

Institute for Steel Development & Growth (INSDAG)

52/1A, Ballygunge Circular Road, Calcutta-700019

Phone: (91) 33 2461 4045/4047; FAX: (91) 33 2461 4048; E- mail: insdag@rediffmail.com , insdag@cal2.vsnl.net.in

Teaching Materials

The idea for this Project was born out of a lunchtime conversation this writer had with Mr. R.K. Prasanna, Development Commissioner for Iron and Steel, and Mr. M.S. Ramanujam, the Regional Development Commissioner (Ministry of Steel) in late 1998. It became obvious that the low usage of Structural Steel in India was largely attributable to skills shortage in the effective use of this material in construction. The urgent need to reorient the education of student engineers and to retrain the current stock of practicing professionals (based on the current state-of-the-art) was clearly identified. It was noted that the British Steel industry, when faced with similar problems of skills shortage in the 1980's, solved it by generating a Teaching Resource to enhance the teaching quality in the Universities, under the expert direction of Professor Patrick Dowling. The present success of the British Steel Industry is generally regarded as a direct consequence.

An Expert Team led by Professor Rangachari Narayanan, Retired Head of the Education and Publications Division, The Steel Construction Institute, England, working in co-operation with Professor V. Kalyanaraman, (Head of the Department of Civil Engineering at IIT Madras), Professor A.R. Santha Kumar, (Dean, Anna University, Chennai) and Dr. S.Seetharaman (Assistant Director, Structural Engineering Research Centre, Chennai), representing Dr. T.V.S.R. Appa Rao, (Director, SERC, Chennai) was entrusted with the task of compiling this Teaching Resource which could be used for the purposes outlined above. Dr. S.R. Mediratta, the Director General of the newly formed Institute for Steel development and Growth (INSDAG) was requested to act as the facilitator. The Team commenced its work in August 1999 with the added strength of three young experts, Dr. Satish Kumar (IIT, Madras), Mr. Arul Jayachandran (SERC) and Mr. R. Senthil (Anna University). Rapid progress of the work was made possible by the willing support given by the young Project Associates, Miss R. S. Priyadarsini, Mr. S. Sambasiva Rao, Mr. G. Venkateswara Rao, Mr. Indranil Banerjee and Miss P. Usha who joined the Team.

Till the late 1960's, Structural Steel Design was based on the "Working Stress Method" all over the world. The more modern "Limit State Design" approach - developed in the early 1970's - is technologically sound and results in significant economy in the completed structures. This is of particular advantage as Steel is a reusable material and is environment-friendly. Moreover, modern Steel Mills have made substantial improvements in the quality of finished steel in recent years. To derive the fullest benefits from this improved steel, the Codes of Practice in the use of Steel will need updating. Unfortunately, the Bureau of Indian Standards has not revised the Indian Codes for Steel Construction to conform to Limit State methods, unlike the Codes for the Structural Use of Concrete. This makes the use of steel in construction an uneconomic proposition. Professor Kalyanaraman of the Indian Institute of Technology Madras had very kindly volunteered to provide the necessary leadership for revising the Codes to modern Standards and the work is in progress.

There are literally hundreds of University Institutions in India teaching courses in Structural Engineering. Being autonomous, all the Universities formulate their own syllabi. The depth and breadth of coverage in Structural Steel Design - as in other subjects - does vary between Institutions. In view of the obsolescence in the teaching of Structural Steel Design referred to in the previous paragraph, all the Universities and Colleges would need support and assistance to varying degrees in their need for state-of-the-art training material. Retraining of Engineers who are currently employed in Industry and in Design Offices is an added challenge. The urgent need for an up-to-date Teaching Resource, as a reference material for the teachers and trainers, is obvious.

A high-priority task was to upgrade and widen the academic base of Indian University teachers in the subject of Structural Steel Design to the levels prevailing in the Western World, so that they can teach this subject confidently at the Undergraduate Level. With the availability of this support, many motivated young academics would be able to advance even further and develop an infectious enthusiasm for the subject among the students.

In planning this task, the Expert Team identified the following challenges and opportunities.

- Most of the teachers for whom this Resource is intended, have not had ANY education in up-to-date Construction Technology. This situation is not different even in high profile Colleges. The I.S. Codes and the present level of University teaching are out of date by 25 years. Many Masters Degree courses in Structural Engineering (even those organized under Quality Improvement Programmes funded by AICTE) do not include any in-depth coverage of Structural Stability and similar subjects, which are vital for the understanding of behavior of Steel Structures.
- An overwhelming majority of Colleges do not have any worthwhile collection of up-to-date books, largely on account of their high costs and diminishing budgets. Even if they wanted to, there is no easy way for the Teachers to refer to modern books and enhance their level of competence. (This is not an indictment of the Teachers; nevertheless this leads to unsatisfactory teaching and subsequently to incompetence in the field practice of Structural Engineering.)
- Teachers in most Colleges are overworked. (Many Colleges routinely assign about 25 hours of teaching to very young teachers. Assuming that it takes 2 hours to prepare a lecture and to mark the scripts, they are expected to work 75 hours a week, EVERY WEEK!). The ready availability of a well-researched set of notes will be very helpful to them.
- Discussions with a selection of Engineering Teachers revealed that Structural Steel as a subject is not very popular among senior academics and young and inexperienced Teachers in their early part of their career are forced to teach it.
- The level of research activity in Structural Steel is abysmally low. Only a handful of people are engaged in research and generation of new knowledge. There are – indeed – few Structural Steel-related patents taken out by any Engineer or Scientist working in India.
- There are very few refresher or in-career courses in Structural Steel Design.

Notwithstanding these limitations, the Team felt that they had an opportunity to set things right. With the participation of the best known centers of expertise in India, the Expert team - with a total relevant experience of over 150 years gained in this country and abroad - is perhaps the best that can be assembled in this country. Some very bright young men and women, with excellent potential to become future leaders in the profession, were recruited as Project Associates. The Team had access to all the relevant books and journals. With these favorable conditions, the Team set out to assemble an up-to-date and technically complete material, which could be used to cover the needs of a typical undergraduate course. We obtained the syllabi from most of the Indian Universities, which helped to guide us to formulate the contents of the Resource. The material generated is user-friendly and does not demand references to many other books, - not available (in India) to the teachers. University Teachers and panels of experts reviewed the drafts before finalization. Drafts were also published in the web site of INSDAG in installments to enable University Teachers and other interested persons to review them. The Members of the Expert team hope that the Resource material generated with so much effort and care would help to eliminate an important gap in the training of Structural Engineers in the area of Structural Steel design. Suggestions to improve the contents and constructive comments and criticisms will be gratefully received by the Team.

An exciting aspect of the project was to discover the number of people in India with a lively interest in the developments in the subject. The writer values the many new friends he has made in the course of directing the Project and is grateful to the many academics - too numerous to mention - who devoted their time to review and improve the Project. For those who donated their time so generously to the Project, as well as those who funded it, there could be no greater reward for their efforts than to see the benefits accruing to the next generation of Structural Engineers.

Rangachari Narayanan