

them how things should be done and what can be achieved

The skills to be developed are

- (i) setting targets: with the approval of the contractor and to the satisfaction of the mine overseer
- (ii) getting the contractor to execute the plan used in setting the target
- (iii) persuading the contractor to accept labour standards
- (iv) utilizing the abilities of the team so as to achieve the best results
- (v) using one's own initiative to the

full and exploring all possibilities before going to the boss with a complete analysis of the problem

- (vi) the creation of a climate so that people want to work and want to further the objectives of the company.

## Colloquium on shaft sinking

A successful colloquium which was attended by approximately 175 people was held on Shaft Sinking on the 15th November, 1972 at Kelvin House. Four papers were presented.

The chairman for the first session was Mr W. W. Malan, Consulting Engineer, Goldfields of South Africa. The first paper "The influence of economics on the design of mine shaft systems" was presented by Mr H. M. Wells, Senior Lecturer in the Department of Mining Engineering, University of the Witwatersrand. He highlighted the various headings in his paper and stressed his reasons for arriving at a quadratic function in expressing total shaft cost in terms of the shaft diameter.

Mr V. O. Steed suggested that instead of spending more on shafts this could be spent on tunnelling and refrigeration, provided the shape of the mining area was suitable. In addition water spraying at and after blasting time could reduce refrigeration requirements. Mr Fuller-Good thought that the acquisition costs of the property should rank as capital expenditure in the designing of a shaft system. Mr D. A. Immelman thought that the D.C.F. rate of return method could be used as effectively in evaluating various shaft designs. In reply Mr Wells explained his reasons for choosing the P.V. ratio in preference to the D.C.F. rate of return method. Dr A. Taute felt sceptical at the thought of working out a mine in less than 20 years if capital expenditure was to be deferred as much as possible. He wondered if the practical life was not closer to 40 years, and asked if it was not better to have a shaft or mill bottleneck until it was definitely certain that the mine was capable of producing the required tonnages.

A contribution, "Raise and shaft

drilling, a continuing development" was presented by Mr Richard J. Robbins, President, The Robbins Company of Seattle, Portland, U.S.A., who illustrated with slides certain raise borers planned for the future. A film was shown of the 81 R Raise Drill, the most powerful built to date, in use on a 12 ft. diameter shaft at Hecla's Lakeshore property, Arizona.

The second session was chaired by Mr M. Barcza, Managing Director, Corner House Laboratories. During this session two papers were presented. The first, "A review of some aspects of shaft design" was presented by the authors Mr G. W. Holl and Mr E. G. Fairon, Managing Director and General Manager, Mining and Engineering Technical Services (Pty) Ltd. Slides were shown on the sinking of the twin shafts of the Cleveland Potash Mine, Yorkshire, and a shaft at a mine in Bolivia. The second paper "Design features of a deep level shaft" by Mr D. H. Hillhouse, Consulting Mechanical and Electrical Engineer, O.F.S. Mines, Anglo American Corporation, and Mr G. Lange, General Manager, President Steyn Gold Mining Company, was presented by the latter author who discussed some of the design features of the new No. 4 Shaft, President Steyn, from which mining will take place to a depth of 2 300 metres, below which inclines will be used.

A lively discussion on the papers presented up to this stage ensued, with several contributions from the floor. The merit of choosing between an incline shaft and a vertical shaft was discussed, and the question of whether the ventilation requirements or the hoisting capacity had a greater influence on the ultimate shaft size was debated.

After lunch, the session chairman Mr G. H. Grange, Technical Adviser, Chamber of Mines, introduced Mr M. H. Thompson, Goldfields-Cementation Co. Ltd., who presented his paper "Some aspects of shaft sinking techniques and shaft sinking contracts". Mr Thompson stated that years had elapsed without any major change in shaft sinking techniques and felt that a careful study was necessary to decide whether shaft drilling equipment should be introduced. The drilling and blasting cycle was the most expensive item in shaft sinking and some sort of drilling rig would have to be developed. The blowing over regulations were also very stringent and could possibly be relaxed with the introduction of impact-free explosives. He suggested improvements to tendering documents which he felt were loaded against the contractor; thought that the introduction of an arbitration clause could help in solving disputes; and that more attention should be given to specifications in shaft sinking contracts.

