The following responses from previous Steel Interchange columns have been received:

The structural steel design manuals establish a minimum length of thread on structural bolts, referencing ANSI B18.2.1. They also give a formula of $2D + \frac{1}{2}''$ for bolts less than 6'' in length, and $2D + \frac{1}{2}''$ for bolts longer than 6'' long. What are the consequences if the bolts are fabricated with thread lengths less than this amount, but still capable of making up a proper connection? Is this grounds for rejecting the bolts? Why is this length the same regardless of what type of bolted connection (N, X, SC) is used? It would seem that the thread length values should differ depending on the type. Finally, the Specification for Structural Joints Using ASTM A325 or A490 Bolts states “The length of the bolts shall be such that the ends of the bolt will be flush with or outside the face of the nut when properly installed.” With this added criteria, it would seem that the thread lengths could be shorter than those specified in the Table, because a single nut and washer is never greater than 2D in length.

The two formulae ($2D + \frac{1}{2}''$ and $2D + \frac{1}{2}''$) are for A307 bolts, not A325 or A490. N, X, and SC are terms that do not apply to A307 bolts.

Thread lengths and their function are explained in the Research Council on Structural Connections Specification for Structural Joints Using ASTM A325 or A490 Bolts. One feature of A325 and A490 bolts is that any given diameter has the same thread length regardless of bolt length, e.g. $\frac{3}{4} \times 3$ and $\frac{3}{4} \times 5$ both have a $\frac{1}{2}''$ thread length. This is a control factor for the structural engineer or the fabricator/erector to match bolt lengths.

Adrian L. Sherrill
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Are there any references on allowable compressive stress (buckling stress) for large diameter (120 ft.) steel tank wall when it is empty and subjected to external soil pressure?

A good approach to this problem can be found in Steel Plate Engineering Data, Volumes 1 & 2 published by the American Iron and Steel Institute in association with the Steel Plate Fabricators Association. This method is based on providing sufficiently rigid stiffening rings at the extents of the soil pressure and then calculating the number of buckling waves between these rings. Intermediate stiffeners are provided between the rings to resist the buckling action. This should take care of the buckling mode.

The circumferential stress in the shell alone, not including the stiffening rings, must also be checked and should not exceed the allowable working stress for the shell material in compression. I have generally used 15,000 psi allowable compressive stress for most mild steels. (AWWA D100 Welded Steel Tanks for Water Storage also recommends 15,000 psi allowable compressive stress).

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What size mig wire is considered structurally acceptable or comparable to an E70XX specification? Is there a solid wire that is acceptable? With what gas? Can the penetration and weld properties be equivalent to arc welding with, say, an E7018 rod?

The welding electrode size is irrelevant to the strength that the weld metal develops. A MIG wire that is identified as ER70S-X or ER70C-X (where “X” is some number) will exhibit strength equal to an E70XX type electrode. For carbon and low alloy steel welding using gas metal arc (GMAW), aka MIG, flux cored (FCAW) and submerged arc (SAW) welding, the electrode designations contain a number that identifies the minimum tensile strength that the weld metal will
Some drawings indicate: "SMA process will not be allowed". Why?

I've come across the end-plate connections shown in the figure several times. Are they all rigid moment connections or are they semi-rigid connections?

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What is the correct procedure for checking a structural steel tube wall for local failure due to a load applied by a clip angle as shown?

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AWS 94 Code 2.3.2.4 states "The effective throat shall be the short distance from the joint root to the weld face of the diagrammatic weld." In the AISC Specification it states the same with the addition of "except that, for fillet welds made by the submerged arc process, the effective throat thickness shall be taken equal to the leg size for 1/8-in and smaller fillet welds, and equal to the theoretical throat plus 0.11-in. for fillet welds larger than 3/8-in.

Why is there an exception specified in AISC? Will SMA process for fillet weld get higher strength and will it cost more?

Is SMA only used in shop conditions?