



BOOK REVIEW

Concrete Progress by Gunnar Idorn. Publisher: Thomas Telford, 1 Heron Quay, London E14 4JD, UK, 1997, 359 pages. Price £65.

In this book, which has four parts, the author has succeeded in presenting a highly interesting account of progress in concrete technology based on 50 years of his professional experience. According to Idorn, in the course of the last one hundred years, portland-cement concrete has not only become the most widely used building material in the world but also will remain indispensable for the global socioeconomic development during the next millennium.

The first part of the book contains a historical review of important developments in concrete technology from antiquity to 1976. One of the highlights is a chapter on cement and concrete technology heritage with a balance sheet of credits and debits up to World War II. Another chapter contains Idorn's personal observations on lessons from the field performance of concrete. As an illustration of his insightful comments, this is what he has to say about the genesis of one of the problems in the area of concrete durability today, namely an over-reliance on data from laboratory tests, "Increasing reliance on standardized laboratory test methods in the 1920s and 1930s turned the attention of researchers away from different mechanisms of the deleterious reactions, and the quest for reproducibility in laboratory testing prevented the recognition of the impact of temperature and relative humidity on field concrete deterioration." A separate chapter is devoted to post World War II rapid growth of housing and infrastructure. The final chapter of the first part of the book documents Idorn's personal experiences in concrete technology research management during 1960–1976 when he served as the Head of the Concrete Research Laboratory at Karistrup in Denmark.

The second part, comprising more than one-third of the book, deals with alkali-silica reaction (ASR) in concrete. Justifying the disproportionate number of pages devoted to one single topic in the area of concrete durability, the author says, "Part II is in fact a vertical dissection of almost 60 years of international research investment on one particular subject (ASR) as a cause of distress in field concrete." From his personal involvement with the 10 international conferences on ASR, held during the period 1974–1996, Idorn has pieced together a very interesting account of the rise and fall of six decades of concrete technology research which, in his opinion, has gradually become infected with reductionistic philosophy and laboratory empiricism. For example, the test methods for determining the potential alkali-reactivity of aggregates, such as the ASTM Method C 289 and C 227 are not useful for predicting the field behavior of concrete containing reactive aggregates. According to the author, approximately 40 such test methods have been developed during the course of research on ASR but none of them can establish whether a reactive aggregate will cause harmful or harmless reaction if used in field concrete. Actually, Idorn's comments with respect to ASR are applicable to the entire area of concrete durability research today. He correctly blames the reductionistic philosophy to have assumed the position as the governing principle, leaving large holes in the overall durability picture.

Part III of the book contains a brief description of several research projects in which the author has been involved as a consultant, following the closure of the Concrete Research Laboratory at Karistrup in 1976. Of particular interest is Idorn's experience as an expert witness in lawsuits involving field concrete deterioration in several countries, such as the UK,

the USA, and Canada. Major cases were settled with the clause that all documentary studies were deemed permanently confidential. According to the author, the overall consequence of this settlement policy is that, increasingly, the concrete technology expertise urgently needed for the benefit of the society is being diverted to confidential investigations and research. For instance, in the Middle Eastern concrete deterioration cases this meant that the comprehensive analyses which documented the urgent need for new standards and quality control methodology adaptable to the special environment, could not be communicated for general improvement of concrete technology and for new strategic research planning.

With the hindsight of long and varied experience in concrete research and field practice, Idorn is uniquely qualified to project a vision of an appropriate technology for the concrete world in the next millennium, which is the subject of Part IV of his book. The author foresees a tremendous growth of the concrete industry in countries of Asia, Africa and South America which have tropical/subtropical climate, and where the prevailing knowledge base in concrete technology derived from research and field practice under relatively cold conditions in Europe and the US would be inappropriate. Idorn recommends that cost-effective research and development in resource-conserving technology for long-term service life of concrete structures under real environmental conditions ought to be made a first priority item of new research strategies. As thermal cracking is associated with many concrete durability problems worldwide, he predicts that the practice of site measurement of heat of cement hydration during the curing process, which was originally developed in Denmark and is now being used on all major construction projects and precast industries in Nordic countries, will spread globally. The author also feels the urgent need for a paradigm shift from the reductionistic to holistic approach in concrete structural design, materials technology, research, and development. Incidentally, a holistic model of concrete deterioration proposed four years ago by this reviewer addresses Idorn's question as to why harmless ASR has predominated in field concrete structures.

Idorn's message to the concrete research community can be best expressed by the concluding paragraphs of the preface to the book:

Progress needs to be made where the demands are, not where they have been; and 50 years ago the obstacles also appeared to be unsurmountable—lacking the present day knowledge base, instrumentation, equipment, and abundant capital resources. I am therefore, confident that, irresistibly, the circle will close around the world, with updated concrete research and practice being developed into a global, cost-effective entity—the indispensable foundation for a concrete world constitution.

Idorn has written a remarkable book indeed. It is also well produced and well documented with almost 300 references. This reviewer recommends it as a “must read” for all serious researchers, educators, and managers of research and development in concrete technology.

P.K. Mehta

Professor Emeritus in Civil and Environmental Engineering
University of California, Berkeley