

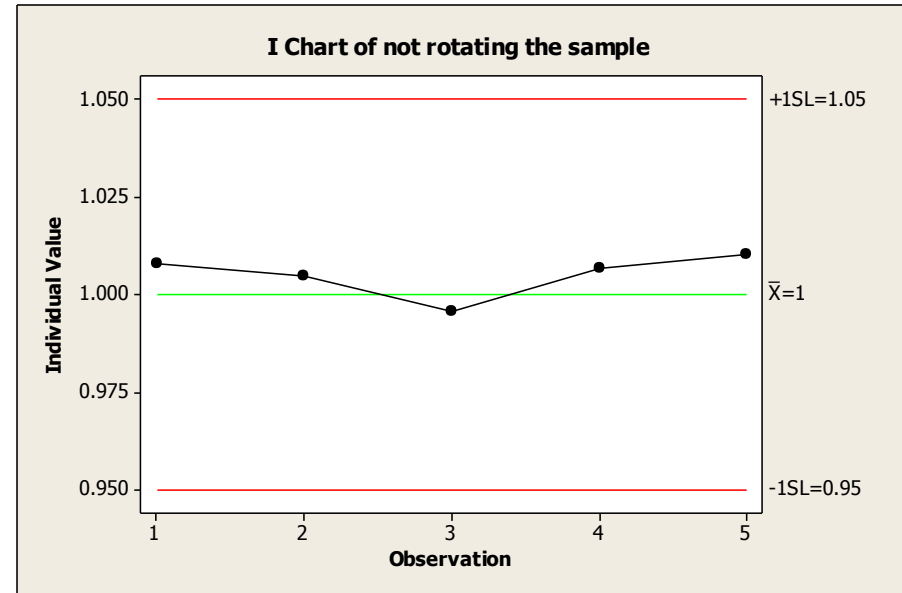
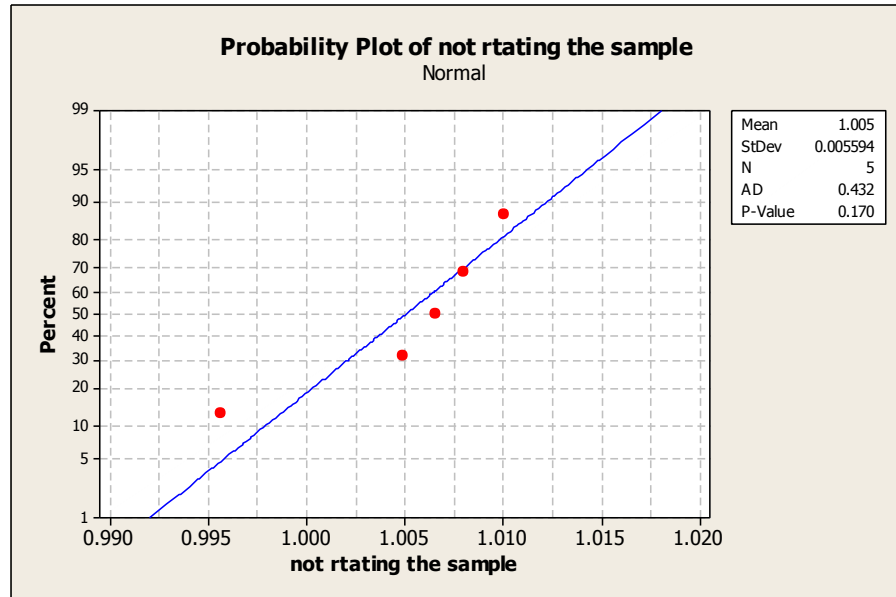
Results

- Some goals met
 - Device consistency goal ($\pm 5\%$ when measuring exact same sample) met when sample is not moved and camera settings are not changed
 - Program outputs match MathCAD program outputs for same input
 - Samples are much easier to load and measure
 - No strings needed
 - No tape needed
 - Device is self-contained as one unit
 - Smaller than last team's device
- Some goals not met
 - Device is inconsistent when zooming in or rotating sample around drum
 - Cylinder not precisely aligned
 - Specific size requirement not met

