

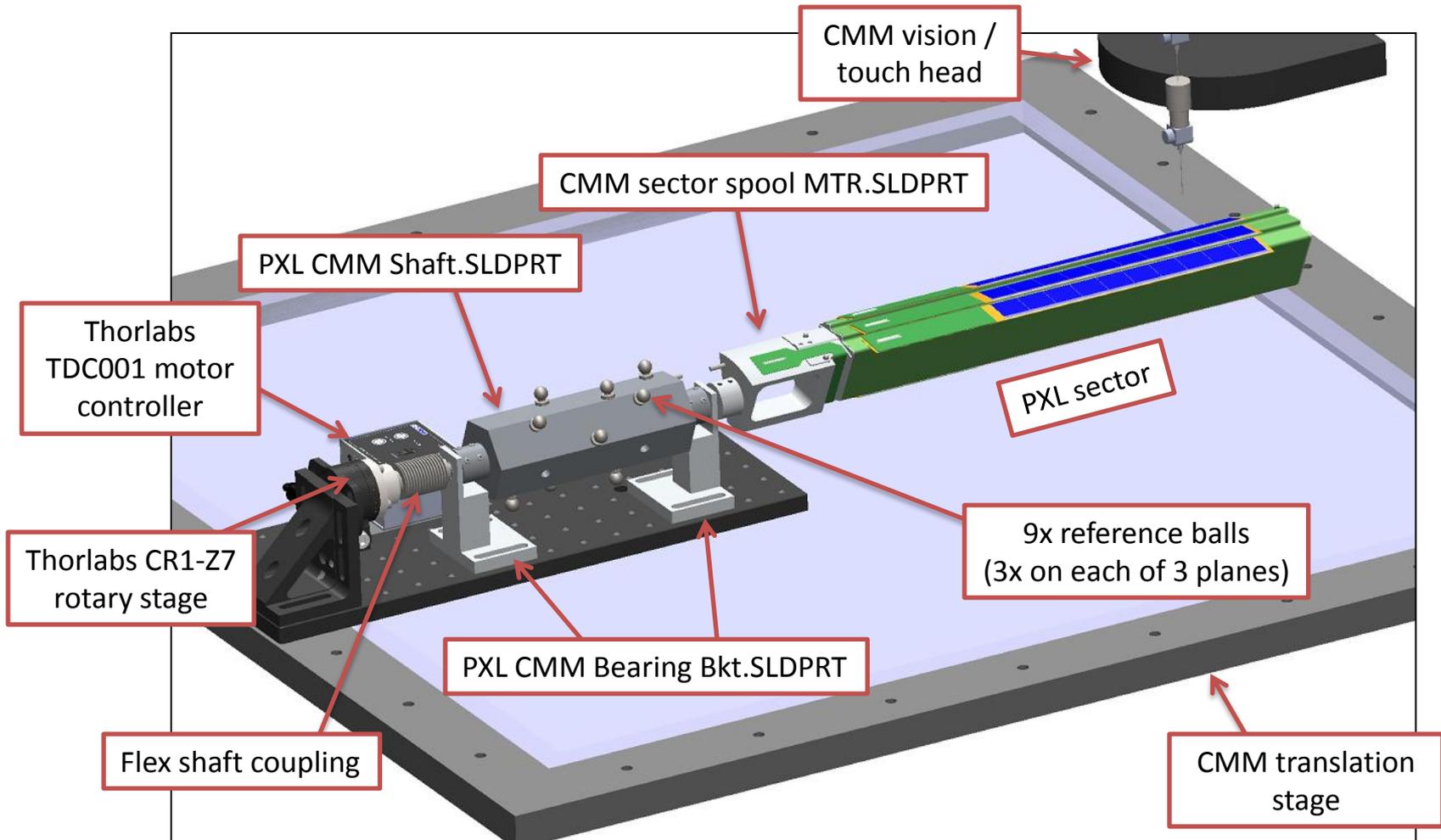
# CMM MTR LBNL Homebrew Assembly Notes

Silber

2012-07-23

