Clean room experience with RF Dipole

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On behalf of CERN / SY-RF-SRF section and WP4

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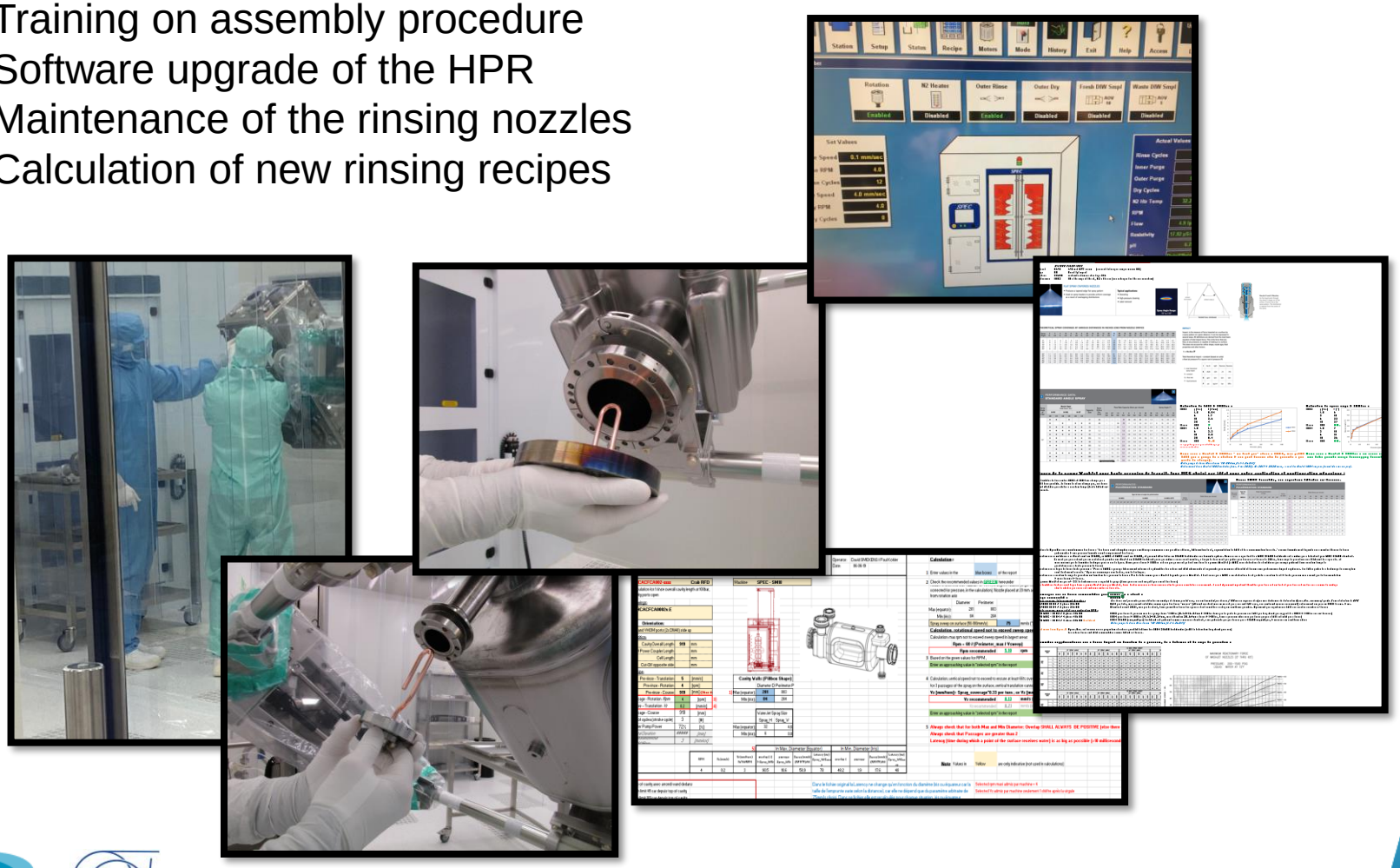
Outline

- Adaptation of know-how
- Adaptation of tools
- Systematic quality control & processes
- Standardize behaviours for reproducibility
- Achievements of results
- Lessons learnt
- Investment in team

Adaptation of know-how

Upgrade of assembly techniques, and HPR system !

