



ALICE

Tuesday 9 August 2022

ITS3 TEST SUMMARY

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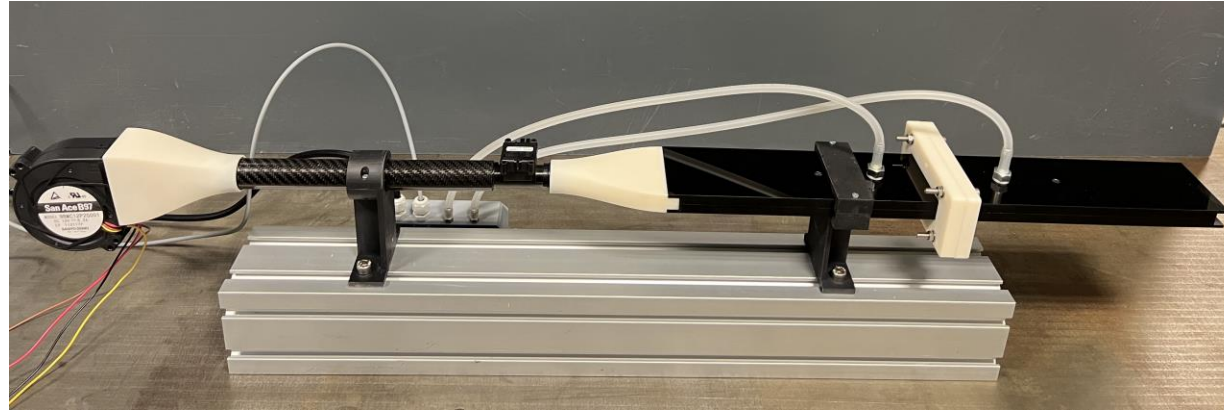
1. GLUE TESTS
2. THERMAL SETUP
3. EM3



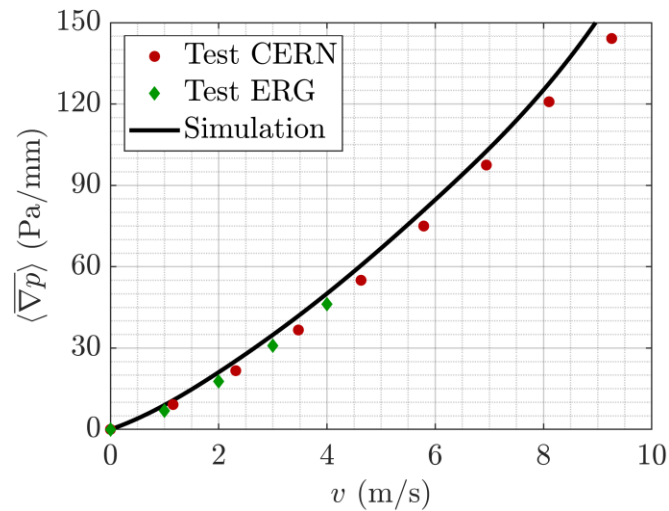
- Taking into account many parameters (filler, viscosity, thermal conductivity, electrical conductivity, coefficient of thermal expansion, young modulus, ultimate shear strength, curing temperature, water absorption, flammability) four glues were bought for testing.
- **Araldite 2011**: Properties used as a reference and for validation of the measurement machine.
- **Epotek T7109-19**: Samples ready and prepared to be tested. No water absorption. The measurement machine is broken, expected to be repaired this week.
- **Epotek 930**: **No curing possible at ambient temperature. Discarded.**
- **Epoxies 3150-FR**: **No water absorption. Three tests give $k=0.85 \text{ W}/(\text{m}\cdot\text{K})$. Pieter tested it and provided good feedback in terms of viscosity. Will be used in EM3 for thermal joints.**
- **Polytec 423-2**: **Disaster. The received sample had a syringe of bad quality, and the pot life is less than 15 minutes. Discarded.**
- **NEXT**: Test the T7109-19 glue and take a decision between it and the Epoxies 3150-FR.

Adhesive → Property ↓	A-2011	EK-T7109	EK-930	EX-3150	P-423
Particle size (μm)	—	< 20	< 20	15	< 150
μ (Pa·s)	40	40-70	12-17	28	87
k (W/(m·K))	0.22	1.3	1.7	2.2	3.1
CTE (1/K)	85	60	25	24	30
T_c (K)	298	353	423	298	298
Flammability	—	—	—	V-0	—

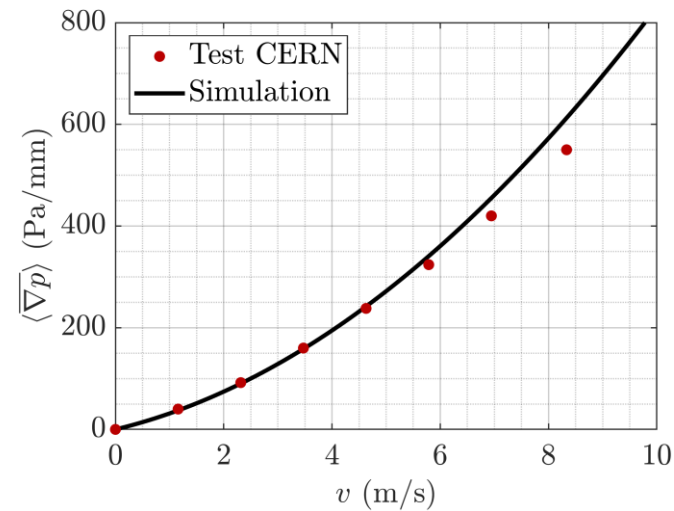
** Although the curing temperature is higher than ambient temperature in the Epotek glues, they can be cured at ambient temperature*



