

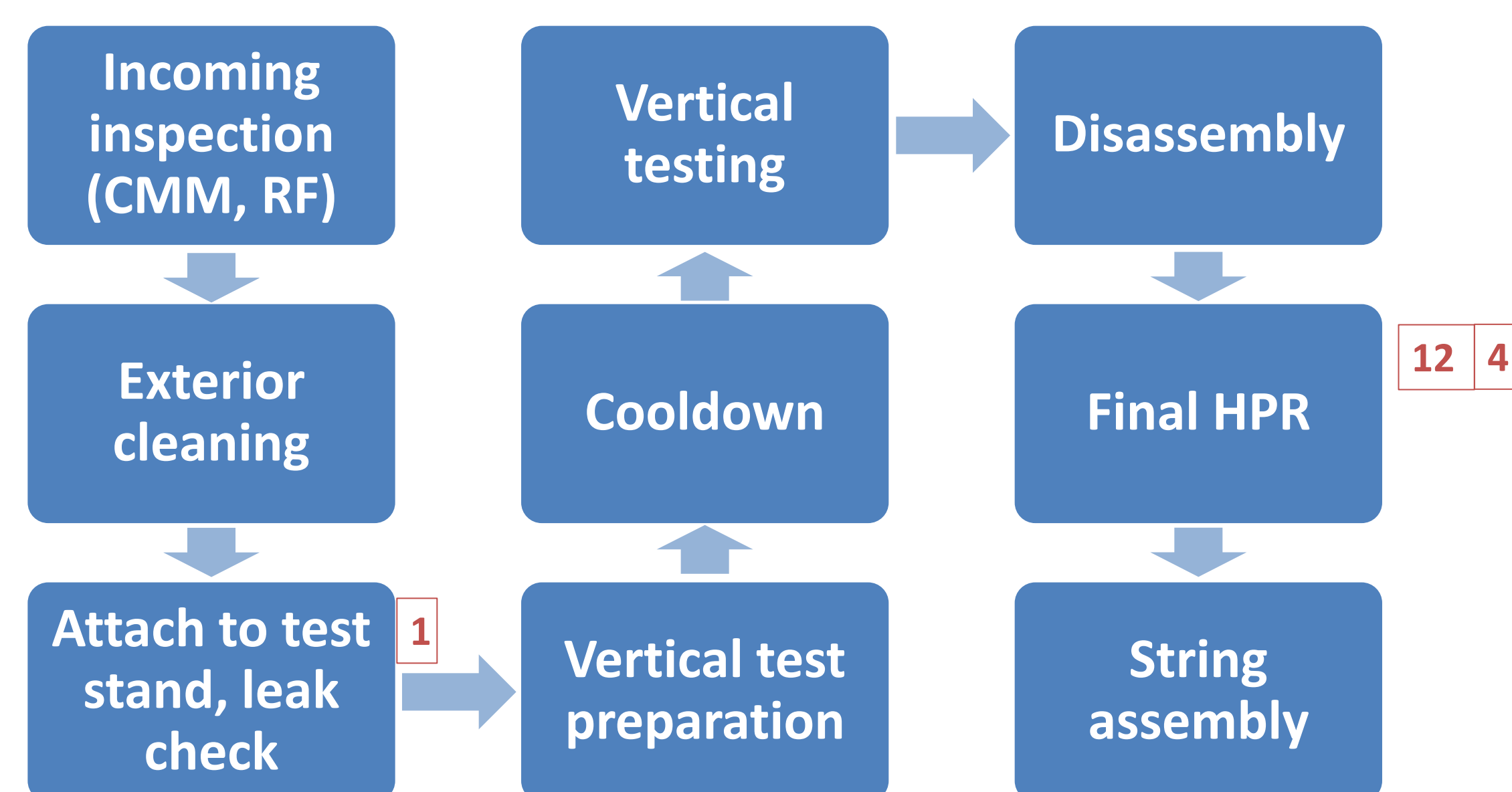
## Abstract

Cryomodule production for LCLS-II is well underway at Jefferson Lab. This paper explains the process flow for production cavities, from being received at the Test Lab to being assembled onto cavity strings. Taking our facility and infrastructure into consideration, process optimization and process control are implemented to ensure high quality products.

