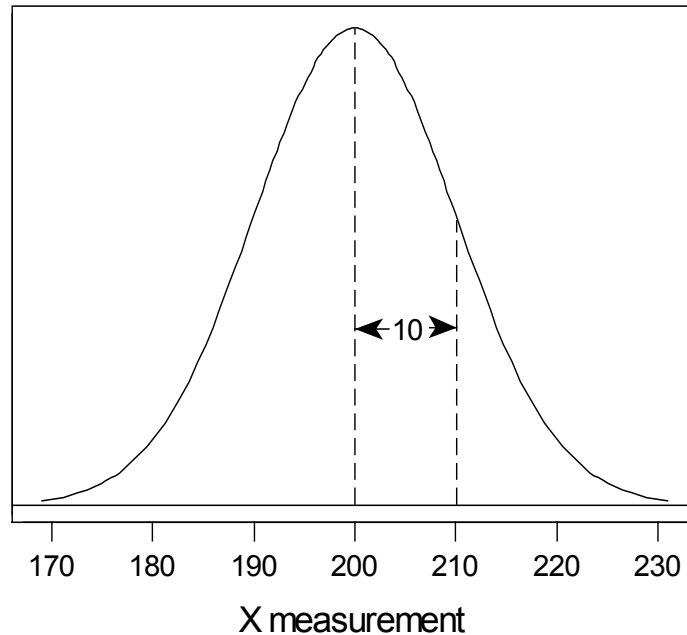


Where do Control Chart Coefficients come from?

Process Quality Characteristic: Normal Distribution

Process Mean = 200, Process Sigma = 10



Subgroups of a given size are selected from this hypothetical process distribution. For each subgroup a subgroup range, R , is calculated. Every subgroup will have different values and thus produce different ranges. If we think about taking many, many subgroups over time we will build up a distribution of values of R . This is called the sampling distribution of R . In order to see where the control chart coefficients come from, we need to look at the sampling distribution of R for each subgroup size.

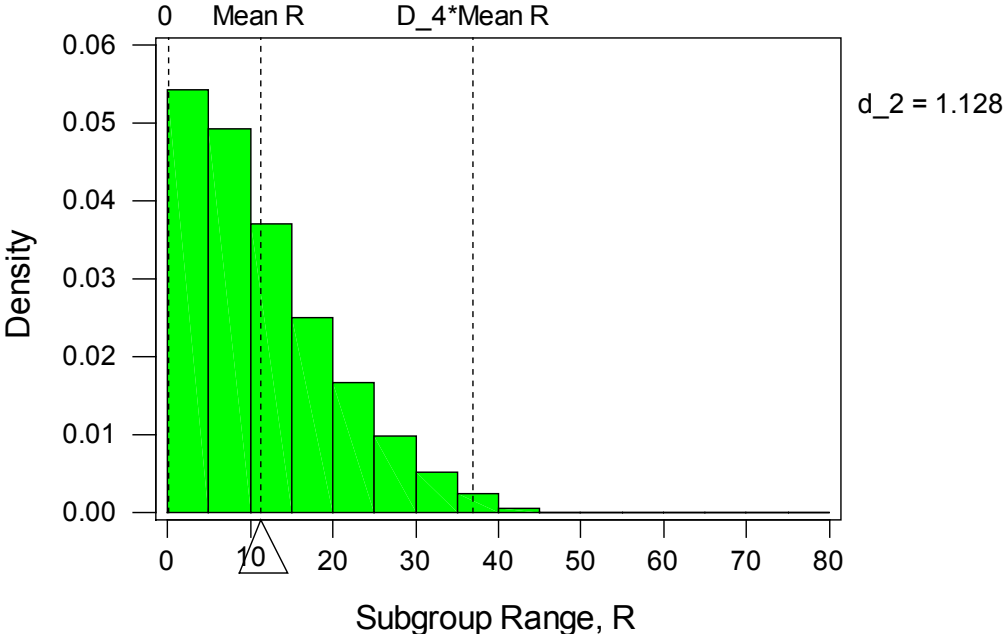
The center of the sampling distribution of R is related to the process standard deviation;

