Tests of the VTX ladder support prototype

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Purpose of test

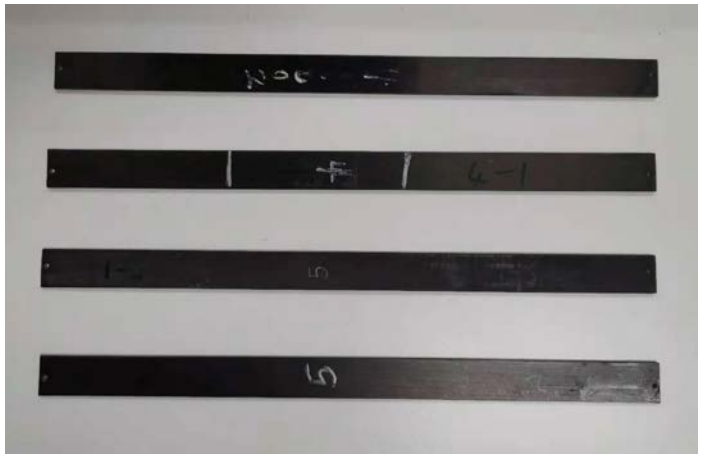
CEPC vertex detector aims for the spatial resolutions of 3-5 microns.

Air cooling will induce vibration, the vibration amplitude should be much lower less than the spatial resolution. Besides the Static test of the ladder support, the vibration test of the ladder support is necessary to verified it is stiff enough.

Ladder support prototype - latest

Prototype of ladder support with 120 micron thick CFRP, number 2.

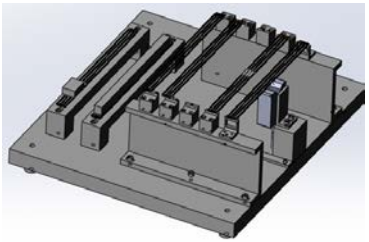
4-1 2.83(2.50)
4-2 3.23
5-1 2.83(2.98)
5-2 3.26

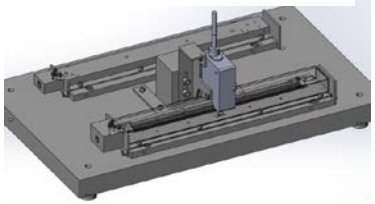


Prototype of ladder support with 150 micron thick CFRP, number 2.

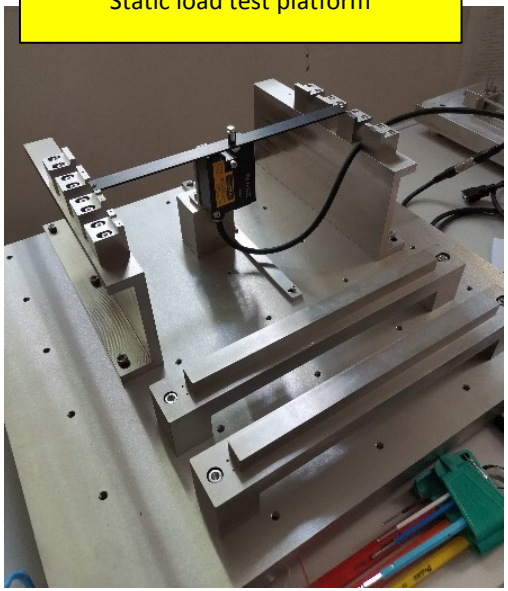
Test Platforms of Ladder and Ladder support

- Static (different support and load cases)
- Vibration and cooling + pressed air (different cases)

