



CLEANING PROCEDURES

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Outline

- Ideas
- Real life
- Experience
- Future

Preparing the clean room



Idea

- Stainless steel parts
 - Wash with brushes/lint free rags, Simple Green + distilled water
 - Rinse in bath of distilled water (field cage tubes by pushing water through via hose)
 - Dry with rag, than warm-air (heated air pushed through fan)
 - Wrap in plastic
- G10 parts
 - Wipe down with lint-free rags and distilled water
 - Rinse in distilled water
 - Bake at least 24 hours at 100-150 under vacuum (actual temperature to be determined later)
 - Wrap in plastic

Experience



- We used de-ionized water for the small baths from a barrel
- Many larger parts had flakes from machining, the best way to clean them was with a pressure hose, e.g. tap water
- Brushes and rags do not remove dried oil and marks, we needed ScotchBrite

Pipes



Pipes insides are not easy to clean, we let them soak and ran them through with dedicated brushes, sponges, and additional KimWipes until no more dirt got removed

Size does matter



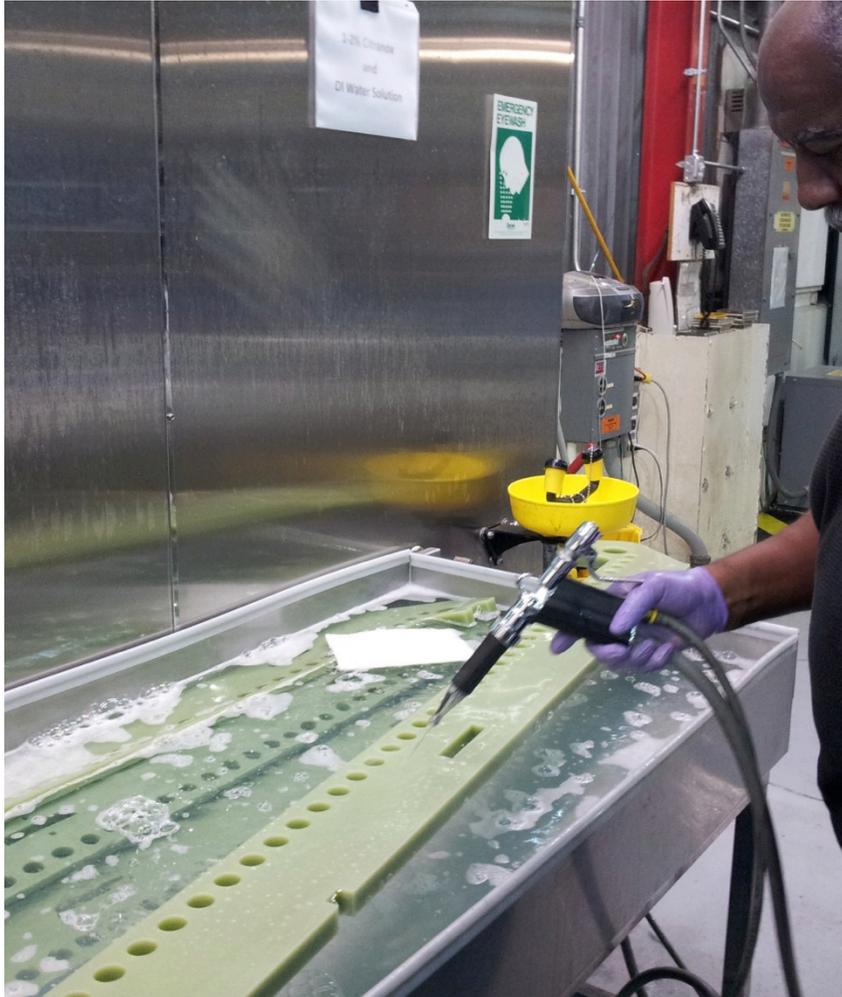
When parts reach dimension of meters, their handling gets difficult

