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New Critical Current Test Methods at LBNL

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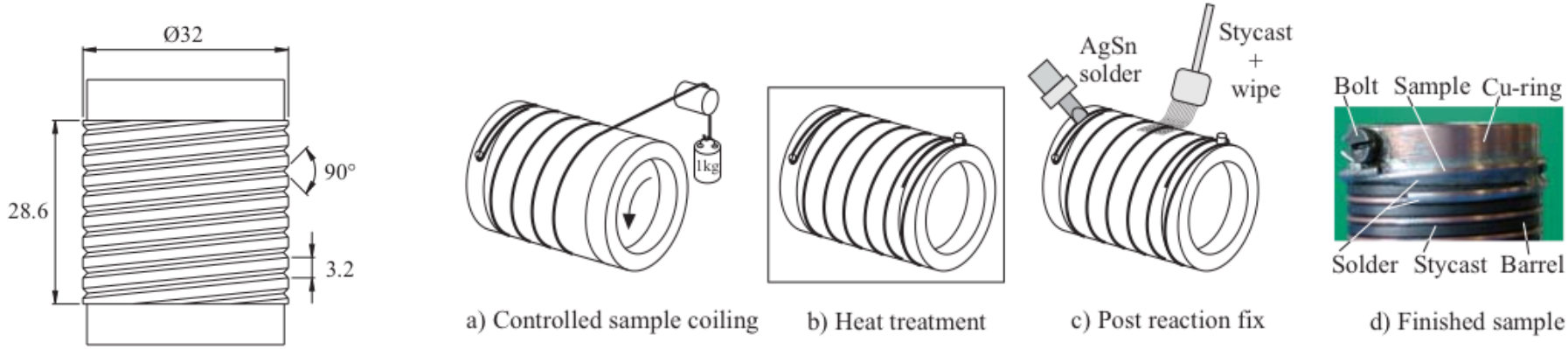
Standard ITER Barrel

Standardized I_c measurement holder from ITER 3rd benchmark (~1997)

- Prep details vary per institute

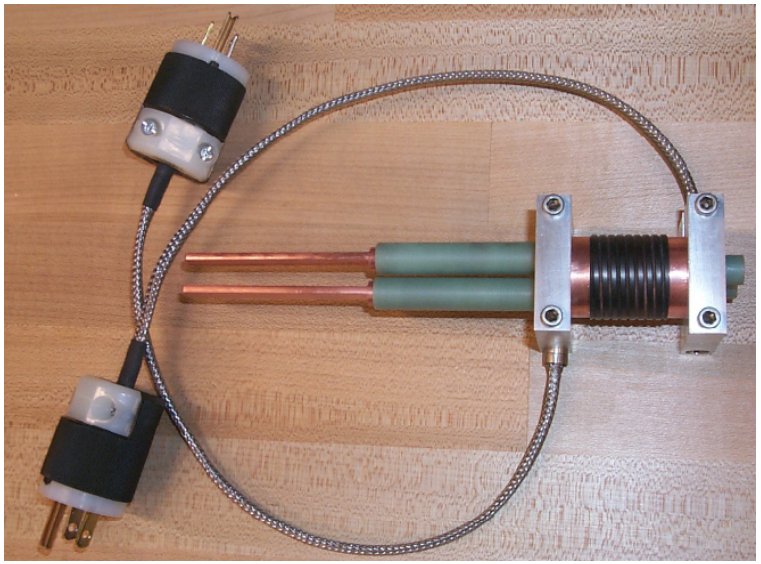


A. Godeke, *Ph.D. Thesis*, 2005

- Pro's
  - Standardized
  - Works reasonable for low current wires
- Con's
  - Limited Cu connection area => **Less suited for modern, high-current wires**
  - Cu end-rings often loose => Sample failure at Cu ring to barrel interface
  - Costly, one-time use of Cu end-rings

