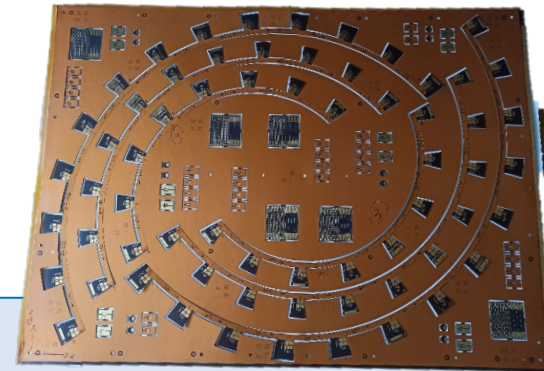


EC Type 0 Flow

C.Gemme, E.Ruscino (INFN-Genova)

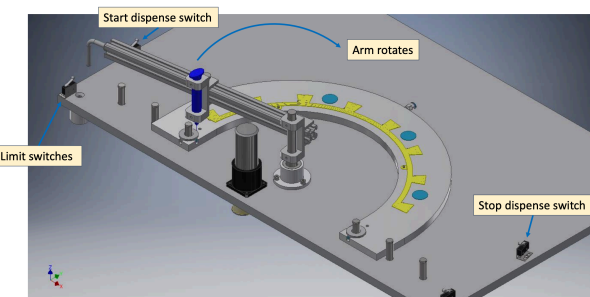
Jan 11th 2020



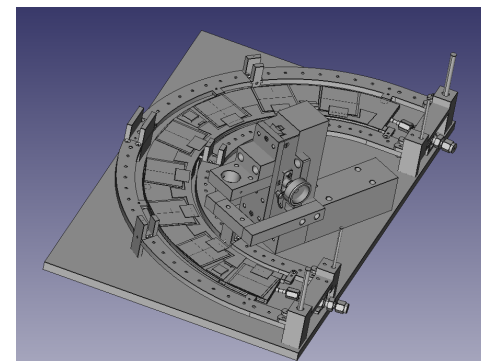
- **Tape Design** → Genova
- **Tape Production** → Single Vendor - CERN (<200k: ~500 ChF * 300 tapes (~2tape/HR * 30HR/HS* 4HS)
 - Post-production actions (presoldering, loading connectors, components such as SMDs and MOPS) in industry/CERN
- **Tape QC** → CERN first; then Genova and UK
 - maybe all tapes tested in Genova before shipping in UK

- **Two Tapes Loading on HR** → Genova
 - Jigs: Discussed with UK, responsibility in [Manchester](#). We will copy the design or ask for a copy of the jigs.
- **Two Tapes QC on HR** → Genova/UK
 - Half of the Italian HRs sent to Lecce. Some quick receipt test may be done there.

Place top plate on platform.



- **Module Loading on HR**
- **Tape – pigtails welding on HR**
 - Jigs and procedure being optimized in Genova. Once optimized, share the design or **single production for all ¾ sites**



Spare Slides

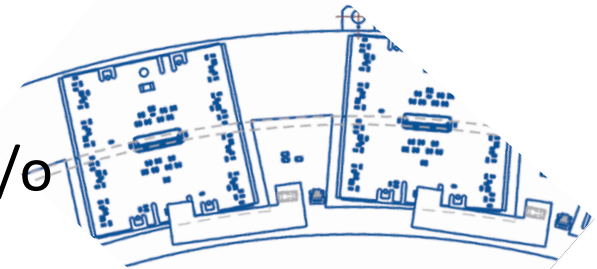
Towards V6:

Focus on Connection to modules

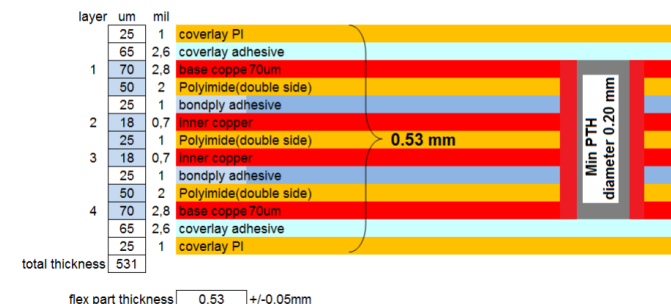
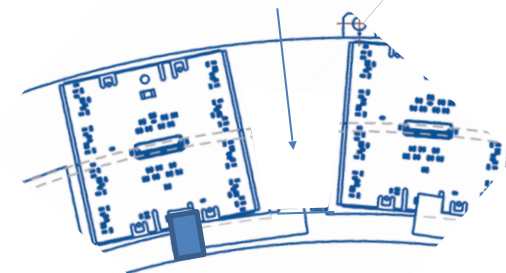
- In V5 baseline connection to modules is via a connector on the wing, assuming an **U-Shape** pigtail.
- In V6 we plan a **I-connection** to the tape , w/o a **connector, but welding** to pads.