Mr J. J. Geldenhuis read a contribution by Mr P. M. Johnston who thought that improvements were required to the contract documents, and felt that contractors could best be used in sinking the first shafts on a property. Mr O. F. Rheeder suggested that there was scope for using a raise borer and then slipping to the final size. Mr A. N. Brown stressed the need for the more accurate drilling of holes and the possibility of using shaped explosives was raised.

The colloquium chairman Dr A. Taute, Technical Director, Goldfields, summed up the days proceedings. He felt that it was obvious that both ventilation and hoisting capacity largely governed the size of shaft,

but that the handling of men and material could be a predominant factor in certain cases, and would certainly be of more importance in the future. He stressed that each particular case had to be considered

on its merits and that shaft sinking could not be standardised. Shaft sinking contractors were ideally suited to sinking shafts in new areas, and some of the disputes were possibly

due to the contractors encroaching on the mining companies environment. Finally he agreed that the concept of raise boring would play a significant role in future shaft sinking.

## Visit to the Modderfontein factory of A. E. & C. I. Ltd

23rd November, 1972

A full programme was arranged to suit both the mining and metallurgical sections of the Institute. After refreshments were taken and visitors welcomed by the factory management we were split into two groups, viz metallurgical and mining.

The metallurgical group first visited the ammonia and nitric acid plants which feature prominently in the making of ammonium nitrate for explosives manufacture.

They were then taken to the metallurgy section of the engineering department and shown how the quality of new materials of construction is tested. On the preventive maintenance side, non destructive testing methods as applied to existing plant were also demonstrated.

The mining group was shown safety fuse and ignitercord manufacture where 1 000 000 metres of fuse and 600 000 metres of ignitercord of all types are manufactured daily. They were then taken to the engineering research department where machines for automating electric detonator and capped fuse manufacture were demonstrated.

Trucks for the on site mixing at large quarry sites of ammonium nitrate/fuel oil explosive on the one hand and slurry explosive on the other were available for our inspection.

Cartridged slurry explosive for use in small diameter holes was demonstrated; this explosive, like Anflex is relatively insensitive to impact and friction but differs in having a dense pliable composition

of high bulk strength that is resistant to water.

As a means of demonstrating the practical significance of the impact insensitive explosives presently being researched by A.E. & C.I., a demonstration was witnessed in which a rock drill was used to drill into such an explosive, without initiating the 150 g charge.

A buffet lunch amidst the pleasant surroundings of the Modderfontein golf club was enjoyed by all present and after a busy morning, members were afforded the opportunity of spending the afternoon relaxing at golf, tennis and bowls.

The day's proceedings were concluded with a sun-downer party at which the opportunity was provided to discuss the many and varied activities carried out by our hosts.

## Book review

**Stress-relief Heat Treatment of Vanadium Steels** by Dr G. D. Joy and Dr A. M. Sage (21 pp, 77 references).

This booklet reviews most of the recently published literature on the subject of stress-relief cracking and embrittlement of steels (mainly the Cr-Mo, Cr-Mo-V and Ni-Cr-Mo-V types) that are used for pressure vessels and other structures called

upon to withstand high working temperatures/pressures.

It is shown that, although the literature does not provide a complete explanation of these two phenomena, they can be avoided in many cases by proper attention to process parameters such as: structural design, number of welding runs, and preheat and stress-relief heat-treatment conditions. In other cases, the

answers to the problem are not to be found in published work, and therefore the review indicates topics on which further investigation is required.

Copies are available free on application to: C. Vaughan, Publications Manager, Highveld Steel & Vanadium Corporation Limited, 7 Rolls Buildings, Fetter Lane, London, EC4A 1HX.