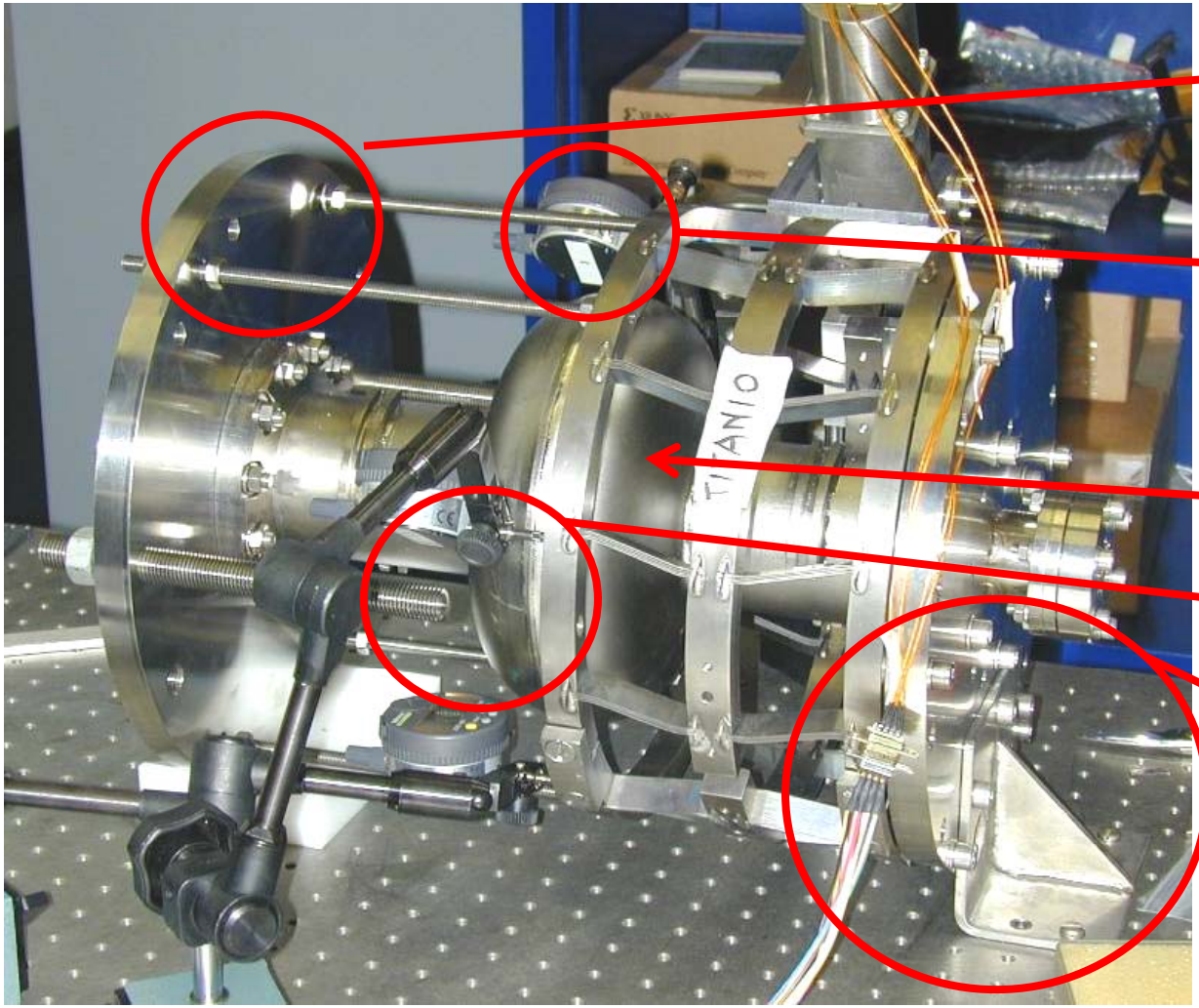
Tuners Test Facility

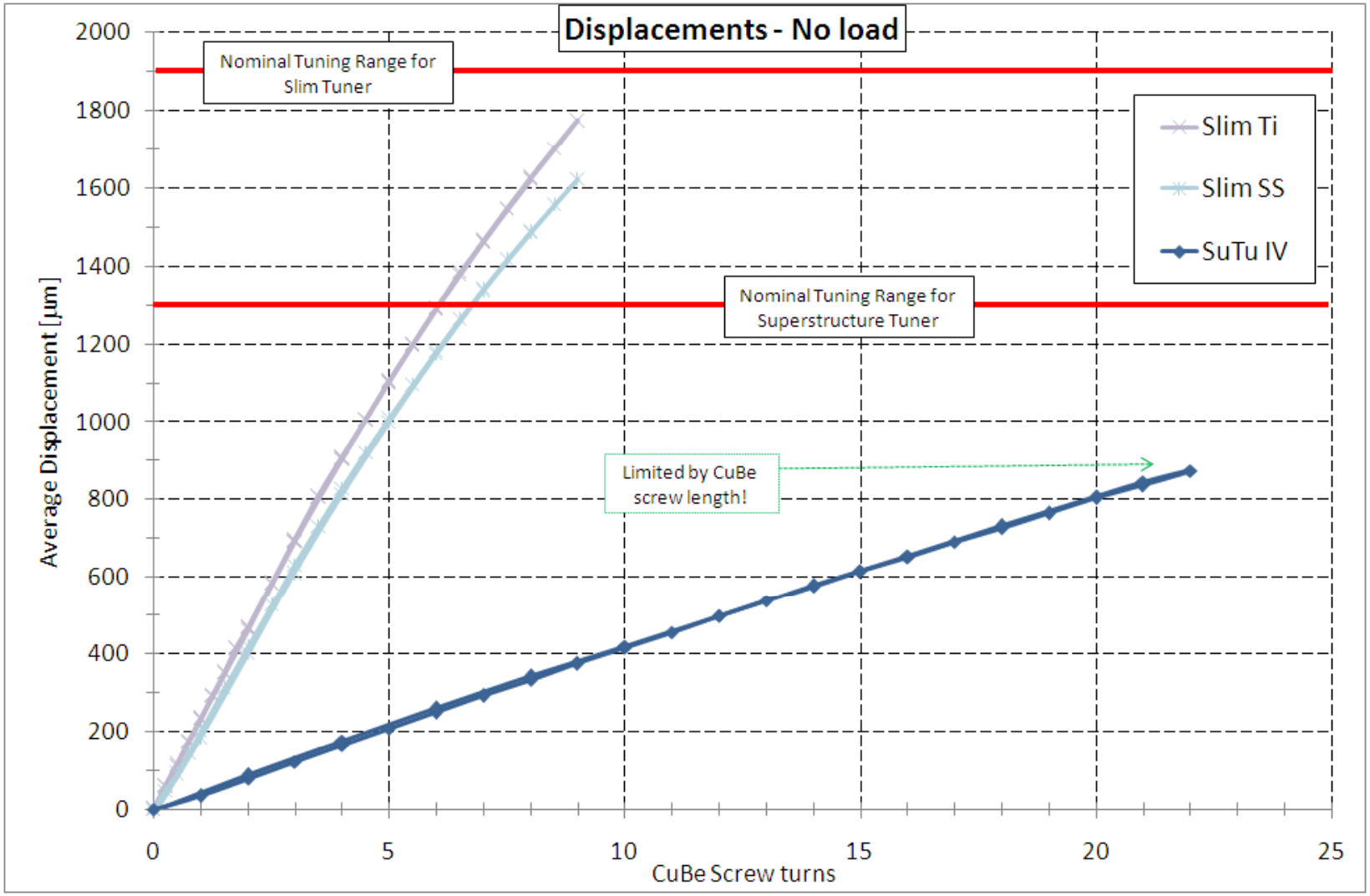
Different blade model tuners, **Slim design Titanium** (Slim_Ti), **Slim design Inconel** (Slim_SS) and **SuperStructure design Titanium** (SuTu_IV), have been installed for basic testing in a fast & slow tuning test facility available at LASA, based on a Nb TTF monocell.



- Stiffening rods fixed at the moving end of the chassis
- gauges for the measurements of tuner elongation
- Nb TTF monocell
- piezo screw support and holder
- fixed side of the whole chassis