$$\text{Mean } R = d_2 * \sigma$$

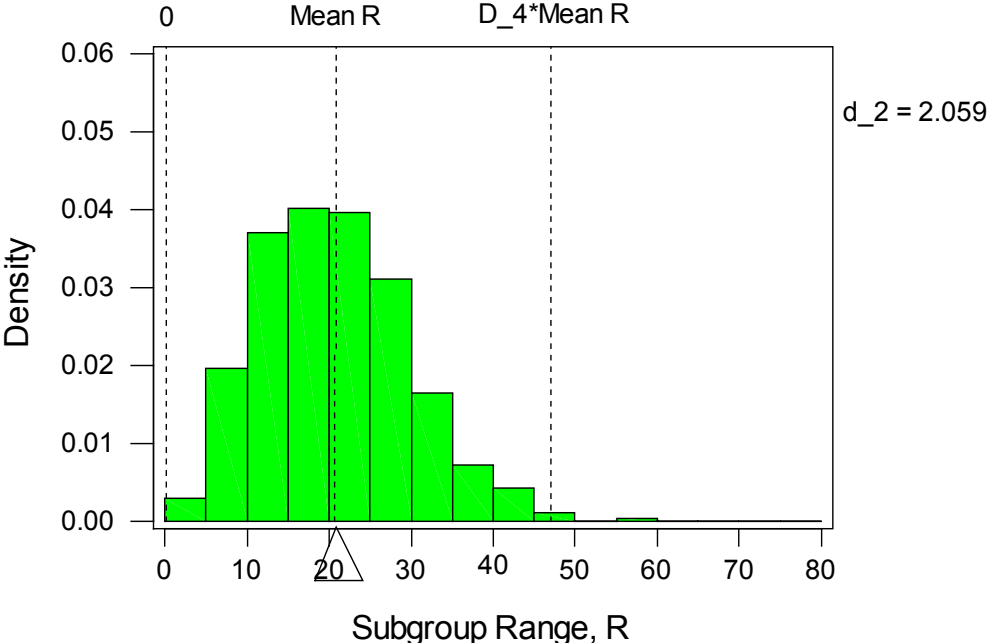
Most of the sampling distribution of R will fall between;

$$D_3 * \text{Mean } R \text{ and } D_4 * \text{Mean } R$$

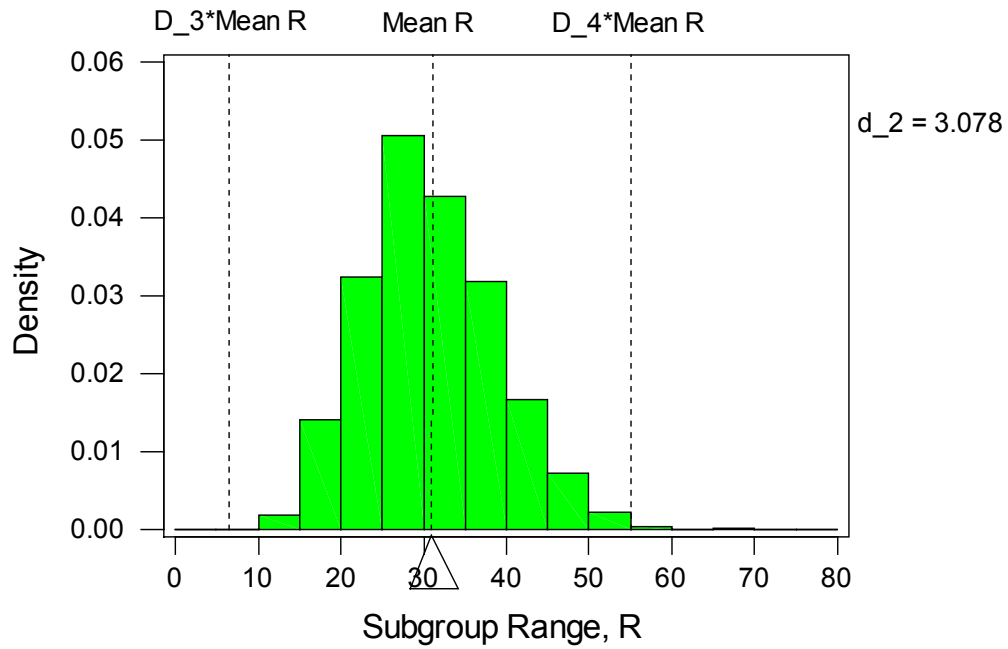
Simulated sampling distribution of R, n=2



