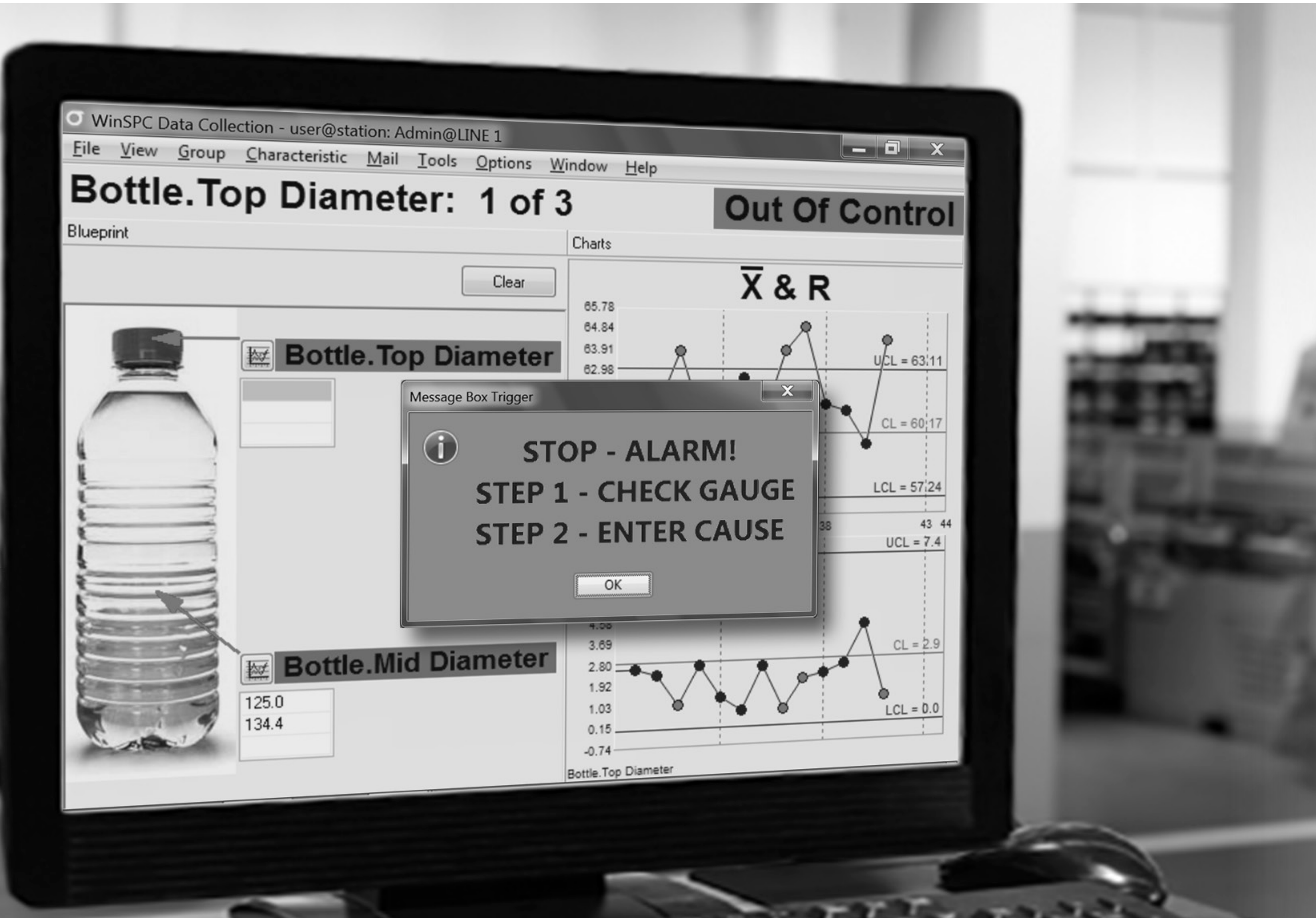


WHY DO SPC?

*SPC helps manufacturers make the **HIGHEST QUALITY PRODUCT** at the **LOWEST POSSIBLE COST**.*



SPC monitors the performance of a process and, using statistics, helps **IDENTIFY TRENDS** and **VARIATION** to prevent the process from going out of control.