Test 1

Repeating captures of the same sample without re-mounting the sample, zooming, or changing the f-stop

FOV = 11.509375mm, F-stop value = 232

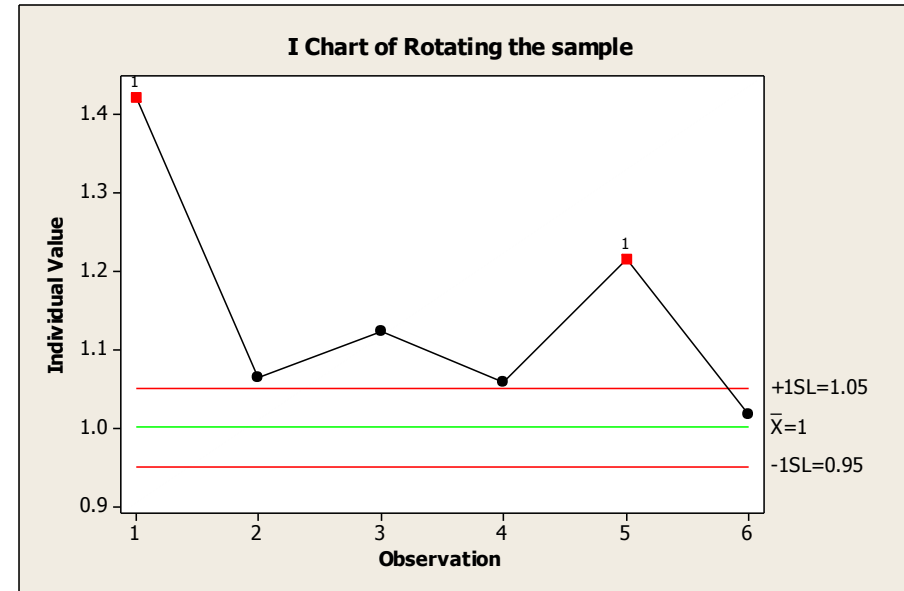
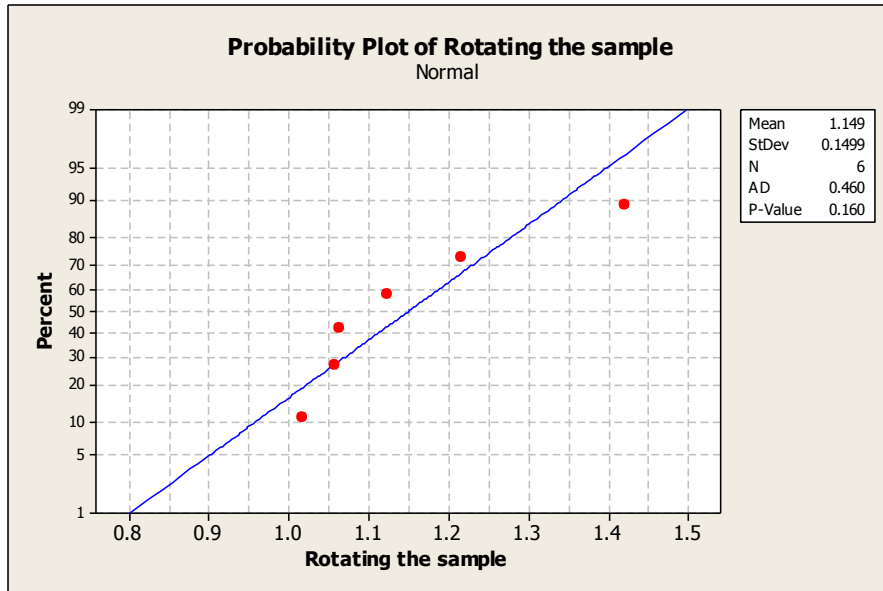


Consistently within error range (+/-5% of desired value of 1)

Test 2

Repeating captures of the same sample without zooming or changing the f-stop, but re-mounting the sample

