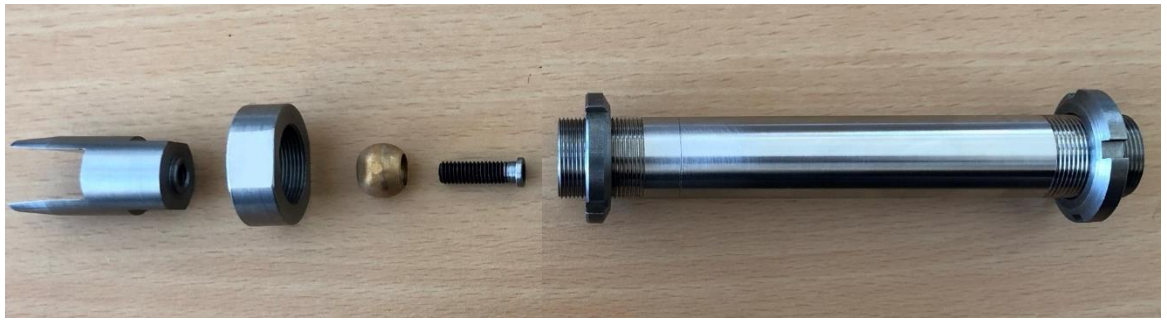
“V3.5” SAS Adjustment Prototype + Joint: Test Results

