SPOTLIGHT

on minerals research in the Western Cape

by J.S.J. VAN DEVENTER*

The 8th Annual University of Cape Town (UCT)/ University of Stellenbosch (US) Minerals Processing Symposium was held at the Van Riebeeck Hotel in Gordon's Bay on 3rd August, 1990, under the auspices of the Western Cape Branch of The South African Institute of Mining and Metallurgy. The primary object of this meeting was to give research students at UCT and US the opportunity to present their work to a critical audience from industry, and to obtain feedback regarding the research needs of the minerals industry. Although the emphasis of these symposia is on work in progress at US and UCT, they also create an excellent opportunity for informal discussion between academics and metallurgists in industry. The first symposium in this series was held in 1982 at US, while the symposium in 1989 was replaced by the International Colloquium on Developments in Froth Flotation, also held in Gordon's Bay.

The 1990 symposium attracted 97 delegates, of whom 38 were staff and students from US and UCT, 52 were from industry, and 7 were from other institutions. In the three technical sessions on hydrometallurgy, flotation, and modelling, 10 papers were presented, while 14 posters were displayed during the day. Delegates received a booklet containing abstracts of papers and posters.

The Annual Dinner of the Western Cape Branch was held at the same venue on the evening before the Symposium. The guest speaker was Dr O.K.H. Steffen, President of the SAIMM, who emphasized in an entertaining manner the necessity of environmental awareness in the minerals industry. Dr Steffen also opened the Symposium officially the next morning, and extended his appreciation to the Western Cape Branch for stimulating interest in the minerals industry among students. He also congratulated the organizers on the interesting and industrially relevant programme.

Technical Sessions

Dr M.A. Ford, Director of Hydrometallurgy at Mintek, delivered the keynote address on the historical development of hydrometallurgy, and referred to major advances in interstage screens for in-pulp technology, the elution of loaded activated carbon, and selective ion-exchange resins. He identified the following aspects to be important for research in the 1990s: chloride metallurgy, selective ion-exchange resins, destruction or regeneration of cyanide, containment of sulphur dioxide and arsenic, refining of precious metals by solvent extraction, continuous processing and control, and precipitation from the organic phase. Delegates debated the relative merit of these areas in the lively discussion that followed Dr Ford's address.

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In the first session, Mr P.F. van der Merwe (US) reviewed his research on the mechanism and simulation of the elution of gold from activated carbon, pointing out that AARL and Zadra elution can be modelled by the use of a generalized approach. Mr F.W. Petersen (US) explained that mass transfer to adsorbents was inhibited by blockage of the pores by organics and fine particles, as well as by temporary blinding of the resin or carbon surface by fine particles. Humic acid reduced the equilibrium loading of gold even at low levels of fouling.

All four papers in the second session dealt with column flotation. A portable column cell was used by Mr M.C. Harris (UCT) in on-line trials to show that significant quantities of gold could be recovered from the tailings streams of pyrite flotation plants. Mr S. von Holt (UCT) showed that virtually ideal separation of gangue from ultrafine feeds of Witbank coal could be achieved in column flotation. In an interesting paper on the scale-up of column cells, Mr P.J. Mills (UCT) developed a correlation for the effect of column parameters on the rate constant in the pulp zone. He found that bubble size had a substantial effect on mixing, which should be considered in scale-up. Mr P. Stonestreet (UCT) discussed the reverse column flotation of artificial mixtures of coal, quartz, and kaolin, as well as run-of-mine coals from Ermelo Colliery and Grootegeluk.

In the session on modelling after lunch, Mr T.J. van der Walt (US) explained quantitatively how the effects of incomplete leaching, preg-robbing, competitive adsorption, fouling of carbon, and distribution of carbon through a circuit can influence the efficiency of a carbon-in-pulp or carbon-in-leach plant. A two-dimensional stochastic model for the sintering of fly ash was proposed by Mr B. Ritter (US). In an interesting overview of expert systems, Mr J.J. Cilliers (UCT) explained that these systems still have many shortcomings, but that recent work in artificial neural networks appears to be promising.

Poster Presentations

Posters from UCT were reviewed by Professor J.-P. Franzidis at the end of the first session, while posters from US were reviewed by Professor J.S.J. van Deventer at the end of the second session before lunch. Two of the posters gave an overview of research activities in the Department of Metallurgical Engineering at US and the Department of Materials Engineering at UCT. Other posters from US presented research results on: (1) the mechanism of continuous elution of carbon, (2) the competitive adsorption of metal cyanides on carbon, (3) the optimal design of gravity-separation circuits by linear programming and expert systems, and (4) the application of expert systems to the modelling of hydrometallurgical processes.

The Department of Chemical Engineering at UCT displayed posters on the following topics: (1) Mass transfer of oxygen and carbon dioxide in bio-oxidation at high solids concentrations, (2) the flotation of coal using a combined air-sparged hydrocyclone and column cell, (3) the development of a Jameson type of column cell, (4) bacterial leaching on a rotating pyrite disc, (5) the use of dithiocarbamates in flotation as sulphide collectors, (6) an investigation into sulphur assaying, (7) the evaluation of industrial-scale air spargers for column flotation, and (8) the measurement of bubble sizes in air-agitated systems.