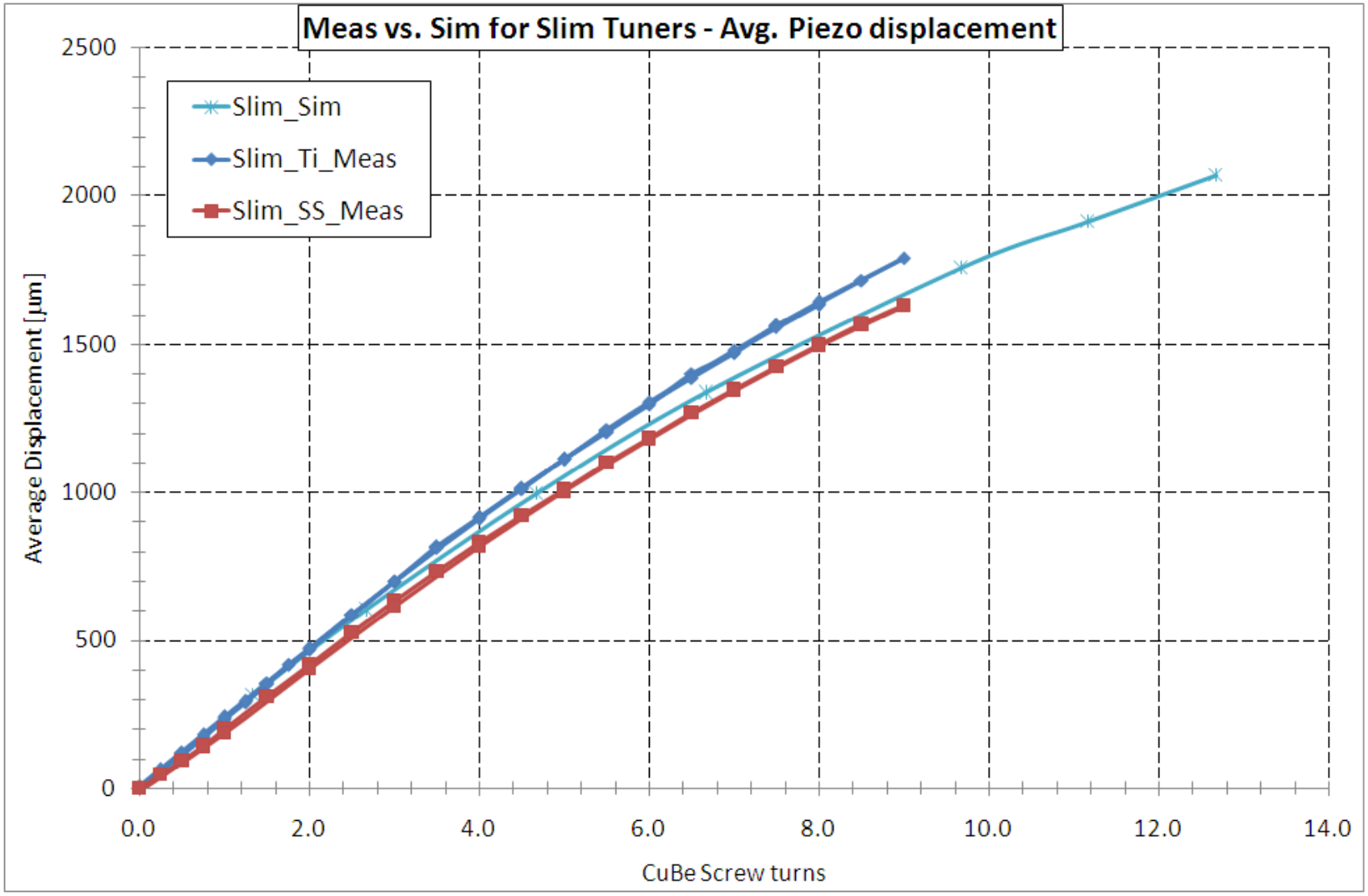
Unloaded cinematic performances

The unloaded cinematic performances of each tuner model were tested. The average readout of the gauges in piezo position were considered. All tuners behaved as expected, the SuTu IV tuner was actually limited by the length of the CuBe motor screw.