- The idea is to load the two tapes on the HR sides, then load the modules on one side, then connect electrical the modules on an ad-hoc setup, then go back to the P&P machine to load the second side.
 - Coupons have been produced for tapes (V6 thickness) and pigtails to do tests to validate welding and part of the assembly procedure

- V6 draft** layout/stack done, on 4 layers



No more module wings, only PPO wings



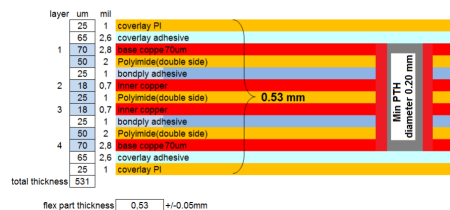
Test coupons for welding studies

Oct 23

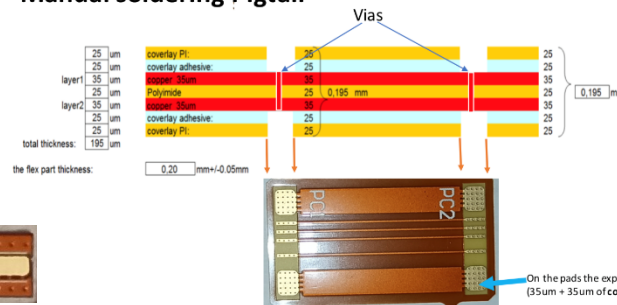
Sep 22

- Representative Tapes and pigtail coupons produced and in hands since October.
 - 96 Mini Tape 0 - V6 stackup (24 circuits x 4 panels)
 - 60 Pigtail for Hot Bar soldering (10 circuits x 6 panels)
 - 60 Pigtail for Manual soldering (10 circuits x 6 panels)
- Tests done focusing on **Manual soldering** – more compatible with in house assembly
 - Controlled Solder deposition, Electrical resistance, Mechanical robustness.

