

DSES 4230

Quality Control

Spring 06

Test II b

Name:

Test Score: 38/40

03/30/06

Use of computer (laptop) is allowed

Problem 1

20 points

The following process has a USL of 130 kg and a LSL of 75 kg. Determine C_p , C_{pu} , C_{pl} , and C_{pk} . What is the capability ratio?

Note: The data is in the Excel sheet. Password to open the file is QCS6T2

The password is case sensitive

control charts : removed group 21, 2, & 4 ✓

Normality test : p-value = .022 > .01

doesn't resemble any other distribution OK ✓

$C_p = 1.19$ ✓

$C_{pl} = 0.79$ ✓

$C_{pu} = 1.59$

$C_{pk} = 0.79$ ✓

capability ratio = $1/C_p = 84\%$ ✓

20

Problem 2

20 points

The inner diameter of automobile pistons is measured, and samples of size 5 were collected and tabulated in the Excel file. Using the first 25 samples set up X-bar and R charts and calculate trial limits and center line for each chart. Estimate the process mean and standard deviation.

If any point falls outside the control limits, assume assignable causes and recalculate limits and center lines. Use these charts to monitor samples 26 – 40 in the same file.

Discuss your results. No need to submit chart printouts.

First 25: $\bar{x} = 24.0012$ $\hat{\sigma}_x = .0099$ $UCL_{\bar{x}} = 24.014$ $UCL_R = .049$
 $LCL_{\bar{x}} = 23.988$ $LCL_R = 0$
 $\bar{R} = .023$

→ in control. ✓

Using the above process mean & std. dev. the following points are out of control:

failed	sample
test 1	34, 35, 36 - out of limits 37-38-39
test 5	32, 34, 35, 36, 37 - 2 out of 3 > 2σ 35-37-38-39-40
test 6	35, 36, 37 - 4 out of 5 > 1σ 38, 39, 40

By the looks of the \bar{x} -chart and the tests that it failed, the process mean seems to be increasing. The process is no longer in control. ✓