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Conference Reports

MINING AND METALLURGY IN A CHANGING ENVIRONMENT

HARARE, ZIMBABWE
3 – 5 JUNE 1996

To celebrate their 10th anniversary, the Departments of Mining and Metallurgical Engineering, University of Zimbabwe, organised an International Conference to consider and exchange views on critical aspects of minerals and materials industries in Africa and elsewhere. The conference was sponsored by the German Agency for Technical Co–operation (GTZ) and was held on the University of Zimbabwe campus.

The theme of the conference was chosen because the world is going through a period of rapid changes and mining and metallurgy are no exceptions. This is demonstrated by:

- ⋆ Concerns for environmental protection and sustainable development are leading to increasing demand for environmentally friendly practices in mining and metallurgy, world–wide
- ⋆ Enthusiasm for mining and metallurgy is on decline in the North, while the African mining is entering a period of boom
- ⋆ Student and staff numbers in mining and metallurgy departments in the industrialised North have been contracting in the last several years; some departments have even closed are somewhat 'absorbed'. In Zimbabwe, two new mining and metallurgy departments are being developed.

The conference was attended by a sizeable number of delegates, both local and international. The majority of delegates were from institutions of higher learning so the presentations and questions asked were rather academic. The opening address was delivered by the Hon. Zimbabwean Deputy Minister of Mines Zenzo Nsimbi. The keynote address was given by N. Ncube from the Zimbabwean Investment Centre. He explained in investment climate in the mining sector in Zimbabwe and its great potential in the changing economic climate.

The opening and plenary sessions were held collectively, with mining and metallurgy combined. The theme was investment, Education and Training. After this, mining and metallurgy sessions ran in parallel. The metallurgical presentations were divided into four sessions, namely mineral processing, physical metallurgy/materials, pyrometallurgy and hydrometallurgy.

There were three post–conference tours to Makaha (Riverbed mining), Victoria Falls and Hwange Game Reserve (holiday resorts). The Makaha tour (220 km north–east of Harare) was the most intriguing as it showed the promotion of small

scale mining operations in Zimbabwe. The operation consists of about 4 km of river bed in which the principles of rehabilitation by mining are being practised. There were also hundreds of gold panners in the surrounding area.

The conference was well organised and the papers presented showed high research standard. Even though most of the presentations were too academic, they poised some intellectual stamina and the delegates who were reluctant to do research left with considerable challenge. The organisers did well to include some holiday resorts in the post–conference tours as this promoted the local tourist industry.

Stanford Dumbu
De Beers Diamond Research Laboratory
Johannesburg, South Africa

MINERALS AND MATERIALS '96

SOMERSET WEST, SOUTH AFRICA
31 JULY – 2 AUGUST 1996

The conference was held under the auspices of the South African Institute of Mining and Metallurgy, Western Cape branch. This was the third such an international meeting, the theme last year being Minerals and Materials. The venue was the Lord Charles Hotel in Somerset West, and the delegates came from as far as Spain, Zambia, Canada, Australia and China.

The conference was run on a parallel session basis. The minerals processing presentations were kept separate from the materials presentations. The papers on mineral processing covered the following broad areas: pyrometallurgy, coal processing, milling, gravity separation, flotation, hydrometallurgy, the environment, modelling and process monitoring. A common theme of the majority of the papers was the extensive use of modelling in describing various processes. There were only a few papers from industry, the majority being from the academic world.

As is customary of such international conferences there were three keynote lectures. Of interest to the readers of this journal is the paper by E. Forssberg on development and application of magnetic separation techniques in processing Swedish minerals. The paper was very specific on the use of magnetic techniques for the Swedish industry and did not give any global overview of magnetic separation in general. A minor criticism of the paper as this may have been a unique opportunity to dispel some of the magic that people associate with magnetism. The thrust of the paper was on recovery of fine particles of decreased magnetic susceptibility, in terms of fundamental research, comparative pilot scale separator tests and industrial applications.

Fundamental research covered the need for further studies into the characteristics of minerals for their magnetic properties for both sulphide ores and oxide iron minerals. The second area of research was the effect of pH on selectivity and its effect on ultrafine particle concentration. In order to optimise recoveries it has become important to integrate surface chemistry know–how into magnetic separation.

Recovery of ultrafine weakly magnetic particles is an area where improvements are continuously being sought. Ultrafines are defined as particles less than 10 μm and two interesting techniques were discussed. The first involved the use of "carrier" particles of a slightly larger size to promote coagulation during treatment. The second method focused on aggregation due to magnetic bonding induced by the application of external magnetic fields or the presence of remanent magnetisation.

Comparative pilot scale tests were made with five wet high intensity magnetic separators. These represented three distinct principles of magnetic circuit design with three different types of gradient generating matrices. The machines investigated were the Jones P71, Boxmag–Rapid SHW1, Reading 16–pole, Krupp–Sol 24/14 and Sala HGMS MkII using a mixture of ground heamatite and quartz as the test material. As predicted, each machine had its own advantages and limitations.

A similar comparison was made of four dry high intensity magnetic separators. They included Permroll supplied by Bateman USA, induced magnetic roll supplied by Humboldt Wedag of Germany. dry HGMS from Sala and High–Force from Inprosys in the USA. All were band type separators except for the Swedish model which uses a new recently developed air transportation system. This unit seemed to offer certain advantages in the finer size ranges.

Finally the applications of magnetic separation were discussed for three Swedish plants. The first one was the use of a single head carousel Sala HGMS to recover zinc lost in the lead concentrate. The results was to decrease the zinc content from 10% down to about 6% with little loss of other metal values. The benefit was tow–fold, a higher grade final lead concentrate to be treated in the smelter, and a higher grade zinc product by recycling the HGMS magnetic fraction to the zinc circuit. The other two applications related to the purification of kaolin clays and calcite to remove residual magnetic impurities.

George Dellas
De Beers Diamond Research Laboratory
Johannesburg, South Africa