

Optimization Design of Steel Structures and Cost Estimation of Welded and Bolted Joints

A. Javanmiri*, J. Mäkinen*

*Faculty of Built Environment,
Tampere University, Korkeakoulunkatu 5,
33720 Tampere, Finland
azad.javanmiri@tuni.fi, jari.makinen@tuni.fi

ABSTRACT

When we consider the interaction of design, we should not forget the cost of the structure. Considering frame structure, a double-sided beam-to-column connection is investigated. For the objective function, an advanced cost function is used including material, welding, and bolted costs. The steel structure platform is constructed from rolled UPE-profile, rectangular, and square cross-section elements consisting of universal columns and a universal beam. In this article, the optimum design is applied to the cost minimization of welded and bolted steel structures. In this case, the bolted version is cheaper than the welded one. The main methods of connection design according to Eurocode. The combination of the costs of connections and the cost of material will generate the total costs. Further, it will also set insight into the equilibrium between the cost of connections and the cost of the material. In this case, the bolted version is about 5% cheaper than the welded one. This difference is caused partly by the material and partly by fabrication cost differences.

Keywords: Bolted joints, Welded joints, Beam-to-Beam connections, Beam-to-Column connections, Cost estimation.