CLOSURE

Design and Behavior of Multi-Orientation Fillet Weld Connections

Paper by LOGAN J. CALLELE, ROBERT G. DRIVER and GILBERT Y. GRONDIN
Closure by LOGAN J. CALLELE, ROBERT G. DRIVER and GILBERT Y. GRONDIN

The authors thank Mr. James for his comments on our paper and agree that a check of the weld throat and of the shear plane in the connecting material is sufficient; the fusion zone does not need to be checked. The first comment, regarding whether or not there is a need to check the base metal capacity in fillet weld design, is largely a historical review of how this is dealt with in the AISC *Specification*. However, he seems to be in agreement with the paper that Equations J2-4 and J2-5 of the 2005 edition of the AISC *Specification* are sufficient to adequately design fillet welded connections made with matching electrodes and that Equation J2-2 is not a necessary part of the weld capacity check—although this is contrary to the apparent requirements of the AISC *Specification*, as well as the provisions of Canadian design standard S16-01.

The second point made in the discussion is about the fracture surface angle of a fillet weld loaded to rupture. It must be recognized that inconsistencies with pure theory are to be expected due to the nonhomogeneous nature and geometric irregularities of the weld material. In experimental research programs on the strength and behavior of fillet welds, a variety of fracture surface angles have been observed that include angles of 0 and 90 degrees. Moreover, the angle can change dramatically along the length of a fillet weld, even if the theoretical stress conditions are uniform. As such, the predicted fracture surface angle can only be quantified for a given angle of loading from a statistical perspective. Although it has been observed on some tested fillet weld connections with matching electrodes that the fracture surface does indeed follow the fusion surface (though this is statistically unlikely), Equations J2-4 and J2-5 of the AISC *Specification* still adequately predict the strength of these connections.

Logan Callele, P.Eng., Structural Engineer, Waiward Steel Fabricators Ltd., Edmonton, AB, Canada (corresponding author). E-mail: logan.callele@waiward.com

Robert G. Driver, Professor, Department of Civil and Environmental Engineering, University of Alberta, Edmonton, AB, Canada. E-mail: rdriver@ualberta.ca

Gilbert Y. Grondin, Professor, Department of Civil and Environmental Engineering, University of Alberta, Edmonton, AB, Canada. E-mail: ggrondin@ualberta.ca