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Cost reduction of residential construction due to self-help, with the usage of skeleton structures

The goal of the research is to evaluate how costs of the construction of family homes can be reduced by using skeleton structures by giving the owner the possibility of self-help.

The skeleton structures, consisting of pre made units, which can be erected within a few days are the supporting structure of the walls, ceilings and the roof. After finishing the roof construction and covering the roof, the owner of the house under construction using self-help has two advantages. First further work can be done in dryness without the influence of the weather. Second the supporting structures are giving the owner a guidance for his further construction. With this guidance it will be possible for the owner to finish the construction of the internal and external walls and slabs based on the foundation of the skeleton structures, without having to consult a specialist in most of the cases.

In our research we evaluated local and foreign examples of family residences which are built on the base of skeleton systems made of wood or steel. We evaluated a cost reduction of 20% due to self-help.

The problems of the skeleton structures concerning the constructive physics under the aspect of self-help, have shown that problems can occur especially in the field of heat-insulation and moisture control. They consist of the difficulty of including a moisture barrier and connections which are wind proven. It has to be made sure that in organizing self-help, the owner has to have an awareness of these problems, and include specialists in supervising the construction site.

In order to differentiate the cost reductions of the skeleton construction due to self-help, we calculated a fictive construction of a row house. The constructive costs for row houses of same size and equipment have been calculated for skeleton structures made of wood and steel. The cost reductions due to self-help have been differentiated in factors which are skeleton structure specific - for example infill of walls and slabs - and factors which apply to solid constructions in general, such as painting work, heat-insulation of the wooden roof structure and roofing.

Due to skeleton specific self work the costs of construction of a row house with cellaring are reduced by 15% and without cellaring by 18%. Including the cost reductions by self-help applying to constructions in general we find cost reductions of 21% for houses with and 25% for house without cellaring.

Cost reductions have to be seen in the relationship to the needed working hours. For self-work working hours have been calculated based on experiences of average „do it yourself“ workers, who as employees have for self-work at the construction 1300 hours per year available at most. For the specific self-help of wooden skeleton structures about 1000 hours were needed, plus an additional 730 hours for general self-help. The cost reduction of the skeleton specific work is greater, therefore this self-help is more effective than the self-help in conventional solid constructions.