JSCE Efforts at Codification of Design in Steel Structures

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1 INTRODUCTION

Committee on Steel Structures is one of the technical committees founded in Japan Society of Civil Engineers (JSCE). It deals with steel/composite materials and structures, and has some 15 active subcommittees at the moment, covering a wide range of technical issues.

A major role that the committee takes is to collect latest findings and developments in the field and publish them in the form of design-related books such as model codes, recommendations and guidelines. In this paper, the recent efforts of the committee in this category are summarized.

2 PAST ACTIVITIES

Committee on Steel Structures, JSCE have been putting much effort into the design-related activities. It seems that the design-related books published by the committee are aimed mainly at domestic use. As a result, most of them are prepared only in Japanese. One of the few is Design Code for Steel Structures shown in Photo 1 (Japan Society of Civil Engineers 1997). This code was prepared first in Japanese and then translated into English.

This is a model code for general steel structures. It was issued first in 1987 and employed the limit design concept. It is noted that at that time, most of the codes of practice in Japan were based on the allowable stress design concept. This JSCE code was revised and published in 1997. The English version mentioned above is the translation of the 2nd version. The following three limit states are recognized in this code:

Ultimate Limit State
Serviceability Limit State
Fatigue Limit State

Photo 1. Design Code for Steel Structures.
In recent years, the performance-based design concept has emerged. Committee on Steel Structures, JSCE was well aware of it and started research into it. The results came out in 2003 as a book “For Construction of Performance-Based Design for Steel Structures”. Part B of the book is a model code of the performance-based design. It consists of four major parts:

I General Provisions
II Structural Planning
III Design
IV Construction

The book presents and illustrates the way the performance-based design code should be. But it is not comprehensive yet.

Prior to the above book, Japan Society of Steel Construction (JSSC) made similar effort at the performance-based design and published the book entitled “Guidelines for Performance-Based Design of Civil Engineering Steel Structures” in 2001. This is a code for performance-based design code writers and includes the backgrounds and the underlying concept of the performance-based design. The book consists of three major parts:

I General Rules for Performance-Based Design of Steel Structures
II Manual for Verification Procedure of Steel Structure Design
III Fundamental Knowledge in Some Fields

3 CURRENT ACTIVITIES

Design codes need to be reviewed and updated, because new technologies and/or unconventional damages come out constantly. For example, in Japan, the 1995 Hyogo-ken Nanbu Earthquake, also known as Kobe Earthquake, caused an enormous amount of structural damage (Photo 2) and had a huge impact on seismic design. The 2004 Niigata-ken Chuetsu Earthquake has given second thoughts to seismic design also. In recent years, a hot issue in steel bridges is a fatigue problem: many fatigue cracks have been found in the bridges in service.

Reviewing the past activities related to design codes, Committee on Steel Structures, JSCE decides to launch a project on Design Standards for Steel/Composite Structures. To this end, a subcommittee was set up in 2004. The subcommittee has been preparing the following 6 volumes for the design standards since then:
All the volumes should be comprehensive and based on the performance-based design concept. The target publication years are

* 2007 for the three volumes of General Provisions, Structural Planning, and Structural Design
* 2008 for the two volumes of Construction, and Maintenance.

The reason why the two volumes of Construction and Maintenance are to be published a year later is that JSCE has no preliminary design codes in these two areas and needed to start from scratch. On the other hand, the remaining three have some past work to start with.

4 INTERNATIONAL COLLABORATION

International collaboration is getting more and more important. The field of structural design codes is not an exception, not to mention Eurocodes. Committee on Steel Structures, JSCE has taken this trend seriously. It also has the intention of making Design Standards under preparation internationally acceptable in terms of design format and quality.

The committee therefore founded the International Collaboration Task Force in Subcommittee on Design Standards for Steel/Composite Structures. Also, three distinguished Korean Professors were invited to the subcommittee: Professor Young Suk Park of Myungji University, Professor Kab Soo Kyung of Korea Maritime University and Professor Dong Ho Ha of Konkuk University.

The International Collaboration Task Force has been quite active. The following activities have been done so far:

1. Meeting with Korean researchers in Tokyo in 2004
2. Meeting with Korean researchers in Seoul in 2004
3. Invitation of Professor Joel Raoul (SETRA, France) to Japan in 2004
4. Seminar and meeting with Thai researchers in Bangkok in 2005
5. Seminar and meeting with Bangladesh researchers in Dhaka in 2005
7. Seminar and meeting with Vietnamese researchers in Hanoi in 2006 (Photo 3)

Collaboration for codification as well as technical issues has been discussed in these activities. With Civil Engineering Division, Institution of Engineers, Bangladesh, Cooperative Agreement between has been signed (Photo 4).

In 2007, two activities have been planned:

1. Seminar and meeting with Chinese researchers in Shanghai in January
2. Seminar and meeting with Thai researchers in Bangkok in March

5 CONCLUDING REMARKS

Some efforts of Committee on Steel Structures, JSCE at the codification of design in steel structures were reviewed. The international activities of the committee were also mentioned. Needless to say, international collaboration is very important, and in fact, Asian Model Codes and the codification issues (International Journal 2005) have been discussed in different frameworks than JSCE as well. Committee on Steel Structures, JSCE intends to further promote international collaboration especially for the codification of design in steel structures. To that end, the committee plans to publish the design standards not only in Japanese but also in English in the near future.

REFERENCES

Japan Society of Civil Engineers (1997) Design Code for Steel Structures.