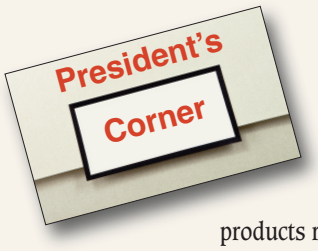

Within the Southern African Institute of Mining and Metallurgy, metallurgy is generally taken to refer to extractive metallurgy as this sphere of metallurgy represents those processes used for the beneficiation of run-of-mine ore. However, I believe that many SAIMM members do not realize that the metallurgy part also represents physical metallurgy. Physical metallurgy is the transformation of metal products into alloys and/or semi-fabricated products. The metal products resulting from the application of extractive metallurgy proceed to physical metallurgy processes. These can start with the production of alloys such as stainless steel, brass, and bronze, followed by semi-fabrication processes. Alternatively, the metal products are taken straight to semi-fabrication, usually via melting. Semi-fabrication processes cover the production of plate, rod, wire, pipe, and other intermediate products via casting, drawing, forging, rolling, and annealing.

The applications of physical metallurgy processes in South Africa are far more extensive than people realize. The most obvious is steel production as practised by Arcelor Mittal, Highveld Steel & Vanadium, and Scaw Metals, and stainless steel production by Columbus. The feedstocks to these production centres are all derived locally. On a smaller scale, but still an important contributor to the South African economy, are physical metallurgy processes associated with magnesium, aluminium, titanium, vanadium, chromium, manganese, cobalt, nickel, copper, zinc, cadmium, tin, tungsten, and lead. The application and development of physical metallurgy processes are critical to manufacturing. In particular, the fast-paced development of technology in consumer products such as computers, cellphones, tablets, and televisions is heavily dependent on physical metallurgy. While mining and extractive metallurgy provide the metals required for technology development, it is physical metallurgy that develops the processes that allow the utilization of the metals in technology-based appliances.

A considerable amount of physical metallurgy research is undertaken in South Africa, mainly through the CSIR, Mintek, and the universities. Government is a sponsor of this research through the Department of Science and Technology. The research is not only around developing new materials and new uses for existing materials, but also around improving physical metallurgy processes such as melting, casting, annealing, and forging. South Africa already produces a significant number of speciality metals on which this research is based. Quite soon South Africa will be producing rare earth element products, which are particularly critical for technology development.

Another important aspect of physical metallurgy is corrosion and corrosion protection. This affects our daily lives – rusting steel, peeling paint from metal surfaces, and stained/weathered metals, particularly copper, brass, and silver. Physical metallurgy explains the mechanisms of corrosion and allows the implementation of solutions to corrosion problems. The life of painted surfaces can be extended by the correct surface preparation, which differs for different metals. Steel can be protected by hot dip galvanizzing, and aluminium by anodising. A number of different metal surfaces can be protected using different forms of electroplating. The selection of the right materials for different corrosive environments, which is particularly critical in the mining industry and which relates to mining environments as well as metallurgical environments, is also essential.

I hope that this President's Corner will succeed in highlighting the importance of physical metallurgy, and that our physical metallurgist members realize that their Institute does understand and acknowledge their contribution to the mining industry and the economy as a whole

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M. Dworzanowski
President, SAIMM