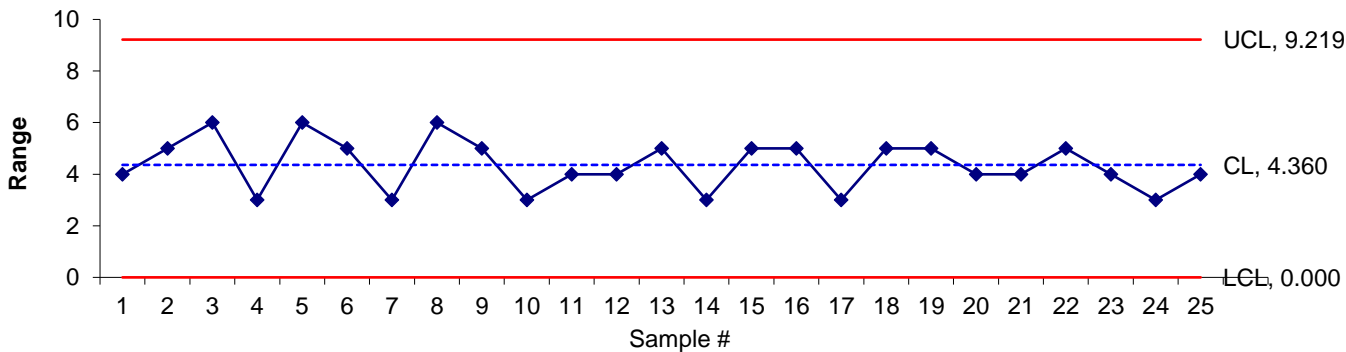
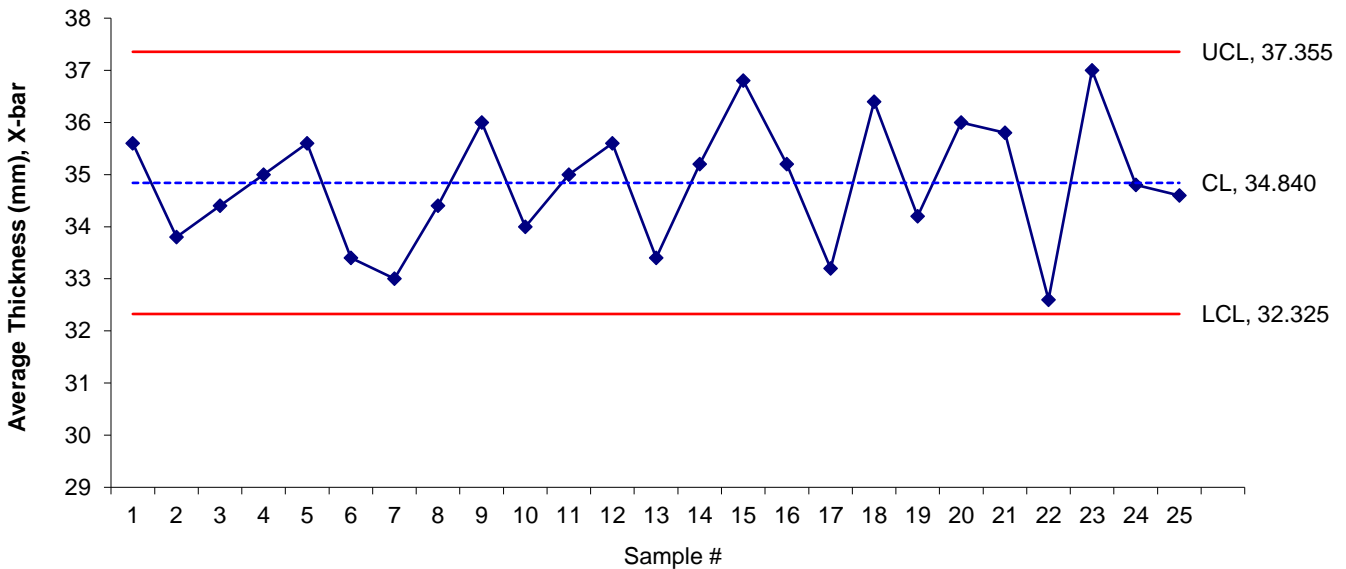


Control Chart for Mean and Range

[Title or Process]
[Date]

| | |
|------------------------|-------------------------------|
| Quality Characteristic | Average Thickness (mm), X-bar |
| Sample Size, n | 5 |
| k | 3 |



