The Institute of Lighting Engineers of South Africa

The Institute of Lighting Engineers of South Africa (ILESA) was constituted in May 1972 and now has over 70 members. The first Annual General Meeting was held on 15th August, 1973, at the Philips Auditorium, when the first presentation of membership certificates was made. The President reported on the successful meetings held during the year, including two at which papers were presented by prominent overseas speakers. The Symposium on Street Lighting, held in February jointly with the S.A. National Committee on Illumination, was attended by over 80 delegates, including some from Rhodesia and the Cape, and is to be repeated in greater depth in February 1974.

ILESA has been active in the educational field and assisted in arranging a course in Lighting Technology at the Witwatersrand College for Advanced Technical Education. In May 1973, eleven candidates who had taken this course sat for the examination of the City and Guilds of London Institute, and all the students succeeded in obtaining the certificate, with five distinctions and five credits. The course is being repeated in 1973-74.

For students unable to attend this course, ILESA hopes to offer a correspondence course of about twenty lessons if there is sufficient support. The cost would be R40-50, and anyone interested is invited to contact the Secretary.

A two-week summer-school course at the University of Cape Town in January-February 1973 conducted by Dr H. D. Einhorn was attended by nineteen students. It is hoped to arrange further courses of this type as the need arises.

ILESA is open to all who are concerned with lighting and ancillary sciences, whether in research, design, planning, production, sales, or administration, either as corporate or affiliate members. Anyone who is interested should write to The Secretary, ILESA, P.O. Box 61552, Marshalltown, 2107, for further details.

Book Reviews

Der Hochofenprozess. Das kinetisch-dynamische Simulationsmodell des Vereins Deutscher Eisenhüttenleute. Düsseldorf, Verlag Stahleisen M.B.H., 1973.

In 1965, a major collaborative effort was initiated by the Vereins Deutscher Eisenhüttenleute (Association of German Blast-furnace Personnel) to study the possibilities of developing a kinetic-dynamic simulation model of the blast furnace that could be used in a quantitative assessment of new ideas and systematic continued optimization. The model was intended as a mathematical model that would build up on scientific, exactly defined, measurable parameters (especially in the spheres of thermodynamics, reduction kinetics, heat transfer, and flow dynamics), and that would use few empirical data. In December 1971, the decision was made to hold a congress in which the various participants delivered papers on their particular research topics. This book reproduces these papers and the respective discussions, and is therefore representative of present knowledge on the mathematical modelling of the blast furnace.

The book opens with an account of studies on the development of models for the various aspects of blast-furnace operation. The relation between the reactions in the blast furnace and the three transport phenomena for heat (i.e., conduction, convection, and radiation) is defined in terms of an energy balance for a volume element.

The specific consumption of coke is significantly affected by the usage of gas in the shaft of the furnace. The reduction kinetics are assumed to be a function of temperature, particle size, degree of reduction, and reduction gas. Results have shown the significant effects of hydrogen. The reduction process is characterized mathematically on the assumption that reduction takes place in a series of steps: namely, gas diffusion through the adhering layer, gas diffusion in the pores of the ore, and the reaction at the oxide/gas phase boundary.

The gasification of the coke is examined from fundamental principles, and a new quantitative relationship is proposed.

Softening of the burden and incipient fusion affect the ratio of indirect to direct reduction, and fusion is associated with an increase in the activation energy for reduction. Experiments have shown that the appearance of fluid phases occurs from 1200 °C, and sufficient time is available for all the subsequent reduction steps, except the reduction of SiO_2. Because the reduction of SiO_2 is relatively slow and the kinetics are strongly temperature-dependent, the reduction of SiO_2 has to be considered in the derivation of any model describing the blast furnace.

It is shown that the distribution of raw materials in the shaft to relatively low levels is dependent on the method of feeding. A considerable portion of the work on gas flow in the burden has been completed, but a final quantitative analysis has not been achieved.

Several extensive data-logging campaigns were undertaken on a number of blast furnaces to permit the correlation of plant data with data calculated from fundamental principles. The results show that present-day knowledge of the thermodynamic-kinetic model is already sufficient to forecast the behaviour of the blast furnace in many instances. It proved possible to interpret the change in parameters as measured on a blast furnace while the temperature of the air blast was increased from 1120 to 1260 °C in terms of proposed models, and while the furnace was stopped and started.

The paper completing the sections on the derivation of various models for specific aspects and the correlation of plant data with various proposed models is one that strives to illustrate, firstly, just how far the objective of deriving a kinetic-thermodynamic model has been achieved and, secondly, to illustrate the problem areas in the derivation of a complete model and its present limitations.