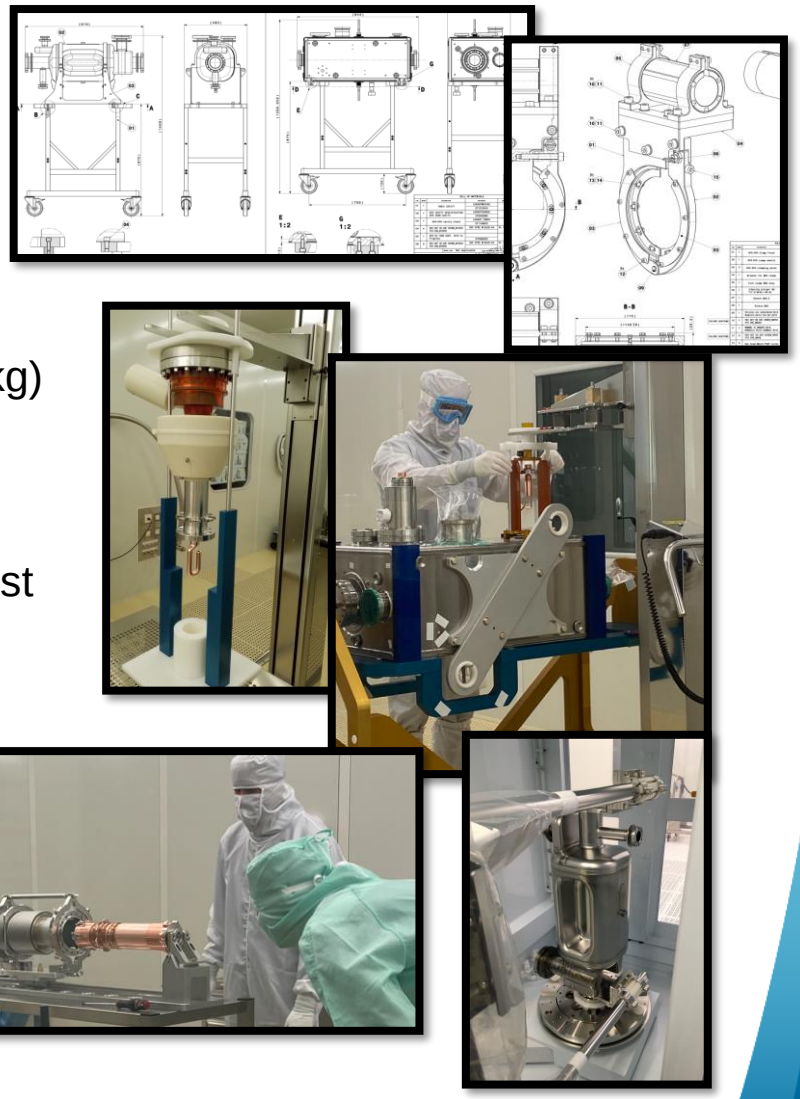
- Training on assembly procedure
- Software upgrade of the HPR
- Maintenance of the rinsing nozzles
- Calculation of new rinsing recipes



Adaptation of tools

Getting tooling right to minimize human related influence in assemblies !

- Handle a light bare cavity (<40kg)
- Handle a heavy jacketed and dressed cavity (>200kg)
- Assemble the HOMs in a reproducible way
- Strict management of the HOMs angle positioning
- Assemble the FPC and tube without collision risk
- Assemble the PIMs of the primary line in the cleanest way possible



