If you've ever asked yourself "Why?" about something related to structural steel design or construction, *M S*'s monthly Steel Interchange is for you! Send your questions or comments to **solutions@aisc.org**.

Camber and Specific Instructions to the Contrary

The specification for a project requires camber to be measured in the field in the stressed condition and not in the fabricator's shop in the unstressed condition, as indicated in Section 6.4.4 of the AISC *Code of S anda d P ac ice* (ANSI/AISC 303), available at www.aisc.org/standards. The specification then states that the fabricator will be responsible for any repairs required to bring nonconforming beams into compliance with the specified camber.

After the project was awarded, the fabricator issued a request for information (RFI) requesting the unstressed camber required so that the beam when installed would settle to the stressed camber noted in the contract documents. The RFI quoted the Commentary from Section 6.4.4 of the *Code* to explain why the camber measurement cannot be measured in the field in the stressed condition. In his response, the structural engineer of record stated that, per the contract, this determination must be made by the contractor.

I have several questions:

1. **Since the Commentary to Section 6.4.4 states that there is no way to inspect beam camber after the beam is received in the field (due to numerous factors), is it not the intent of Sections 3.1(e) and 3.1.5 that the magnitude of camber specified in the structural design documents be that which is measurable for the purposes of fabrication?**
2. **Does AISC permit the engineer to deviate from the *Code* in this manner?**
3. **Can the fabricator be held responsible for achieving a condition over which the fabricator may have little control?**

axial load. ASTM F3125 Grade A325-N bolts are provided. Can a square washer be used at each of the bolts to increase the thickness to meet the required thickness determined by the software? Are there better means of reinforcing this connection?

The answer to your first question is no. Adding a square washer at each bolt will not satisfy the assumptions likely made in the calculations. We cannot comment on what your software may be doing, but locally reinforcing the plate would not satisfy the models presented in either AISC Design Guide 4: *E E -P M C S W A* or Design Guide 16: *F E M - R M E -P C* (both are free downloads for AISC members at **www.aisc.org/dg**), which probably form the basis of the checks used by your software.

Adding the washers may have some effect on the strength of the plate, but it will likely be small and difficult to quantify. Theoretically, one could use the plate washers to modify the yield lines used in Design Guides 4 and 16, which would result in an increase in strength if the strength of the connection is controlled by the plate yield lines. The guides also provide references to additional information on the models used. I am not aware of anyone that has taken this approach and cannot provide any definitive guidance on how to do so. You will have to rely on your own judgment.

Here are some other observations, in case you still wish to pursue this option:

1. Even if you used a reinforcing plate over the entire connection, you still may not be correctly interpreting the condition. The models in the design guides assume a solid plate. Your software probably makes the same assumption. Therefore the increased strength predicted is most likely based on the square of the total thickness. If you do not adequately connect the reinforcing plate to the original plate, then the strength increase would result from the sum of the squares of the two thicknesses, not the square of the sum of the thicknesses—a big difference.
2. The ability to form yield lines at the edges of the reinforcing plate will depend on several factors, including the distance the reinforcing is extended beyond the joint and/or that way in which is attached to the existing plate. This will further complicate the design.

Other approaches are possible and might provide a better solution.

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