



WILLIAM & MARY  
CHARTERED 1693

# Tooth strip to board step measurements

Nelson, Dar  
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# Calibration of step measurement at W&M

- Reminder - specification of +/- 200  $\mu\text{m}$  (0.2mm) between top surface of the board and the top of the tooth strip
- Two measurement techniques
  - A machinist's dial indicator – for production (right)
    - UK specified tip indicator with 1mm tip  
<https://www.zoro.co.uk/shop/measuring-and-test-equipment/dial-test-indicators-lever-type/dial-test-indicator-513-424-10t/p/ZT1025781P>
    - Data taken on an optical table
  - A precision profilometer – for testing precision of method
    - <https://www.bruker.com/en/products-and-solutions/test-and-measurement/stylus-profilometers/dektakxt.html>
    - 10s of nm precision, available for (shared) use in W&M's core labs
    - Used as a cross calibration and to determine precision/accuracy



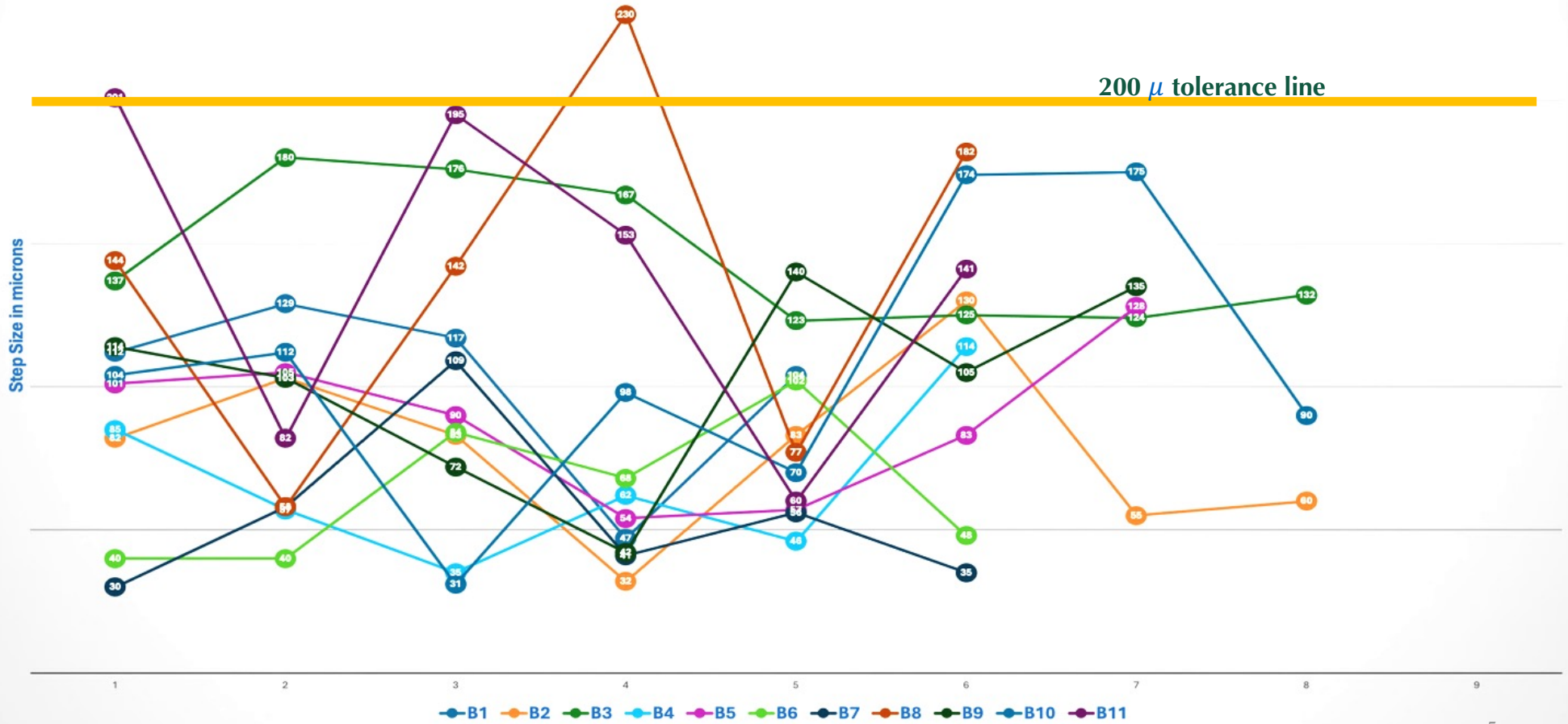
# Profilometer in action





# Profilometer data

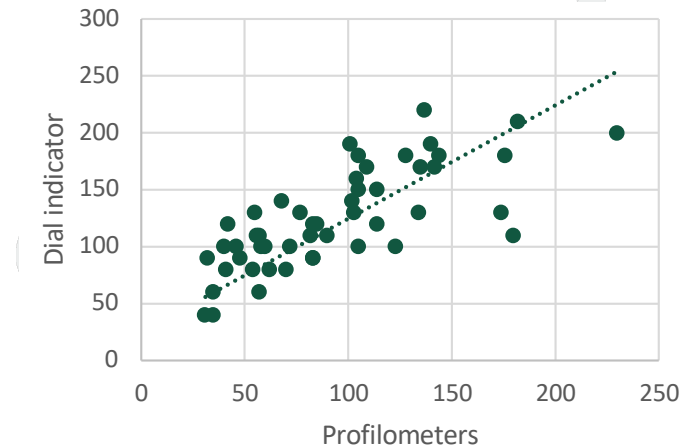
## Step size for different boards in microns



All are "board taller than strip" in this sample

# Compare 36 measurements over 6 boards

- Profilometer results: all points with the board above strip; all but one within spec [slides]
  - Average step size = 91um
- Dial indicator measurements
  - Two different techs each measured both boards
  - We occasionally see a quite high value and remeasure
  - Tech 1; ave bias +25um; RMS WRT profilometer 39um
  - Tech 2; ave bias +27um; RMS WRT profilometer 41um
  - RMS between the 2 techs is 35um
- Plot is tech1 vs profilometer
- We plan to recheck anything above 170um step on the profilometer



# Production status/schedule

- Boards for APA 3U layer for starting final QC
- Delivered draft “lessons learned” document to Brian & Justin last thursday
- Completed a draft comprehensive inventory
  - Want to do some QC on it this week before we finalize
- Fixture updates
  - Side bars for modifying the fixtures are made
  - Working on the holes on the fixtures
  - Have Kapton tape for shims to raise the strip WRT the boards
  - ETA for new clamps ~couple weeks’ time