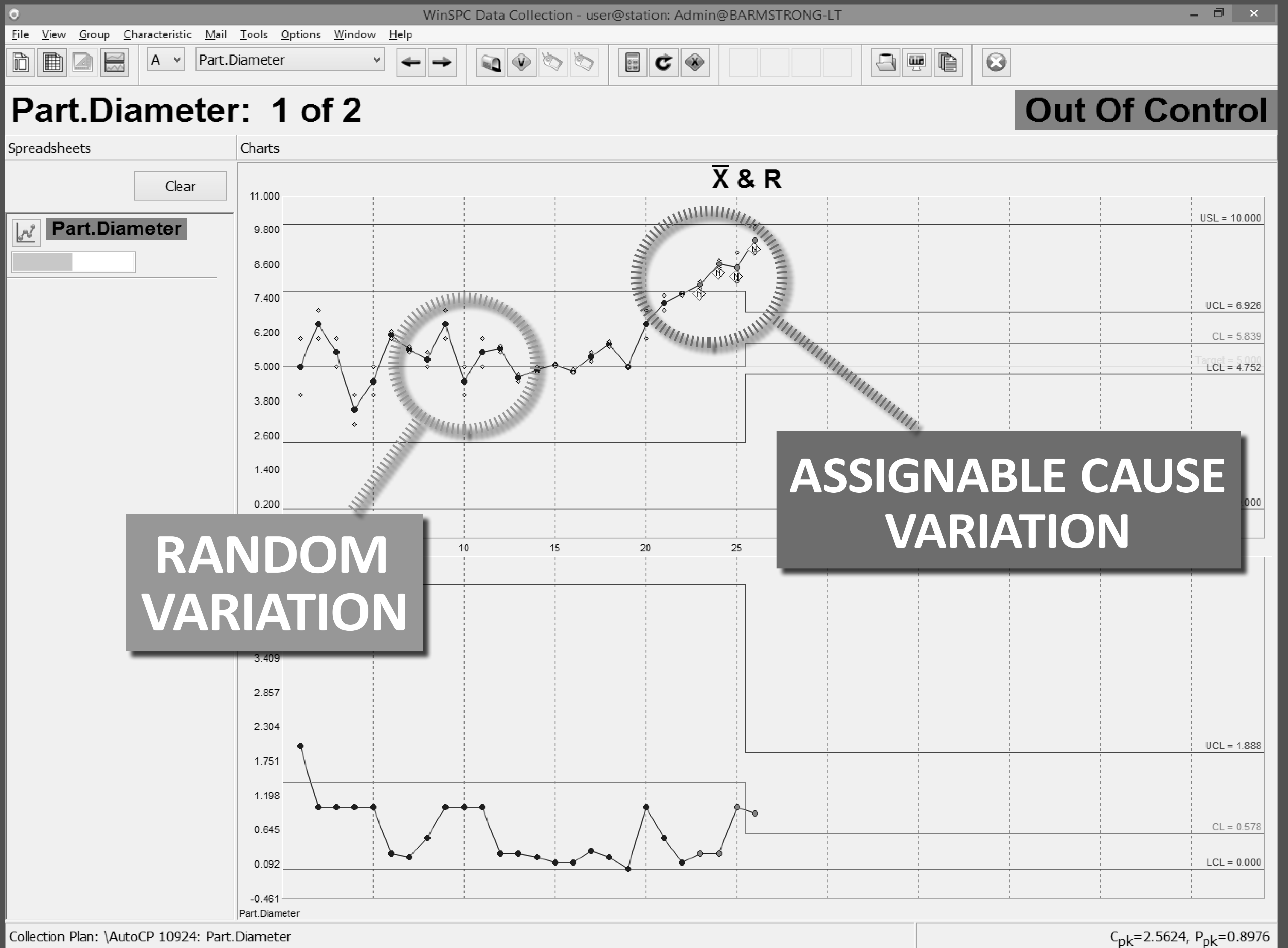
BENEFITS OF AUTOMATED SPC

Statistical Process Control

- MONITOR PROCESSES IN REAL-TIME
- IMPROVE QUALITY
- REDUCE VARIATION, SCRAP & REWORK
- ELIMINATE PAPERWORK
- COMPLY WITH CUSTOMER & REGULATORY REQUIREMENTS

VARIATION

In SPC, variation refers to differences in observed measurements from the expected target value.