## Cavity fabrication and treatment:

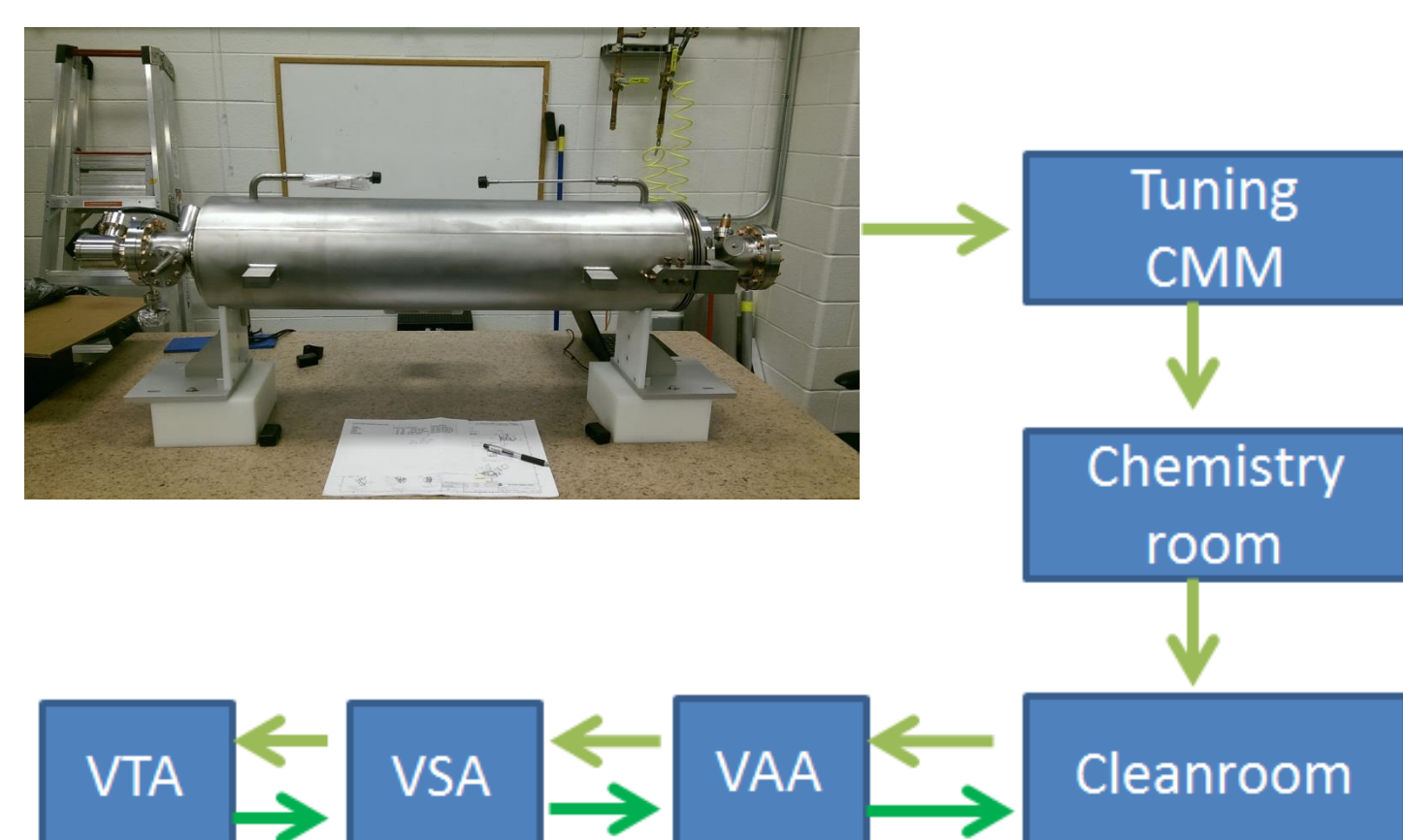
- LCLS-II production cavities are fabricated by two vendors: Research Instruments, GmbH (Germany) and Ettore Zanon, S.p.A. (Italy). They are fully assembled and shipped to JLab for RF test.
- Re-HPR on field emission limited cavities is performed at JLab.