High Current ITER Barrel Systems

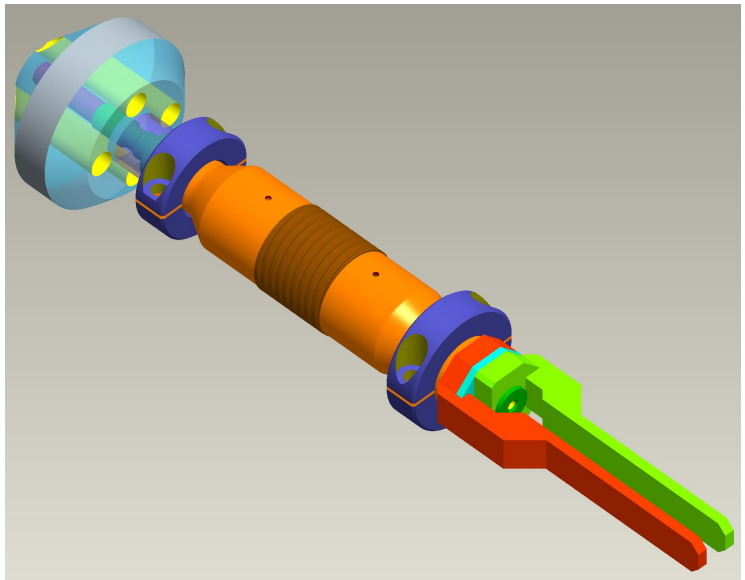
Example: Previous LBNL system

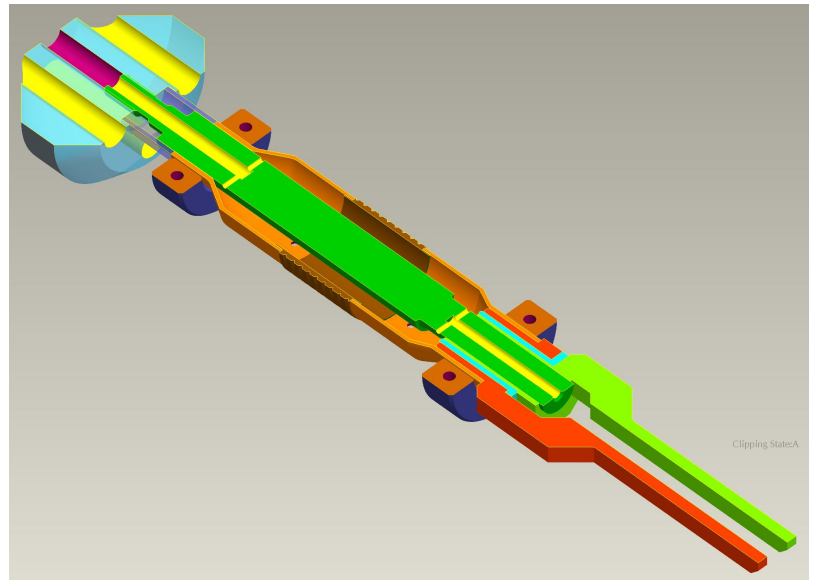


- Pro's
  - Reliable high current tests, Cu end-rings clamped to barrel
- Con's
  - Expensive Cu end-rings
  - Reaction with Ti-6Al-4V end-rings => **Post-reaction handling of wires**
    - Risk of handling errors
  - Labor intensive

