World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:16, No:12, 2022

Company-Independent Standardization of Timber Construction to Promote Urban Redensification of Housing Stock

Authors : Andreas Schweiger, Matthias Gnigler, Elisabeth Wieder, Michael Grobbauer

Abstract : Especially in the alpine region, available areas for new residential development are limited. One possible solution is to exploit the potential of existing settlements. Urban redensification, especially the addition of floors to existing buildings, requires efficient, lightweight constructions with short construction times. This topic is being addressed in the five-year Alpine Building Centre. The focus of this cooperation between Salzburg University of Applied Sciences and RSA GH Studio iSPACE is on transdisciplinary research in the fields of building and energy technology, building envelopes and geoinformation, as well as the transfer of research results to industry. One development objective is a system of wood panel system construction with a high degree of prefabrication to optimize the construction quality, the construction time and the applicability for small and medium-sized enterprises. The system serves as a reliable working basis for mastering the complex building task of redensification. The technical solution is the development of an open system in timber frame and solid wood construction, which is suitable for a maximum two-story addition of residential buildings. The applicability of the system is mainly influenced by the existing building stock. Therefore, timber frame and solid timber construction are combined where necessary to bridge large spans of the existing structure while keeping the dead weight as low as possible. Escape routes are usually constructed in reinforced concrete and are located outside the system boundary. Thus, within the framework of the legal and normative requirements of timber construction, a hybrid construction method for redensification created. Component structure, load-bearing structure and detail constructions are developed in accordance with the relevant requirements. The results are directly applicable in individual cases, with the exception of the required verifications. In order to verify the practical suitability of the developed system, stakeholder workshops are held on the one hand, and the system is applied in the planning of a two-storey extension on the other hand. A company-independent construction standard offers the possibility of cooperation and bundling of capacities in order to be able to handle larger construction volumes in collaboration with several companies. Numerous further developments can take place on the basis of the system, which is under open license. The construction system will support planners and contractors from design to execution. In this context, open means publicly published and freely usable and modifiable for own use as long as the authorship and deviations are mentioned. The companies are provided with a system manual, which contains the system description and an application manual. This manual will facilitate the selection of the correct component cross-sections for the specific construction projects by means of all component and detail specifications. This presentation highlights the initial situation, the motivation, the approach, but especially the technical solution as well as the possibilities for the application. After an explanation of the objectives and working methods, the component and detail specifications are presented as work results and their application.

Keywords : redensification, SME, urban development, wood building system
Conference Title : ICTEWS 2022 : International Conference on Timber Engineering and Wood Science
Conference Location : Rome, Italy
Conference Dates : December 15-16, 2022