ALL PROCESSES HAVE VARIATION

RANDOM VARIATION is normal and expected.

ASSIGNABLE CAUSE VARIATION is the result of at least one **EXTERNAL INFLUENCE** and indicates a process is **OUT OF CONTROL**.

KEY TERMS

MEAN | **AVERAGE** of **MEASUREMENTS**

SIGMA | **SPREAD** of **MEASUREMENTS** (process distribution)

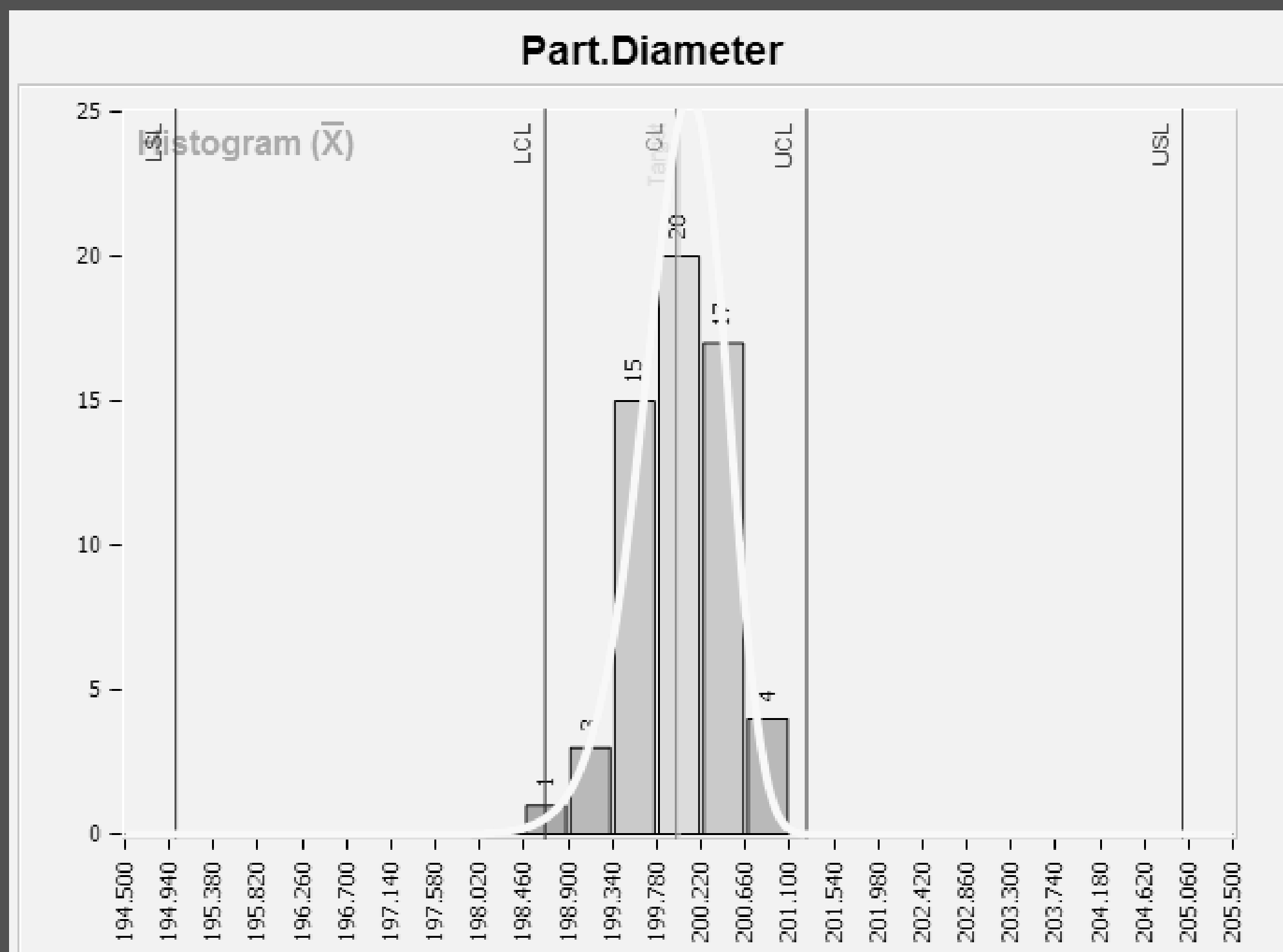
STANDARD DEVIATION | The **EXTENT** of **VARIATION** for a set of data values