Ultrasonic 1



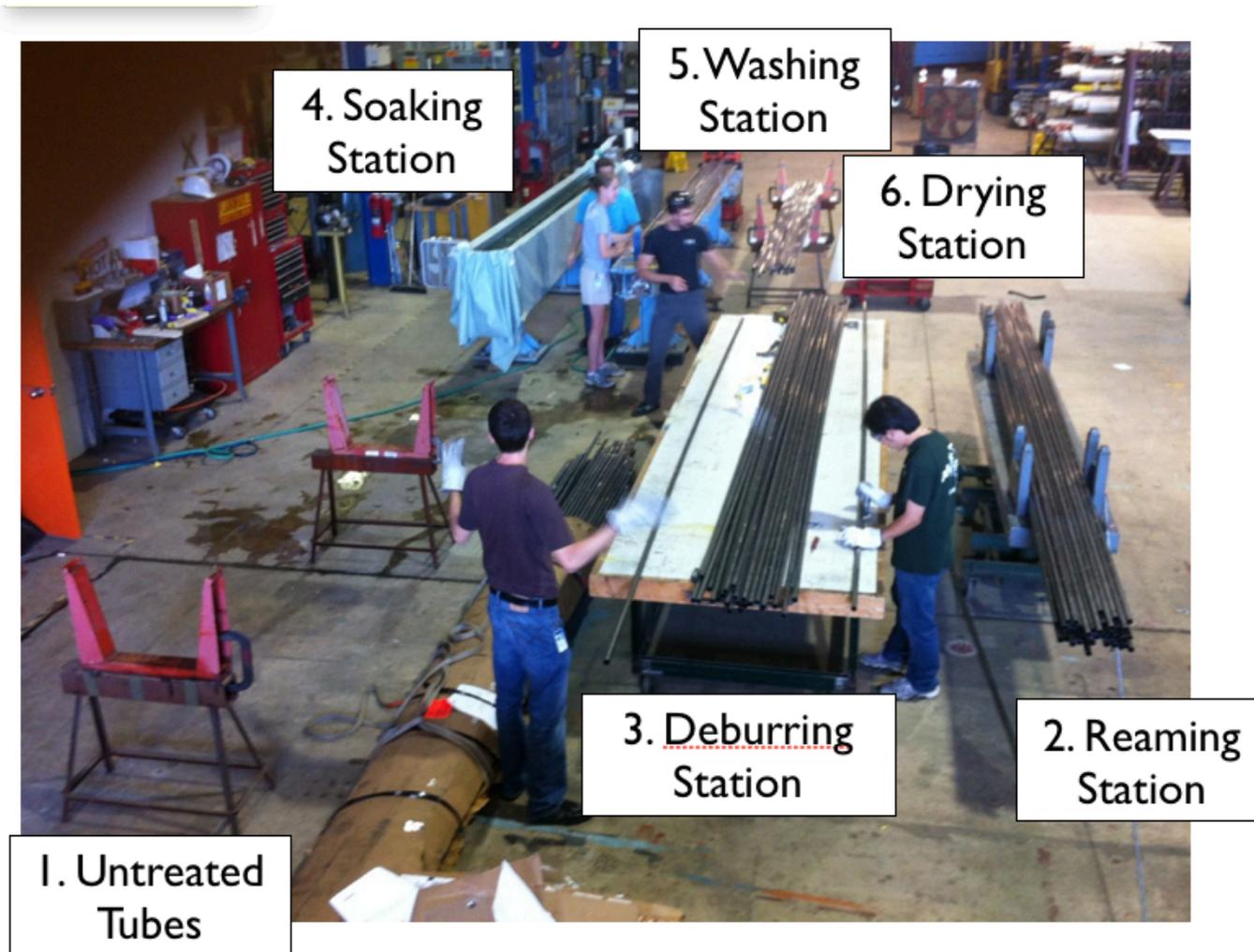
Ultrasonic baths proved a very useful tool for cleaning the large quantities of small parts

Ultrasonic 2



Large G10 parts got cleaned at the Fermilab AD Ultrasonic bath station with 5 steps