The several very interesting papers that follow contribute to the topics discussed in the first half of the book, but the range is wider and includes mathematical and experimental simulation of the blast-furnace stack region, the influence of hydrogen additions to CO-containing gases on the reduction of iron ore, investigation of the coke combustion and coke size in the race way, comparison of reaction kinetics of coke prepared by different techniques, and the simulation of the SiO_2 reduction process.

The final chapter is particularly useful for gauging the importance of modelling. It presents several models that are at present being used in the industry in the selection of appropriate industrial trials, study of process dynamics with a view to process control, and simulation of the causes of blast-furnace incidents. These models represent current thinking in the Netherlands, Japan, West Germany, Belgium, France, Great Britain, and Italy.

In the final analysis, the Chairman of the Congress states that the application of the simulation models at least permits the asking of definite questions that are important to an understanding of the blast-furnace process, although this particular point may not be of much interest to blast-furnace personnel. Further, this work on the modelling of the blast furnace has permitted the definition of specific areas in which further fundamental and applied research should be conducted. A final serious question posed by the Chairman concerns the extent to which a model should be developed in relation to its anticipated value.

P.R.J.

Jones, M. H. and Woodcock, J. T. *Ultraviolet spectrophotometry of flotation agents with special reference to the determination of xanthate in flotation liquors.* London, Institution of Mining and Metallurgy. 1973. 25 pp. £2,50.

The xanthate ion has a characteristic, and simple, absorption spectrum in the ultraviolet region. The absorption at 301 nm is extremely sensitive and is in a region where measurements can be conveniently and accurately made. For well over a decade, workers in the field of flotation have exploited this characteristic of one of the most important classes of flotation reagents. It provides a simple means of determining xanthate in concentrations of the same order as those used in flotation systems, and is now employed almost universally for this purpose in fundamental studies. Its potential as a means of controlling the addition of collector to full-scale plants has been widely appreciated, and many attempts have been made to apply spectrophotometry either in on-line monitoring systems or in feed-back control loops.

In this publication, Jones and Woodcock provide an exhaustive and very useful treatment of the spectrophotometric determination of xanthates in the type of environment that might be encountered in flotation pulps. The major portion of the publication is devoted to the results of their own laboratory testwork, most of which have not been published previously. They describe the four variations of the spectrophotometric procedure that they used in the determination of xanthates. The development of these variants was necessary as a way of overcoming interference from dissolved or suspended foreign materials in the solutions, and in essence they all involve the comparison of the absorption of the solution before and after its xanthate content is destroyed by treatment with acid. They go on to discuss the ultraviolet spectra of an extremely wide range of substances—flotation frothers, collectors, flocculants, filtration aids, inorganic solids, depressants, and other reagents—and present the results of tests that show how satisfactorily xanthate can be determined by each of their four methods in the presence of these materials. Their obvious intention is to deal with all classes and chemical types of reagents that might possibly be found in sulphide flotation pulps and that might therefore interfere in the determination of xanthates by spectrophotometry.

They succeed very well in this goal. The only relevant substances that they have neglected are the alkyl mono- and trithiocarbonates, which can occur either as impurities in commercial xanthate reagents or as reaction products in solution. The results presented show that, if an appropriate spectrophotometric procedure is used, only cuprocyanide interferes. Some difficulty might be experienced with cuprocyanide in concentrations above 20 p.p.m. The most serious possibility of interference, and one that does not seem to have been fully treated by the authors, is that from suspended solids.

This publication, with its completely empirical approach, will not satisfy the purist who is interested in the spectrophotometry and the chemistry of flotation reagents, but then it is probably not directed at the purist. What it does do is provide a mine of valuable information for anyone who has an interest in the determination of xanthate concentrations in flotation pulps. From this point of view, it is a valuable contribution to the literature, and it may well become an essential reference work for those interested in the control of flotation circuits.

It is not clear why the paper, and it is just that—a paper principally devoted to the presentation and discussion of original research results—should have been published as a separate 'book' rather than as part of the *Transactions* of the Institution. It seems to this reviewer that, by presenting the material in this form, the publishers have made it a trifle more likely that those who use the literature will miss it. This is a pity because it is not one of those papers that is best forgotten.

N.P.F.

Notice

VI INTERNATIONAL CONGRESS OF ENGINEERS

The above congress is to be held in Barcelona from 6th to 10th October, 1974. The theme is *Creativity and Innovation, a Worldwide Challenge to the Capabilities of Engineers*, and the congress is to be divided into the following sections:

Technological creativeness as an outstanding activity of man

Problems of creativity and innovation in education

Creativity and innovation in industry

Socio-economic implications.

Enquiries should be directed to: Associación Nacional de Ingenieros Industriales, Agrupación de Cataluna, Via Layetana 39, Barcelona 3, Spain.

NIM reports

The following reports are available free of charge from the National Institute for Metallurgy, Private Bag 7, Auckland Park, 2006.

