

## Book reviews

**Fiftieth Annual Report (1971) of the Safety in Mines Research Establishment, published by H. M. Stationery Office, London on behalf of the Department of Trade and Industry.**

The importance of publications, with particular reference to safety, is recognised throughout the scientific and technological community. In the field of mine safety there is a special need to communicate the results of research not only to other research workers but to all levels in the industry. The Safety in Mines Research Establishment 1971, Fiftieth Annual Report in no way detracts from these ideals.

It can be safely said that the National Coal Board has been pursuing a policy of steady development in mechanisation and automation with the object of saving manpower. As mechanisation in industry advances, the necessity for the production of safer equipment and recommendations governing its design has always been foremost in the minds of the staff of the Safety in Mines Research Establishment.

It may well be said that all research pertaining to mines in Great Britain may have a bias towards coal, but as research in the United Kingdom is given greater impetus with the object of its application in practice, the Fiftieth Annual Report will be of great value as a reference volume to mining and industrial engineers throughout the world.

The Safety in Mines Research Establishment has developed from the original Mining Dangers Research Board which concentrated, initially, on research into the incidence of explosions and mine fires. From 1926 onwards research into engineering and metallurgical problems was added to its syllabus. At that time tests of mine supports concentrated mainly on the study of the properties of mine timber, a far cry from the testing of the sophisticated supports in use on the mines of to-day.

The Safety in Mines Research Establishment, besides being a research organisation, is also the official testing centre of all equipment used in the mining and engineering industries in Great Britain, including

the research and test work on health hazards associated with airborne dust.

As the research establishment has, since its inception, led the field in investigations into the inherent hazards associated with coal-dust and methane gas, it can be gleaned from the report that this field is particularly well covered in the aspects of the detection and the prevention of explosions. The mechanics and properties of potential sources of ignition are continuously being investigated, with the accent being placed on the design and implementation of underground equipment and excavations. The strict application of the recommendations of the Research Establishment have certainly borne fruit, and it is recorded with pride, that for the fifth year in succession no deaths have been caused in coal mines due to explosions of either coal-dust or methane.

Investigations into the cause, detection and prevention of underground fires are carried out on a large scale, with particular emphasis being placed on the design of effective rescue apparatus. As more attention is being paid to the dangers of underground fires it is noted that only thirty-eight incidents were reported throughout the United Kingdom during the year, considerably less than the numbers reported in previous years. For comparison some fifty-six fires were reported on the mines in South Africa during the same period. The dramatic reduction in the incidence of underground fires in England could be attributed to the application of the recommendations of the Research Establishment.

The cutting of rock under laboratory conditions with the use of high pressure pulsating water jets has continued, providing useful information on the factors influencing the efficiency of the rock-fracturing process. Experimentation has been carried to the point where a transportable cutter will be used in open-cast operations in the near future.

Advances have been made in the development of instruments for the determination of quantities of res-

pirable dust. These instruments, whose operation is based on the principles of polarisation of light and lightscattering techniques, have reached an advanced stage of development, and field trials were to be initiated in 1972.

Investigations have been carried out into the corrosive and fatigue properties associated with the connection of winding ropes to hoisting conveyances, with the object of promulgating standard specifications. Recommendations for the utilisation of hydraulic support props have been up-dated following the introduction of modern designs.

The Safety in Mines Research Establishment have been examining the possibility of devising a non-wired underground communications system utilising the induction component of electromagnetic waves, which it is hoped, would solve the problem of communication with persons trapped beyond falls of ground. Experiments have shown that with the portable receivers presently available communication is possible over distances up to 200 metres in some rock formations.

The close investigations carried out in respect of mine accidents has revealed a host of preventive measures covering all accidents which may occur in mines or industries.

The booklet provides rapid reference in respect of more comprehensive information about current investigations, recommendations and literature available pertaining to the development of safe practices in mines, not only in the United Kingdom but also, as a result of the international collaboration in the field of mine safety, those ideas evolved in European mines and the United States of America are available.

The book is entirely suitable, as is intended, for engineers in the mining, mechanical and civil professions, as it carries comprehensive lists of research reports, general industrial safety aspects and references pertaining to all aspects of safety which engineers encounter in their daily duties.

L.v.d.B.

### **Advances in extractive metallurgy and refining.**

This excellent volume, published by the Institution of Mining and Metallurgy, contains all the thirty papers presented at the International Symposium held in London in October, 1971. It covers a wide range of subjects, and the papers are of high quality. It contains something of value for every worker in the pyrometallurgical field, but unfortunately not a great deal for workers in other branches of extractive metallurgy.

The book is arranged in nine sections, each covering one of the sessions of the symposium. Each session dealt, as far as possible, with a group of related subjects, so that the subject matter is presented in a convenient form.

In the first section are papers containing the latest information on continuous copper smelting — converting processes, and the slags produced. Next are equilibrium studies on various pyrometallurgical processes followed by three papers on hydrometallurgy. One session was devoted to fuel/energy sources, including papers on formed coke, iron-carbon composites, and plasma and other high-temperature technologies.

