Updated SAS Adjustment Prototype: Initial Test Results

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Test Plan

• 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
Vertical Axis 1 (Wedge) Test

Displacement [µm] vs. Turns

- $y = 33.298x - 10.862$
- $y = 32.227x - 26.327$
- $y = -31.685x + 5.6053$
- $y = -32.342x - 21.604$

Legend:
- Blue dots: Start Low: Move Up
- Orange dots: Start Mid: Move Up
- Gray dots: Start Mid: Move Down
- Yellow dots: Start High: Move Down
Vertical Axis 1 (Wedge) Test

Displacement [µm] vs. Turns

Resolution

- $y = 33.298x - 10.862$
- $y = 32.227x - 26.327$
- $y = -31.685x + 5.6053$
- $y = -32.342x - 21.604$

Backlash

Start Low: Move Up
Start Mid: Move Up
Start Mid: Move Down
Start High: Move Down

Start Low: Move Up
Start Mid: Move Up
Start Mid: Move Down
Start High: Move Down

Start Low: Move Up
Start Mid: Move Up
Start Mid: Move Down
Start High: Move Down

Start Low: Move Up
Start Mid: Move Up
Start Mid: Move Down
Start High: Move Down

Start Low: Move Up
Start Mid: Move Up
Start Mid: Move Down
Start High: Move Down

Start Low: Move Up
Start Mid: Move Up
Start Mid: Move Down
Start High: Move Down

Start Low: Move Up
Start Mid: Move Up
Start Mid: Move Down
Start High: Move Down

Start Low: Move Up
Start Mid: Move Up
Start Mid: Move Down
Start High: Move Down
Lateral Axis 1 (Differential Screw) Test

y = -33.738x + 24.609

y = -39.427x + 9.2454

y = 38.163x - 8.6352

y = 39.248x - 16.484

Displacement [µm] vs. Turns

Start Out: Move In
Start Mid: Move In
Start Mid: Move Out
Start In: Move Out
Longitudinal Axis (Wedge) Test

\[ y = 29.619x - 30.507 \]

\[ y = 30.383x - 16.711 \]

\[ y = -30.606x + 8.0066 \]

\[ y = 30.347x - 2.1658 \]
Longitudinal Axis

• Initially the wedge was losing contact with the fork before reaching the end of travel
  • This could be seen by looking down the tube
• This seems to have been corrected by regreasing the fork and swapping in a stiffer spring
  • Video shows fork and wedge moving correctly
Vertical Axes 1 & 2

- A repeat of the vertical axes 1 & 2 tests the following day showed a lot of backlash from the bottom of travel
  - ~5 turns without recording any displacement
- This seems to be due to the wedges loosing contact with the fork
Vertical Axes 1 & 2

• Video appears to confirm the fork is losing contact with the wedge
  • Exact cause is unknown, especially as it did not occur during the first tests

• We cannot increase the spring force (as we did for the longitudinal axis) without adding tension springs to the design
  • Might be fixable by loosing the tolerance between the tube and the fork
  • Or simply regreasing