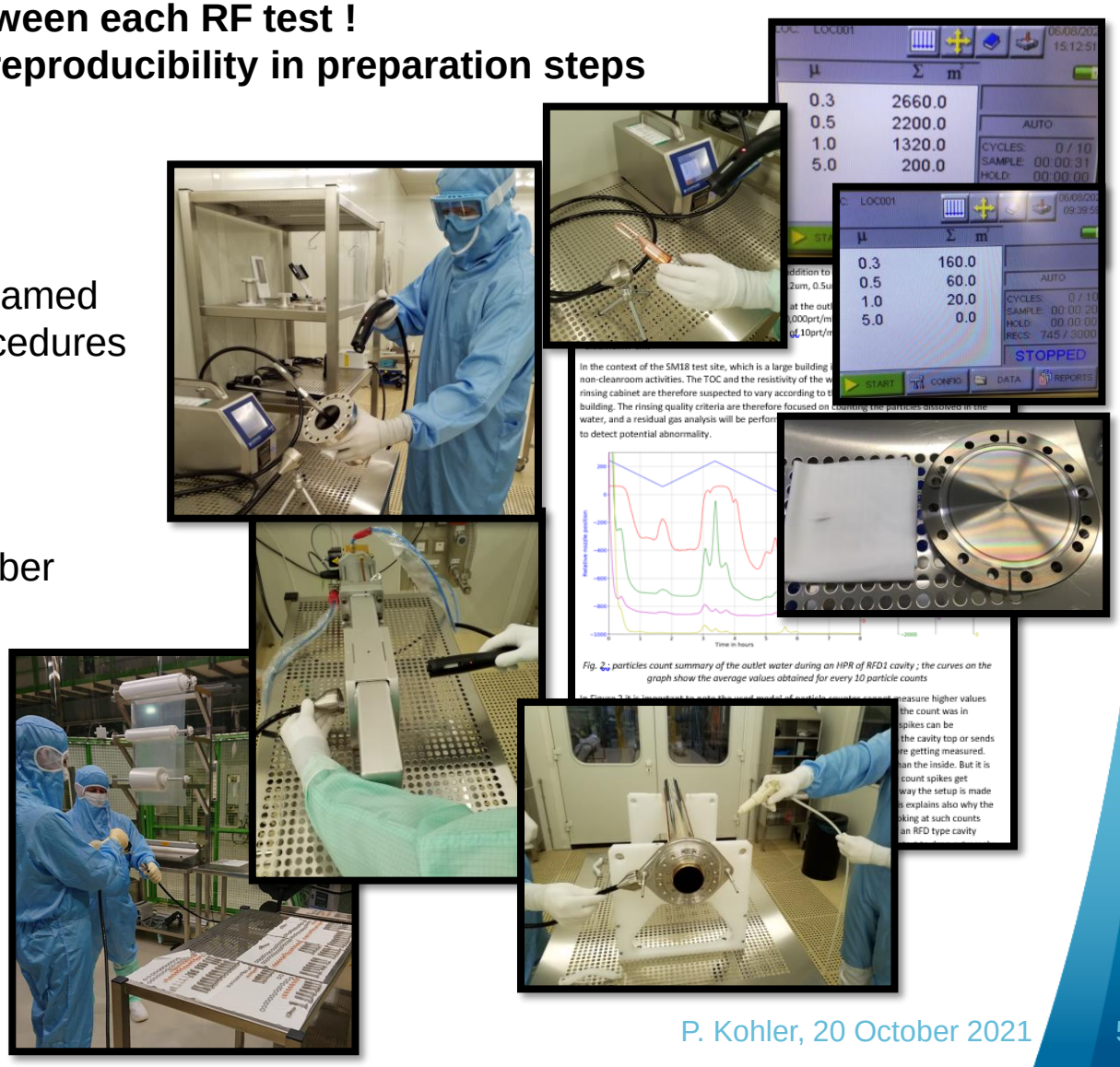
Thank you EN-MME, SY-RF and many others for all the new cleanroom toolings !

Systematic quality control & processes

Critical to be comparable between each RF test !
→ Strict quality control, and reproducibility in preparation steps

- Particle count thresholds
- Anti-dust preparation mainstreamed
- Implementation&tuning of procedures

Achieved goal : become reproducible over the number of preparations & increase the number of conform pieces (ISO 4)



