



Challenges in structural designing of egg-shaped steel structure

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Abstract

This paper presents the evolution and challenges of structural designing of a highly unusual three-storey steel structure. The construction will operate as an office building, having an egg-shaped form and it will tower in between the existing reconverted single-storey buildings. In addition, includes the structural design of the additional necessary objects for reversion process, such as skylights and connecting greenhouse. The article provides detailed examples, methods and results of structural design, accomplishing the challenges of multi-criteria decision making through structural efficiency, building implementation, environmental issues and project costs.

Keywords: multi storey steel structure, steel detailing, joint design, buckling analysis

1 Introduction

In Romania, many of the buildings have reached the service life stage, when retrofit is unavoidable. The majority of old buildings are not part of a maintenance program; therefore, their level of degradation is quite high. Usually, unused industrial spaces are demolished, creating a significant amount of environmentally harmful construction debris. Reason why a mixed reversion solution was applied in the case of our project: the middle concrete tower was demolished and the two remaining longitudinal concrete halls, having 105 m length each, were refurbished and reconverted to office buildings.

The architectural design process started in March 2015, however numerous cladding and partitioning details were modified during the structural detailing and erection work. These changes presented an additional challenge, also provided significant time pressure for the design

team. The structural design process of the structure started in June 2015 and was completed in November 2015 (see evolution on Fig. 1).

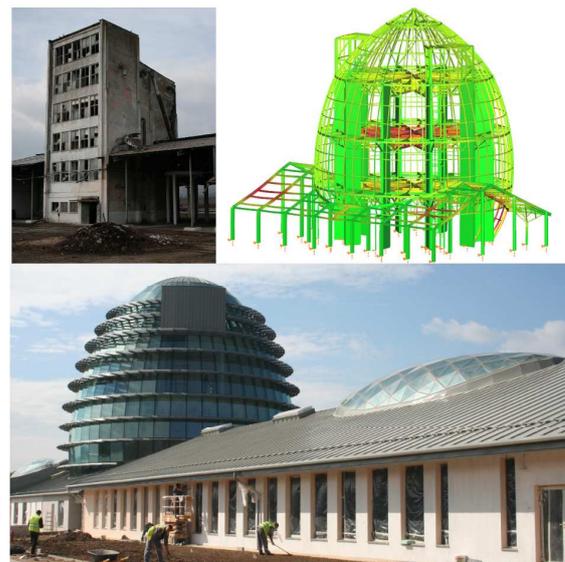


Fig. 1: Structural walkthrough