

Category: Design for Manufacture and Assembly (DFMA)

Example: Redesign of braze joint to eliminate process issue

Situation: A majority of plasma cutting system torches consist of a brass body into which are brazed metal tubes; most brazing is done by using a hand-held high-temperature gas torch, and manually feeding braze wire into the joint.

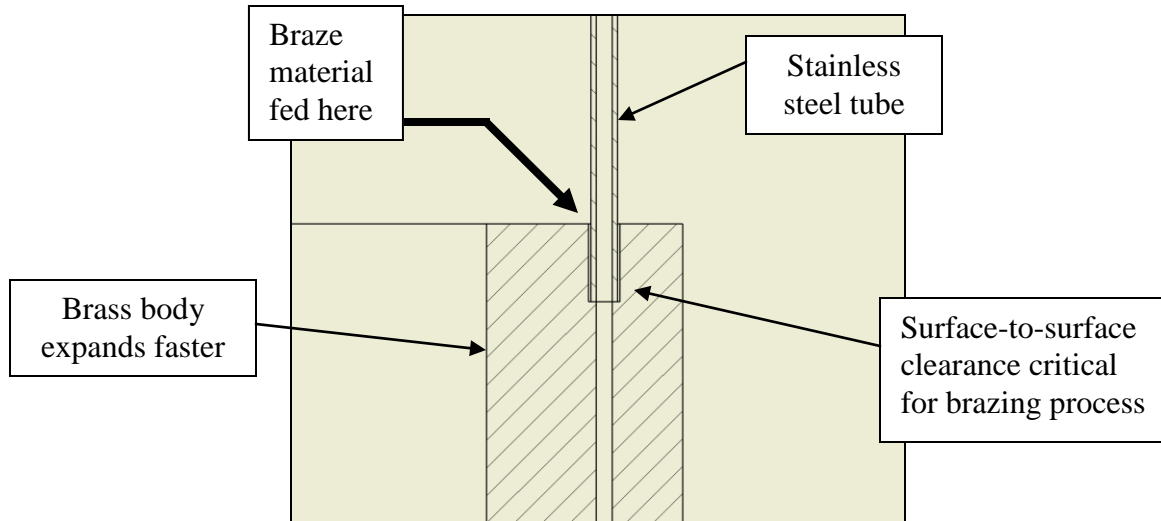


Image 1: Tube in brass body (section view)

Problem: On one torch in particular a small-diameter stainless steel tube was brazed into a much larger cylindrical brass body. Approximately 50% of the time the braze material would wick into the small tube, requiring use of a drill to rework the item.

Action:

1. Talked with floor operators; found problem was independent of person doing the job or gas torch setting
2. Studied design and compared to “Design for Brazing” standards
3. Determined design did not take thermal expansion data into account
4. Calculated recommended room temperature dimensions on brass body (tube was standard stock) adjusting for different expansions
5. Had supplier machine a batch of brass bodies (30) to calculated new dimension and tolerance
6. Did blind study on the floor to test effectiveness of solution

Result:

1. None of the brass bodies with proposed dimension and tolerance resulted in plugged tubes
2. Confirmed design change viability with Design Engineer
3. Wrote ECO
4. Plugged tube frequency on this product fell to zero