The fifth session dealt with pneumatic processes in pyrometallurgy, and the sixth with the use of oxygen and with molten salt electrolysis. Papers on process control in smelting plants were presented in the seventh session.

In the eighth session, new and improved techniques in recovery of aluminium, magnesium, zinc and sulphur were described. In the ninth and last session, "recovery of values" in three plants was dealt with. This general title included papers on recovery of metals from secondary copper slags, on the zinc-lead blast furnace, and on heat recovery in plants of the Outokumpu Oy.

Of the papers presented, twenty six dealt with pyrometallurgical processes (including three papers on electrolysis in molten baths), four with hydrometallurgical processes, and none with mineral dressing. This presents an interesting picture of the "state of the art". It might be expected that the enormous and increasing tonnages of low-grade ore treated initially by mineral dressing

techniques would result in advances in this field. Similarly, with the current outcry about atmospheric pollution, significant advances in hydrometallurgical processes might be anticipated. It appears, however, from this symposium that ninety per cent of the advances in extractive metallurgy are in the pyrometallurgical field — a rather surprising situation.

This book is recommended for all metallurgical bookshelves. Obtainable from the Institution, 44 Portland Place, London W1N 4 BR, price £12. H.P.C.

### **Electric Melting Practice by A. G. E. Robiette, Charles Griffin and Co. 412 pp.**

In recent years the application of electric furnaces to melting processes has expanded to such an extent that it has become a topic in its own right, quite distinct from the related subject of electric smelting which is still limited, for the most part, to those areas where inexpensive electrical power is available.

In his capacity as a consultant, Dr Robiette has been involved with its divergent aspects and has been able to witness plant practice in many parts of the world. As a result his book is not only authoritative but contains a wealth of practical knowledge drawn from the various disciplines involved. Arc furnaces (direct and indirect) are discussed not only for their metallurgical significance but also from the standpoint of the electrical engineering involved. Although these types form the most important industrial usage, the more specialised techniques involved in the operation of consumable-electrode furnaces, various induction furnaces and methods for fusion of refractory oxides are also covered. The text is thoroughly up-to-date with sections on electron-beam melting, electroslag refining and plasma furnaces, including torch design.

Diagrams and illustrations depict not only furnace types, but ancillary equipment and circuitry used for control purposes, while the numerous tables give useful information on the dimensions and outputs of various items. Modern technology is changing the melting process from art to science and for this reason the book

will be useful to manager, engineer and student alike.

W.G.L.

### **Optimum use of manpower by A. J. van Zyl.**

The sixties represented one of the longest periods of sustained economic growth South Africa has experienced. At the same time it caused a certain amount of inflation and an acute manpower shortage. Developments were too fast for making available sufficient trained manpower. During the seventies skilled people will be scarce in most countries, especially on the higher levels.

Increased immigration, the employment of economically inactive women, and the fuller use of all sections of the population, may contribute to the solution of our manpower problem but the major contribution will be made through education and the aid of two giants of our century, science and technology. If they can be made to work for us, we shall go a long way towards solving our problem, but this means more concentration on education and training and specially on science, technology, technical training at all levels and in many fields.

Because of the availability of so-called cheap manpower, many industrialists resorted to an increase of workers in order to increase productivity. But this is a false approach because doubling the workers means doubling the mouths to be fed and the houses to be built and therefore not necessarily raising the standard of living.

If however, the same number of people can be made to produce more by making use of science and technology, productivity will increase and inflation slow down.

It is obvious therefore that we need more tertiary or higher education. Australia had the same problem and decided that the universities could not cope with the problem because their approach was too academic and the failures too high. Therefore they decided to concentrate on the institution of colleges of advanced education. South Africa followed a few years later in 1968 but while Australia was creating new colleges South Africa created more

universities. While Australia raised the status of the colleges, the gap between college and university status in South Africa widened e.g. as regard salaries, capital expenditure, etc. Because colleges for advanced technical education offer career-oriented tertiary education, the approach is more concrete and more students can achieve success at the tertiary level.

The better use of our manpower is dealt with in a most interesting way in a new publication "Optimum use of Manpower" by Dr A. J. van Zyl, Director of the Pretoria College for Advanced Technical Edu-

cation. The 362 pages of the book are packed with illustrations, graphic representations in two colours and interesting information. The use of manpower in ten other advanced countries is analysed and on the basis of a model practical suggestions are made to solve our manpower problem. The book shows clearly that in a technologically advanced country the quality of workers instead of the quantity should improve. It deals with manpower problems at different levels, the artisan, the technician, the engineer and the manager. There is a useful chapter on the financial implications

of education and training. This book should be of interest to men in industry, commerce, education and government.

Manpower should be planned on a national scale so that priorities in education and training may be determined. All industrial planning should include planning for education and training, because trained manpower is not readily available and may take years to produce. But it is important that a healthy balance is maintained between general and vocational education.

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