Abstract

Due to their facilities wood-concrete composite slab are a promising alternative to the traditionally used structures. Its use in multy-storey buildings has therefore augmented in recent years. Thanks to consolidated knowledge, engineers are nowadays in the position to realize high quality and economically advantageous wood-concrete composite slabs.

The effort of engineers to improve the system was so far limited to the floor element, ceiling joists were barely considered. But the fact, that ceiling joists bear the heaviest expenses should encourages wood-engineers to focus on steel-concrete-composite beams. Generally, ceiling joists are built in steel-cylinder shape. In the present situation of composite-slabs, these profiles claim a lot of material and are therefore cost-intensive. Moreover, mechanical handling during assembly is constrained and the load transmission of the covering concrete slab is only ensured by additional reinforcement bars. The only advantage of the steel-cylinder shape lies in the opportunity to efficiently and economically plan and calculate with the support of tables.

The fact,that the covering concrete slab is not exposed to loads in the range of the ceiling joists leads to the solution of bonding the steel beam with the covering concrete slab. This bond decreases the beam's cross-section by well-directed activation of building materials without reducing neither stiffness nor bearing capacity.

This Bachelorthesis documents the choice and the planning of an economically and resource-orientated ceiling joist construction in steel-wood-bond-systems. Based constructions built by PIRMIN JUNG Ingenieure für Holzbau AG, statical systems of ceiling joists are evaluated. After this analysis and an overview of the applicative structurally engineered regulations, a catalog sums up the ceiling joists standards. This catalog leads to the presentation of possible cross-section constructions. The analysis of cost and stiffness led to two possible cross-sections. One possibility is a half cylinder, the other possibility a t-shaped welding outline. Both types are economically cheaper than the comparison joist, but do not completely reach its level of reference stiffness.

Therefore, the required coverage of analyzed ceiling joists by this approach is only approximately reached. Nevertheless, this approach allows notable reduction of material and declines thereby the amount of not-renewable material in the complete system.

The steel section's T-shape simplifies the mechanical handling in the period of construction. This thesis enables engineers to plan ceiling-joists in wood-steel composite-slabs efficiently. A pilot-study as a next step is to be formed to test the data calculated in this thesis.

Keywords:

wood-concrete composite slab; steel-concrete composite beams; concret dowel