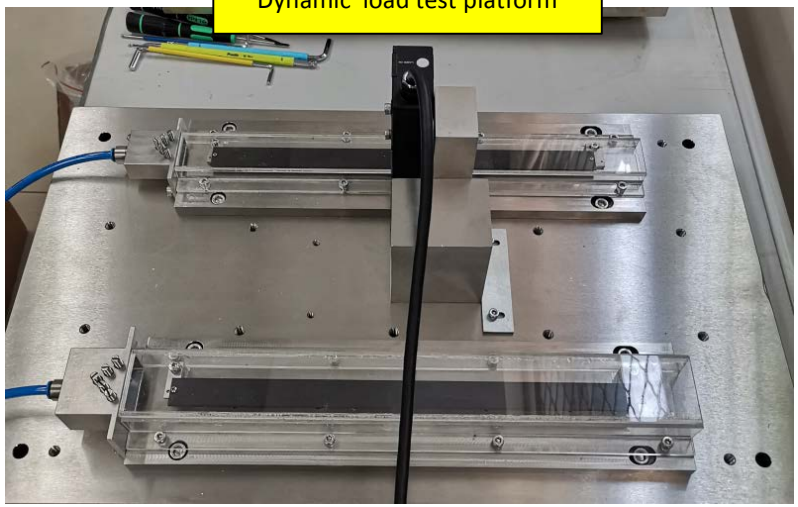




Static load test platform

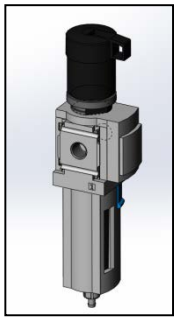


Dynamic load test platform



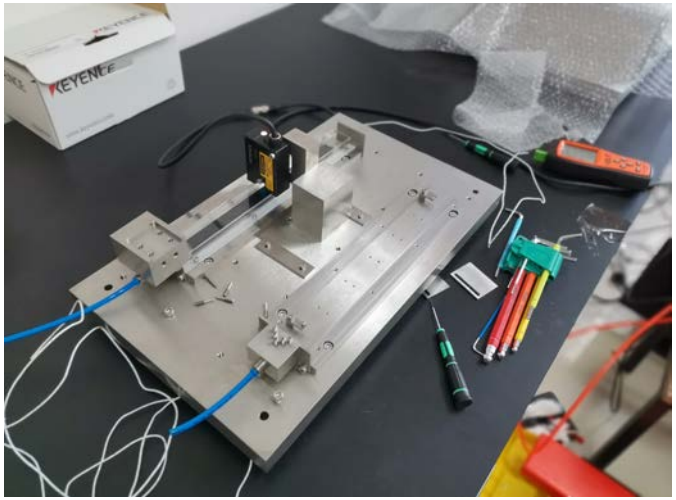
Preliminary Test of the Informal Ladder Support

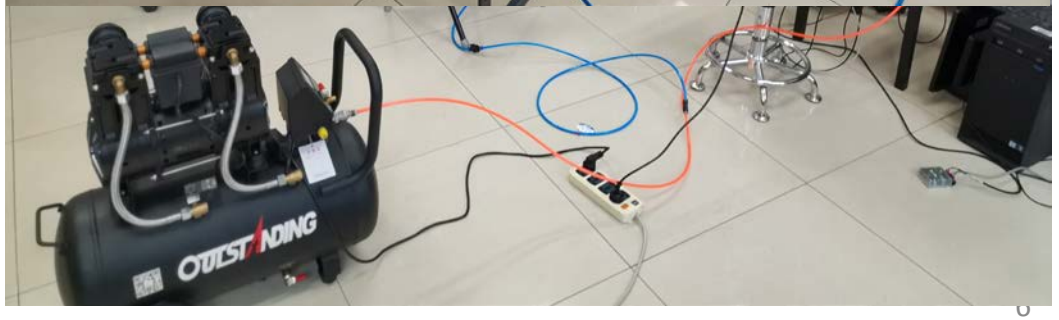
Very preliminary test of the informal ladder support samples has been done, which is mainly for verifying the function of the test platforms and the measuring instrument.



- devices updated
  - new digital flow meter for stable gas control
  - update pressure and flow control devices)
- temperature monitor

Preliminary Test of the Informal Ladder Support





Preliminary results of vibration test

Small channel - Vibration amplitude(um) .

Here roughly estimated the difference between the peaks according to the measured curve.
The listed numbers could be very conservative.
Further processing of the measured data to be carried out.