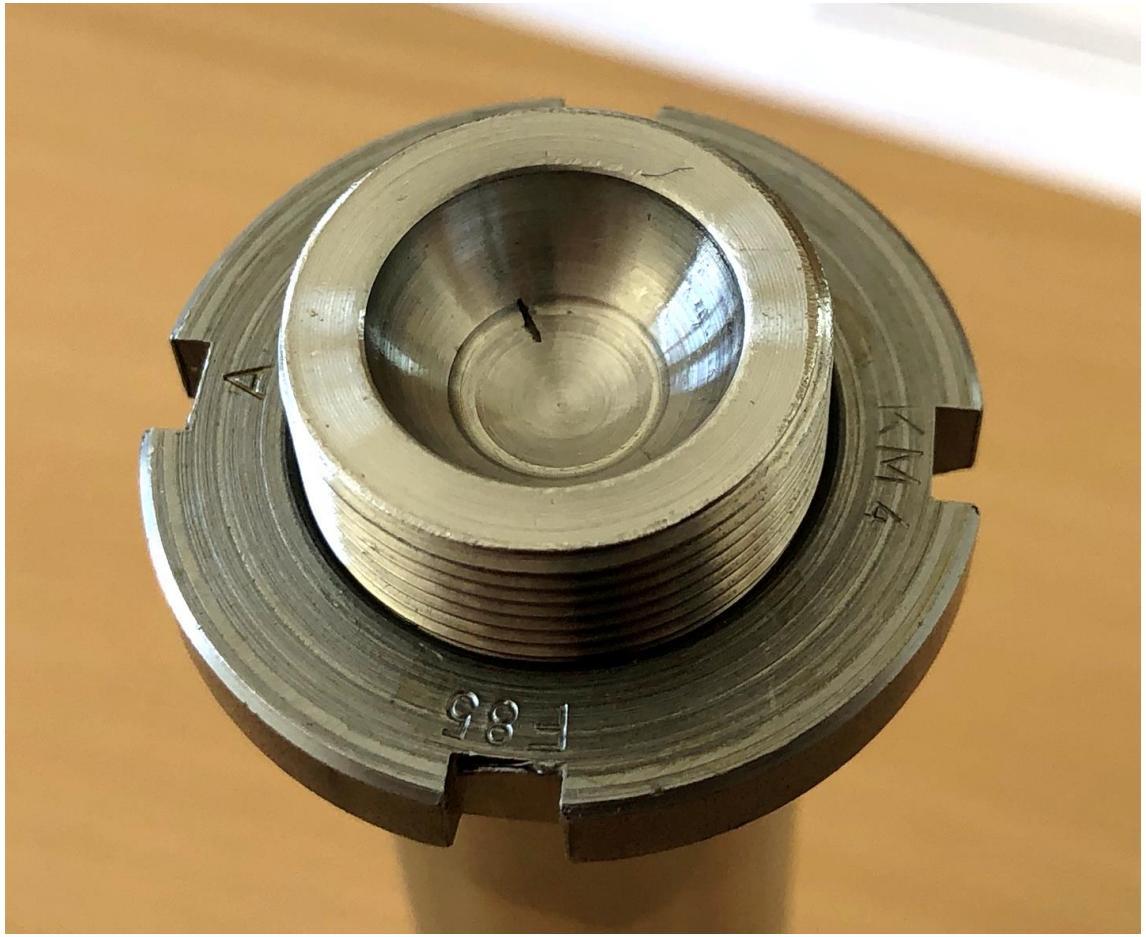
Matthew Capstick

2021-10-20

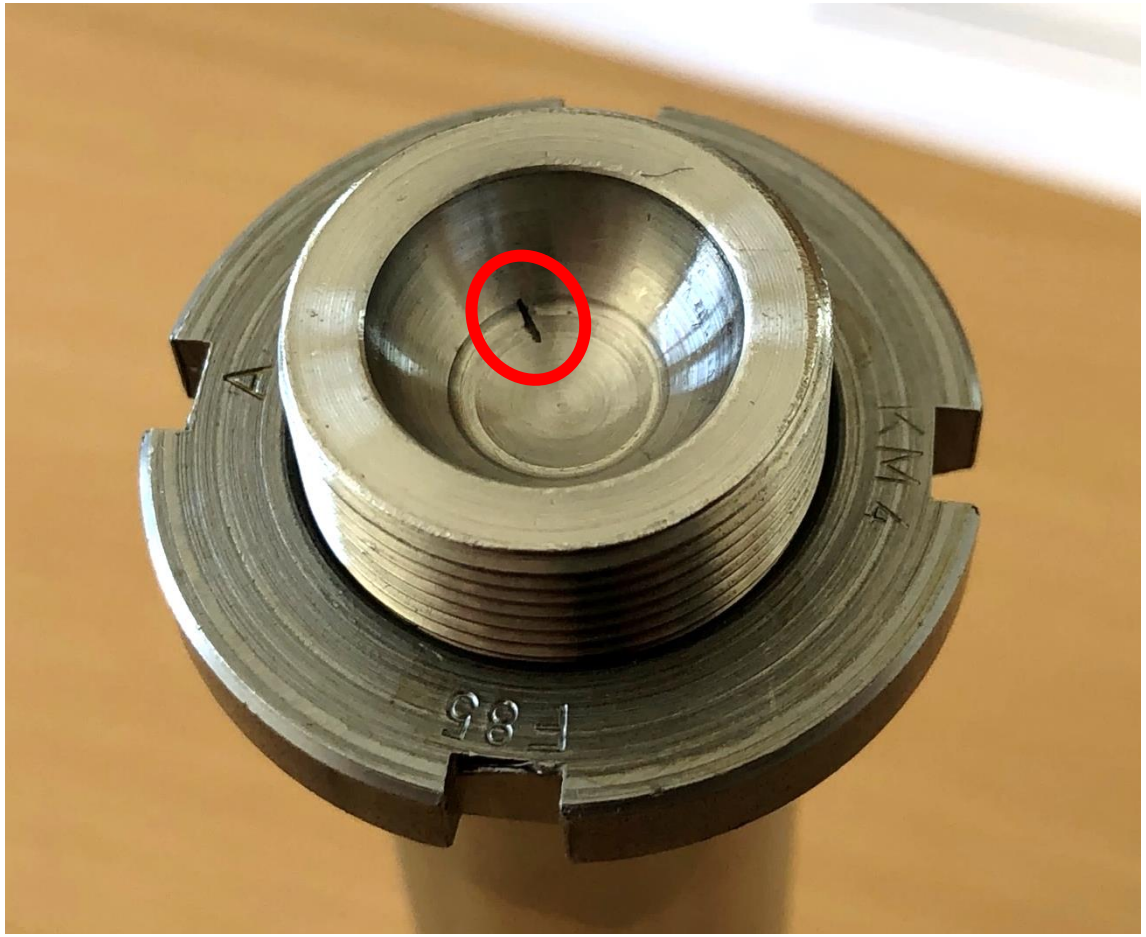
Pre-test Joint Images



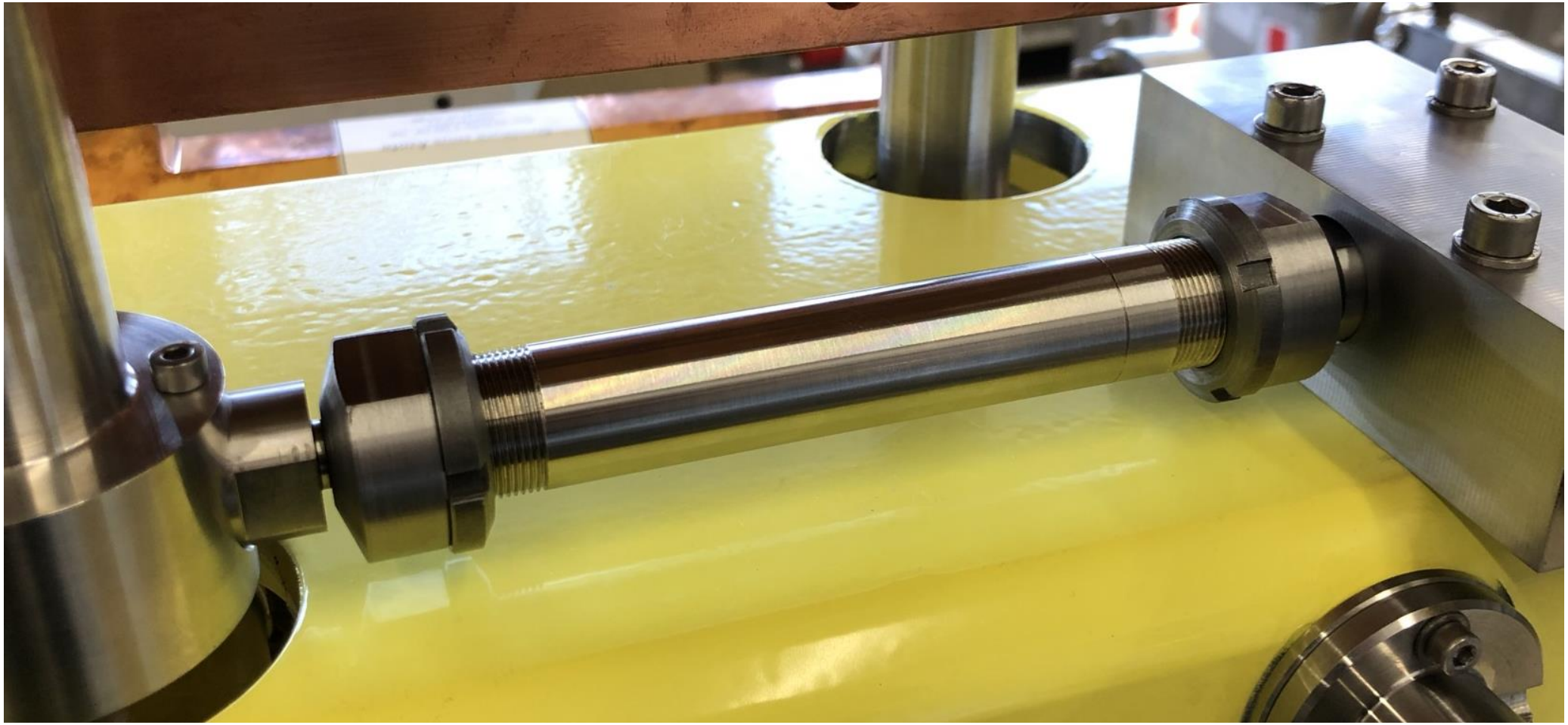