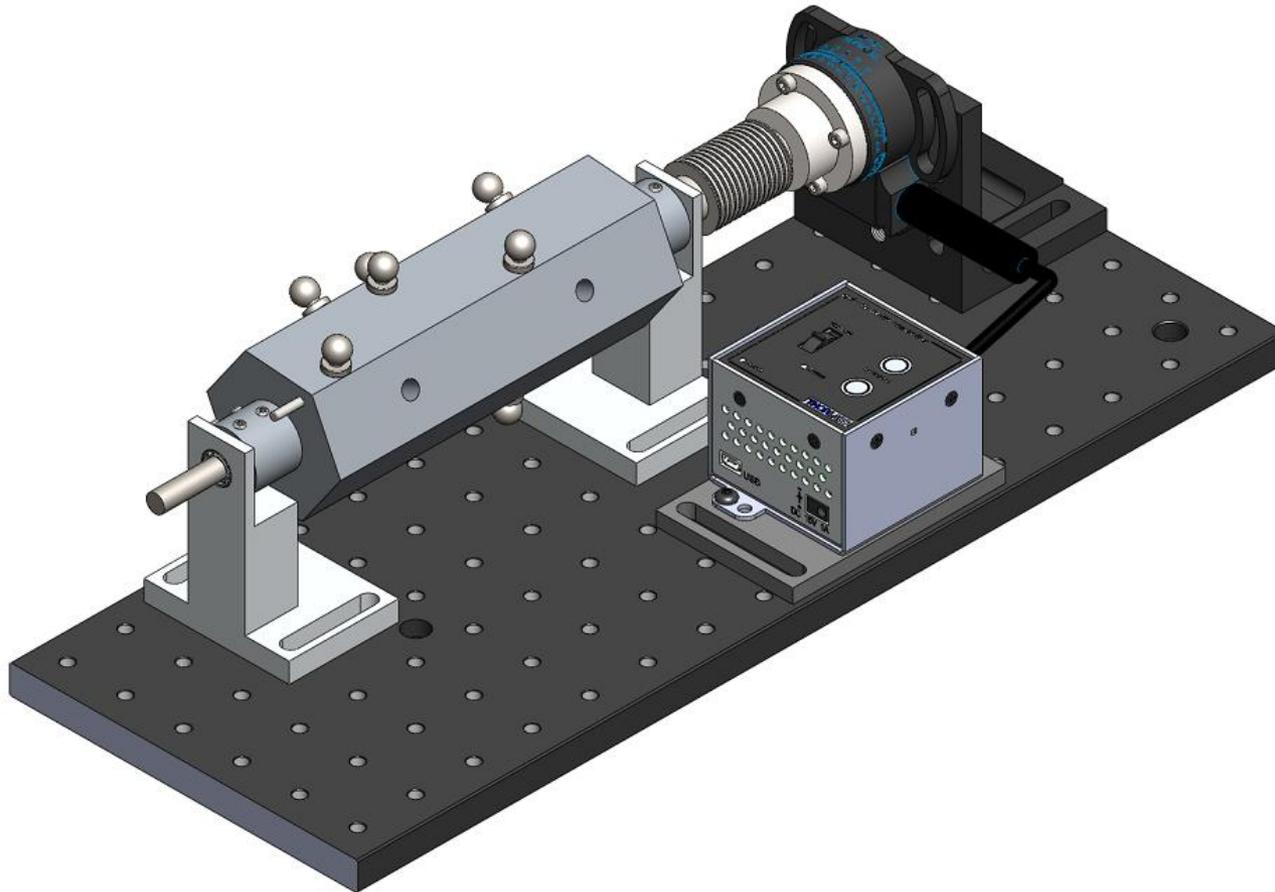
# Overview

*(CMM MTR sector system.SLDASM)*



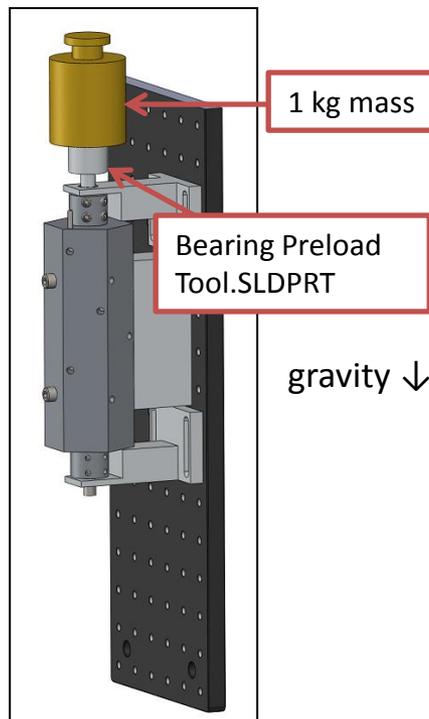
