



Trial Design of the Composite Steel-Timber Structure

Masanori FUJITA

Prof., Dr. Engineer
Yamaguchi University,
Ube, Japan
fujitam1@yamaguchi-u.ac.jp

Yuki OKOSHI

Graduate Student
Kanagawa University
Yokohama, Japan
r201270087vy@kanagawa-u.ac.jp

Hiroataka ODA

Engineer
Yamaguchi Prefecture Office
Yamaguchi, Japan
oda.hiroataka@pref.yamaguchi.lg.jp

Mamoru IWATA

Prof., Dr. Engineer
Kanagawa University
Yokohama, Japan
Iwata01@kanagawa-u.ac.jp

Summary

In light of the global environment, the authors proposed a building system comprising steel and timber (Hereafter referred to as CSTS), which consist of rolled section steels and timbers. A design method of the CSTS uses the concept of a damage controlled structure and its mechanical model is established based on the previous tests. The design method of the CSTS member for columns and beams are shown and a trial design of the CSTS is conducted using analytical models of building structure.

Keywords: Steel; Timber; Composite structure; Design method; Contact joint; Reuse.

1. Introduction

Building structure is aiming to the primary goal of extending the service life of the entire structure and a secondary goal of realizing a structure system that enables the structural members to be reused in case the primary goal of longevity cannot be attained due to design, economic, or social factors [1,2] (Fig.1).

In order to address global environmental issues, there is an urgent need for the building structure field to use as much timber as possible to contribute to reforestation as well as to research and develop a building system that does not diminish the structure's functionality and safety. Composite steel-timber structures, which is one of contributions have been used for spatial structures and some building structures, are expected to be used even more widely in the future [3-7].

In this paper, we discuss a trial design of the CSTS. First, the design flow is presented, design methods for beams and columns are shown based on the results of previous tests [8]. Next, a trial design of the CSTS that meets the target criteria is implemented based on the proposed design methods.

2. Composite Steel-Timber Structure

2.1 Structural members of the CSTS

The outer surface of the steel members is entirely covered with timber (Fig. 2). Assuming that the CSTS structural members are to be reused, rolled H-section steel is used

Building structure:

- Structural building level : Longevity
- Structural member level : Reuse of steel
- Structural material level : Recycling of steel



Composite steel-timber structure:

- Steel : Reuse (Rolled section steel)
- Timber : CO₂ fixation (Glued laminated timber)

Fig.1: CSTS and environmental burden

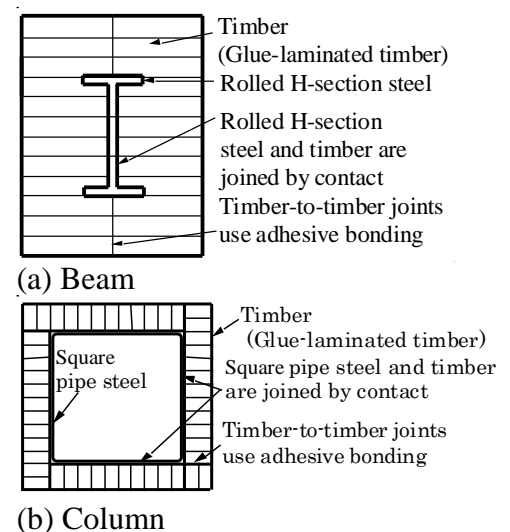


Fig. 2: Section of the CSTS