## Cavity processing work flow at JLab:



## Process tracking:

- Procedure
- Pansophy. Traveler

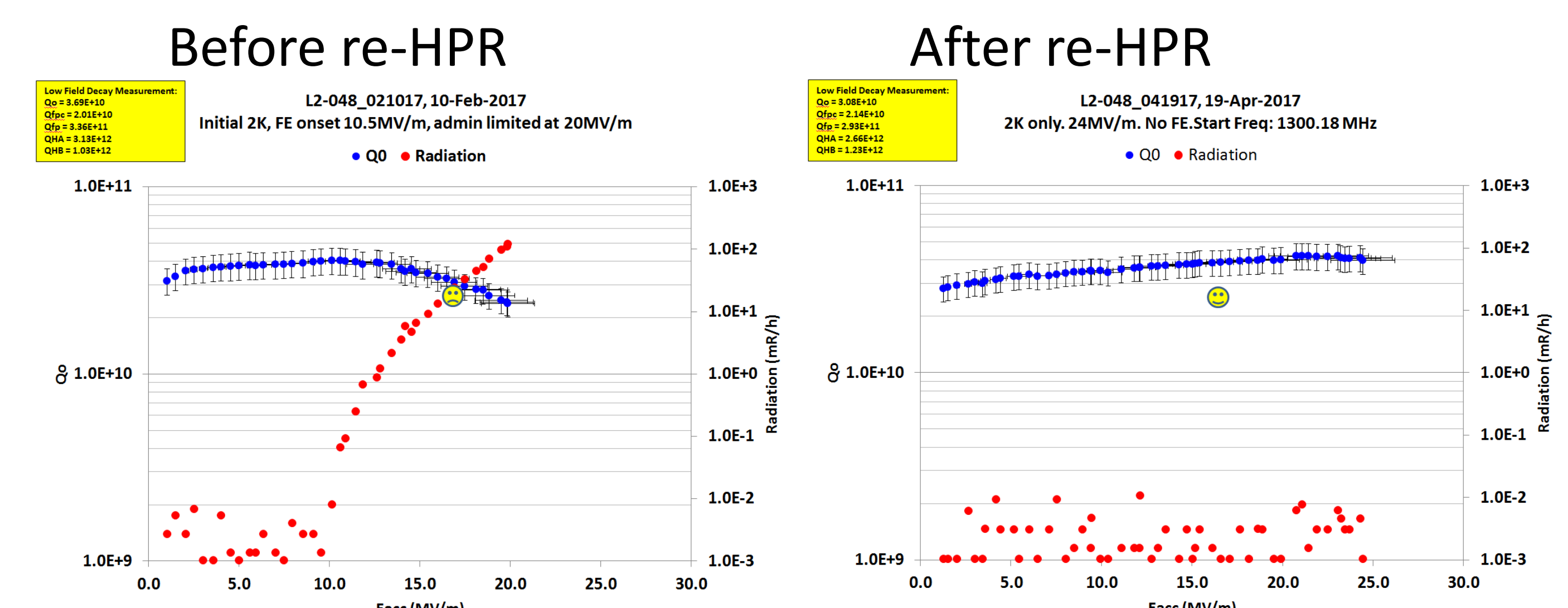


## Cavity vertical testing at JLab:

### Definition of a qualified cavity in VTA:

- $Q_0 \geq 2.5 \times 10^{10}$  @ 16MV/m (Equiv.  $2.7 \times 10^{10}$  in CM)
- FE onset  $E_{acc} \geq 17.5$  MV/m
- $E_{acc} \max \geq 19$  MV/m