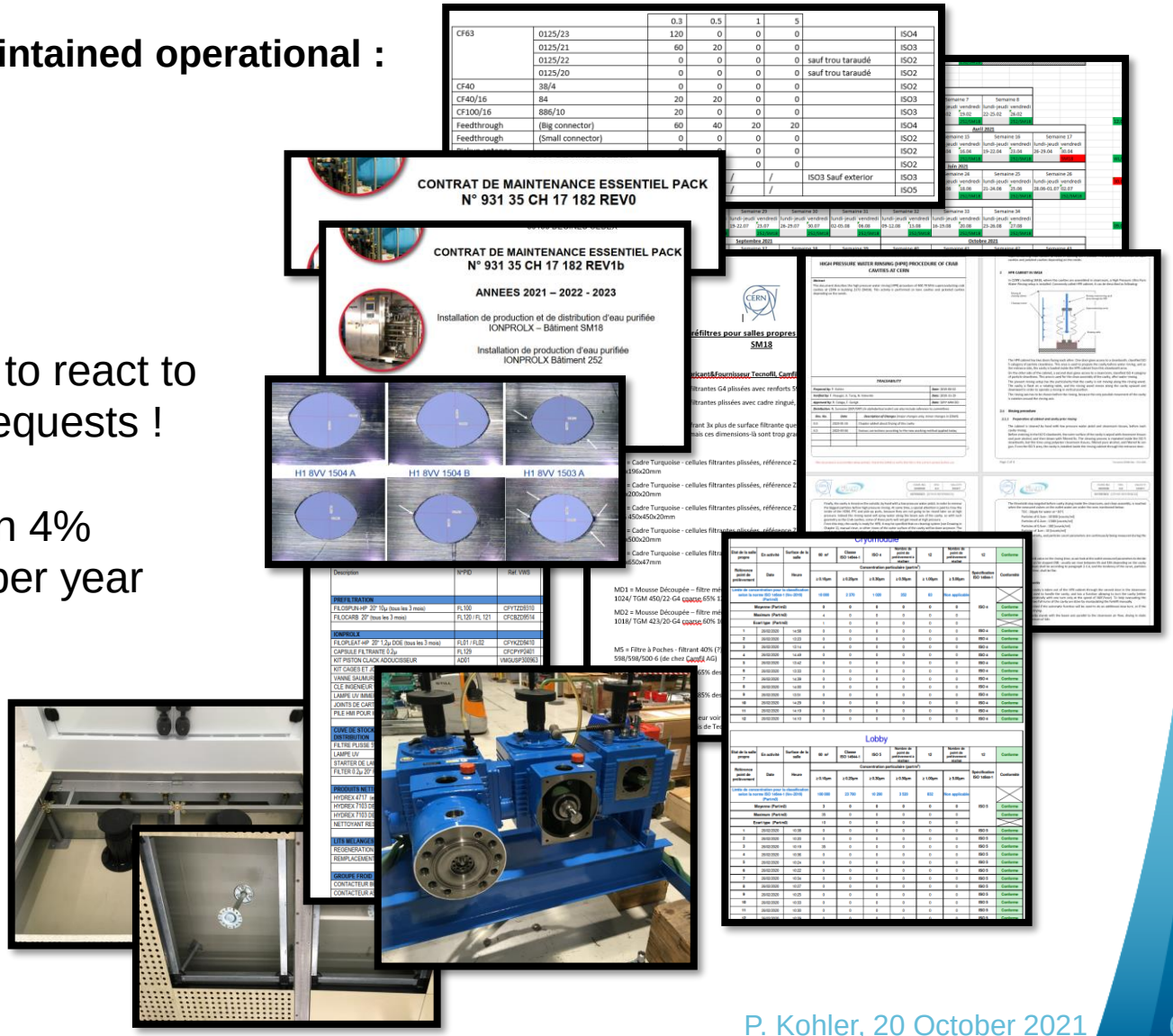
Standardize behaviours for reproducibility

Must be all year long maintained operational :

- Infrastructures
- Measurement devices
- Parts stock
- Working procedures

Give the section freedom to react to unpredicted events and requests !

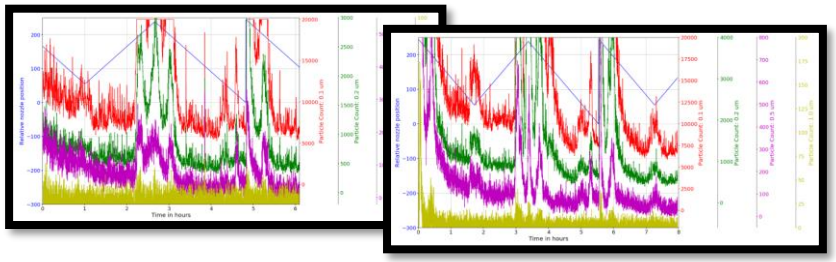
Achieved goal : less than 4% infrastructure down time per year



