each other." He said: "We need each other – as soon as you open a tap or switch on a light, you are part of the world of the engineer."

TRAC SA

He was the founding director in 1994 of Technology Research Activity Centre SA (TRAC SA), an American concept that he adapted to South African conditions and needs. With the help of dedicated facilitators, it has over the past 30 years provided supportive teaching in science and mathematics to Grade 11 and 12 learners, thanks to funding from industry and commercial partners.

Learners are supported to apply for university and student bursaries. Regular photographs on social media of former participants at their graduation ceremonies at SU and other South African universities show the success of TRAC SA's involvement. In 2008, TRAC SA received an award from the National Science and Technology Foundation (NSTF).

Debbey Olivier took over as director in 2006. Prof Hugo served as advisor until 2015. TRAC SA, which was established in the Department of Civil Engineering, now resorts under the SU Division of Social Impact and Transformation.

Sheer determination

Any idea or process takes time to bear fruit. It requires sheer determination, courage, mercy and grace to reach fruition, says Prof Hugo.

When in the early 2020s a stroke left him partially paralyzed, Prof Hugo with determination learnt to walk again. It was one of his biggest tests and challenges, he notes today.

"You do not necessarily realise how your life actually prepares you for something like that," he notes.

Youtube: [Prof Frederick Hugo Honorary Doctorate December 2014](#)