Report No. 1568

A computer programme for the estimation of parameters in flotation.

This report describes a computer programme for the estimation of parameters in the model that is used to predict the performance of any flotation plant. The confidence limits for the parameter estimates are also provided by the programme. Data from an incremental batch test or from the rougher and cleaner cells in a continuous plant can be used for the estimation. A method is given for the testing of various hypotheses concerning the parameters to give the characterization of a slurry that is both adequate and significant.

Report No. 1571

The commissioning of a direct-reading spectrometer for the analysis of silicate rocks by use of the graphite-pellet technique.

A number of relevant factors concerning pellet preparation, pellet surfacing, excitation parameters, preburn time, and spark geometry were investigated and assessed, and a set of calibration graphs was prepared for a group of twenty-five standard samples. The various element lines were assessed, and, where necessary, appropriate corrections were applied for spectral interferences. The method was shown not to be as accurate as classical chemical analysis, but it requires considerably less time and is therefore less costly. The accuracy of the method is 100 $\pm$2 per cent. The details of the procedure are listed in an appendix.

Report No. 1579

The determination of tin in geochemical-survey samples.

A rapid method for the determination of tin in geochemical-survey samples, based on the procedure used by the Geological Survey of Canada, has been investigated. This method involves the sublimation of tin as stannic iodide, the sublimate being dissolved in hydrochloric acid. The concentration of tin in the hydrochloric acid leach liquor is determined by visual comparison with known standards, gallein being used as the chromogenic agent. The use of spectrophotometric analysis, instead of visual comparison, was found to offer no advantage with respect to precision and time of analysis. So that the time of analysis would be reduced, a special fusion apparatus with a cooling jacket was constructed to take nine samples and a blank. When the visual-comparison procedure is used, the coefficient of variation at the 95 per cent confidence limit is approximately 20 per cent, and fifty samples can be handled in slightly more than three hours.

Report No. 1587

A preliminary investigation of the flotation of copper-activated sphalerite without the use of collectors.

Although non-activated sphalerite cannot be floated without the use of collectors, it is shown that this is possible once the sphalerite has been activated with either copper or silver ions. Elemental sulphur in any of its normal allotropic forms does not play a role in this flotation.

The major factor affecting the collectorless flotation of copper-activated sphalerite is the extent of oxidation of the sphalerite both before and after activation. Oxidizing agents such as $KMnO_4$ or $K_2Cr_2O_7$ were found to be the best depressants for collectorless flotation, which does not appear to be affected by the source or composition of the sphalerite used.

Report No. 1589

Preliminary investigations into the flotation of tin dioxide, cassiterite, and some related gangue minerals.

There is a conflict in the literature about the floatability of pure tin dioxide with cassiterite collectors. Some workers have found that ferric activation is necessary, whereas others have reported that ferric activation hinders flotation.

The results of the present investigation show that the flotation properties of pure tin dioxide samples depend on the crystallinity of the samples. The more crystalline samples were found to have good flotation properties, whereas the less crystalline samples required ferric activation before flotation could be achieved.

The differences in the literature are consistent with the theory that samples used by different workers varied in crystallinity.

Professional engineers

Reference (18/19/1) 22nd November, 1973

Dear Sir/Madam,

From time to time questions are being asked publicly concerning registration of professional engineers. These questions mainly concern the time it takes to finalise applications, especially those of applicants who do not hold a recognised engineering qualification.

Remarks have also been passed that the South African Council for Professional Engineers (SACPE), to which the task of registration has been assigned, with few exceptions only register graduated engineers.

What is the actual situation? The Professional Engineers' Act (Act 81 of 1968) under which SACPE received its mandate, stipulates the acquisition of a recognised qualification together with engineering work of sufficient variety and satisfactory nature as prerequisites. As a transition measure, exemption from the qualifications requirement was granted, provided that sufficient experience has been gained prior to 1969. The principle, therefore, is that persons who were engineers in the real sense of the word prior to 1969, graduated or not, were registered.

At the time of notification that applications for registration were being awaited, it was clearly stated that the registration fees of unsuccessful applicants would be refunded which has been done. This proved an encouragement to potential applicants, and the grand total of 12 000 applications was received up to the end of August, 1973, of which approximately 50% were from non-graduates. The merits of these applications varied over a very wide spectrum. In many cases it was clear that the abuse of the term "engineer" in the past encouraged some applicants with a totally inadequate background to venture an application.

Full consideration had to be give to every application to maintain a just standard. Applications were dealt with by the Council's Advisory Committees and thereafter by its Registration Committees which, to date, have met some 250 times. This work has been done by Members and Alternate Members of the Council and its Committees in their own time and without remuneration of any kind whatsoever. The fact that the task took almost 4 years to complete is a measure of the thoroughness with which cases were considered.