### Typical $Q_0$ - $E_{acc}$ curve of production cavities:

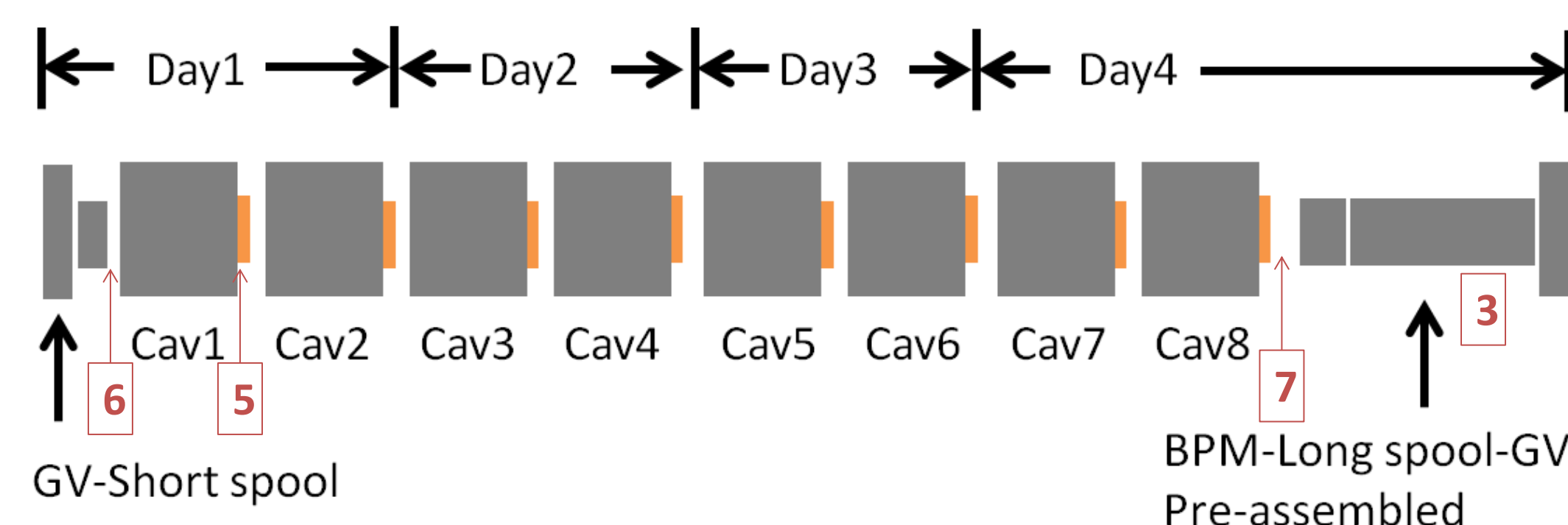
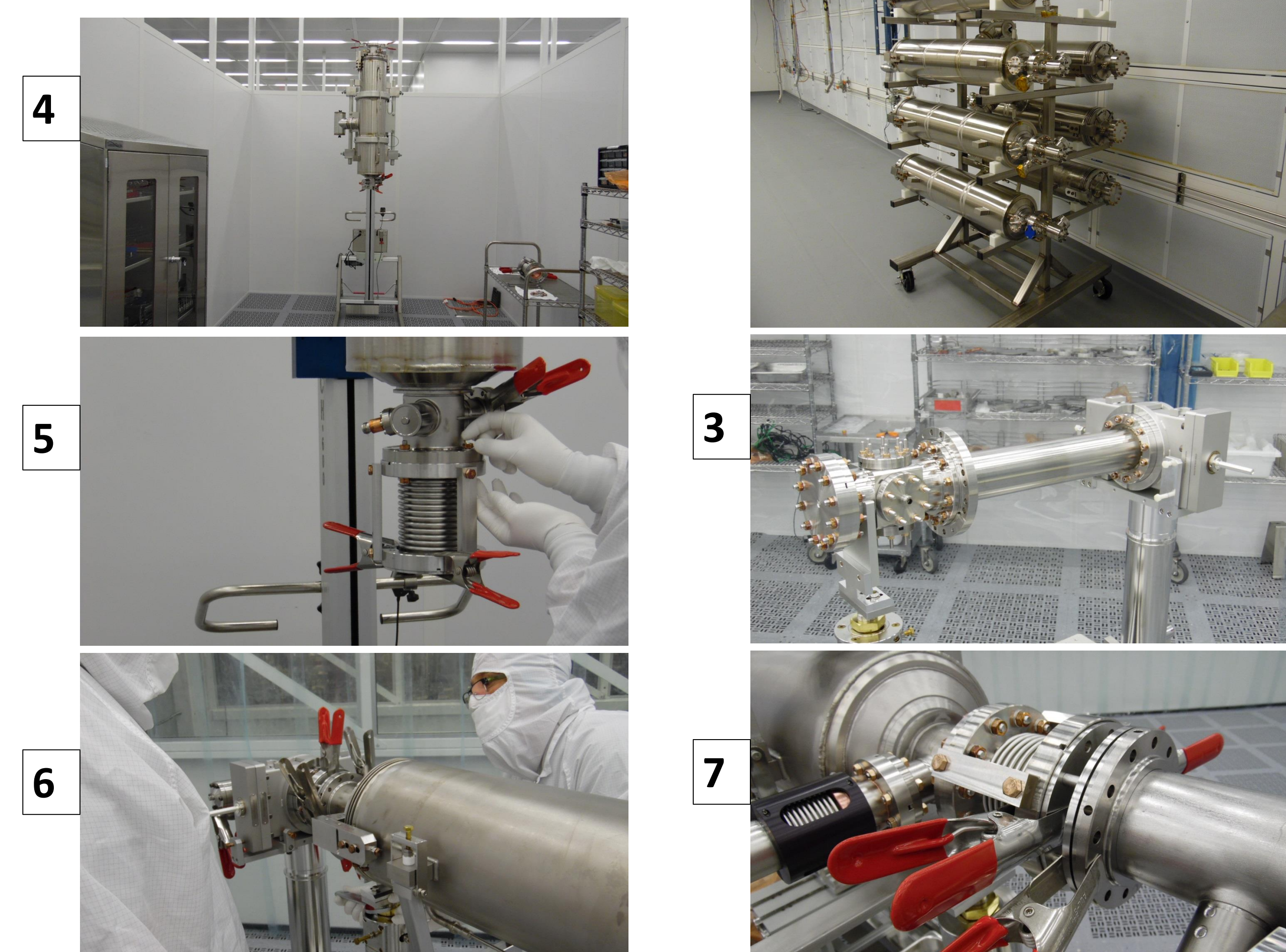