New LBNL High Current Barrel Method

New system with off-the-shelf Cu end-rings

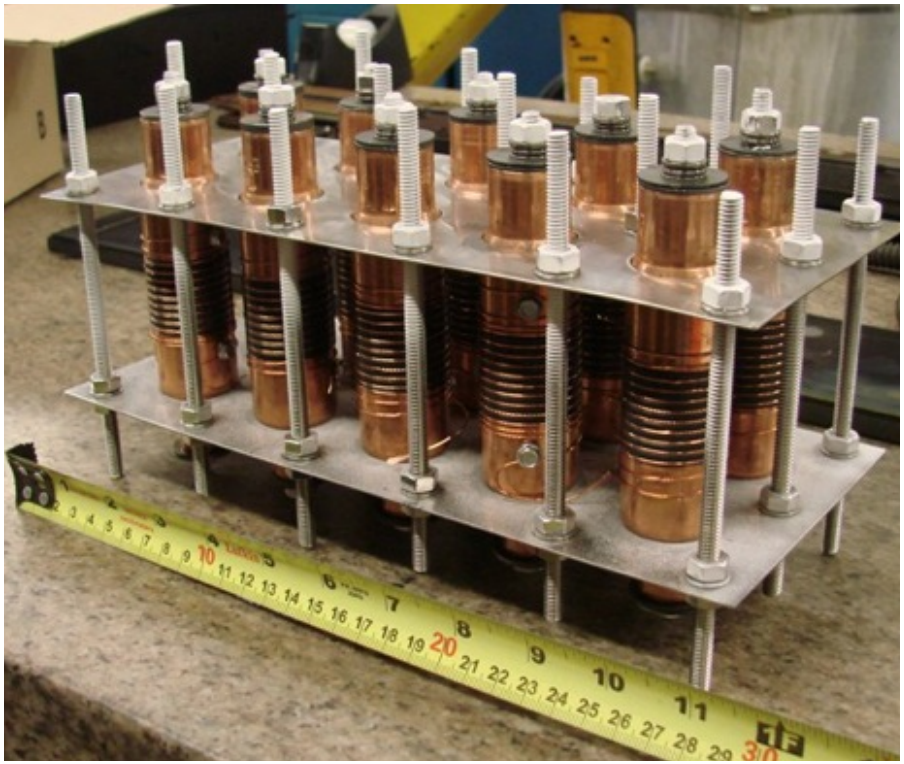


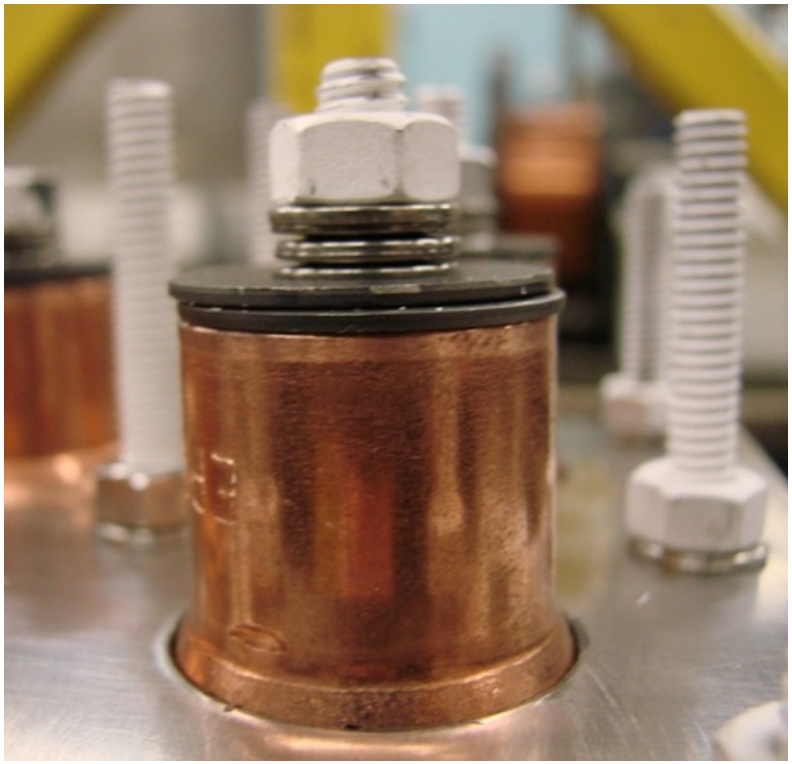


- Pro's
  - Press fit of standard (e.g. cheap) plumbing Cu-bells to standard ITER barrel
    - Backward compatible with existing standard Ti-6Al-4V ITER barrels
  - **No sample handling after reaction**
  - Tested reliably to 1000 A (higher currents pending), high through-put
- Con's
  - None so far

New LBNL Barrel System for Cable R&D

10 HQ cable R&D samples ready for reaction





Tested without issues

- Results see Dietderich