Statistics from Data Table

| | |
|--------------------------------|--------|
| R-bar | 4.360 |
| Process Mean, μ -hat | 34.840 |
| Process St.Dev., σ -hat | 1.874 |
| $\sigma_{X\text{-bar}}$ | 0.838 |

Process Capability

| | |
|-----------------------|--------|
| Upper Spec Limit, USL | 40 |
| Lower Spec Limit, LSL | 30 |
| C_p | 0.889 |
| CPU | 0.918 |
| CPL | 0.861 |
| C_{pk} | 0.861 |
| Percent Yield | 99.21% |

Control Limits for X-bar Chart

| | |
|----------------------|------------------------------------|
| $CL_{X\text{-bar}}$ | 34.840 |
| $UCL_{X\text{-bar}}$ | 37.355 $CL+k\sigma_{X\text{-bar}}$ |
| $LCL_{X\text{-bar}}$ | 32.325 $CL-k\sigma_{X\text{-bar}}$ |
| α | 0.0027 |
| ARL | 370.4 samples |

Control Limits for R Chart

| | |
|---------|-------|
| CL_R | 4.360 |
| UCL_R | 9.219 |
| LCL_R | 0.000 |

Data Table**X-bar Chart****R Chart**

| <i>Sample</i> | <i>X-bar</i> | <i>Range</i> | CL | UCL | LCL | CL | UCL | LCL |
|---------------|--------------|--------------|--------|--------|--------|-------|-------|-------|
| 1 | 35.6 | 4 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 2 | 33.8 | 5 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 3 | 34.4 | 6 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 4 | 35 | 3 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 5 | 35.6 | 6 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 6 | 33.4 | 5 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 7 | 33 | 3 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 8 | 34.4 | 6 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 9 | 36 | 5 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 10 | 34 | 3 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 11 | 35 | 4 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 12 | 35.6 | 4 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 13 | 33.4 | 5 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 14 | 35.2 | 3 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 15 | 36.8 | 5 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 16 | 35.2 | 5 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 17 | 33.2 | 3 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 18 | 36.4 | 5 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 19 | 34.2 | 5 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 20 | 36 | 4 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 21 | 35.8 | 4 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 22 | 32.6 | 5 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 23 | 37 | 4 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 24 | 34.8 | 3 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |
| 25 | 34.6 | 4 | 34.840 | 37.355 | 32.325 | 4.360 | 9.219 | 0.000 |

Control Chart for Mean and Standard Deviation

[Title or Process]

[Date]

Quality Characteristic

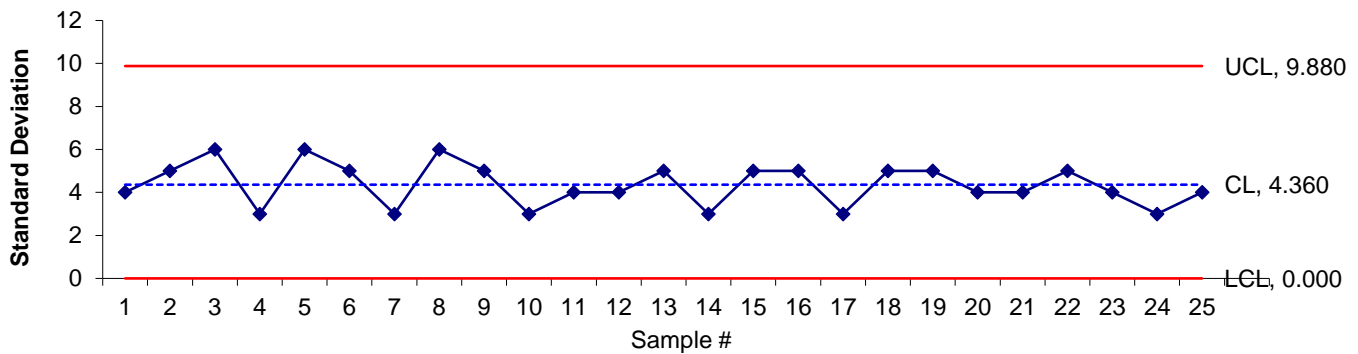
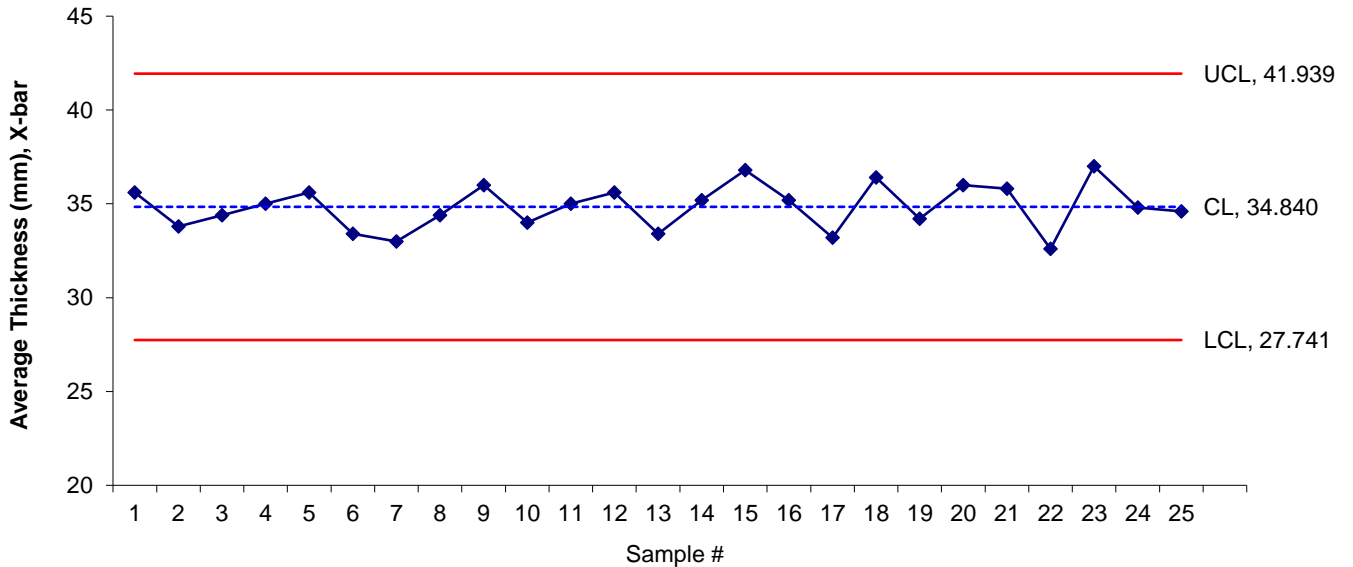
Sample Size, n