SUBGROUP | **GROUP** of **MEASUREMENTS** used to plot a point

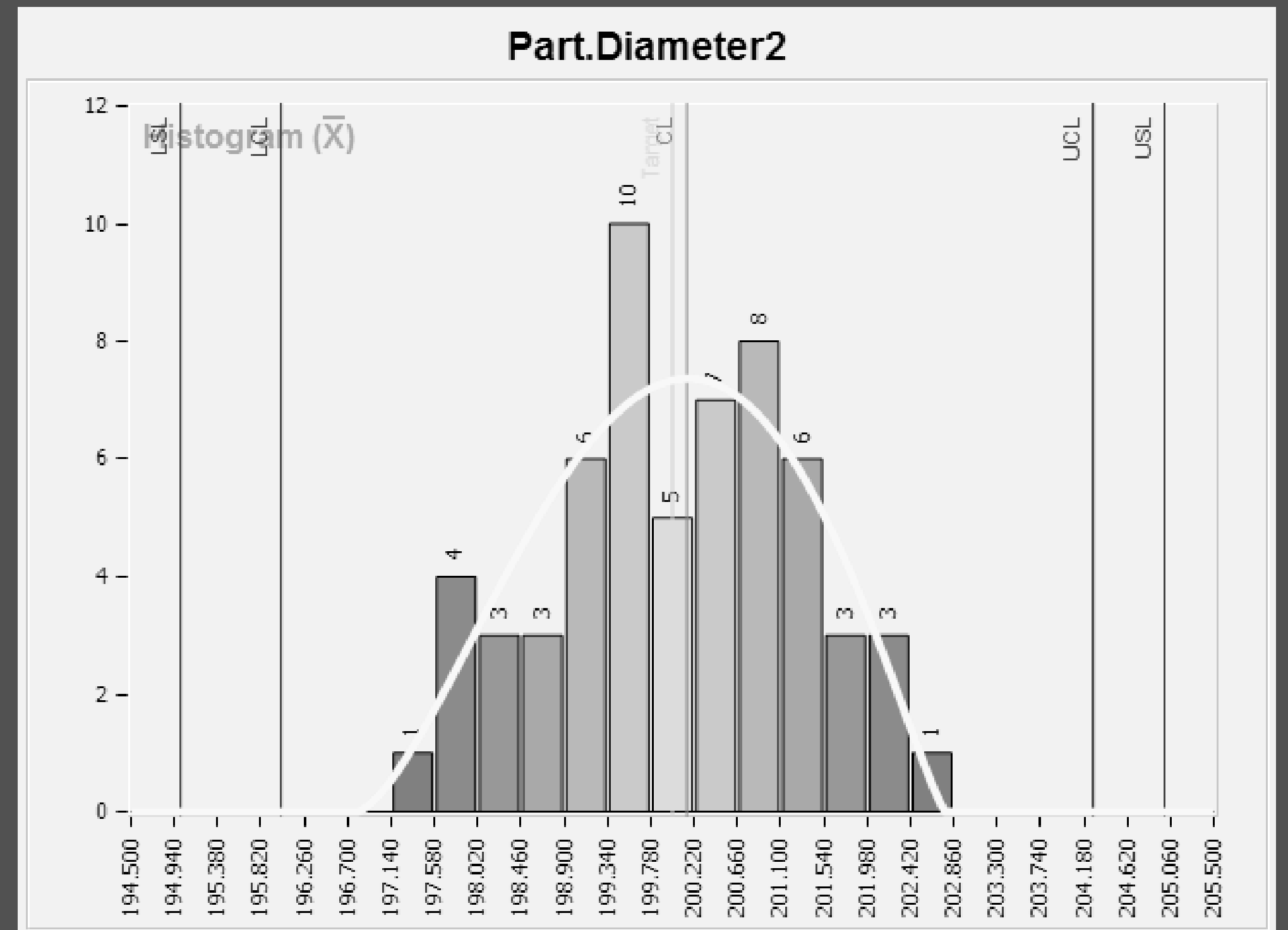
PROCESS CAPABILITY

A method of analyzing a process to determine its capacity to produce units within specification limits.