Pre-test Joint Images



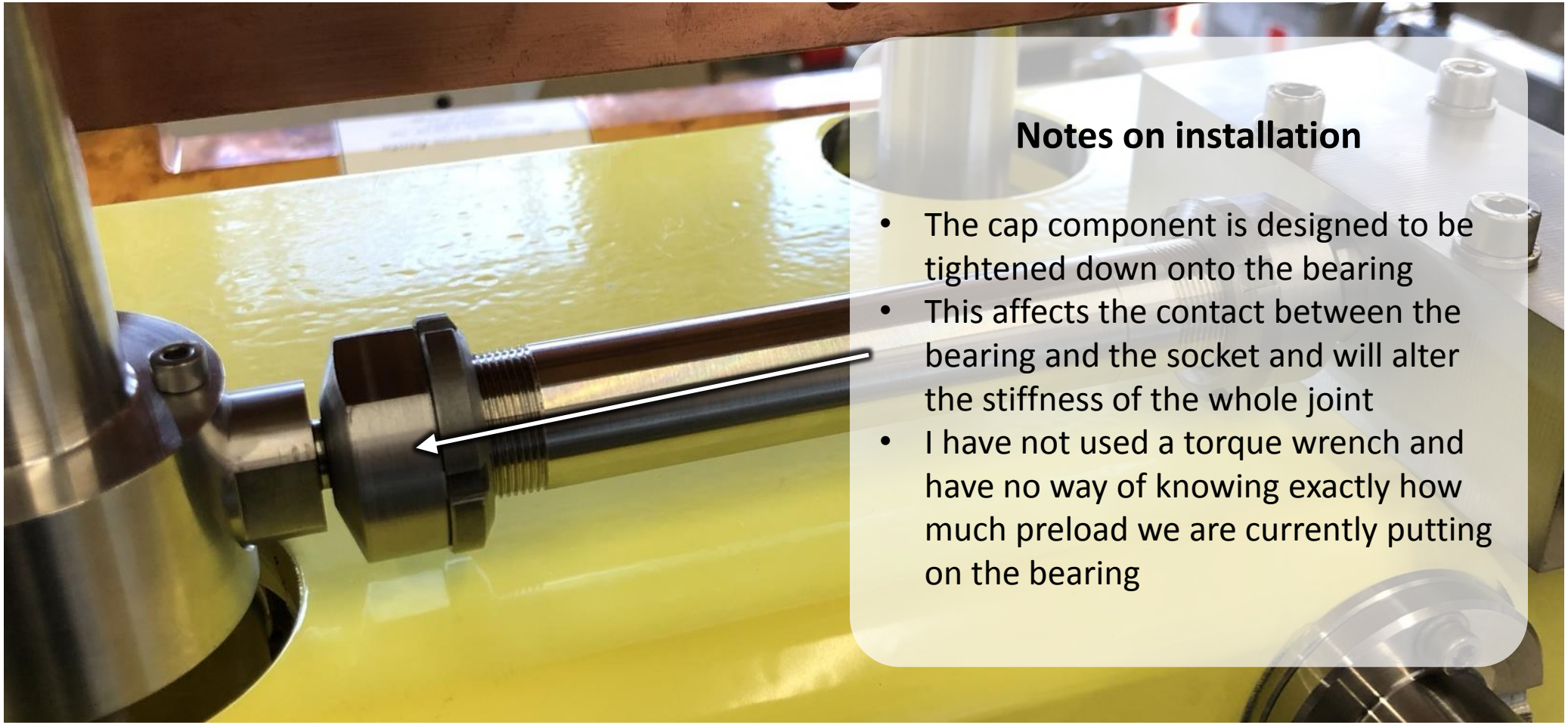
Pre-test Joint Images



Joint Installed



Joint Installed

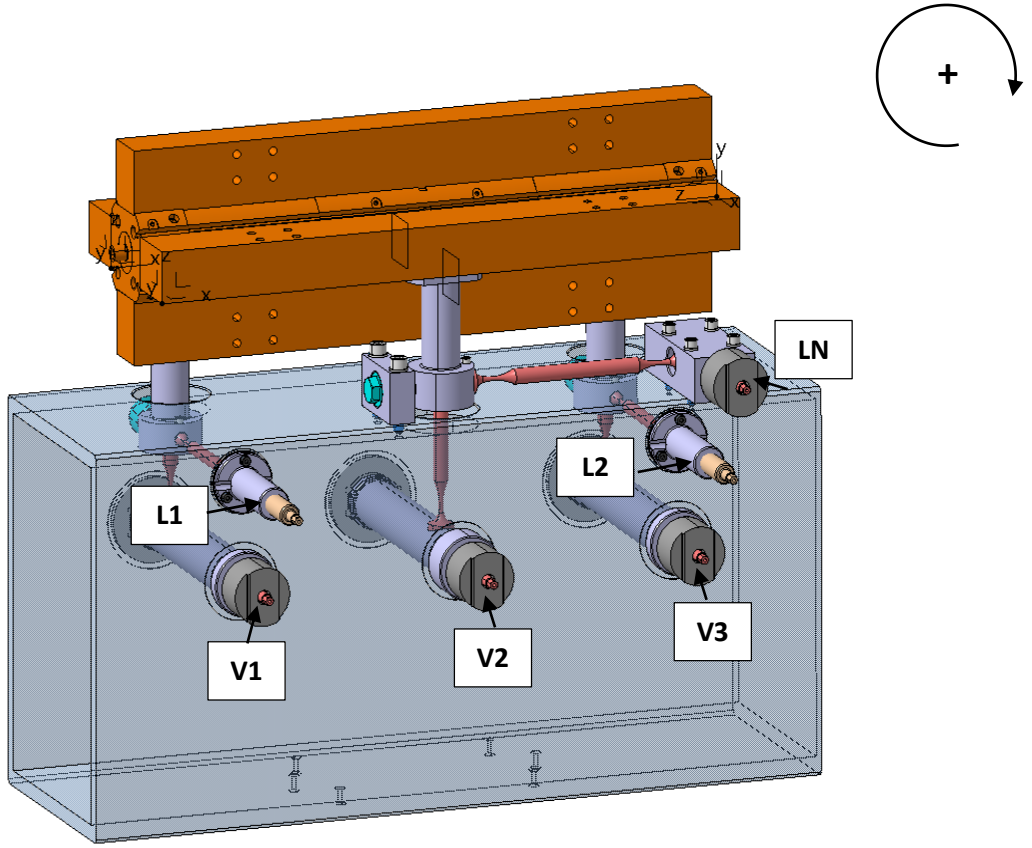


