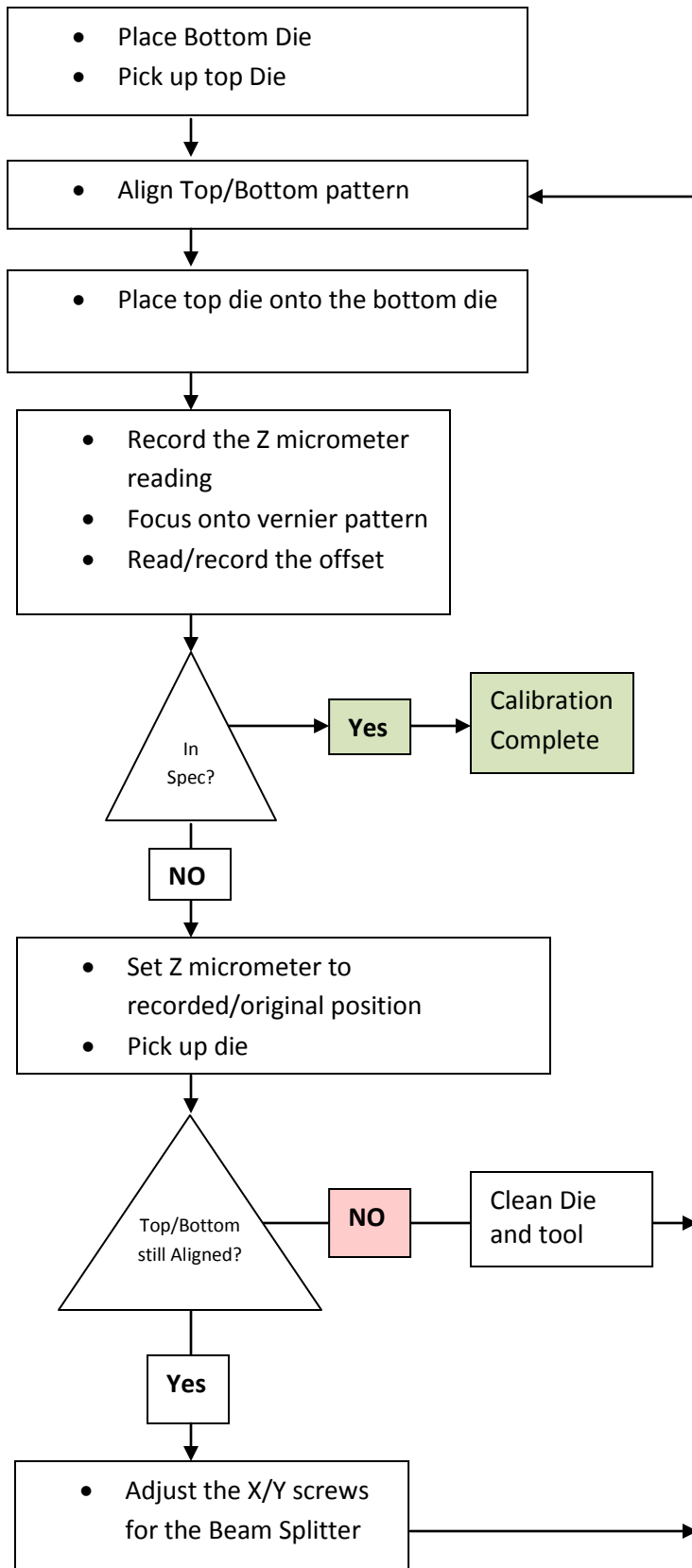


# How to Calibrate the Beam Splitter on a Finetech System



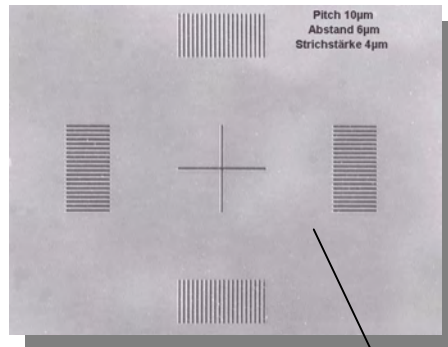
Note: Verify all mating surfaces are clean before using