Up to the end of August, 1973, 5236 graduated engineers and 1090 engineers in training have been registered, against 1571 professional engineers without a recognised qualification, while 4480 applications were refused. The latter applicants were, nevertheless, given the opportunity of submitting further information for reconsideration if they so wished, and these cases were or are still being considered.

It is obvious that persons without a recognised qualification constitute a significant percentage of all registered professional engineers.

Furthermore applicants who were unsuccessful, are being given the opportunity to qualify through external studies and to attain graduate level via an alternative route. By so doing, the able person, who lacked experience prior to 1969 for the purposes of registration, can attain the required status. Having due regard to its responsibilities towards the public in connection with the standard of ability which can be reasonably expected from a professional engineer, the Council aims to provide the opportunity via this route to obtain professional status.

Yours faithfully,

M. R. GERICKE Pr.Eng.

President

Professionele ingenieurs

Verwysing (18/19/1) 22 November 1973

Geagte heer/dame,

Van tyd tot tyd word daar vrae in die openbaar gestel oor die registrasie van Professionele Ingenieurs. Vrae gaan veral oor waarom dit so lank neem om aansoeke af te handel, veral van aansoekers wat nie 'n erkende ingenieurskwalifikasie besit nie.

Aanmerkings is ook al gemaak dat die Suid-Afrikaanse Raad vir Professionele Ingenieurs (SARPI) aan wie die taak van registrasie opgedra is, met min uitsonderings slegs gegradueerde ingenieurs registreer.

Wat is die ware toedrag van sake? Die Wet op Professionele Ingenieurs (Wet 81 van 1968) waaronder SARPI sy mandaat verkry het, vereis 'n erkende kwalifikasie en ingenieurswerk van voldoende standaard en verskeidenheid vir registrasie. As oorgangsmatreël was vrystelling van die kwalifikasie verleen, mits voldoende ingenieurservaring voor 1969 opgedoen was. Die beginsel is dus dat persone wat ervare ingenieurs in die ware sin van die woord was voor 1969, gegradueer of nie, geregistreer was.

By die bekendmaking dat aansoeke vir registrasie ingewag word is dit duidelik gestel dat onsuksesvolle aansoekers se registrasiegeld terugbetaal sou word, wat veel daar toe bygedra het dat tot Augustus 1973, die groot totaal van 12 000 aansoeke ontvang is. Hiervan was ongeveer helfte nie-gegradueerdes. Die meriete van hierdie aansoeke het gewissel oor 'n besonder wye spektrum. In baie gevalle was dit duidelik dat die misbruik van die term „ingenieur" in die verlede sommige aansoekers met 'n totaal ontoereikende agtergrond aangespoor het om 'n aansoek te waag.

Volle aandag moes egter aan elke aansoek gegeee word om 'n regverdige standaard te handhaaf. Gevalle is deur die Raad se Adviserende Komitees behandel en daarna deur beide sy Registrasiekomitees wat tot op datum sowat 250 keer vergader het. Hierdie werk is alles sonder vergoeding van enige aard deur lede van die Raad en Komiteelede in hulle eie tyd gedoen. Die feit dat dit tot vier jaar geneem het om die taak af te handel is 'n maatstaf van die deeglikheid waarmee die gevalle oorweeg is.

Die resultate tot Augustus 1973 was dat 5236 gegradueerdes as professionele ingenieurs en 1090 as ingenieurs-in-opleiding geregistreer is, teenoor 1571 as professinele ingenieurs sonder 'n erkende kwalifikasie, terwyl 4480 aansoeke afgekeur was. Laasgenoemdes is nogtans die kans gegee om verdere inligting te verstrek indien die aansoek heroorweeg moes word en sulke gevalle was of word tans oorweeg.

Dit is duidelik dat 'n betekenisvolle persentasie van alle geregistreerde professionele ingenieurs persone is wat nie 'n erkende kwalifikasie besit nie.

Aansoekers wat nie suksesvol was nie, word bowendien gelenthede gegee on hulle te bekwaam deur middel van eksterne studies om aldus die graadstandaard langs 'n alternatiewe roete te bereik. Hierdeur kan die knap persoon, wat nie die nodige ervaring voor 1969 gehad het vir registrasie nie, en nie voltyds aan 'n universiteit kan studeer nie, wel die verlangde status bereik. Die Raad wil dus, met inagneming van sy verantwoordelikheid teenoor die publiek in verband met die standaard van bekwaamheid wat redelikerwys van 'n professionele ingenieur verwag kan word, kandidate langs dié weg 'n redelike kans gee om professionele status te bereik.

Die uwe,

M. R. GERICKE Pr.Ing.

President