Field cage tubes 1



Field cage tubes 2

Reaming

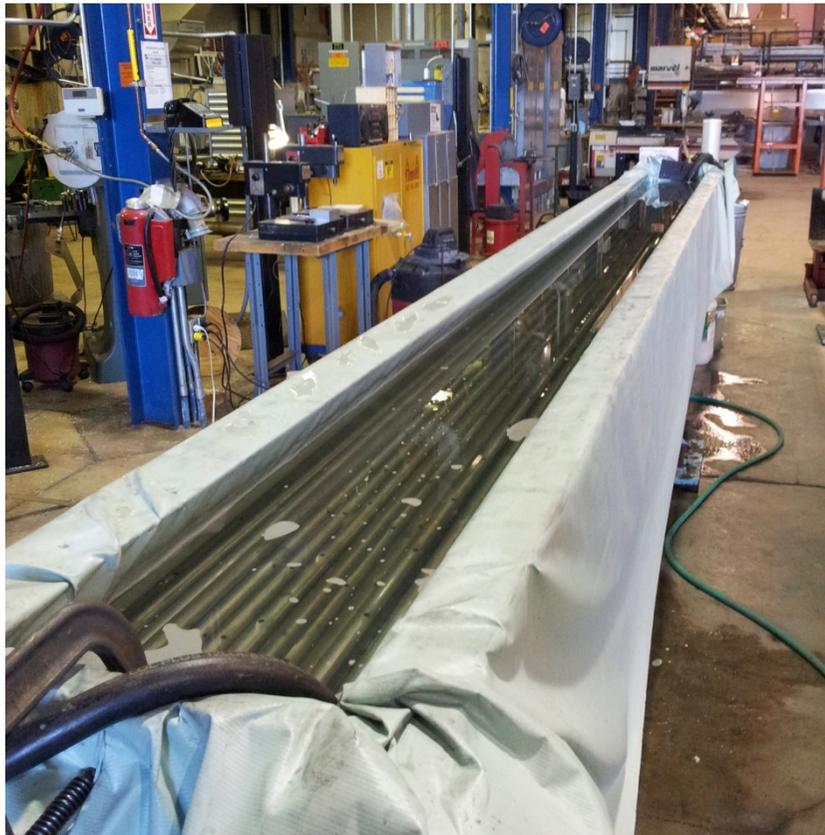


Deburring

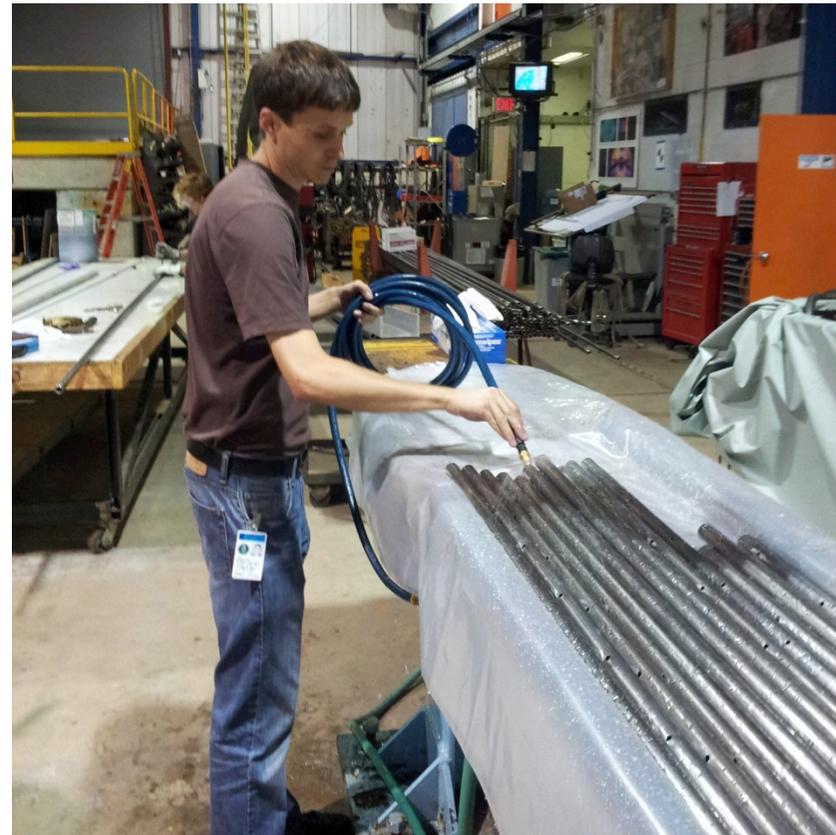


Field cage tubes 3

Soaking



Rinsing



Field Cage Tubes 4

Cleaning the inside



Drying + alcohol wipe



Field cage tubes 5

Wrapping



Summary

- The more holes, the more burrs
- Easy geometries are easy to clean
- Long thin pipes are worse than wide ones
- Welded ends on pipes or beams make cleaning life a nightmare
- Ultrasonic makes your life easy
- Thanks to all people who helped!

Conclusions

- The cleaning note is available as a draft in doc-db **2259**
- For the detector paper, it will be helpful to remember, but it also provides feedback for the future LBNE
- Remember, LBNE will have hundred times more parts than MicroBooNE