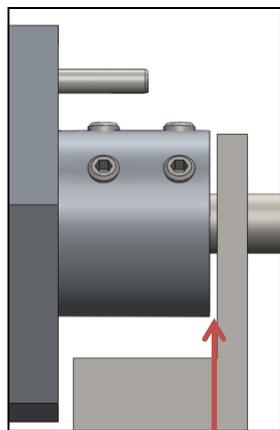
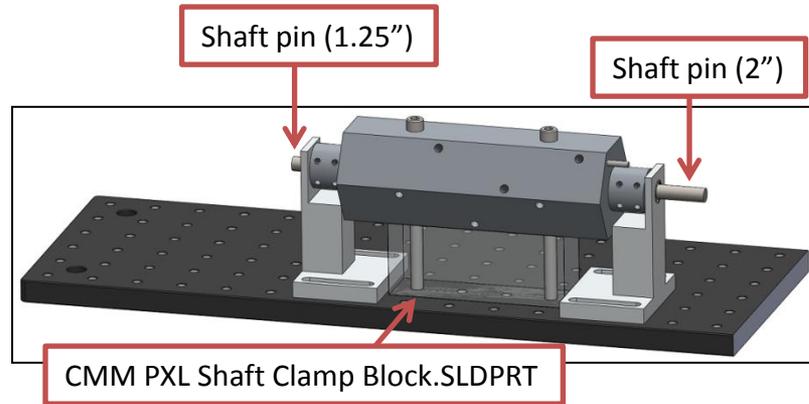
# Rotary stage