Note: Theta alignment and then X/Y axis

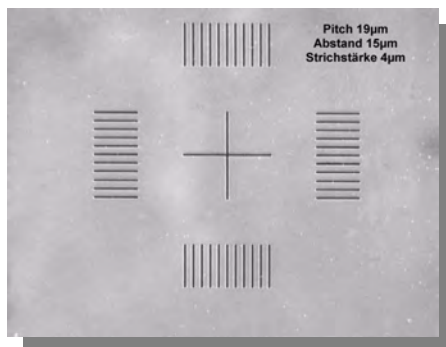
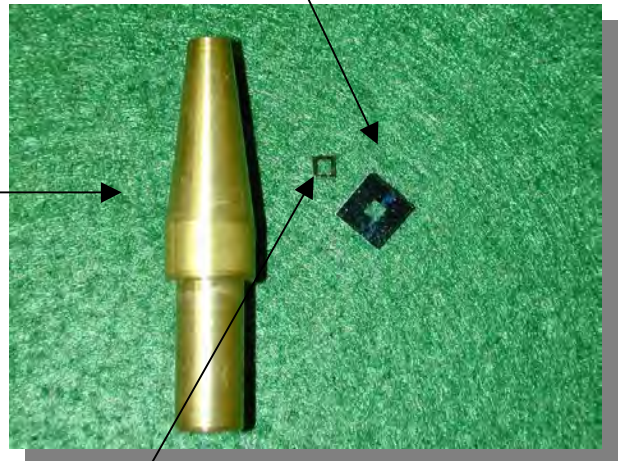
Note: Look for stable top/bottom die

# The Components

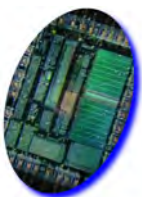
Scale A  
11 lines, 19  $\mu\text{m}$  pitch



Pick-up Tool

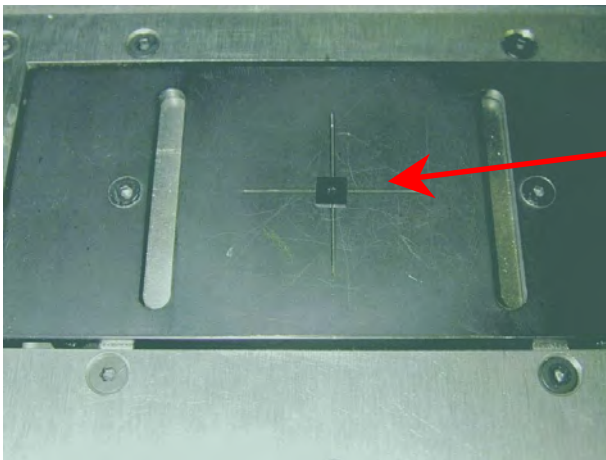


Scale B  
20 lines, 10  $\mu\text{m}$  pitch

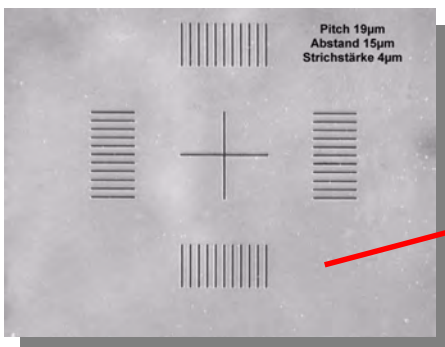
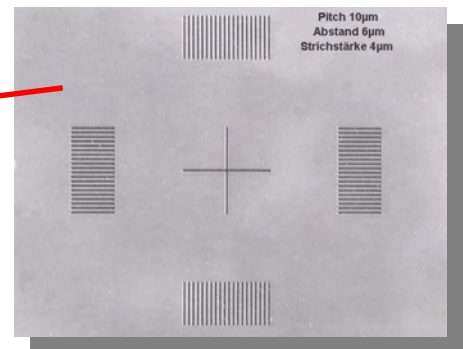


