Rehabilitation of an industrial building in three different solutions

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Summary

This paper presents a case study of single-storey steel buildings imported from another country. The frame was analyzed to meet the specific requirements of the Romanian design codes and results show that the structure requires retrofitting. Three cases are suggested, each of the three cases are analyzed and subjected to some concluding remarks.

Keywords: steel, retrofitting, single-storey building; statically systems.

1. Introduction

In the early 90's, the same time when commercial markets opened towards the western countries, several Romanian investors have bought single-storey steel frames designed and built overseas, occasionally in an out of service state, and imported them in Romania. The structures were designed for the load and strength requirements of the foreign countries.
Because the building license application documents only requires only to attach a minimal part of the technical documentation, usually the foundation plan and the foundation detailing, most of the civil engineers stop the design checking and limit their work to an activity of re-designing of the foundation ground, (conforming the imported steel frame to the terrain configuration). So, it is implicit accepted that these steel structures correspond to the safety and comfort demands.
In reality, the expertise of these structures reveals the necessity of structural consolidation so much the better for the stability problems as for the correction of the dynamic response.
This paper analyses 3 retrofitting cases of the steel frame, the retrofitting being imposed by the bearing capacity overtake of the elements subjected under the design loads of the Cluj-Napoca, RO geographical area.

2. The initial solution

2.1 Structural system

The analyzed frame was taken from [4] PhD work of Gabriela Schneider, Romania, consisting of a classical solution of a single-storey steel frame. The frame originally has only one span of 21.00 meters, the longitudinal span between the cross frames being 6.42 meters. The height of the frame is 7.45 meters at the corner ridge. The columns are made of HEA 160 euro-profiles, and the beams consisting of IPE 360 euro profiles. The steel type is S355 J2G3. The columns are pinned to the foundations by joints. The purlins are being made of thin-walled Omega 200 x 2.5 types, aligned at 2.63 meters axially. The side closings and roof cover are made of sandwich panels. The wall

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