FOV = 11.509375mm, F-stop value = 232

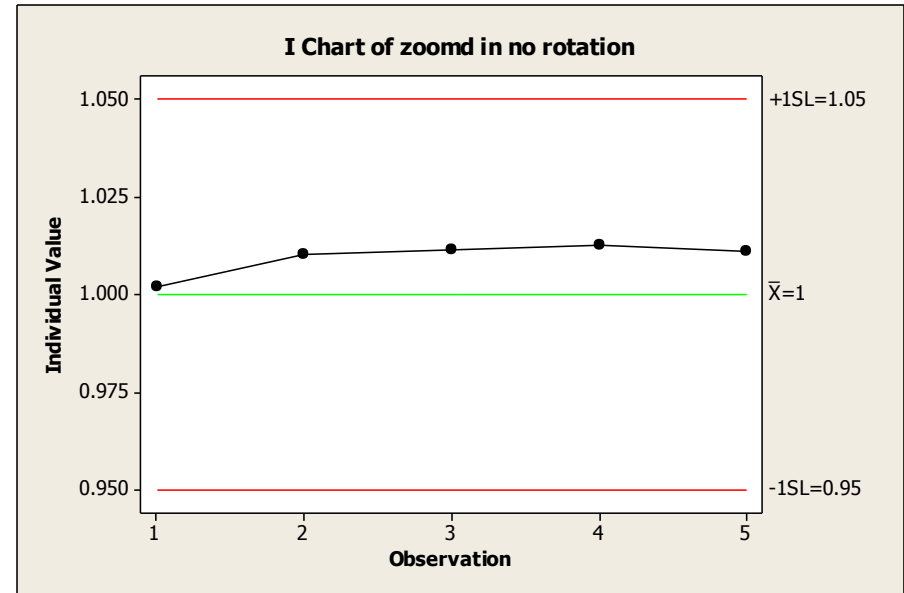
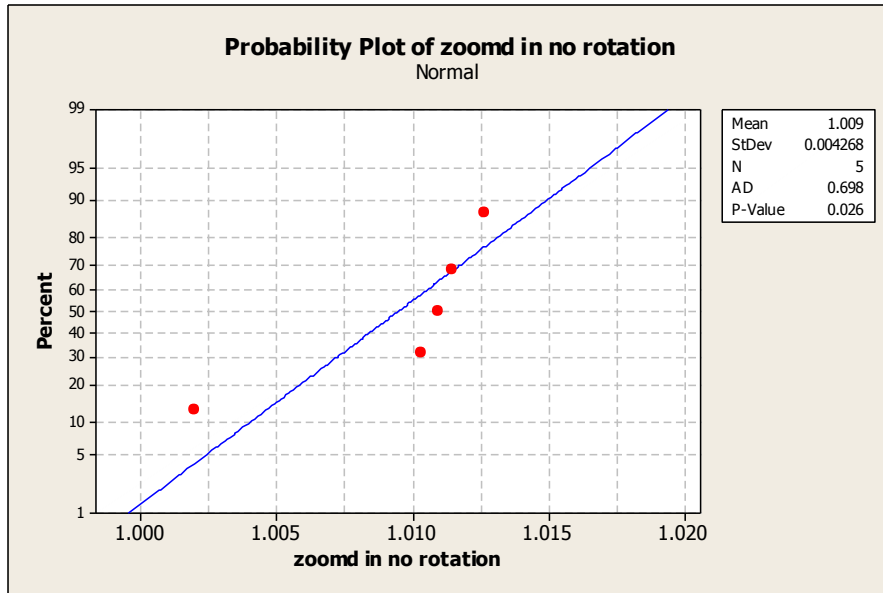


Well outside error range ($\pm 5\%$), mean value of 1.149 which is 15% higher than desired value of 1

Test 3

Repeating captures of the same sample without changing the f-stop, or re-mounting the sample, but zoomed in