# Load the verniers

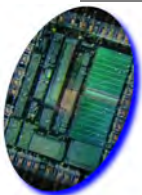
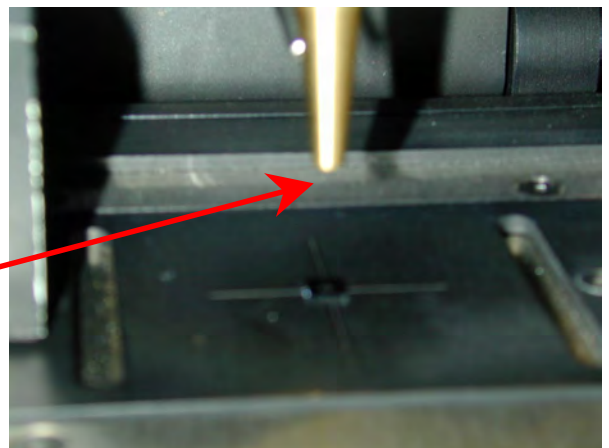
- Clean **A**, **B**, and **tool** in IPA
- Place larger scale (A) on vacuum plate (pattern UP)
- Small scale on the tool (B), (pattern OUT)



**A**

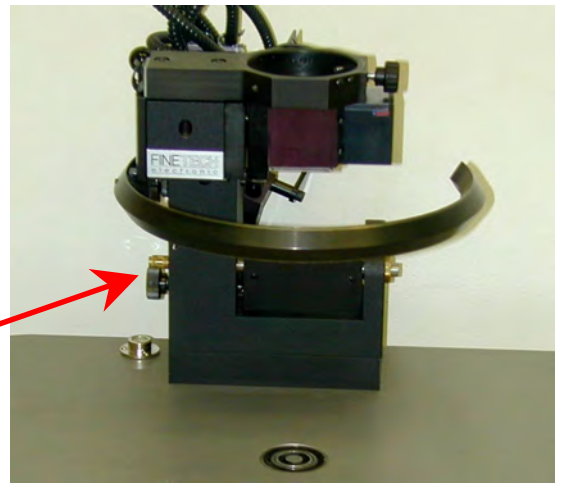


**B**

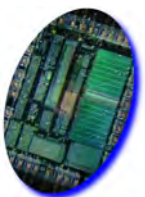
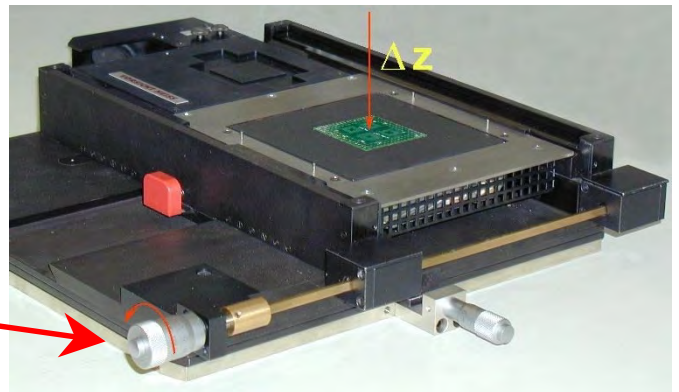


# Focus Adjustments

- Focus scale B  
(use small knurled knob on left side of machine)

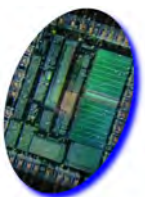
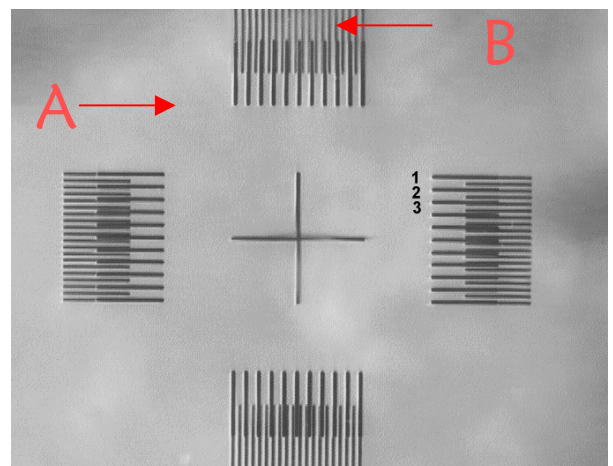
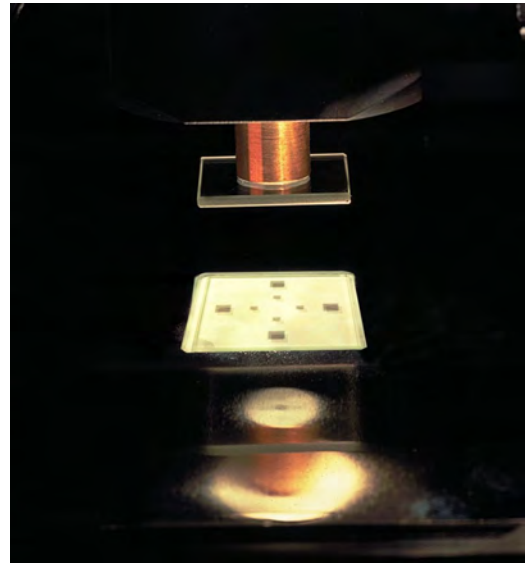