Panel Discussion

The technical proceedings ended with a panel discussion on 'The research needs of the minerals industry', chaired by Professor C.T. O'Connor (UCT). Members of the panel were Mr R.D. Beck (Gold Fields of SA), Dr M.A. Ford (Mintek), Dr A.K. Haines (Genmin), Dr B.K. Loveday (Anglo American Corp. Ltd), and Professor J.S.J. van Deventer (US).

Although the research needs of industry change continually, the view was expressed that universities need to concentrate on selected areas in order to establish centres of excellence. However, research should be useful to industry and aimed at reducing production costs. It is in the interest of the mining companies that their scholarship holders should remain at the universities to strengthen these centres of excellence, but the needs of production should always take first priority. Industry should realize that the cumulative effect of incremental innovations is sometimes more important than breakthrough innovations. An institution such as Mintek is necessary for the transfer of technology between university and industry. It was mentioned that the role of equipment suppliers in R&D and the transfer of technology is not always recognized. The panel felt that more research should be directed at environmental problems and the recovery of minerals from fine particles.

Acknowledgements

Frequently, the interactions between delegates during social functions are as important and valuable as attendance at the technical sessions. The Western Cape Branch of the SAIMM acknowledges gratefully the generous sponsorship of NCP Mining Chemicals, Simon-Carves Africa (Pty) Ltd, and S.A. Cyanamid (Pty) Ltd for the lunch and cocktail party. As in the case of many of the previous symposia, the generous sponsorship received from the SAIMM Council is highly appreciated by the Western Cape Branch.

At the cocktail party*

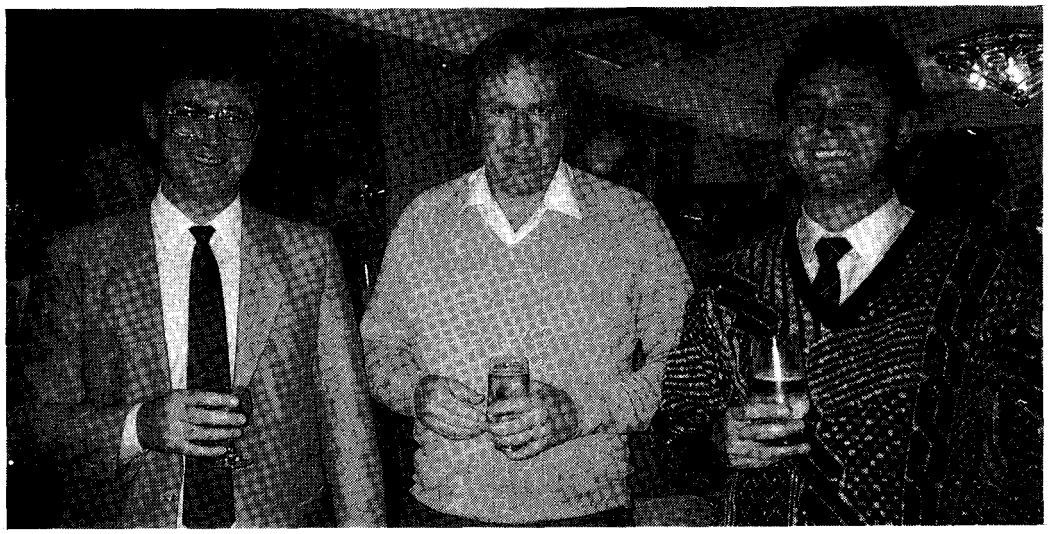
Richard Beck and Lionel Falcon (Gold Fields of SA) with Jan Cilliers (UCT)

* All the photographs read from left to right.

Theuns Botha (Chemserve Steinhall Ltd), with Elmarie Immelman, Jannie van Deventer, and Leon Lorenzen (US)

Cyril O'Connor (UCT) with Peter Radcliffe and Brian Loveday (Anglo American Corp.)

Francois Scholtz, Paul Botha, and André de Ruijter (Genmin)



Brian Broekman (Anglovaal), Peter Rowe (Freegold North), and Danie Bester (Chemserve Steinhall Ltd)

Wolter te Riele (Mintek) and Keith Anthony (US)

Respiratory-protective equipment

The South African Bureau of Standards has announced that legislation to safeguard workers against the use of inefficient respiratory-protective equipment in harmful environments came into effect on 22nd March, 1990. The legislation is based on a specification of the Bureau.

It is now an offence under the Standards Act to sell respiratory-protective equipment in South Africa that does not comply with the requirements of the specification. This applies to locally manufactured, as well as to imported, equipment.

The requirements of the specification also cover efficiency, performance, certain aspects of design, quality, and labelling.

Other equipment that does not provide any protection to the wearer and that is referred to as a nuisance mask or comfort mask is available commercially. This type of mask is also covered by the specification in so far as it is subject to stringent labelling requirements. The object of the labelling is to stop the use of this equipment in environments that are harmful to the respiratory system and that may even be dangerous, and to direct the worker and employer towards the use of the correct type of respiratory-protective equipment.