FOV = 5.85390625mm, F-stop value = 232

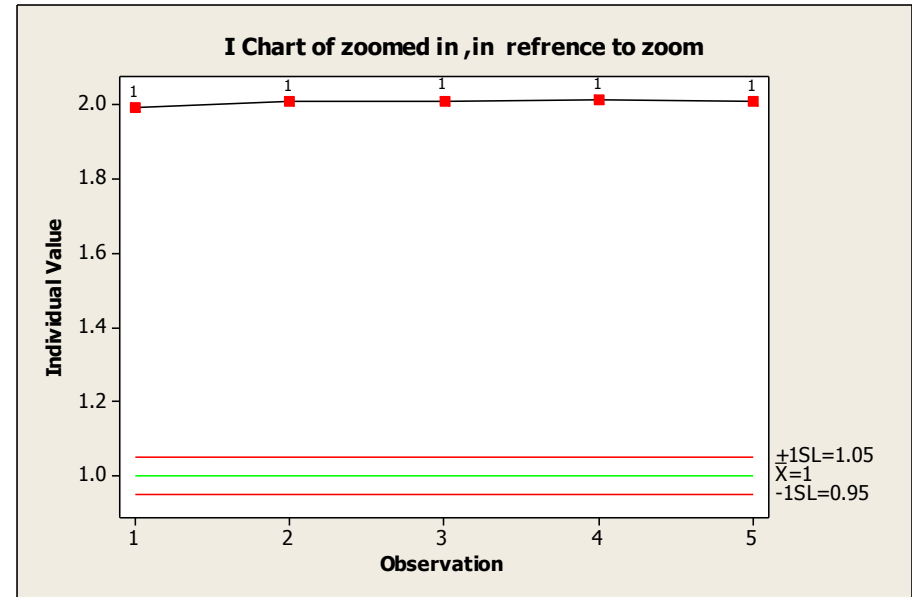
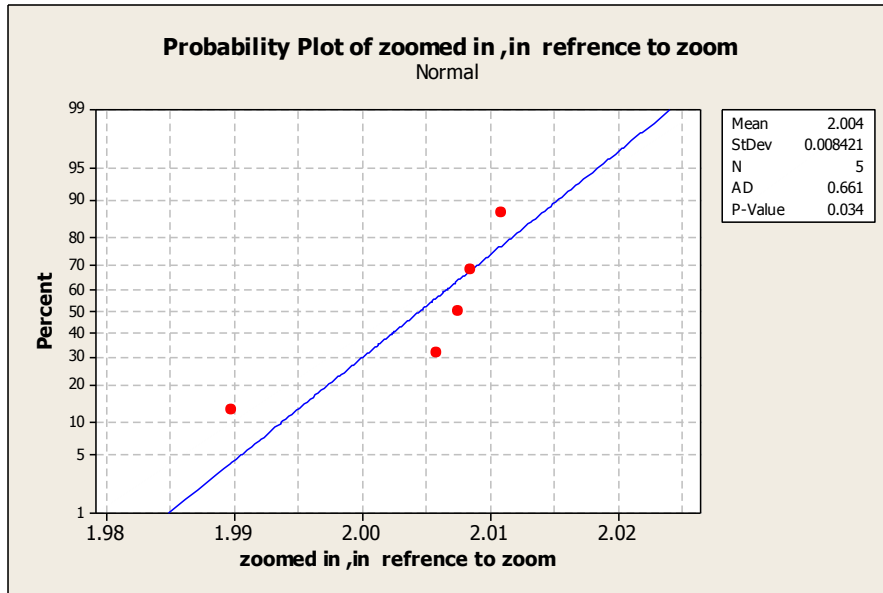


Consistently within error range (+/-5% of desired value of 1)

Test 4

Repeating captures of the same sample without changing the f-stop, or re-mounting the sample, but zoomed in, using Test 1's reference area

FOV = 5.85390625mm, F-stop value = 232



Consistently double desired value (mean 2.004) when FOV half of FOV of reference sample

Zoom 2x → get doubled area??

Problems

- When zooming on the same sample, measured areas change relative to change in field of view. Area should remain the same at any zoom level (could be a math problem).
- When re-mounting the same sample and running calculations, the values are running on the high side by approximately 15%.
- Reflection is also skewed (rotated) so that it is not perfectly vertical in the captured image (could be alignment problems, could also be that the sample is not held tightly to the cylinder).
- The shift causes errors in the “Auto baseline” calculation (not often used anyway).
- Re-mounting a sample also sometimes causes differences in data besides a shift.