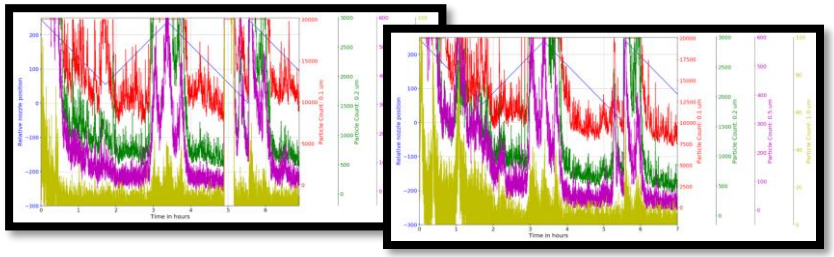
Achievements of results

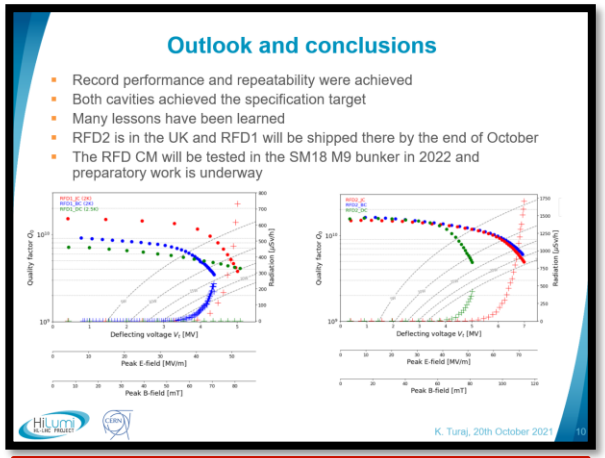
Particle count in water on the outlet of the HPR

RFD1



RFD2





CERN RF Dipole testing experience & outlook
Katarzyna Turaj

14 cleanroom assemblies in total, with reproducibility in cleanliness !

Translated into results showed by Katarzyna Turaj, expl. :

- Very reproducible Q_0 in the range of 10^{10} at low field
- No radiation measured with RFD1
  => Even after HOMs assembly

Lessons learnt

- **Beam screen handling :** Can be improved to gain cleanliness

→ Training will be put in place => even better collaboration between coating&assembly steps

- **Plug In Modules :** Maintaining sub ISO 4 is difficult due to complex assembly sequence

→ Study to improve cleanliness after assembly are on going

- **Main coupler and tube :** Electrical cables make clean installation challenging

→ SY-RF-AC looking at imporvement

- **Sector valves :** Only manually accessible areas can be cleaned

→ Observed ISO 7 conditions when opening/closing the valves despite being all metal valves

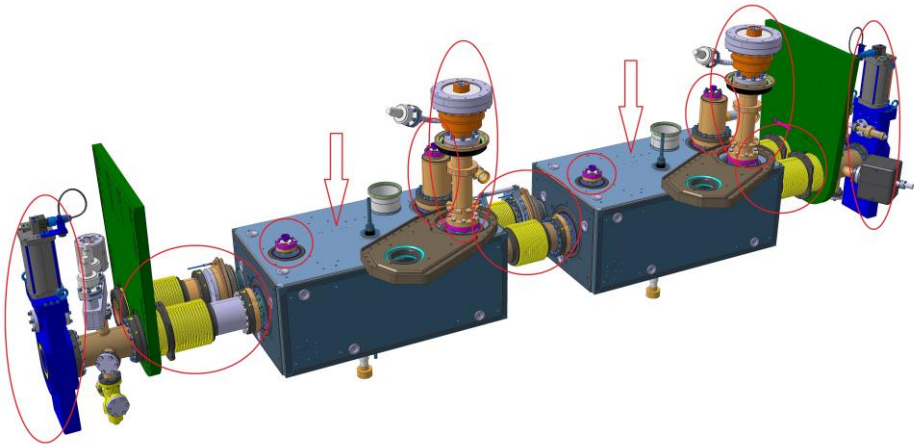
- **High Pressure Rinsing :** Can be streamlined

→ Studies on going to reduce rinsing time and cross-contamination

- **Antidust preparation of the anciliaries :** Very time consumming and subject to variation

→ SY-RF-SRF is implementing an automatic washer with designed rinsing racks for components

- **Quality control tracking :** Sufficient till now, but needs improvement given the future load



Investment in team

Cleanroom qualified team !

Evolved from 4 to over 10 cleanroom trained people now in place.

→ People come from several sections across CERN

CERN SRF Training program implemented :

- Cleanroom behaviour
- Particle counter usage
- High pressure rinsing of cavities
- Clean assembly of anciliaries & pumping lines
- Usage of mobile laminar flow for outside cleanroom antidust connection

Acknowledgments also to : S. Barriere; A. Boucherie; S. Calvo; T. Capelli; M. Chiodini; S. Fiotakis; Z. Jankovic; A. Castilla Loeza; T. Mikkola; D. Murgue; G. Péchaud; N. Villanti; J. Walker, and many others who contributed to cleanroom preparations of Crab cavities.