

**Category:** Design and Analysis

**Example:** Tolerance Stack-up Analysis

**Situation:** Family of electrodes for hand-held plasma cutting torches

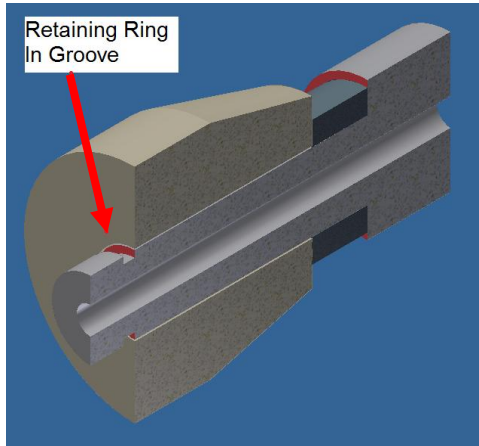


Image 1: Electrode dimensions do not relate functionally-related surfaces

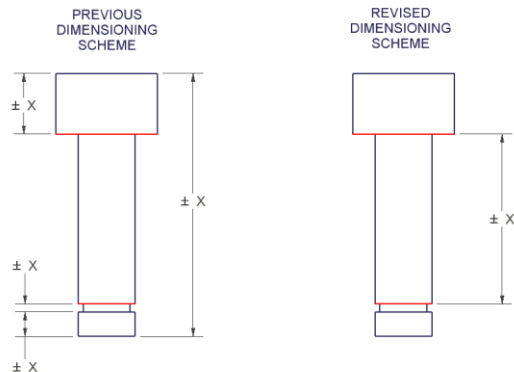


Image 2: Redimensioned electrode has functionally-related surfaces linked

**Problem:** Tolerance stack-up on plasma torch components causing assembly difficulty. Operators had difficulty installing retaining ring because groove surface needs to be proud of insulator top for retaining ring assembly – and was not about 20% of the time.

**Action:**

1. Analyzed tolerance stack-up on all components
2. Observed functional surfaces on electrode were not directly related dimensionally
3. Performed “what-if” analysis if electrode was redimensioned and found relating functional surfaces would eliminate problem
4. Confirmed analysis results and acceptability of change with Product Engineer
5. Wrote and submitted ECO

**Result:**

1. Complete elimination of assembly difficulty