

RECENT RESEARCH ACTIVITIES

Development of CLT panels bond-in method for seismic retrofitting of RC frame structure

(Laboratory of Structural Function, RISH, Kyoto University)

Ryota Haba, Akihisa Kitamori, Takuro Mori and Hiroshi Isoda

1. INTRODUCTION

CLT is a multi-layer wooden panel made of lumber. Each layer of boards is placed crosswise (typically at 90 degrees) to the adjacent layers for increased rigidity and stability. The panel can have three to seven layers or more, normally in odd numbers, symmetrical around the mid layer. Dimensional lumber is the main input material. It can be composed at the factory once the panel is assembled. The effective use of wood for CLT is expected to contribute to sustainable development of forestry. However, there are not so many ways to use CLT in Japan.

2. OBJECTIVE

Many RC buildings built before 1981 need seismic retrofit at present in Japan. Installing new RC shear walls or steel braces in RC frame is one of the seismic retrofit techniques at present. We are suggesting new seismic retrofit method using CLT panels as shear walls. In this method, setting small CLT panels in RC frame and bonding each panel and panel to RC frame with epoxy resin, panels compose shear walls. The advantages of this technique are: There are less dust, noise, and vibration during construction; Light weight panels enable easy construction and short construction period; Light weight panel also lead small seismic force.

3. EXPERIMENTAL METHODS

CLT panels which are used in this test consist of different grade Japanese cedar. These are 3 layer/3-ply, the size of 214mm x 1540mm, and 30mm thick. Seven or four pairs of CLT panels are set in a line in the RC frame. And they are bonded each other and to the RC frame with epoxy resin on-site. Fig.1 shows four types of specimens in this test. These are intended to apply to several kinds of actual seismic retrofitting.

4. TEST RESULT & DISCUSSION

So far we have found that every reinforced specimen is stiffer, stronger, and more ductile than the plain RC frame. This result satisfies actual seismic retrofitting properties. By analyzing this mechanical resisting model, we are studying to propose design manual for this retrofitting technique.

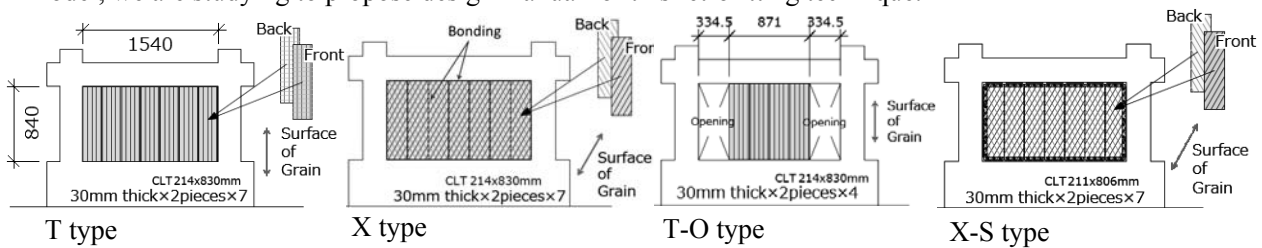


Fig1: Specimens

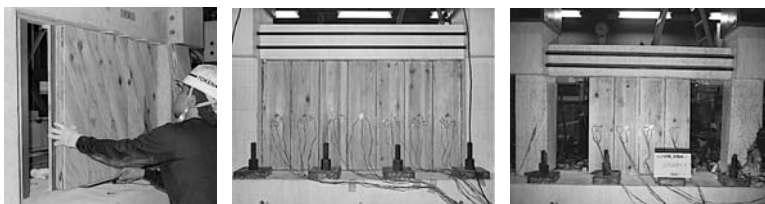


Fig 2: Setting panels(left), Test(middle), Damage(right)

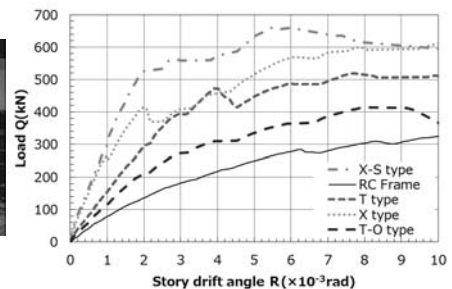


Fig3: Load-Displacement