Journal Comment

The School of Chemical and Metallurgical Engineering at the University of the Witwatersrand

Celebrating one's 21 year of existence is indeed a most joyous occasion, and another milestone in the history of Chemical and Metallurgical Engineering at the University of the Witwatersrand. Since its formation in 1995 through the merger of the departments of Chemical Engineering and Metallurgy and Materials Engineering as the School of Process and Materials Engineering, the School has gone from strength to strength. In 2005 'Chemical and Metallurgical Engineering' became the official designation of the School after ratification of the name change by the University Council. The School has been at the forefront of education and research in engineering and has contributed greatly to the demand for skilled manpower by the process, beneficiation, and metallurgical industries in South Africa. The School prides itself on its contribution in terms of human resources training and development, knowledge generation, and community involvement and contributions. A significant number of industry and academic leaders locally and worldwide are Wits Chemical and Metallurgical Engineering graduates and alumni.

Chemical Engineering at Wits can trace its origins back to the immediate predecessors of the University, *i.e.* the University College Johannesburg (Transvaal) and prior to that the South African School of Mines, both of which offered courses in Chemical Technology. When Wits was established, Chemical Technology courses continued and the first Bachelor of Science in Engineering (Chemical Technology) degrees were awarded in March 1922. After 1926 the courses were revised and the degree awarded from 1928 onwards was Bachelor of Science in Engineering (Chemical Engineering). Although the Chemical Engineering degrees have always been awarded in the Faculty of Engineering, responsibility for the courses lay with the Department of Chemistry and Chemical Technology from 1922–1927 and thereafter the Department of Chemistry and Chemical Engineering from 1928–1960. The first independent Department of Chemical Engineering at Wits was established in 1961 with Professor O.B. Volckman as its first Head. Thereafter Professor David Glasser, Associate Professor Donald Williams and Professor Tony Bryson acted as heads of department until 1995, when the School of Process and Materials Engineering was formed. Professor Bryson was also the first Head of the newly established school from 1995–1998. For a more complete history on Chemical Engineering at Wits, please consult Murray's book 'Wits: the Early Years' (Murray, 1982) and Harris's 'Chemical Engineering at the University of the Witwatersrand, Johannesburg' (Harris, 1983).

Metallurgy at Wits has an even longer history than Chemical Engineering and can trace its roots to one of the three founding departments of firstly the Kimberley School of Mines and, after the second Anglo-Boer War, the South African School of Mines, together with the departments of Mining Engineering and Geology. Both the latter are still independent Schools at Wits, and all three will celebrate their 120th birthdays in 2016. The Department of Metallurgy has grown substantially over the years since the appointment of Professor G.H. Stanley as the first Chair of Metallurgy and Head in 1904. He held this position for 35 years until his retirement in 1939 and was succeeded by Professor L. Taverner from 1940 until 1959. The establishment of the Minerals Research Laboratory in 1934, a joint venture between the State, the University, and the forerunner of the present-day Council for Mineral Technology (Mintek), gave research a strong boost. Both the departments of Metallurgy and Chemical Engineering benefitted from the research focus on the recovery of metals and minerals from ores, and both presented specialized courses in minerals processing and extractive metallurgy for third- and fourth-year students. While some courses were jointly presented, each department awarded its own degree and it was only with the formation of the School in 1995 that the full strength and synergy between the two departments in the field of minerals beneficiation could be fully exploited.

Between 1959 and 1962 Professor C.E. Mavrocordatos led the Metallurgy Department, followed by Professor D.D. Howat who took over from the beginning of 1963 until 1975. From then on the headship of the department became more of a rotating than a permanent position, with Professors G.G. Garrett, R.P King, P. Robinson, and R.H. Eric all acting as heads of department for selected periods of time. Professor Hürman Eric was the last Head of the Department of Metallurgy before its merger with Chemical Engineering to form the current School. He was subsequently also the second Head of the School of Process and Materials Engineering from 1999–2002. For more detail on the history of Metallurgy at Wits, consult Eric's descriptions (Eric, 2004, 2006).

In 2002 Professor Wolter te Riele took over the headship of the School until the end of 2003. Following a short period of four months during which Professor Eric was acting Head of School, Professor Herman Potgieter became the Head of the School and led the efforts to change the name of the School to reflect the traditional disciplines from which it originated. Following his departure in 2008, Mr Bob Tait acted as Head of School until June 2009 when Professor Sunny Iyuke took over the

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reins. Professor Iyuke headed the School until 2014, when the process commenced again to find a new Head. Professor Thoko Majozi steered the ship as acting Head of School in the last six months of 2014 until Professor Herman Potgieter returned in January 2015 as Head of School again.

The School currently has a total staff complement of 54, made up of 14 Chemical Engineers, 14 Metallurgists, 5 visiting temporary lecturers, 4 workshop personnel members, a team of 9 administrative staff, and 8 technicians and laboratory assistants. There are 755 undergraduate students, 240 registered postgraduate students (part-time and full-time) and 5 postdoctoral fellows currently studying and working in the School. The School hosts no less than three South African Research Chair Initiative candidates in the persons of Professor Thoko Majozi (Sustainable Process Engineering), Professor Selo Ndlovu (Hydrometallurgy and Sustainable Development), and Professor Rosemary Falcon (Clean Coal Technology) out of a total of 25 such chairs in the whole of the University of the Witwatersrand. In addition, Professor Jack Sigalas (Chair in Ceramic Science) and Professor Tony Paterson (Welding and Fabrication Engineering) hold endowed chairs from Element 6 and the South African Institute of Welding, respectively.

The School presents fully ECSA-accredited undergraduate programmes in Chemical and Metallurgical Engineering, as well as postgraduate MSc degrees on a 50% taught/50% research, or research-only basis in the specialization areas of Coal Studies, Pyrometallurgy, Minerals Processing and Extractive Metallurgy, and Advanced Chemical Engineering. The postgraduate programme in Oil and Gas Engineering (Petroleum) is unique in South Africa and cannot be followed at any other local university, while the postgraduate program in Welding Engineering is internationally accredited and offers a route to full registration as a Welding Engineer. PhD opportunities in all these areas are also available. The School has excellent ties with industry and in addition it offers consultation services over a wide spectrum for industry. The School prides itself on always being sensitive to the needs of industry and society in general, and updates its curricula and research accordingly in order to stay relevant and provide the latest knowledge to graduates. Current areas of research strength include pyrometallurgy, hydrometallurgy (Metals and Minerals Extraction and Recovery Group – MMERG), physical metallurgy of steels, stainless steels, Wo-Co hard metals, ceramics, and thermodynamic modelling in the research focus areas of Hard Metals and Stainless Steels as part of the Centre of Excellence in Strong Materials – CoE SM), welding, coal (Clean Coal Technologies Group), sustainable energy and environmental research (SEERU), water treatment, specifically acid mine drainage (AMD) (Industrial and Mine Water Treatment Research Unit – IMWaRU), nanotechnology, tribology, and process optimization.

We are proud of our history and our significant contribution to South Africa in terms of human resources development and delivering competent graduates for industry, as well as supplying fundamental and applied research to solve industrial problems and contribute to relevant technology. The School of Chemical and Metallurgical Engineering at Wits is well placed to continue at the forefront of teaching and research with a group of enthusiastic, efficient and dynamic staff consisting of a mixture of well-established and experienced academics and a group of young, developing academics. Despite difficult financial times and turmoil in the mining industry, we look confidently to the future in the knowledge that we shall continue to provide a home for future engineering leaders and inspiring innovation to give our graduates the edge!

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