ASQ CRE Prep course

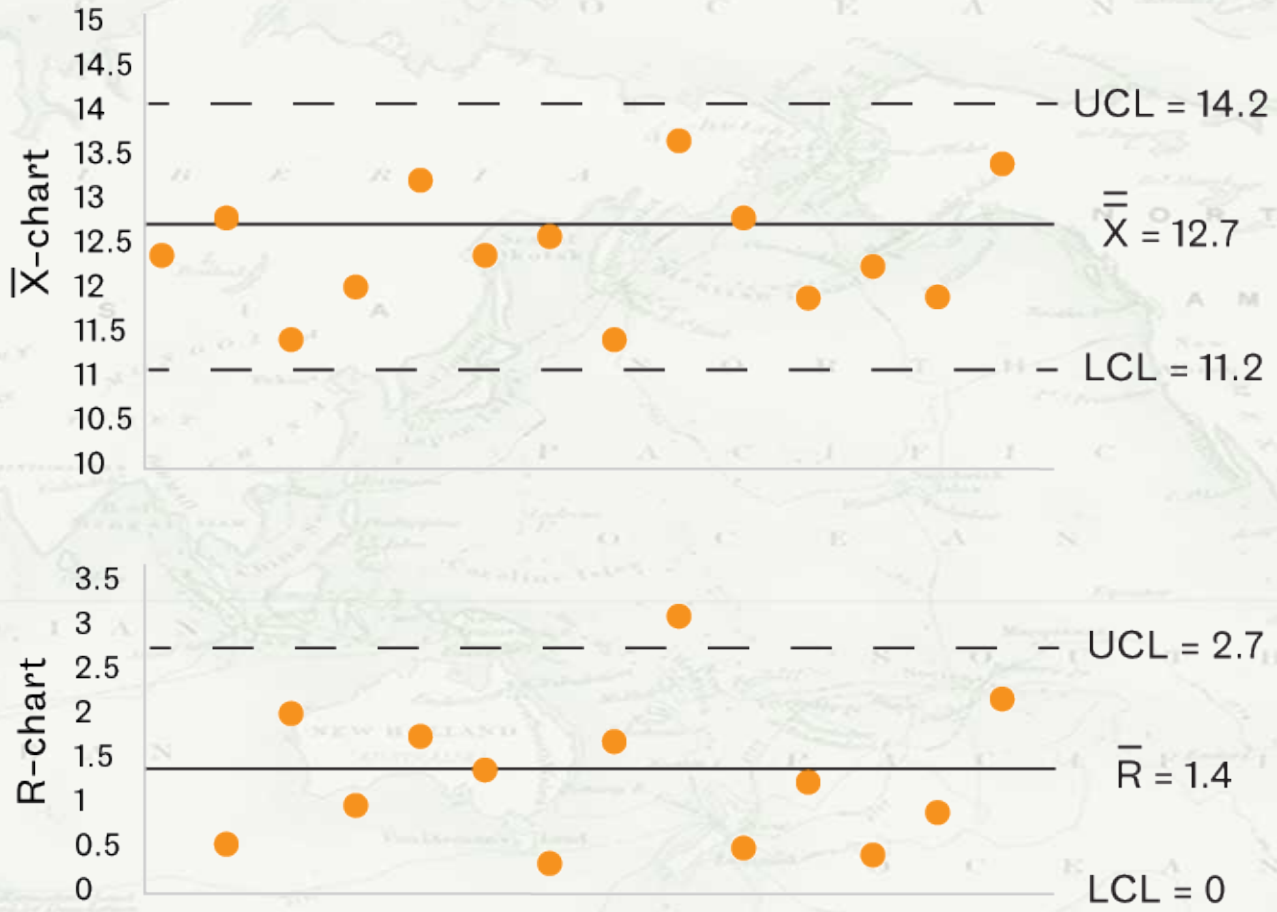
Lesson II. A. 7. b.

SPC and Process Capability

X-bar and R Charts

The one that we all learn first

X-BAR AND R CHARTS


15
14.5
14
13.5
13
12.5
12
11.5
11
10.5
10
X̄-chart
UCL = 14.2
X̄ = 12.7
LCL = 11.2
3.5
3
2.5
2
1.5
1
0.5
0
R-chart
UCL = 2.7
R̄ = 1.4
LCL = 0

Steps to construct X-bar & R charts

1. Determine sample size
2. Collect 20 to 25 sets
3. Calculate average for each sample
4. Calculate range for each sample
5. Calculate X-double bar
6. Calculate R-bar
7. Calculate control limits
8. Plot the data and ID out of control signals

A few factors and formulas

$\bar{X}$ Chart

$$UCL_{\bar{X}} = \bar{\bar{X}} + A_2\bar{R}$$

$$LCL_{\bar{X}} = \bar{\bar{X}} - A_2\bar{R}$$

R Chart

$$UCL_R = D_4\bar{R}$$

$$LCL_R = D_3\bar{R}$$

n	A2	D3	D4
2	1.88	0	3.27
3	1.02	0	2.57
4	0.73	0	2.28
5	0.58	0	2.11
6	0.48	0	2.00

Remember the Limit Distance

$$A_2\bar{R} = 3s_{\bar{X}}$$

$$s_{\bar{X}} = \frac{s_X}{\sqrt{n}}$$

What is the role of the Central Limit Theorem?

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Lesson II. A. 7. c.

SPC and Process Capability

Selecting Control Charts