## Cavity string assembly:

Slow vent cavities, disassembly, HPR assembly to string

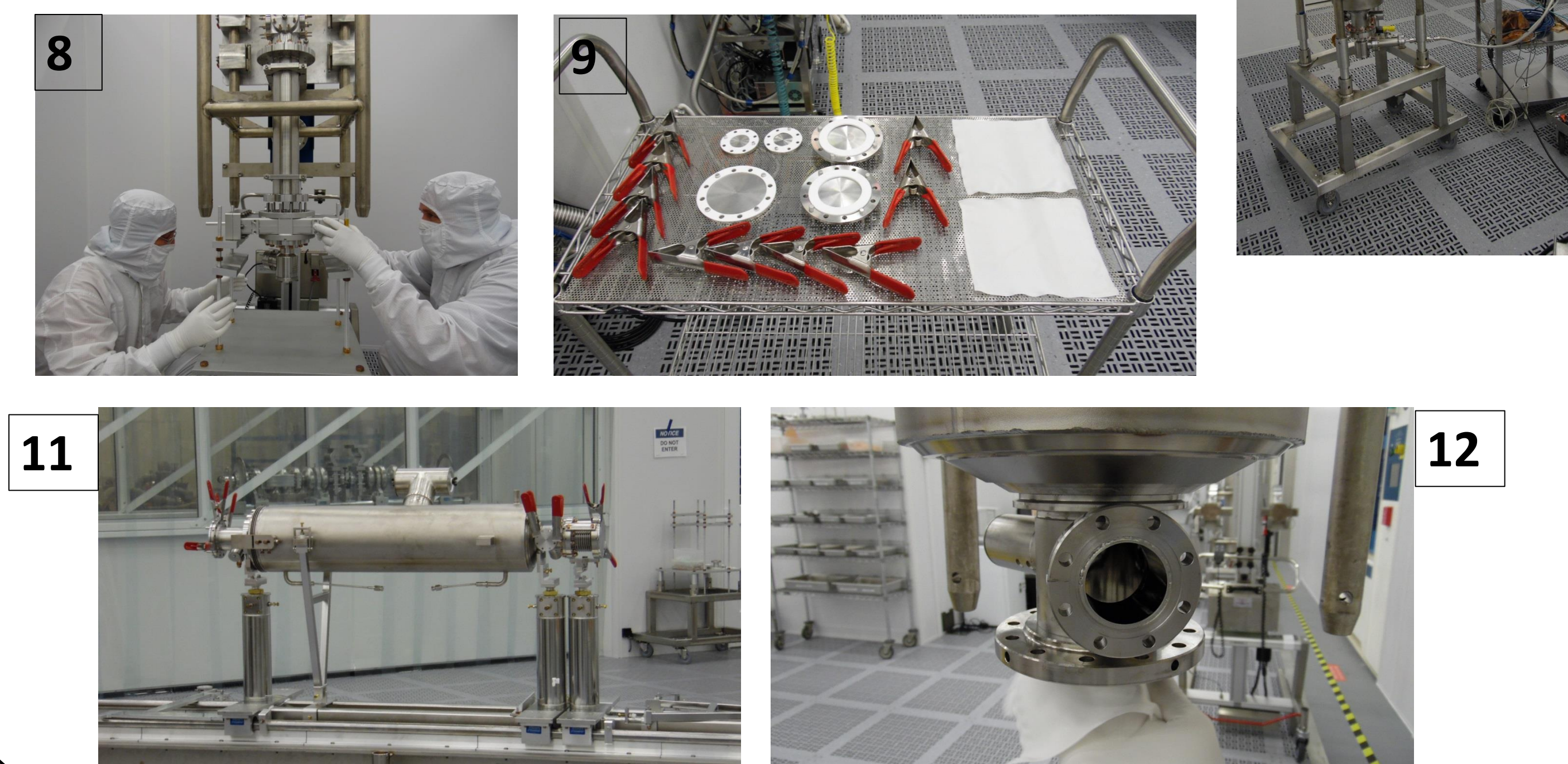
### String assembly sequence:

BPM sub-assembly [8, 3], leak check;  
String cavity assembly, leak check



## Optimized process to reduce FE:

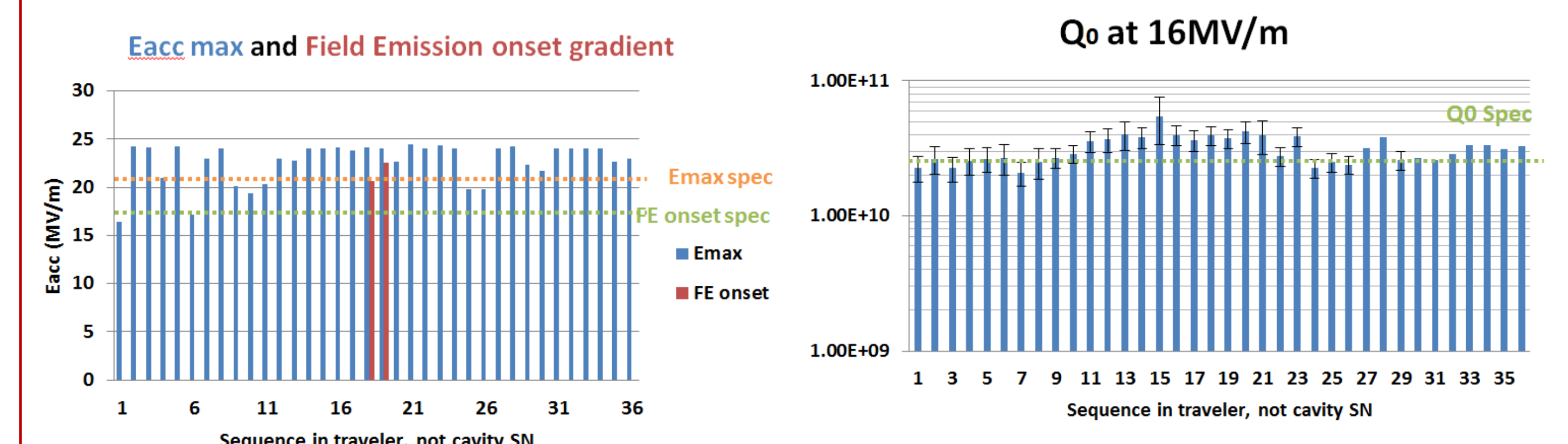
- Dedicated covers and clamps [9]
- Clean disassembly procedure [12]
- Bolt hole and sealing surface cleaning, final HPR
- Slow evacuating and slow venting [10]
- Vertical and horizontal assembly combination [5, 6, 8, 11]



