Dimensioning axially loaded adhesively bonded tubular steel connections for civil engineering applications

Matthias Albiez*[1], Till Vallée[2], and Thomas Ummenhofer[1]

[1]Karlsruher Institut für Technologie (KIT) – Allemagne
[2]Fraunhofer-Institut für Fertigungstechnik und Angewandte Materialforschung (IFAM) – Allemagne

Résumé

Tubular steel profiles are frequently used in architecture and civil engineering applications because of their various advantages. Structures composed thereof are usually critical at their joints, requiring complex welding operations between different metallic materials on specifically cast nodes. Additionally, subjected to fatigue loading the internal, and in many cases inaccessible, roots of welding seams are often starting point for fatigue cracks; the capacity of resulting structures is then often restricted by the structural detailing at such points. Adhesively bonding provides a simple and effective alternative for the demanding welding operations, as it allows for a very simple, strong and durable mechanical connection between tubular members. Although adhesively bonding is increasingly being used for structural applications [1,2], it has not yet achieved the status of being formulated in codes and standards, thus designing such joints remains challenging. This paper reports on experimental and numerical investigations on a series of adhesively bonded axially loaded adhesively bonded tubular steel connections intended for structural applications. It describes the complete chain of experimental work needed to enable practitioners to design the joints in questions, as well as a reliable procedure to accurately predict the capacity of thereof. The article concludes with an objective comparison between experimentally gathered and calculated joint strength data.

Mots-Clés: adhesive bonding, simulation, tubes, steel, dimensioning, design

*Intervenant