Notes on installation

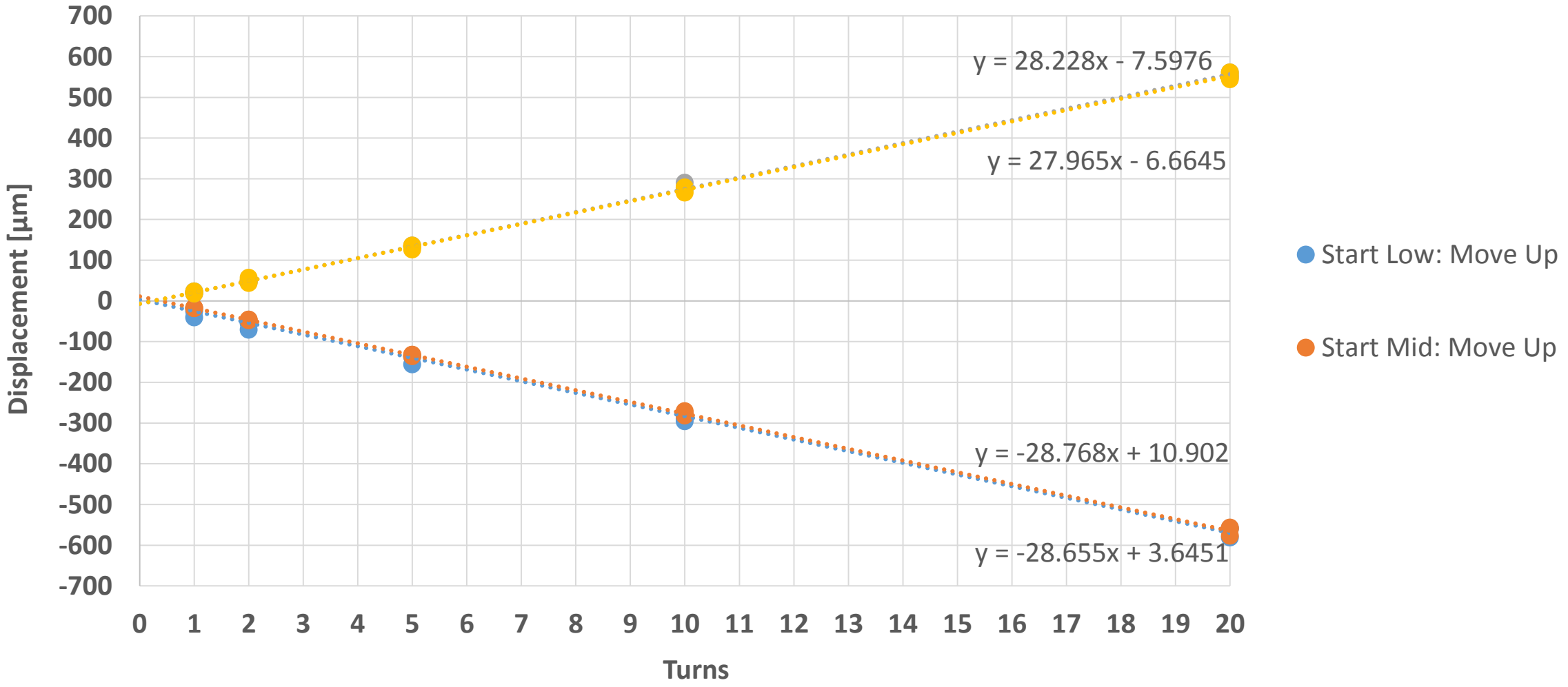
- The cap component is designed to be tightened down onto the bearing
- This affects the contact between the bearing and the socket and will alter the stiffness of the whole joint
- I have not used a torque wrench and have no way of knowing exactly how much preload we are currently putting on the bearing