- Focus scale A  
(use z-height table adjustment)

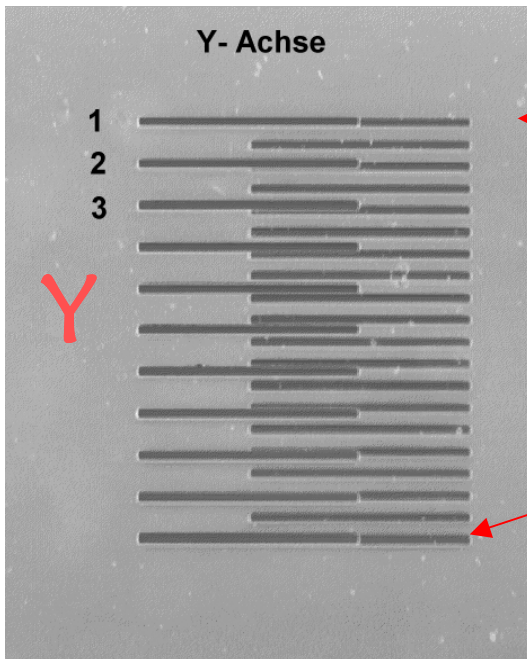


## Place the verniers

- Align the outer lines of scales in both x and y axes.
- Ensure that line #6 of A is between lines 10 & 11 of B. If not repeat
- When finished, only outside lines of both scales should directly overlap (they are same distance apart 200  $\mu\text{m}$ )
- *Lower arm - place A on B*
- Be careful of vacuum procedure – don't release head vacuum until well positioned