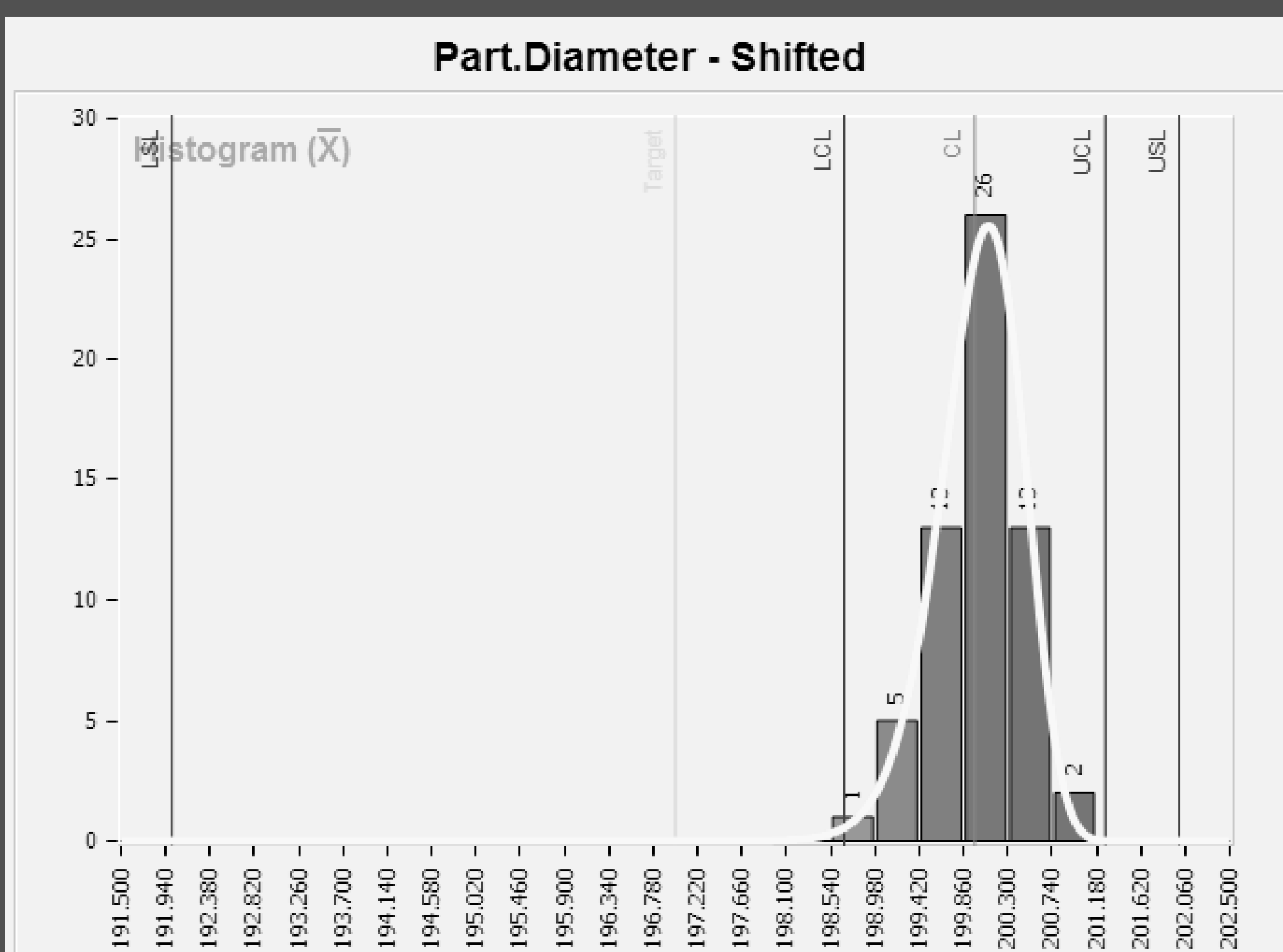
High Cpk | High Cp
Cpk = 1.68 | Cp = 1.68