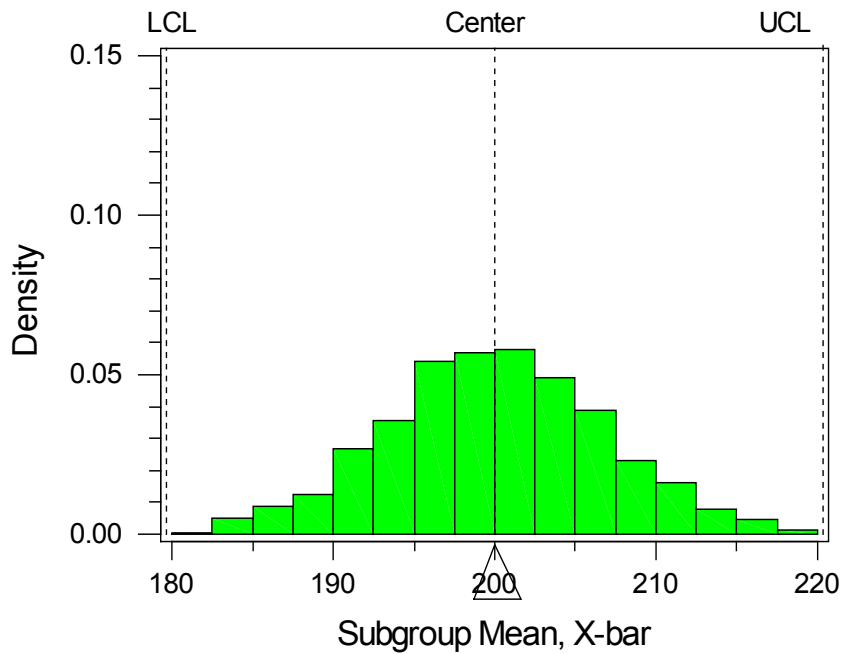
Simulated sampling distribution of R, n=4



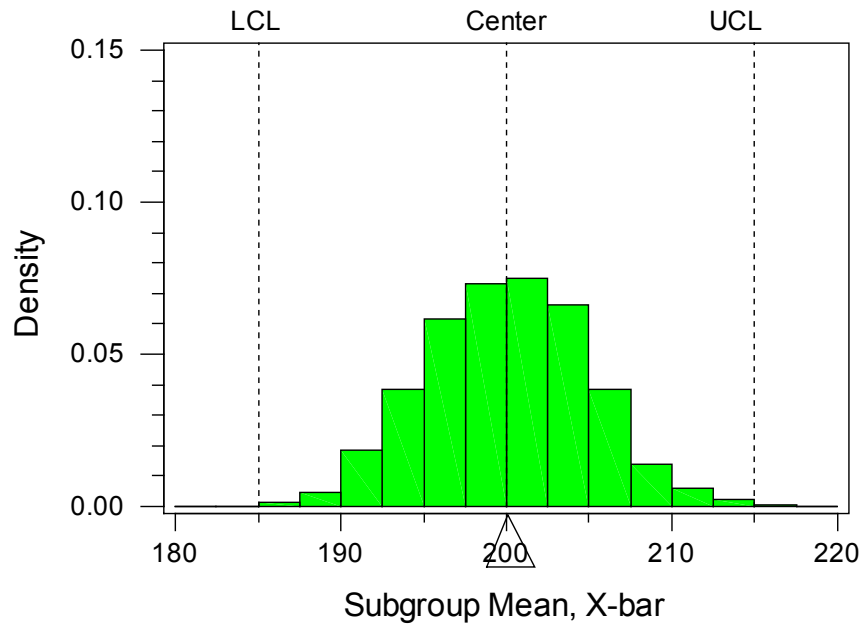
Simulated sampling distribution of R, n=10