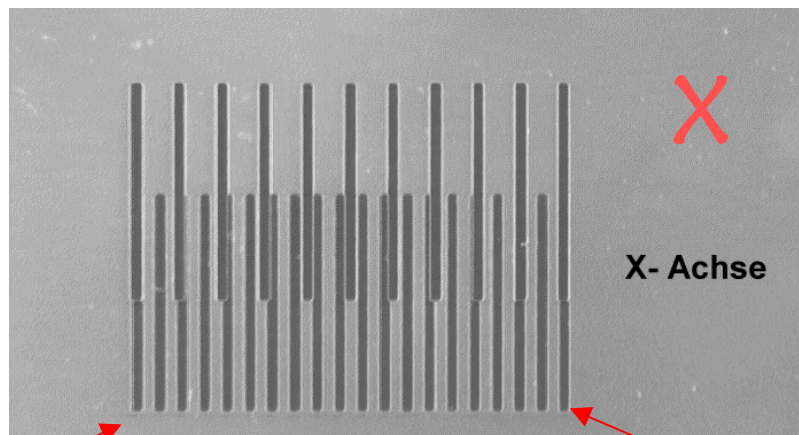
# (Almost) Perfect Alignment



#1A aligned to #1B

.. all others misaligned

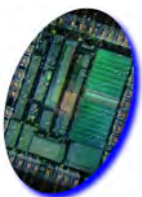
#11 A aligned to #20B



#1A aligned to #1B

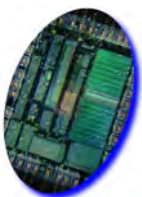
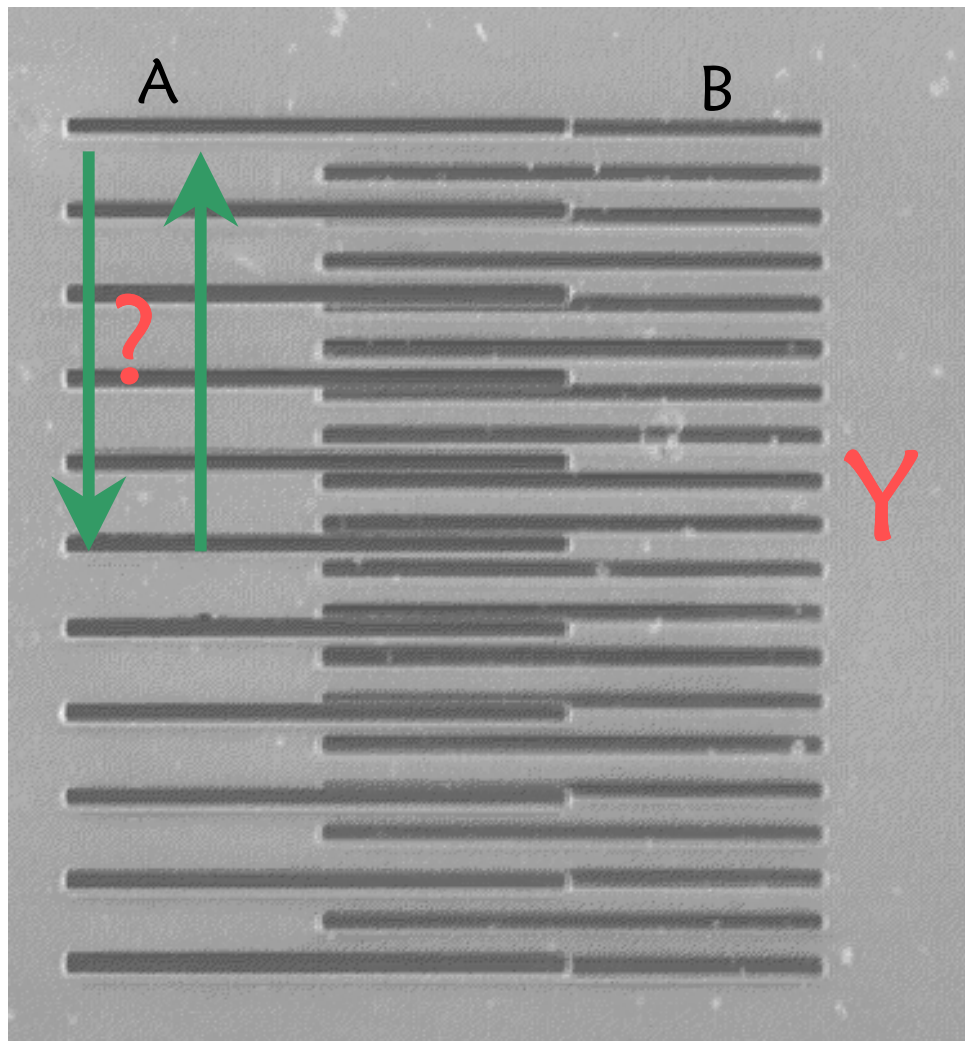
#11 A aligned to #20B