Test Plan (Same as previous version)

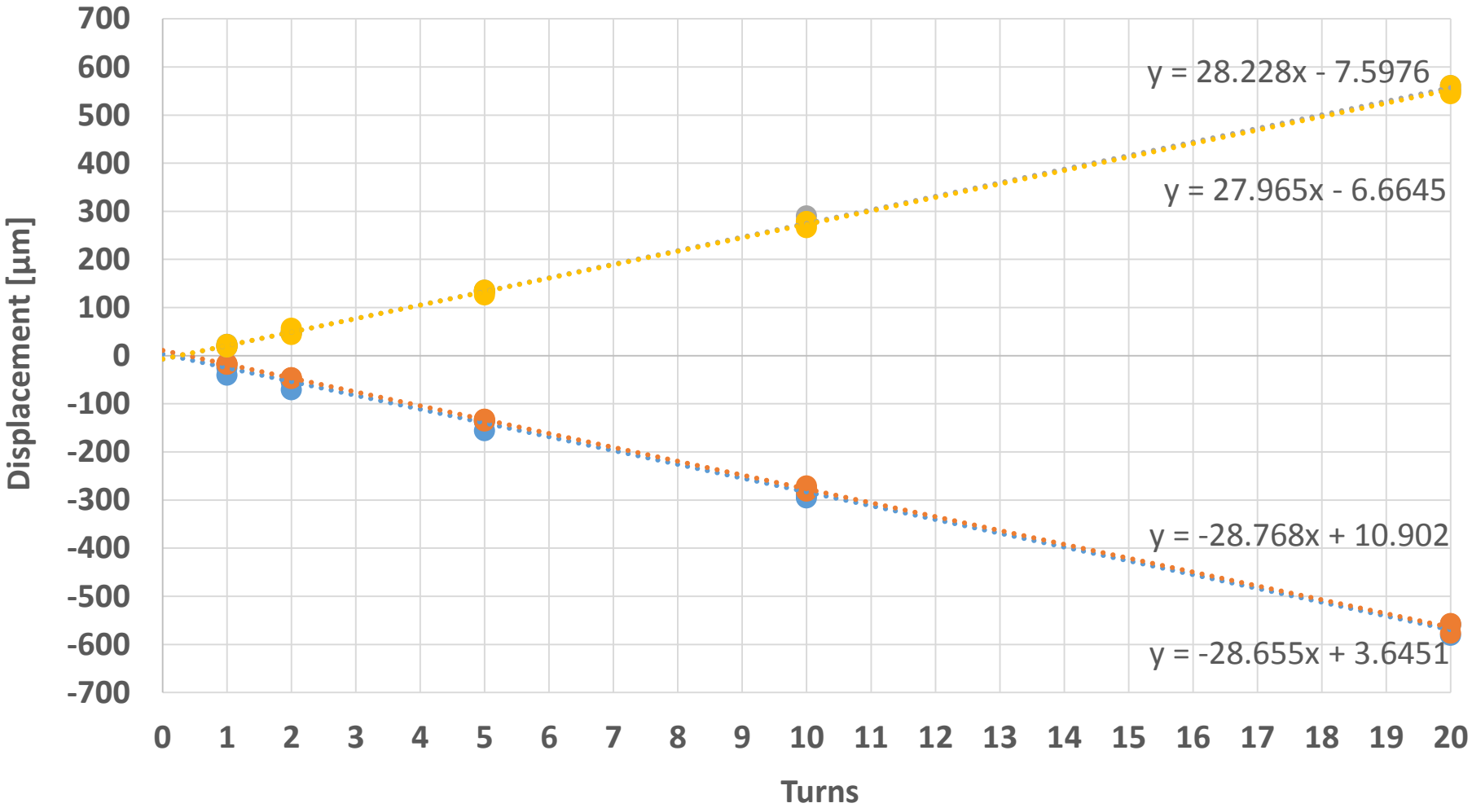
- Each axis is adjusted to:
  - Lowest extreme
  - Middle of travel
  - Highest extreme
- Each point is approached from the other direction to not eliminate backlash
- At each point, the displacement after 1, 2, 5, 10, 20 turns is recorded
  - Measured by a DTI/comparateur positioned on the structure directly in line with the axis under test
- All other axes will be approximately in the centre of travel



