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Reconstruction of Wooden Floors in 19th Century Industrial Buildings

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Summary

The strengthening of wooden floors in the industrial building built towards the close of 19th century is presented in the paper. The strengthening was combined with modernization and adaptation of the building for public purposes. According to this method, the floors in a few buildings, formerly being factories, in Lodz have been strengthened.

1. Introduction

An intensive development of the textile industry in Lodz at the turn of 19th century was accompanied by erecting objects, characteristic for that industry, built from bricks and wood which were available in the region. They were one storey saw-tooth halls or several storeys buildings made of bricks, with wooden floors. These buildings were used in accordance with their assignment during tens of years. Only in the recent period (1980 years), ownership transformations caused the necessity of modernization and adaptation of these buildings for another purposes. The strengthening technique described in the paper concerns wooden floors in several-storeys buildings.

2. Typical building description

The considered buildings are usually of rectangular plan. They have three or four storeys, mostly without cellars. A plan of one of renovated buildings, situated in the downtown of Lodz, is presented in fig. 1.

Floors of these buildings are supported on external brick walls and on two or three rows of internal cast iron columns. Wooden deals of dimensions ca 0.25×0.35m, situated crosswise in spacing of ca 4.5÷5.5m. Ribs made of wooden deals of the cross section ca 0.10×0.20m are situated longwise in spacing of ca 0.5÷0.7m. Wooden boards of thickness of 45mm were applied as the floor covering.

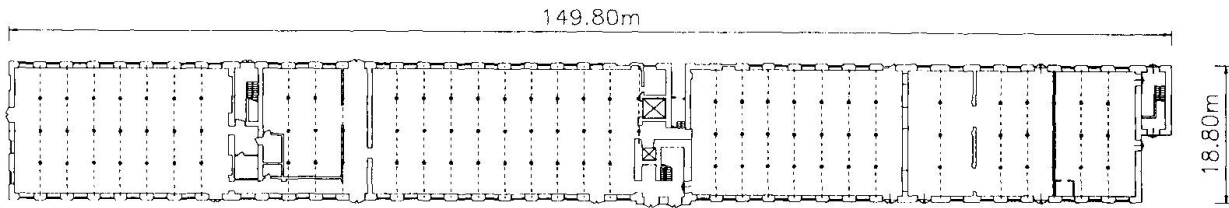


Fig.1 Ground plan of the renovated building

3. Conception and realization of the floor modernization

As the strengthening and the stiffening of the floors, RC beams were designed. They clamped the wooden main beams and were connected with the RC slab cast on the boards of existing floor. The newly designed continuous four span RC beams of ca 0.50m depth, of $2 \times 0.10\text{m}$ web width and of 0.5m upper part width, are supported on cast iron columns (through the existing wooden main beam and the cast iron head) and in external wall pockets which have been hewn beside and above existing main beams (see fig. 2). Ends of the wooden ribs have been cast in the RC beams.

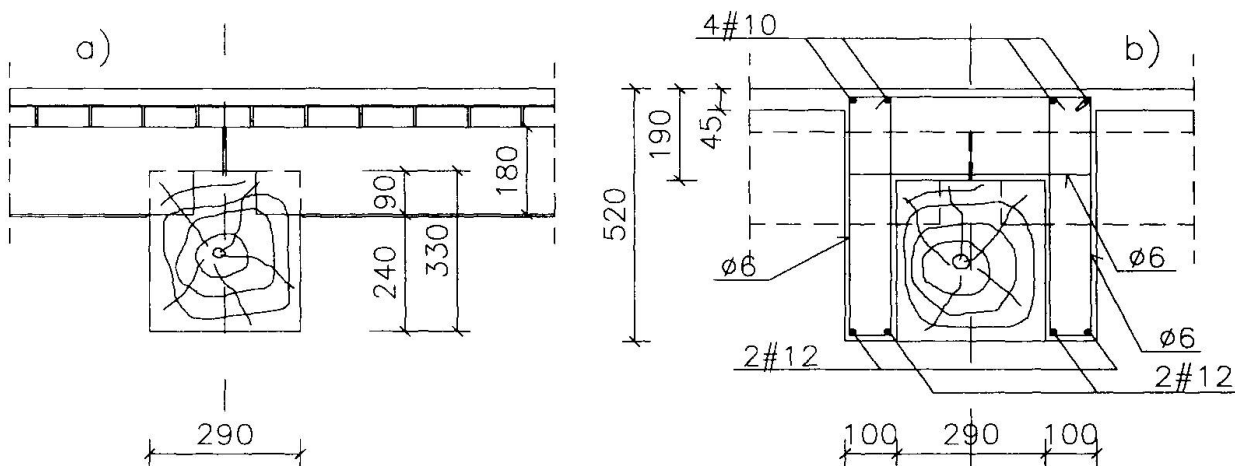


Fig. 2. Strengthening construction

Conclusions

The applied method enables to adapt many old factory buildings for new purposes, considerably saving costs of materials and labour. The constructional result is the building with the floors performing all contemporary requirements relating to load capacity, stiffness and sufficient fire resistance. The applied method minimizes demolition works and is environment-friendly because it does not need the utilization of removed structure elements.