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Diagnostics of Existing Steel Structures of Winter Sport Halls

Authors : Marcela Karmazínová, Jindrich Melcher, Lubomír Vítek, Petr Cikrle

Abstract : The paper deals with the diagnostics of steel roof structure of the winter sports stadiums built in 1970 year. The necessity of the diagnostics has been given by the requirement to the evaluation design of this structure, which has been caused by the new situation in the field of the loadings given by the validity of the European Standards in the Czech Republic from 2010 year. Due to these changes in the normative rules, in practice, existing structures are gradually subjected to the evaluation design and depending on its results to the strengthening or reconstruction, respectively. The steel roof is composed of plane truss main girders, purlins and bracings and the roof structure is supported by two arch main girders with the span of L=84 m. The in situ diagnostics of the roof structure was oriented to the following parts: (i) determination and evaluation of the actual material properties of used steel and (ii) verification of the actual dimensions of the structural members. For the solution, the non-destructive methods have been used for in situ measurement. For the indicative determination of steel strengths the modified method based on the determination of Rockwell's hardness has been used. For the verification of the member's dimensions (thickness of hollow sections) the ultrasound method has been used. This paper presents the results obtained using these testing methods and their evaluation, from the viewpoint of the usage for the subsequent static assessment and design evaluation of the existing structure. For the comparison, the examples of the similar evaluations realized for steel structures of the stadiums in Olomouc and Jihlava cities are briefly illustrated, too.

Keywords : actual dimensions, destructive methods, diagnostics, existing steel structure, indirect non-destructive methods, Rockwel's hardness, sport hall, steel strength, ultrasound method.
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