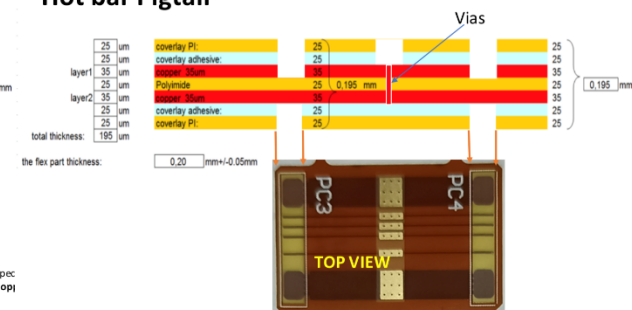
Stack-up



Manual soldering Pigtail



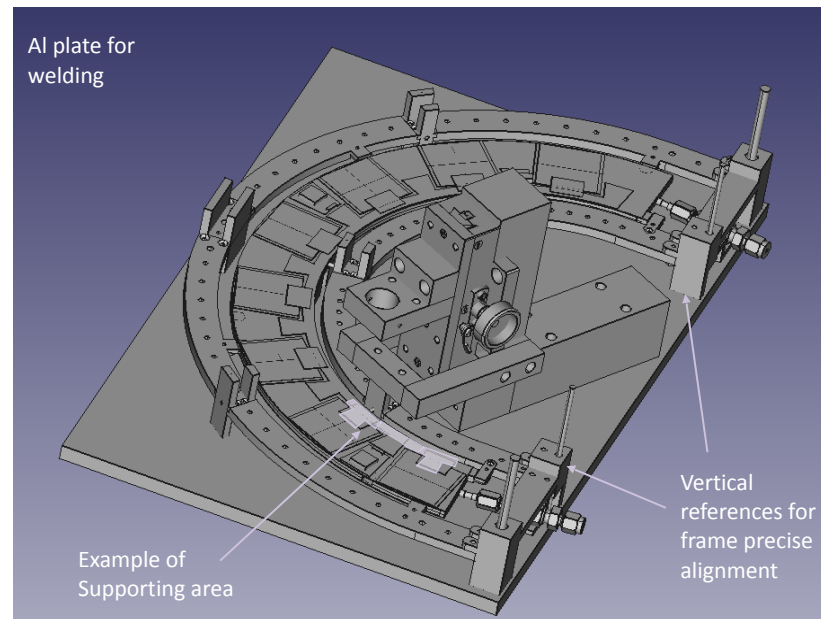
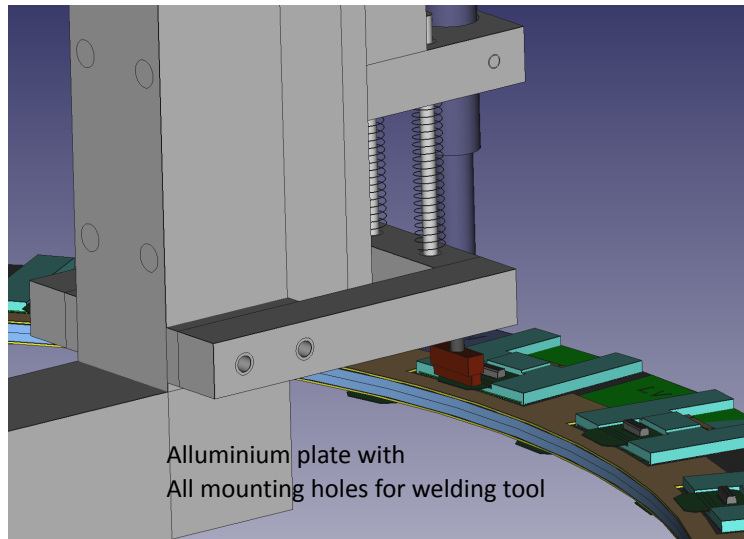
Hot bar Pigtail



In each coupon Groups of Pads are shorted to allow for welding QC

Welding Jigs

- As manual welding on test coupons is promising, now working on a reproducible welding with well defined procedure and jigs.
- On a dedicated setup, the soldering head will weld a module at a time from the top side. Force is balanced from the bottom thanks to mechanical step.
- Verified compatibility with the handling frame – no interference
 - All the region below the power tape (7mm wide x HR length) and the intermodules areas in principle accessible to support the HR during the soldering.



Module Connection next steps

- Finalize **the technique** and check the procedure

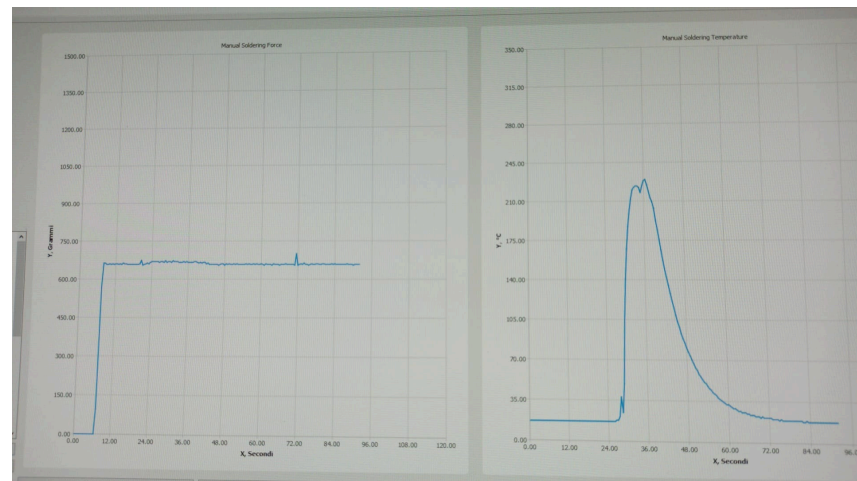
Thermal measurement on HR
while welding pads



