NLC Accel. Mechanical Tolerances

- Tolerance “Drivers”
  1. Beam Optics
  2. RF

- Mech. Errors will not be gaussian
  - Errors are systematic, causal
  - Tolerance Spec. is Go-No Go
  - Selective assembly ?

- Tolerances change with length scale
  - Cup tolerances set by RF
  - Acc. Module tol. set by RF & optics
  - 10meter-100meter tol set by optics

- Tolerances range over time as well as space
  - dimensional stability over time
    1. vibration - milliseconds
    2. thermal distortion - minutes to hours
    3. electrical breakdown damage - weeks to years
    4. metal creep - years
    5. geophysical distortion - years to decades
• Accel. Structure Construction Sequence

1. Cups - QC check subset to gages
   (a) Dimensional Tolerances
       - 2a, 2b, t etc
   (b) Flatness
   (c) Surf Finish

2. Bond Stack
   (a) straightness
   (b) bookshelf

3. 60cm Accel. Subsection Braze
   (a) coupler match - RF scattering matrix
   (b) Phase Distribution end to end - bead pull
   (c) Align Fiducialization -CMM

4. 2.5m Accelerator Module Assembly
   (a) HiPwr load match
   (b) RF Pwr Distribution phasing

5. RF Conditioning
   (a) Gradient
   (b) HOM wakes
   (c) Final internal alignment of module
• Beamline / Tunnel Construction Sequence

1. Civil Construction
   (a) Bore or Cut - global alignment
   (b) Pour floor - flatness, 10m- 100m

2. Install infrastructure
   (a) Electrical Pwr - temp distribution
   (b) Cooling - vibration
   (c) Cable plant

3. Place alignment bench marks
   (a) Horizontal & vertical
   (b) 10 meter to 10 km

4. Install RF
   (a) Phase and amplitude cold tests
   (b) Temperature stability
   (c) RF feed alignment

5. Install Supports for magnets and structures
   (a) Align tol. and static adj range
   (b) Mover range for beam capture