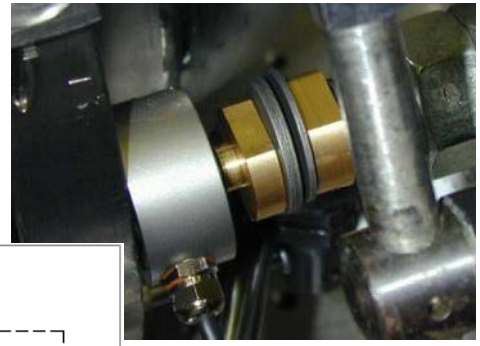
Experimental vs. Simulations - Unloaded

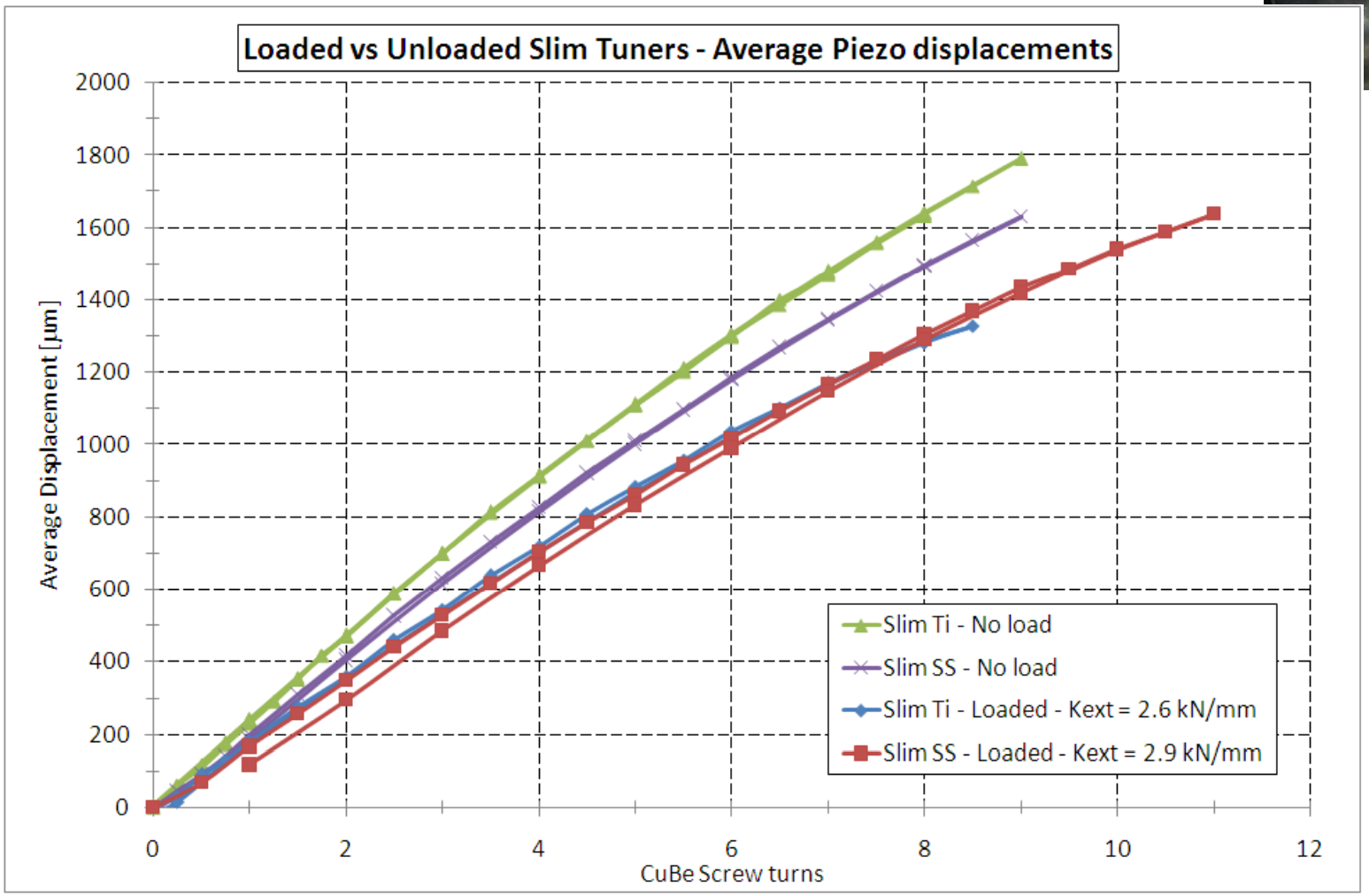
Numerical FEM simulations have been performed for both Slim_Ti and Slim_SS unloaded tuners in order to verify experimental results. A good agreement has been found.