Longitudinal Axis Performance



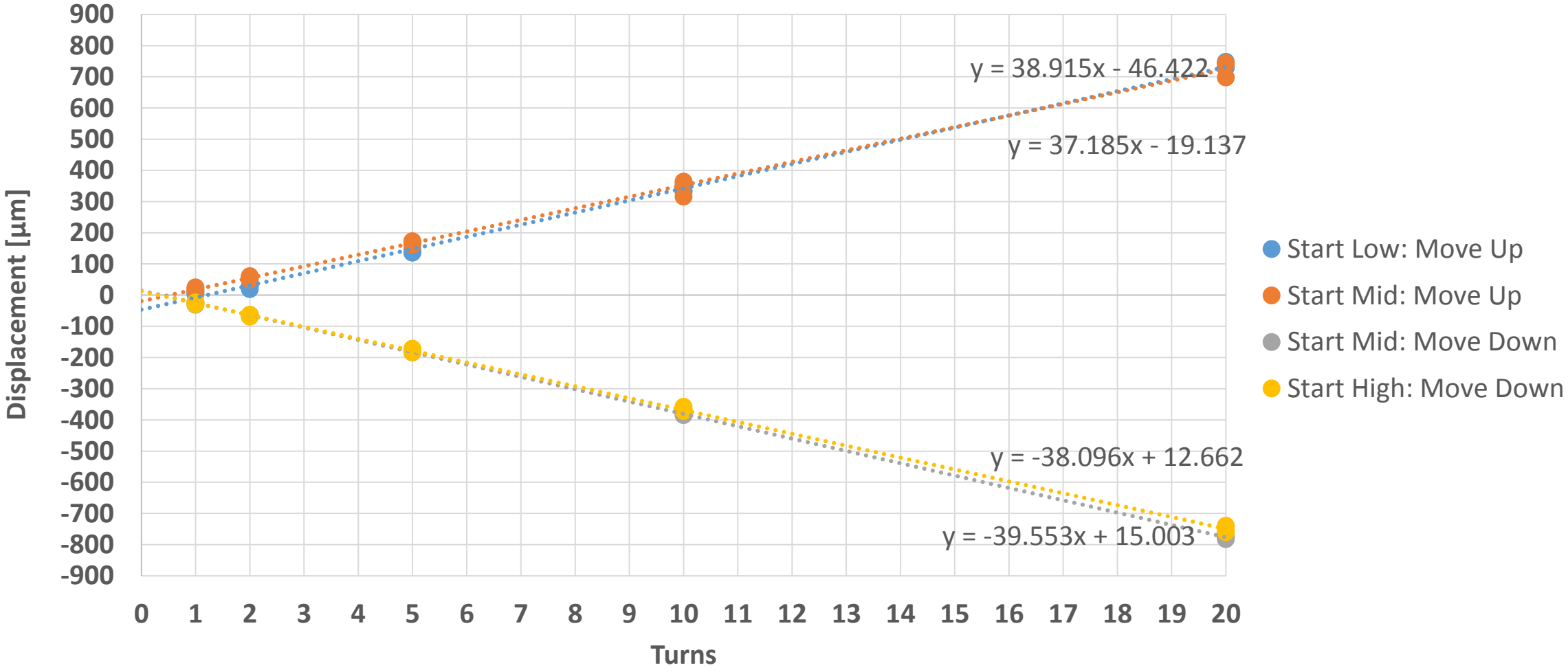
Longitudinal Axis Performance



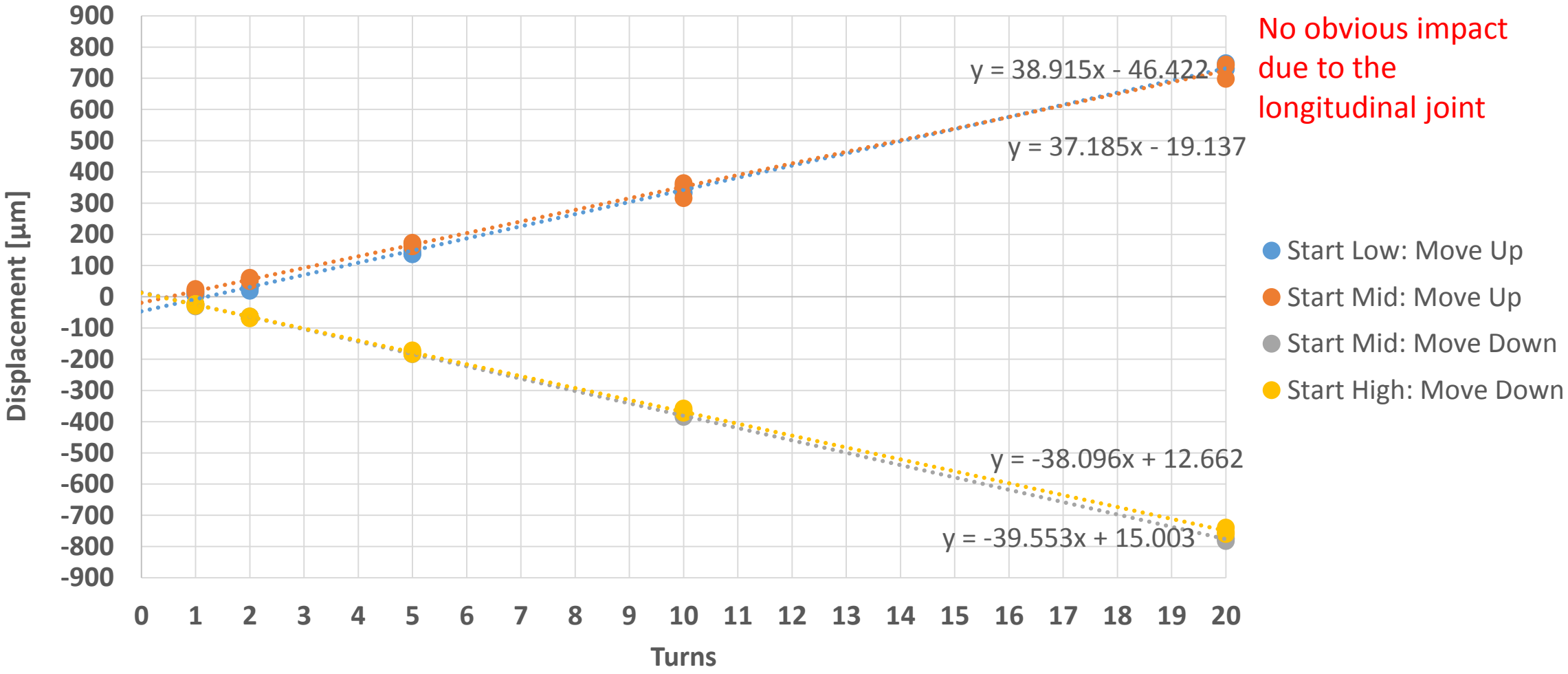
Notes:
Performance when adjusting the longitudinal axis is unlikely to be impacted by the joint, as it remains completely straight.