k

Average Thickness (mm), \bar{X} -bar

4

3



Statistics from Data Table

| | |
|---------------------------------|--------|
| \bar{s} -bar | 4.360 |
| c_4 | 0.9213 |
| Process St.Dev., $\hat{\sigma}$ | 4.732 |
| Process Mean, $\hat{\mu}$ | 34.840 |
| $\hat{\sigma}_{\bar{X}}$ | 2.366 |
| σ_s | 1.840 |

Process Capability

| | |
|-----------------------|--------|
| Upper Spec Limit, USL | 45 |
| Lower Spec Limit, LSL | 25 |
| C_p | 0.704 |
| CPU | 0.716 |
| CPL | 0.693 |
| C_{pk} | 0.693 |
| Percent Yield | 96.53% |

Control Limits for X-bar Chart

| | |
|-----------------|---------------|
| $CL_{\bar{X}}$ | 34.840 |
| $UCL_{\bar{X}}$ | 41.939 |
| $LCL_{\bar{X}}$ | 27.741 |
| α | 0.0027 |
| ARL | 370.4 samples |

Control Limits for S Chart

| | |
|---------|-------|
| CL_s | 4.360 |
| UCL_s | 9.880 |
| LCL_s | 0.000 |

Data Table**X-bar Chart****R Chart**

| <i>Sample</i> | <i>X-bar</i> | <i>St. Dev., s</i> | CL | UCL | LCL | CL | UCL | LCL |
|---------------|--------------|--------------------|--------|--------|--------|-------|-------|-------|
| 1 | 35.6 | 4 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 2 | 33.8 | 5 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 3 | 34.4 | 6 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 4 | 35 | 3 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 5 | 35.6 | 6 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 6 | 33.4 | 5 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 7 | 33 | 3 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 8 | 34.4 | 6 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 9 | 36 | 5 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 10 | 34 | 3 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 11 | 35 | 4 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 12 | 35.6 | 4 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 13 | 33.4 | 5 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 14 | 35.2 | 3 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 15 | 36.8 | 5 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 16 | 35.2 | 5 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 17 | 33.2 | 3 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 18 | 36.4 | 5 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 19 | 34.2 | 5 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 20 | 36 | 4 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 21 | 35.8 | 4 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 22 | 32.6 | 5 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 23 | 37 | 4 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 24 | 34.8 | 3 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |
| 25 | 34.6 | 4 | 34.840 | 41.939 | 27.741 | 4.360 | 9.880 | 0.000 |

Control Chart Template



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