Loading via spring load - 1

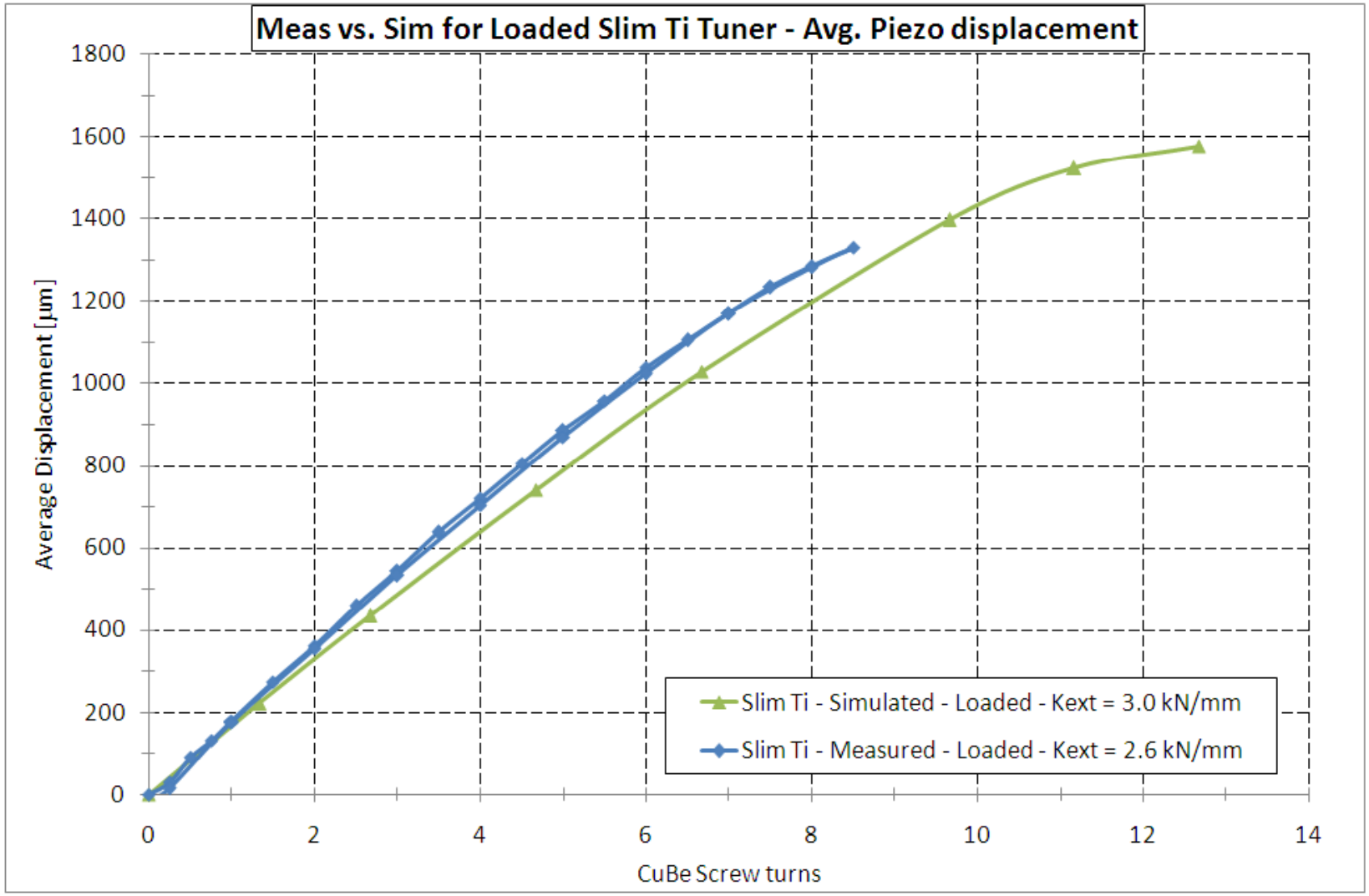
In order to set up a correct loaded case for tuners under test, reproducing the actual external stiffness around 3 kN/mm, a series of a button load cell (medium stiffness, from CELMI) and soft spring washers has been installed in each piezo position.





Experimental vs. Simulations - Loaded

For the loaded case, numerical FEM simulations have been performed (so far) only for the Slim_Ti tuner. A good agreement has also been found, considering that the simulated spring load is slightly stiffer (3 kN/mm vs 2.6 kN/mm)



Conclusions

- Inconel Slim and SuperStructure Tuners showed a mean stiffness, around 22 kN/mm and 32 kN/mm respectively. Therefore the SS slim tuner need a slight improvement in order to attain the required stiffness of 25 kN/mm.
- Titanium Slim tuner reveals to be less stiff than expected, around 11 kN/mm: we found this is due to the inhomogeneous distribution of the load over the blades packs.
- The lateral motor and the position of piezos introduce some asymmetries that reduce the tuners performances.
- ASME load conditions could require more strength than that required for the test in DESY.
- Due to the different stiffness and strength, the DESY tests are planned with the use of the SS slim tuner.
- Some improvements will be introduced after the experimental tests: these modifications will be designed to maximize the tuner stiffness/strength without extra-cost