*(CMM MTR LBNL Homebrew.SLDASM)*



# Preloading bearings of rotary stage

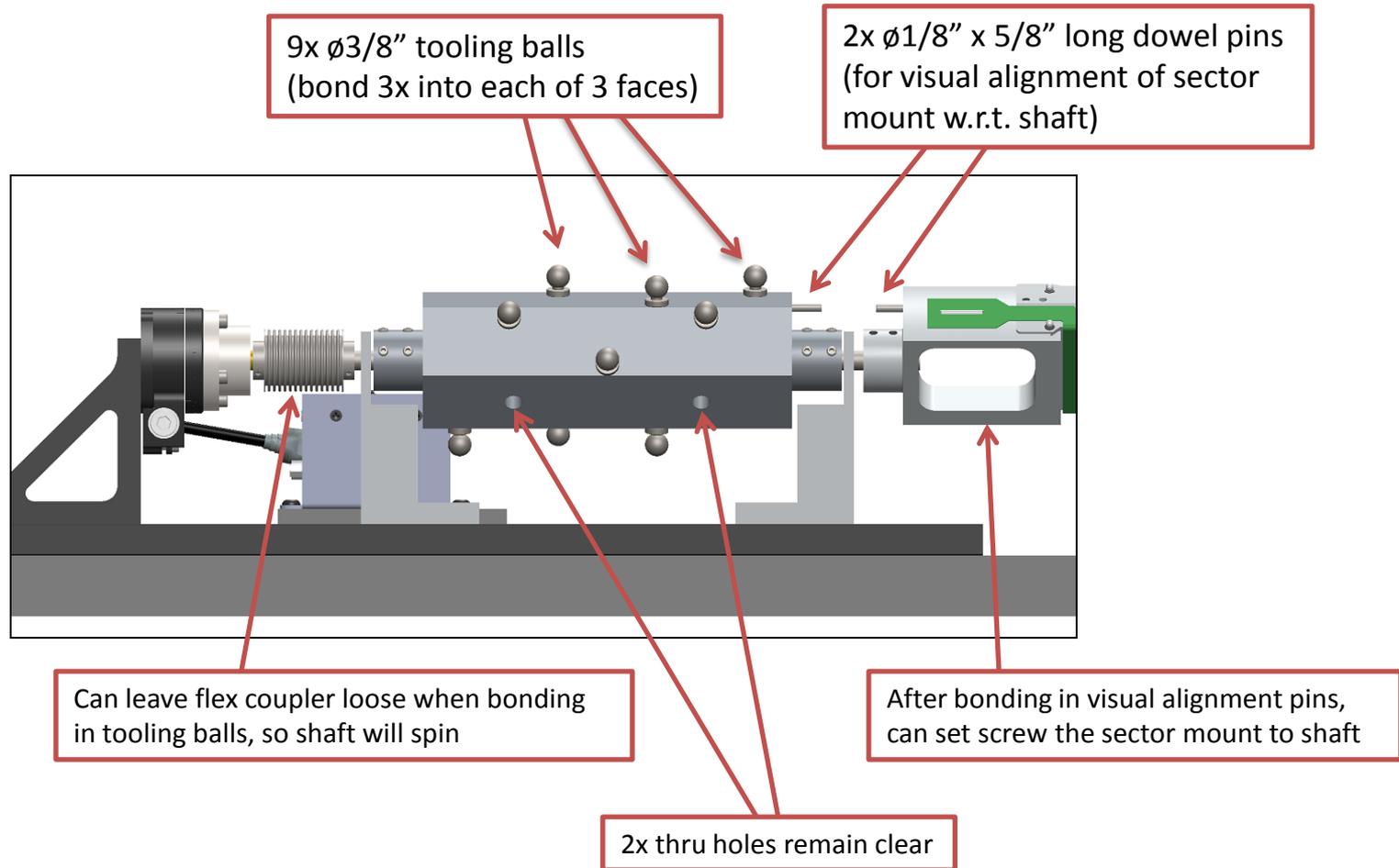
(config "Preloading" of "CMM MTR LBNL Homebrew.SLDASM")



- *Most of the assembly is straightforward, by looking at CAD model, but there is a very specific assembly sequence to get correct preload on bearings.*
1. Bond (Loctite or DP420) inner races to shaft pins. Note:
    - Pins are loose in the aluminum shaft body
    - One pin must be cut down to 1.25" before hand
    - The pins have specific offsets with respect to the inner races. See CAD model, and bond to within 0.5mm of nominal offset.
  2. Dry fit shaft body + shaft pins + bearings + bearing mounts on breadboard
  3. Using temporary spacer clamp "CMM PXL Shaft Clamp Block.SLDPRT", bolt down shaft body to breadboard
    - Use 4" thru bolts
  4. Bolt down bearing mounts to breadboard
    - Bearing outer races should be floating stress-free within their mounts
    - Gap between bearing mounts and ends of shaft bodies is approx 1mm (2x 0.020" shims is fine to set gap)
  5. Bond outer races to bearing mounts (DP420 or 9396)
    - Axially, edge of outer race is approx flush to bearing mount wall
  6. Tilt assembly 90°, C-clamp as necessary
  7. Slip "Bearing Preload Tool" over top shaft pin. Apply preload mass, then tighten set screws to lock in preload on that side
    - Preload mass is 1kg. Use brass reference weight to be exact.
  8. Rotate assembly 180° so the other shaft pin is on top. Repeat 1 kg preload mass and tighten set screws to lock in preload.
  9. Remove the temporary spacer clamp.