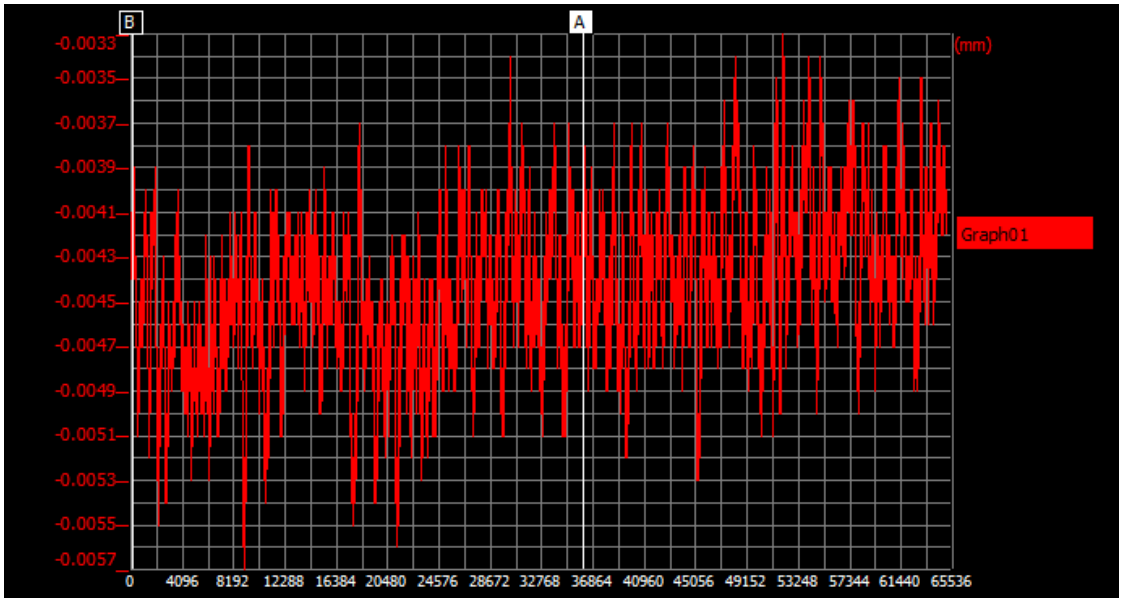
		4-1	4-2	5-1	5-2
V1=60.5 slm With pins	Outlet open	0.4	0.3	0.2	0.3
	Outlet 20% open	0.4	0.3	0.2	0.3
V1=60.5 slm Without pins	Outlet open	0.6	0.5	0.7	0.5
	Outlet 20% open	0.6	1.4	0.5	0.5
V2-30.25 slm Without pins	Outlet open		0.1		
	Outlet 20% open		0.2		

Preliminary results of vibration test

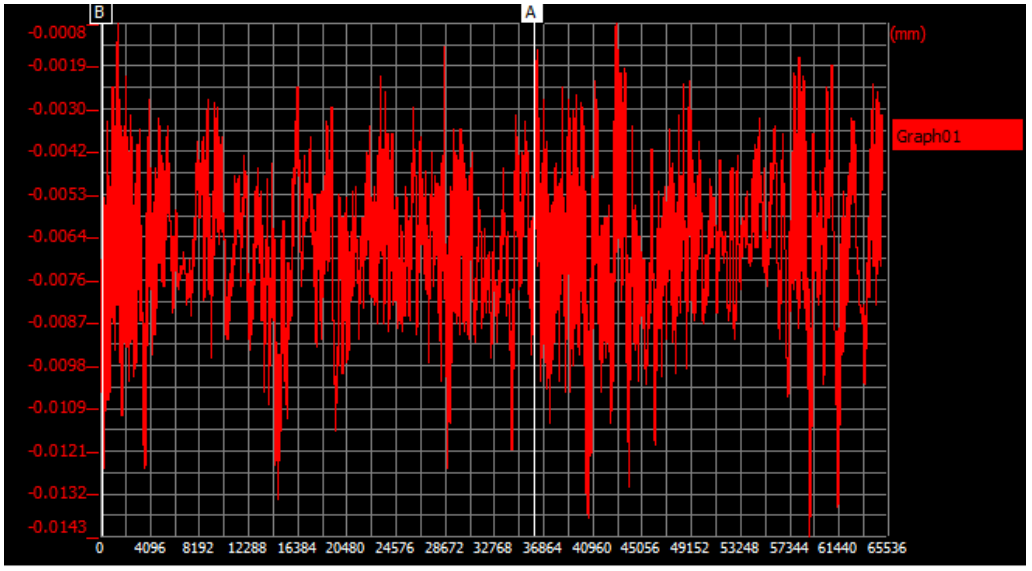
Big channel - Vibration amplitude(um).

		4-1 (100u/20u)	4-2 20u	5-1 20u	5-2 20u
V1=80.5 slm	Outlet open	3.2(2.5)	2.5	4.5	3.7
	Outlet 20% open	4 (2.3)	2.3	2.5	3.9
V2=128 slm	Outlet open	8 (4.7)	7.9	11	7
	Outlet 20% open	12.7(?)	9	9	8
V3=171 slm	Outlet open	? (6.5)	11	10	8.9
	Outlet 20% open	15.6(6.3)	11.4	13.5	10

1ms time interval



20us time interval



Next in the future

- Continue testing the ladder support prototype
- Vibration test of dummy ladder *(It is predicted by FEA simulations that the rigidity of the full ladder can be stiffened by 20% , when compared to the ladder support, due to the contribution from sensors and FPCs.)*
- Cooling test of dummy ladder *(ladder support + dummy sensor with expected heat generation)*