As in a previous test, the fork lifted from the wedge at the end of travel. This was corrected by swapping in a stiffer spring.

Lateral 1 Axis Performance

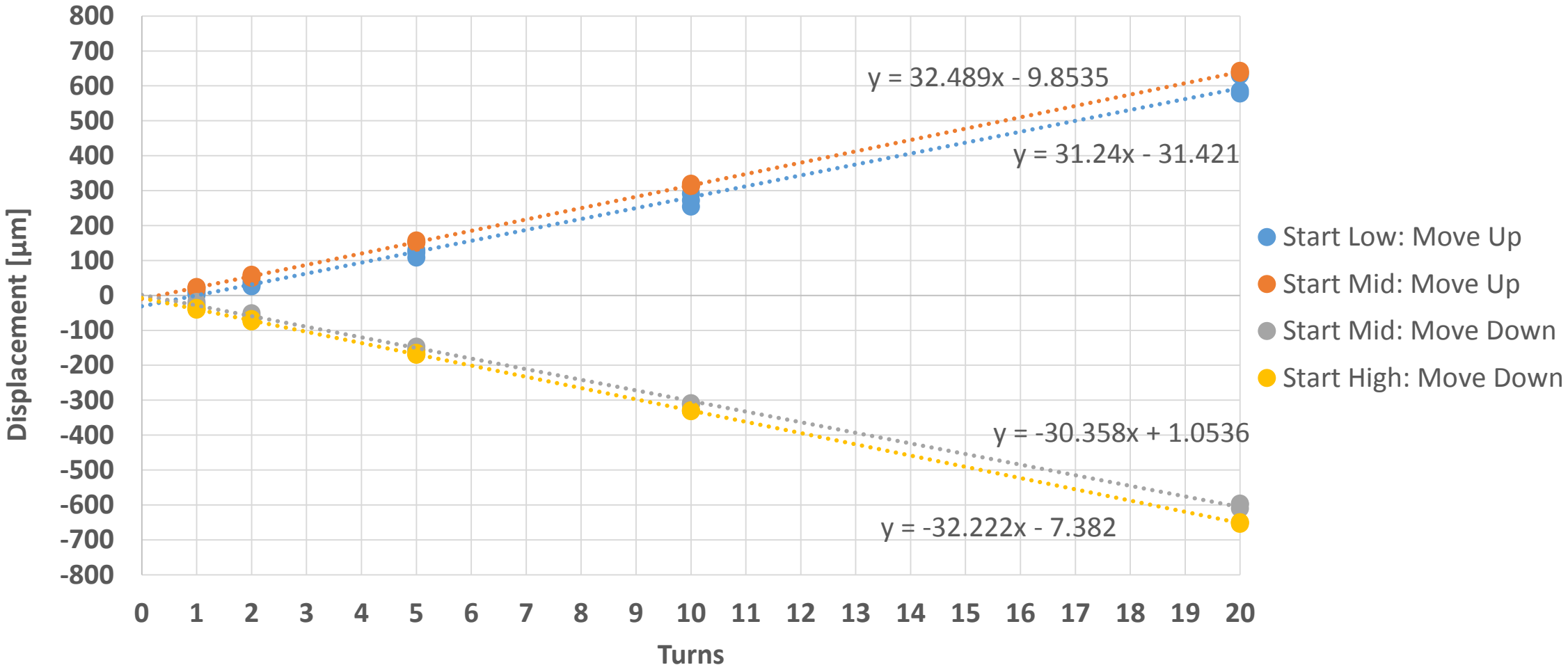


Lateral 1 Axis Performance

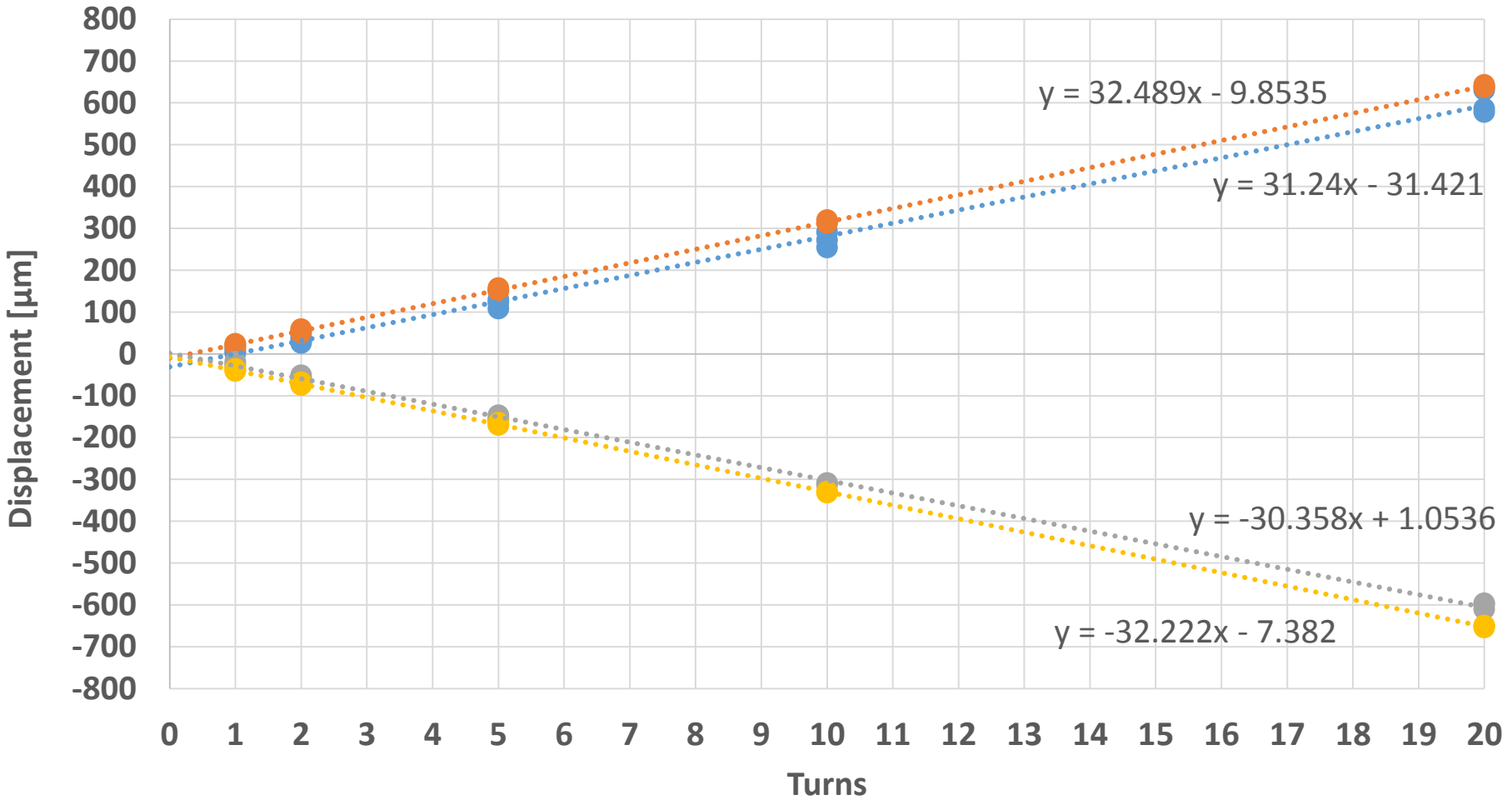


Notes:
No obvious impact due to the longitudinal joint

Vertical 1 Axis Performance



Vertical 1 Axis Performance



Notes:
No obvious impact due to the longitudinal joint

Similar issue to previously where the fork did not stay in contact with the wedge at the lowest point of travel. This was corrected by hitting the top of the structure. Vertical axis springs could be needed.

Comparison

	V3 Platform Results Summary (all flexures)							
	Wedge Axes					Differential Thread Axes		
Axis	V1	V2	V3	LN	Design	L1	L2	Design
Resolution	<1	<1	<1	<1	<1	<1	<1	<1
Average Gradient	32.34	33.39	31.66	29.91	30.00	36.43	31.82	40.00
Average Backlash	11.70	10.82	14.71	13.83	--	7.59	3.47	--
Max Non-Linearity	6.8%	2.6%	1.3%	3.4%	--	4.4%	17.2%	--
Range	2.84	2.97	2.83	2.50	3.00	2.83	2.27	3.00

	V3.5 Platform Results Summary (longitudinal joint)							
	Wedge Axes					Differential Thread Axes		
Axis	V1	V2	V3	LN	Design	L1	L2	Design
Resolution	<1	<1	<1	<1	<1	<1	<1	<1
Average Gradient	31.58	32.59	32.45	28.40	30.00	38.28	35.22	40.00
Average Backlash	12.43	15.79	12.48	7.20	--	2.84	0.00	--
Max Non-Linearity	6.8%	6.4%	1.7%	2.8%	--	6.2%	15.1%	--
Range	2.59	2.94	2.85	2.39	3.00	2.95	2.70	3.00

Stiffness

These tests suggest the kinematics are unaffected by swapping a flexure for a joint.

The stiffness of the joint is untested.