.. all others misaligned

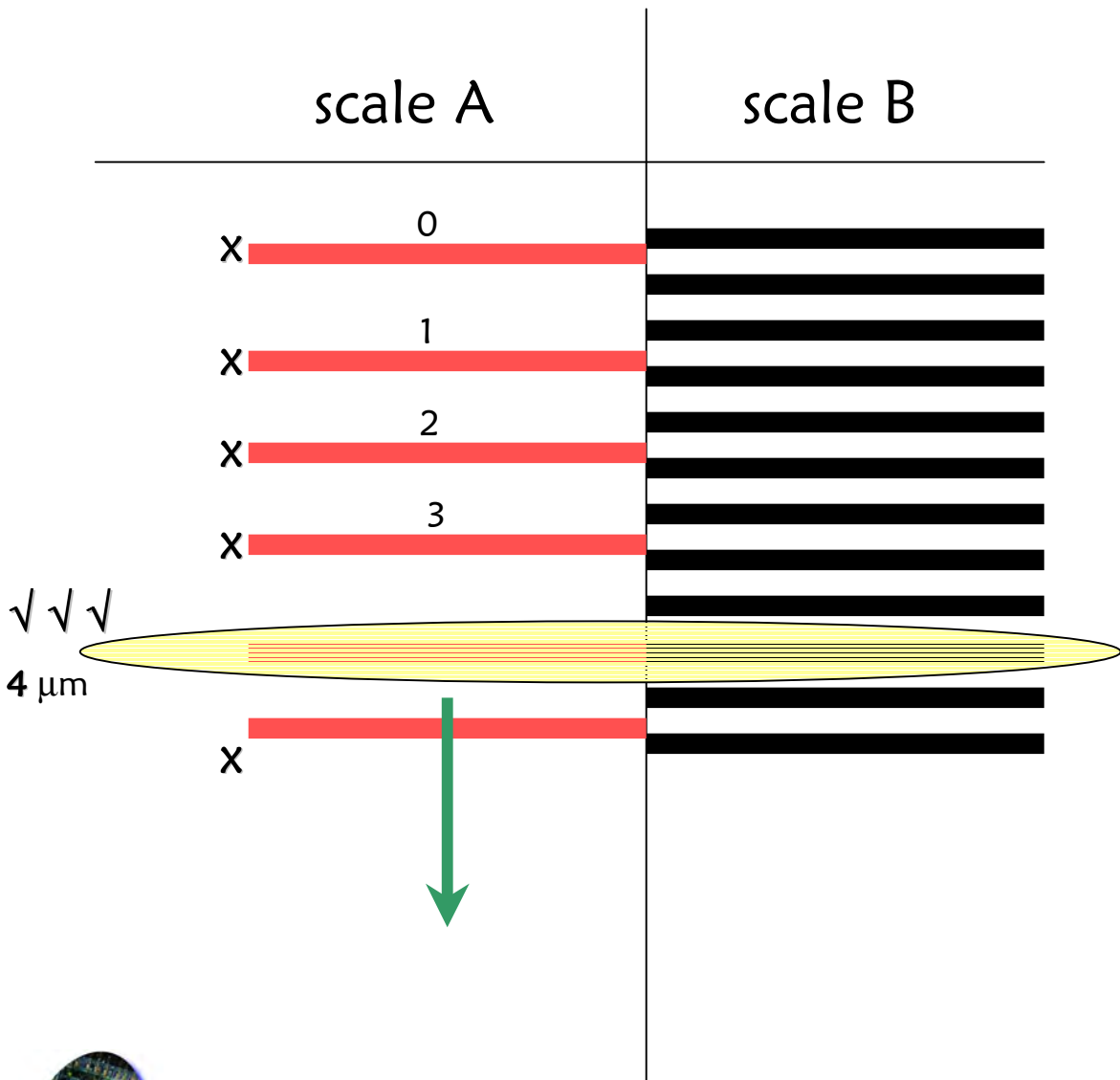


# View Results

- Refocus optics by changing z-height (focus on lines)
- Decide which A-line, overlaps which B-line
- Is A up or down relative to B ?
- By how many microns – see next 2 slides

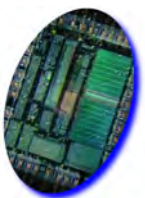
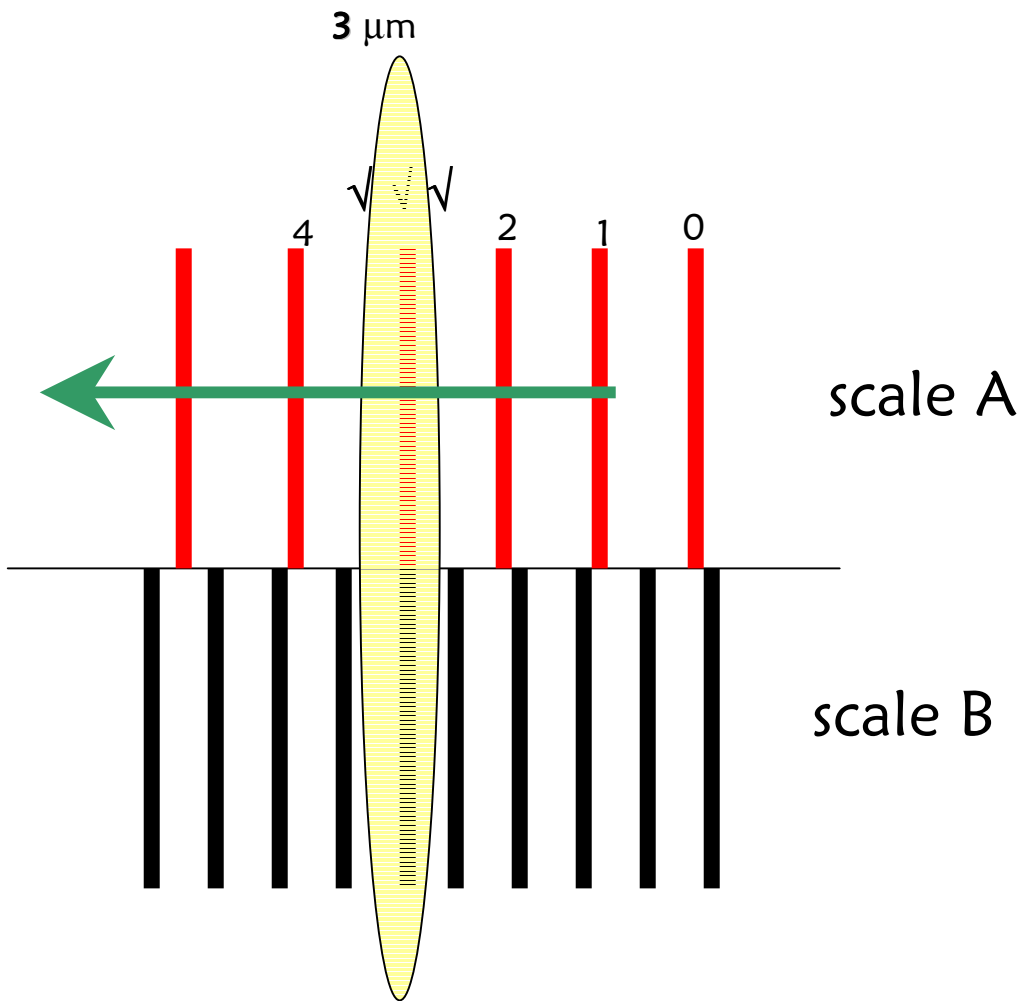