Force measurement on HR
while welding pads

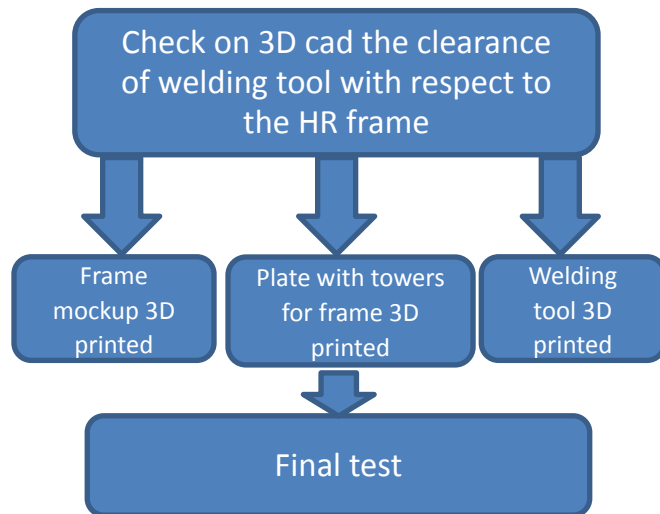
*These tests are done **on carbon samples** or **other supports mimicking** the HR if final properties are not needed.*

In these days we are finalizing the calibration of the setup with cross-sensors to control pressure and temperature. Then moving to real parts.



Module Connection next steps

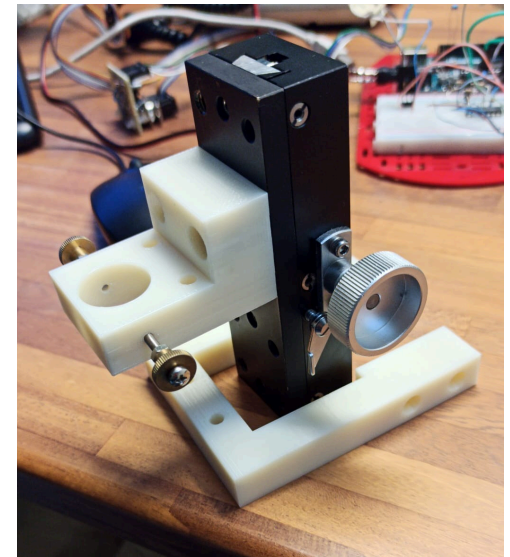
- Finalize the technique and check the **procedure**



*We are planning to 3D print **a sector of the HR**, representing frame, HR, etc ... to validate the clearances in the system.*

To be optimized with realistic parts if no showstoppers are found.

Results in month (s).



Towards V6 - I

- Plan to finalize the welding studies by the Xmas break .
 - Allows to set it as a baseline and sign-off the tape pads on V6 (rather than the connectors).
 - Optimization of the welding setup can then continue and be optimized.

Towards V6 - II

Summary	EC type-0 power tapes	2019-04-16	2023-07-03	2019-04-16	-	1100	302	302	None	None	51%
Schedule Task	EC type-0 power tapes preliminary Design	2019-04-16	2020-03-30	2019-04-16	2020-03-30	100	0	-	1	1	100%
Summary	EC type-0 power tapes design and prototyping	2020-03-31	2020-12-07	2020-03-31	-	180	197	197	None	None	61%
Schedule Task	EC type-0 power tapes prototype Design	2020-03-31	2020-07-20	2020-03-31	2020-07-20	80	0	-	1	1	100%
Schedule Task	EC type-0 power tapes finalizing Design	2020-07-21	2020-09-14	2020-07-21	2020-09-14	40	0	-	1	3	100%
Schedule Task	EC type-0 power tapes testing of final design	2020-09-15	2020-11-09	2020-09-15	-	40	0	-39	1	2	20%
Schedule Task	EC type-0 power tapes ITKPix V1 module adaptation	2020-09-15	2020-12-07	2020-09-15	-	60	9	197	1	1	10%
Summary	EC type-0 power tapes preproduction and QA	2022-03-09	2022-06-14	-	-	70	0	-38	None	None	0%
Schedule Task	EC type-0 power tapes preproduction process	2022-03-09	2022-04-19	-	-	100	0	-38	1	1	0%
Schedule Task	EC type-0 power tapes testing of preproduction tapes	2022-04-20	2022-06-14	-	-	40	0	-38	1	2	0%

- Towards tape V6 (last prototype for the FDR)
 - V5 qualification ~ complete
 - Add test in Database when possible
 - Run more QA tests
 - Cross-check from test in Uk [two middle there for Ring1]
 - Design phase (Dec/Jan → March ?)
 - Include HV PP0 on tape (easy)
 - Finalize option of LV/DCS EoS on tape or an EoS card (as V5).
 - If not baseline, implement two options, maybe on test coupons.
 - Once schematics and design finalized and approved on one tape flavour (O,M or I), design the other two ones.
 - Check against G&S and loading.
 - Production
 - April-July ?