



## Book Reviews

### HEMMAT, a mineral processing database

HEMMAT is a database containing abstracts of over 13,000 papers and books in mineral processing and hydrometallurgy. It has been created by Dr. Samad Banisi of Shaheed Bahonar University of Kerman in Iran. By the click of the computer mouse one can search the material by title, author's last name, date and source. One cannot, however, select a specific author from several authors with a common surname. For instance, when one clicks for 'Rao' the titles of papers of all Raos—there are at least three in mineral processing, S.R., T.C. and K.H.—appear on the screen. The searcher then will have to pick those titles of interest and view the abstracts of those papers by appropriate command. This is probably not a serious limitation as by scanning through the titles one can pick up the items of interest regardless of the author's name, which is fully recorded on the abstract. The source of the full paper is also recorded.

The author of the database claims that it includes papers and books published in the last 60 years. This claim cannot be substantiated as many significant publications of 1960s and 1970s are not found in the database. It is more realistic to expect to find most publications appeared in literature since 1980s. The author updates the database every year. The latest one was produced in March 2002. It lists documents from almost all English language sources, journals, books and conference proceedings. There are also references from Russian literature translated into English, but not from the original Russian journals.

The CD is a handy tool of primary literature search and recommended to engineering libraries, graduate students and researchers in mineral processing. It can be used on Pentium processor or Windows 98, NT, XP. Copies may be obtained by contacting:

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### Paste and thickened tailings: a guide

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A manual on thickened tailings, entitled "Paste and thickened tailings: a guide" has recently been published by the Australian Centre for Geomechanics in Western Australia. The technology to produce very high-density thickened tailings is now at a stage where innovative techniques for deposition of this mining waste product are becoming feasible and are capable of providing significant advantages for the environment. The authors claim that the publication has been developed as a "guidance and advice" manual for those in the industry wanting to determine whether the technique is relevant to their operation and is not intended to be a "design" manual. Nevertheless, this publication provides a comprehensive coverage of the topic, is very informative, well written and illustrated and it comes at an opportune moment for the industry.

The mining industry worldwide is being forced to consider the impact of its activities on both the environment and on human health and whether or not the public is prepared to condone these impacts any longer. At a time when the concept of sustainability is creeping into everyday discussions and becoming an accepted measure of the acceptability of various industrial and commercial activities, the spotlight is falling more and more on the mining industry. The industry sponsored project Mining and Minerals for Sustainable Development (MMSD) is intended to tackle this issue head-on, dealing with issues as diverse as small-scale mining, impact of HIV/AIDS on mining viability and so on. One of the MMSD working groups has been tasked with dealing specifically with the problem of large volume wastes, i.e. most tailings disposal facilities. It is here that the material covered in this publication provides valuable insights and information.

The publication is intended as a guide for those interested in the feasibility of constructing tailings facilities using something other than the conventional upstream, centreline or downstream disposal procedures. These existing technologies have left us with a legacy of many unstable storage facilities, where poor management of tailings deposition has produced potentially liquefiable zones of material, where the steep side slopes are prone to water and wind erosion (with

attendant environmental degradation) and where rehabilitation is often extremely difficult. Whilst the book makes it clear that the concept of high-density thickened tailings is not a panacea for these difficulties, it is clearly argued that in many instances it does provide the environmentally preferred option and should at least be considered at the planning and design stage by any reputable mining company.

International experts in the field have written each chapter of the book and there has clearly been a significant amount of attention paid to tying the various chapters together and to cross-referencing. The introductory chapter provides some historical perspective to the concept of thickened tailings before diving straight into some of the presently contentious debates that are taking place. These revolve around what constitutes a thickened tailings versus what constitutes a paste, and how to define the transition point between these consistency states (and even whether such a definition is needed). The strength versus concentration curve is introduced as a fundamental feature of monitoring the thickening process and this concept is frequently referred to throughout the book.

Chapter 2 tackles some of the key business issues and clearly argues the need to consider the full life-cycle costs of a project when comparing various scenarios (i.e. conventional versus thickened tailings). By including full-life operating costs and factoring in such issues as liability insurance (which is invariably higher for wet-disposal processes), the authors show that the increased initial costs, such as higher costs for positive displacement pumps, may often be more than offset by these other costs. Chapter 3 tackles one of the key issues that need to be understood and studied for any successful implementation of a thickened tailings project, namely rheology. Although it is not a topic that most traditionally trained geotechnical engineers will be familiar with, this chapter and the one that follows (on material characterisation) provide enough background material and examples of experimental data to enable most engineers to understand the importance of this concept in the design and operation of thickened tailings disposal facilities. One important conclusion that emerges from the book is emphasised in both these chapters, i.e. the need to consider a thickened tailings disposal operation as a continuum. It is cogently argued that all facets of the operation, from thickening (material preparation) through transport to final deposition, must be considered holistically. Whilst this may appear self-evident, it is not a required feature of conventional operations and does indeed require a change of approach, as described in the book.

Chapter 5 deals at length with the processes of thickening, providing extensive illustrations and de-

scriptions of the equipment currently available as well as pointing towards what may soon be commonplace. This section also shows the enormous strides that have been made in recent years in thickening technology. Deep-bed thickeners, often with height to diameter ratios in excess of unity, are becoming common and the ability to produce extremely high-density slurries by combining the use of improved synthetic flocculants with adequate residence time in these new-generation thickeners is impressive indeed. Chapter 6 provides extremely useful and detailed information on the pumping and pipeline transport of thickened slurries and clearly describes the relative advantages and disadvantages of centrifugal and positive displacement pumps.

Chapters 7 and 8 deal with the surface and underground disposal of thickened tailings respectively. The ability to construct surface disposal facilities with geometries that are completely different to those that are currently the norm are described and the environmental and safety advantages of these geometries discussed. The chapter on underground disposal is extremely detailed and includes a discussion on the effect of various binders on fill performance. Chapter 9 is concerned primarily with the issue of closure of surface disposal facilities and reaffirms the potential environmental, rehabilitation and aesthetic superiority of thickened tailings disposal facilities.

Given all the touted benefits of thickened and paste tailings, are there any success stories that validate the claims made in the book? Chapter 10 describes four Case Studies that go a long way to achieving this. From the pioneering work at the Kidd Creek mine in Canada, to the very recent implementation at the Bulyanhulu mine in Tanzania, this chapter provides a fascinating view of the different deposition strategies being adopted and how a sometimes revolutionary technology is becoming commonplace.

The book is an invaluable aid for anyone needing to get up to speed on the possibilities offered by paste and thickened tailings disposal and should be required reading for all tailings engineers engaged in the design or evaluation of new tailings disposal facilities.

For further information contact Ms. Josephine Ruddle, Marketing Communications Manager.

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