# Error in Y-Axis



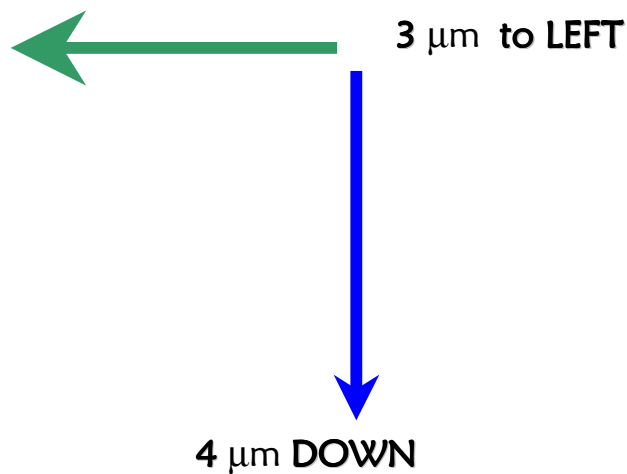


# Error in X-Axis

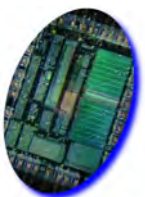


# Adjustment Procedure

(typical values only)



- Switch **OFF** pickup tool vacuum before pickup
- Touchdown tool onto scale A- switch **ON** vacuum.
- Raise arm with scale A
- Check alignment is as before – perfectly aligned ?
- If not repeat procedure and make new measurement

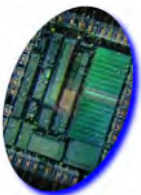


# X-Axis Correction



## The screw is sensitive !!!!!

- Look through microscope – scales should be aligned
- Turn screw in a direction that moves scale A in the direction of the error (green arrow)
- Stop when the scales read an offset the same as the error (  $3\mu\text{m}$  left in the example)
- Looking through the microscope now adjust the x-axis micrometer so that the scales are once again aligned
- Repeat the placement procedure to check the X-axis alignment
- Note the new error
- Repeat the adjustment procedure until error is 1 micron or less

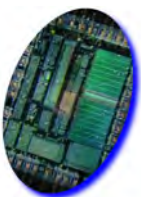


# Y-Axis Correction



## The screw is sensitive !!!!!

- Look through microscope – scales should be aligned
- Turn screw in a direction that moves scale A in the direction of the error (blue arrow)
- Stop when the scales read an offset the same as the error (  $4\mu\text{m}$  down in the example)
- Looking through the microscope now adjust the Y-axis micrometer so that the scales are once again aligned
- Repeat the placement procedure to check the Y-axis alignment
- Note the new error
- Repeat the adjustment procedure until error is 1 micron or less



## Summary

- The process should be repeated until both the X and Y axes look like the photo, both in the pre-placement and placed position.