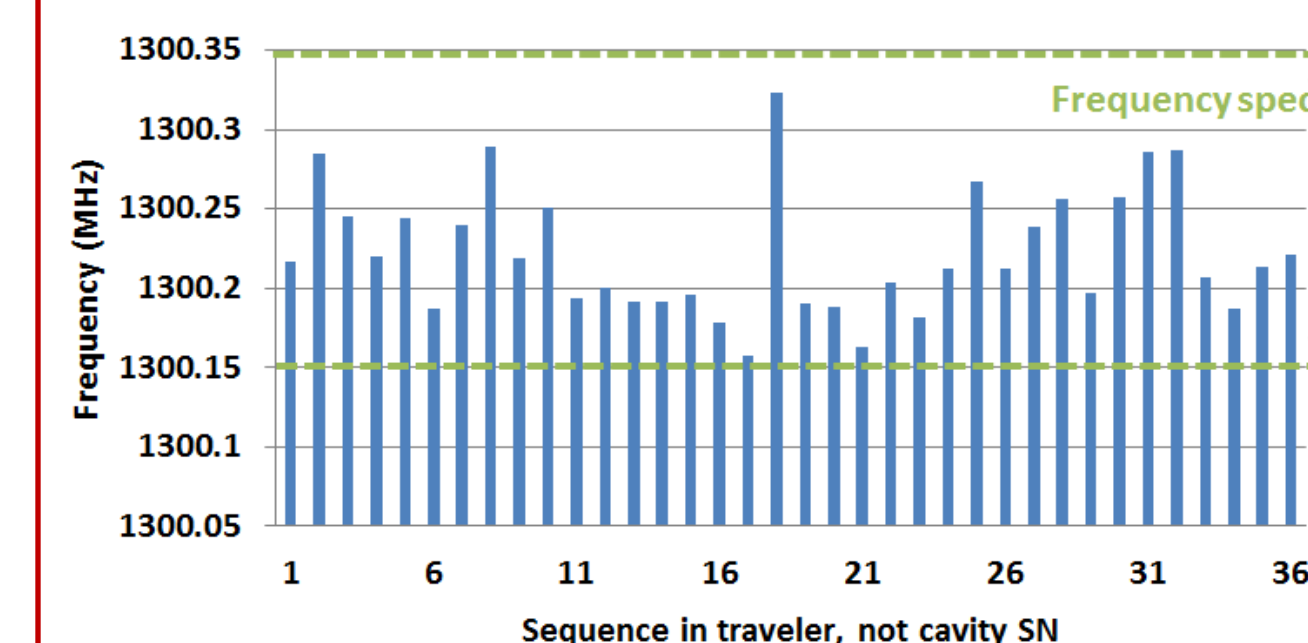
## Summary

As of 06/12/2017, 67 production cavities +8 prototype cavities in house; 50+8 tested at JLAB or DESY; 36+8 qualified for string; 5 strings built; 1 CM tested.

