



Multifunctional commercial buildings in steel and composite construction

Richard Stroetmann, Lukas Huettig

Institute for steel and timber constructions, Technische Universität Dresden, Germany

Contact: Richard.Stroetmann@tu-dresden.de

Abstract

A relatively high vacancy rate of office buildings can be found in Germany and in many other European countries. The building of the future should be planned in a way that the consequences of social and sociological changes within its life cycle can be incorporated with low monetary resources to avoid the vacancy of the property and to achieve a higher profitability. For this, it is necessary to allow for the suitability for different uses, which is variability, in addition to the flexibility for the same use. Steel and composite construction provides advantages over conventional reinforced concrete construction because, besides large spans and fewer columns, a reduction of building materials can be achieved. In the following, results of the FOSTA AIF research projects P881 and P1118 are presented. Contents are the definition of design parameters and the structural design of multi-storey buildings for establishing multifunctionality.

Keywords: office and commercial buildings, sustainability, steel and composite constructions

1 Introduction

As a result of the economic and demographic development of our society, strong changes in the European market of real estate can be observed. The growing urban population and the changes in labour market with more office activities leads to an increasing demand of residential and commercial space. However, growing vacancy rates for office properties in major European cities arising. Economic crises, such as the dot-com collapse at the beginning of the 2000s or the global financial crises in 2008, leading to a rapid increase of the vacancy rates. Also, the rising awareness of sustainability has a major influence. The saving of resources, recyclability, reduction of life cycle cost and recoverability, even under changing conditions are more and more in the focus of planning.

The competitiveness of properties depends inter alia on the flexibility to changing user requirements. For example, there are big differences in the requirements for office and administration buildings, depending on the user and user mix. The implementation of different organisation forms effects the design and construction to a great extent, such as in areas of vertical access, the escape routes, the construction and façade grids, the positions of internal columns and the width of the building [1].

The insufficient adaptability of buildings can lead to a long-term vacancy up to the demolition. The adaption of structures to changing user demands often requires high monetary expenses. Hence, the investment in new buildings seems often more profitable than the rehabilitation of existing structures. The design of flexible buildings by consider-