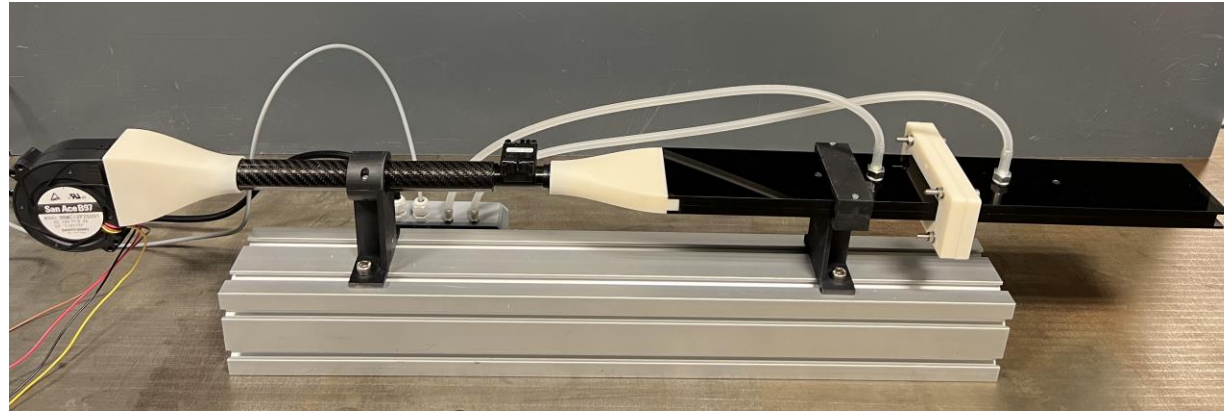
- Setup built 4-8 weeks ago.
- Accuracy of mass flow meter and pressure sensor checked with pressure drop tests of ERG (RVC 100PPI).
- Pressure drop of ERG 100 PPI and Allcomp K9 LD obtained and compared with CFD.



RVC 100 PPI



Allcomp K9 LD



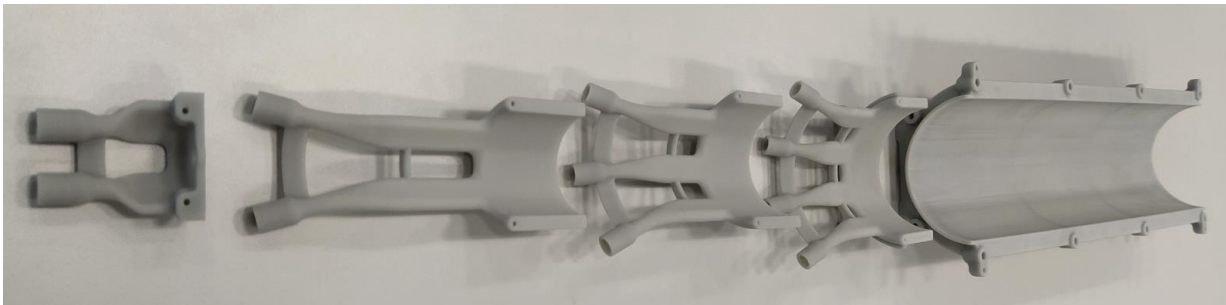
NEXT: Test the thermal resistance of the foam-silicon contact to obtain the optimum glue thickness

- Five samples will be prepared with different glue thicknesses and contact resistance will be obtained
- All of the parts (T-sensors, heaters, foam samples, frames) are ready so that Pieter can perform the gluing process.
- In parallel, it is planned to replace the fan by a vacuum cleaner that provides higher pressure drop and filters the carbon particles.

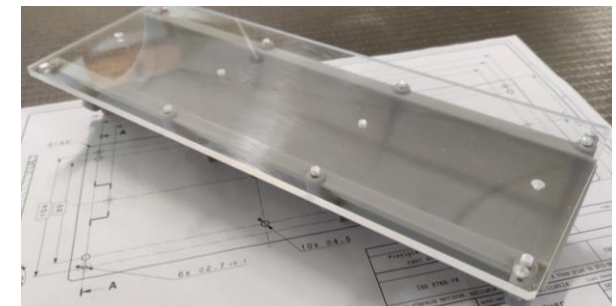


PARTS

- Carbon foam rings (both Allcomp and ERG) produced by Greg in previous weeks.
- Fabio is producing the longerons. Task expected to be finished soon.
- Temperature sensors expected to be purchased this week. Once received, it will be asked to Antoine (back on 18TH August) to solder the wires to the sensors.
- Heaters ready to be assembled. The wires will be soldered by Antoine after the assembly.
- The fan arrived last week. Currently waiting to move it to the composite lab.
- The fan sucks air. The direction of the flow will be decided this week based on temperature measurements of ALICE Outer Barrel.
- Distribution system and cover: arrived last week. Will be glued during the assembly by Pieter.



Individual parts



Assembly



PARTS (CONT)

- Mass flow meters arrived last week. Gaël will work on the coupling with the inlet pipes and the addition of a flow regulator in each channel



Mass flow meter



ASSEMBLY

- Jig arrived last week. Some modifications needed to be performed in the next weeks
- Lee is currently working on producing the new mandrels



Mandrel production



PARTS

1. Production of longerons. Should be finished soon.
2. Purchase of temperature sensors. Will be done this week with a delivery time of few days.
3. Soldering of wires to the temperature sensors. Will be asked to Antoine once is back 19th August.
4. Decision of the glue. It will be taken after testing the last glue (expected to be done this week or next week)
5. Decision on flow direction. Expected to be taken this week or next week after checking the current temperature barrels in the cavern
6. Design and production of parts to couple the mass flow meters and the distribution system. Expected to be finished before Pieter is back

ASSEMBLY

1. Modifications in the Jigs and production of mandrels. Expected to be finished before Pieter is back.