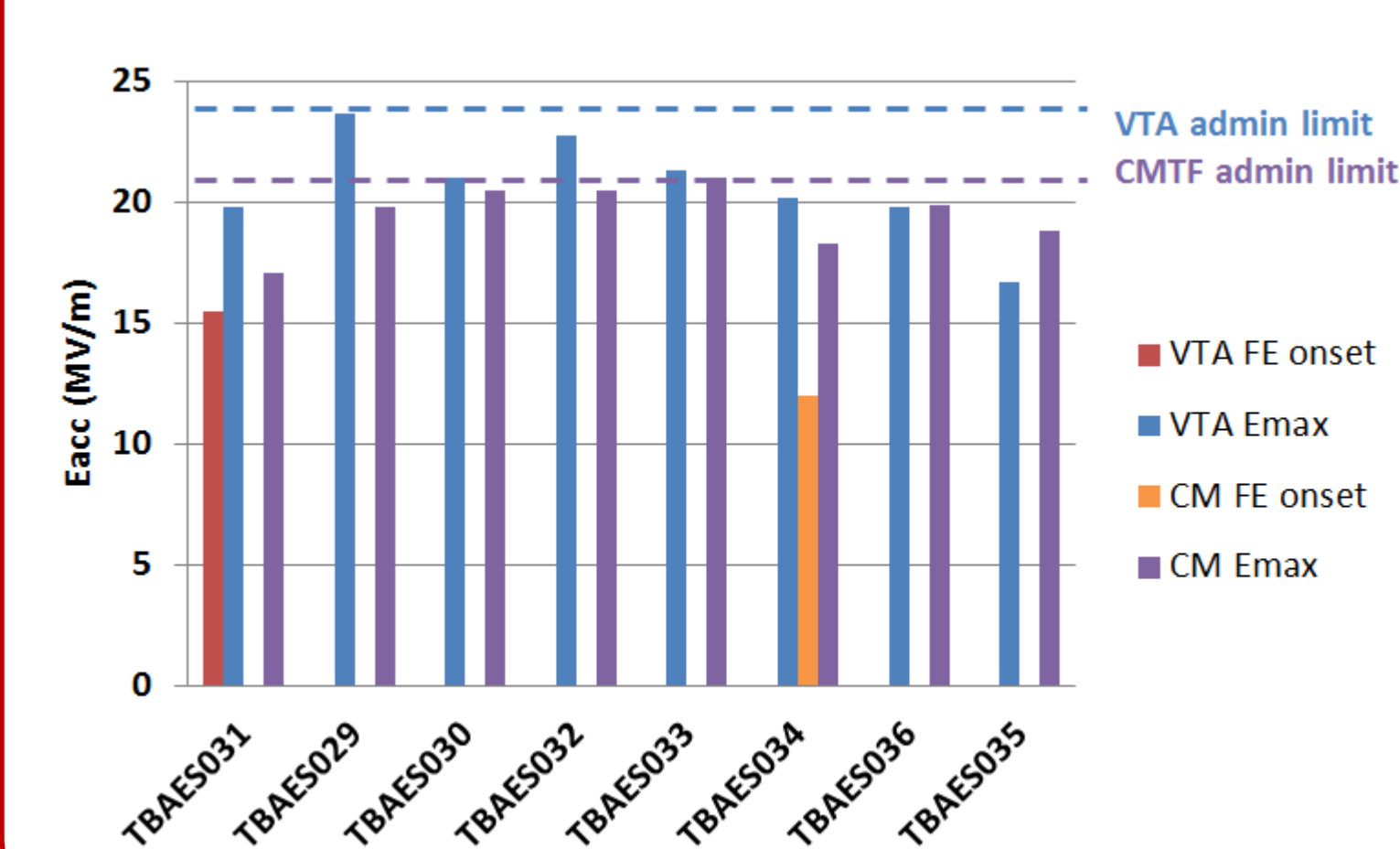
## Production cavity VTA performance



## Lock frequency



## Prototype cavity performance: VTA vs. CMTF



## Acknowledgement

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