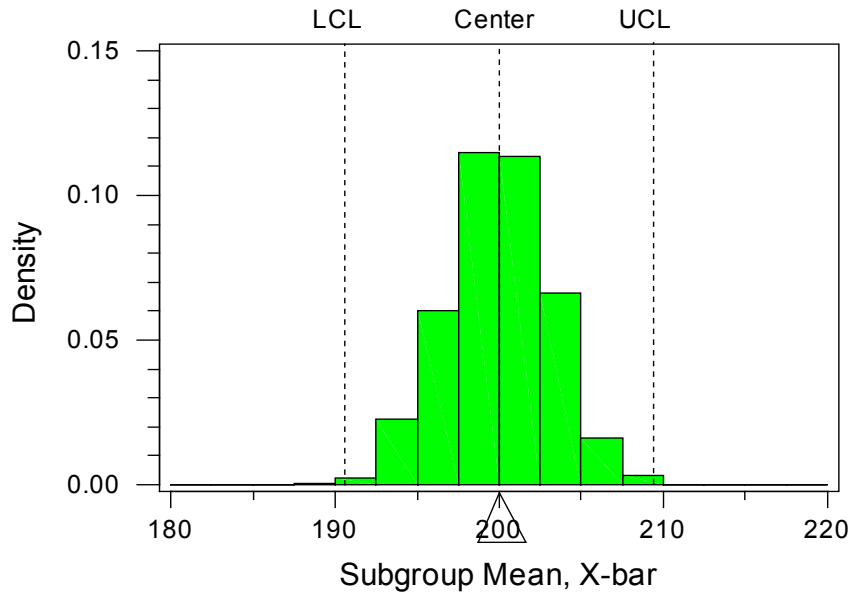
Simulated sampling distribution of X-bar, n=2



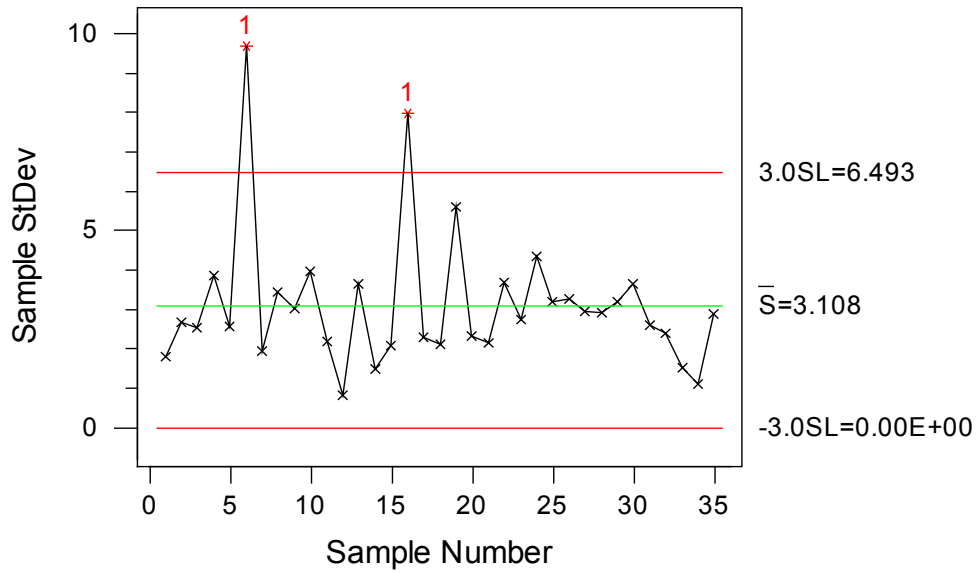
Simulated sampling distribution of \bar{X} , $n=4$



Simulated sampling distribution of \bar{X} , $n=10$



Cylinder Bore
s chart



Cylinder Bore
X-bar chart