# Bonded-in pins and tooling balls (DP420)

*(can do this before or after preloading the bearings)*



# Machined parts

*(being made by main shop)*

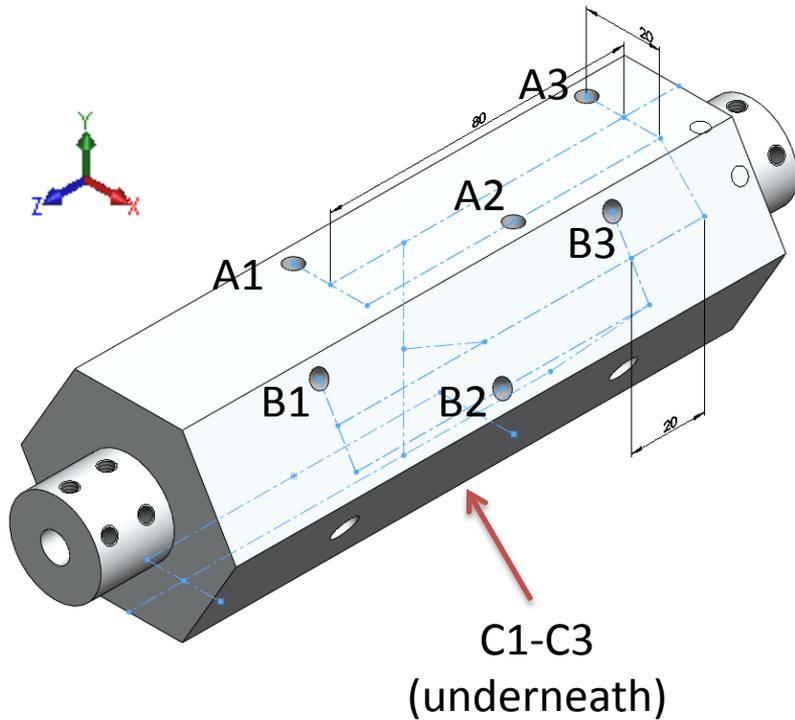
<u>QTY</u>	<u>PART</u>
2	PXL CMM Bearing Bkt.SLDPRT
1	PXL CMM Shaft.SLDPRT
1	CMM sector spool MTR.SLDPRT (mods)
1	PXL CMM Rot Stepped Pin.SLDPRT
1	Bearing Preload Tool.SLDPRT
1	CMM PXL Shaft Clamp Block.SLDPRT

# Misc machining tasks

*(items that aren't being produced by main shop)*

<u>QTY</u>	<u>ORIGINAL PART</u>	<u>MODIFICATION</u>
1	Breadboard 6"x24"	Cut to 16" long
2	Class Z Gauge Pin .3115" minus, 2" long	Cut to 1.25" long (leave a 3 <sup>rd</sup> pin at 2" length)

# Note on reference ball spacing



- If we label the 3 planes A, B, and C...
- And label each ball on a plane 1, 2, 3...
  - $\Delta Z$ : A1  $\rightarrow$  A2 = 40mm
  - $\Delta Z$ : A1  $\rightarrow$  A3 = 80mm
  - $\Delta XY$ : A1, A3  $\rightarrow$  A2 = 20mm
  - $\Delta \theta$ : A  $\rightarrow$  B = 60°
  - $\Delta \theta$ : A  $\rightarrow$  C = 180°
  - $\Delta Z$ : A<sub>i</sub>  $\rightarrow$  B<sub>i</sub> = 20mm
  - $\Delta Z$ : A<sub>i</sub>  $\rightarrow$  C<sub>i</sub> = 40mm
- These are nominal values
- All balls will be accurately measured in 3D touch CMM to determine their true locations with respect to one another
- This provides the reference datums for location of the sector within the CMM (tied together by the sector's ceramic reference balls)