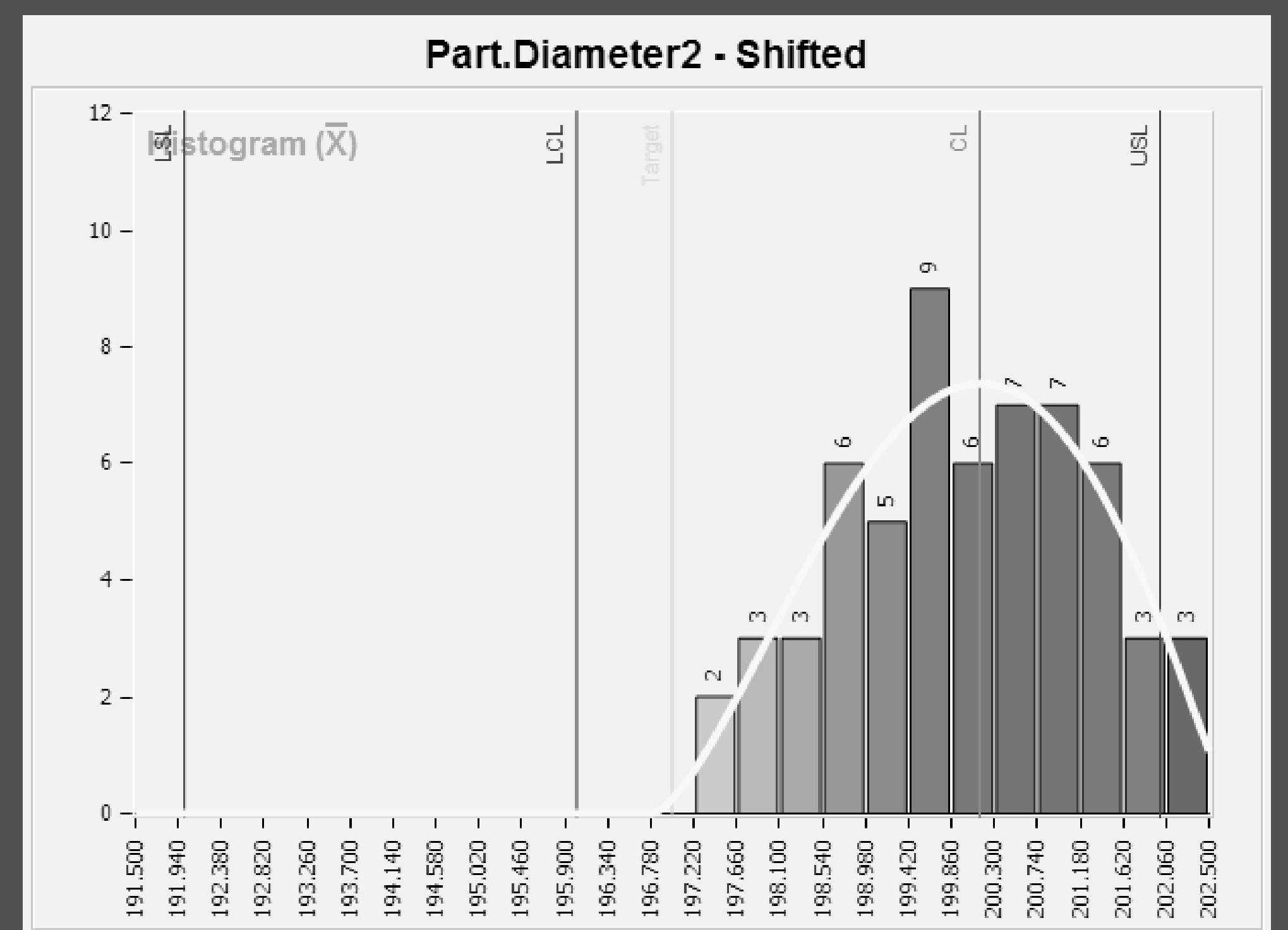
Low Cpk | Low Cp
Cpk = .53 | Cp = .53



Low Cpk | High Cp
Cpk = .67 | Cp = 1.68



Low Cpk | Low Cp
Cpk = .21 | Cp = .53



KEY TERMS

HISTOGRAM | TALLY of MEASUREMENTS that shows the DATA DISTRIBUTION

CP | Indicates the DISTRIBUTION WIDTH for the data (Target Cp > 1.3)

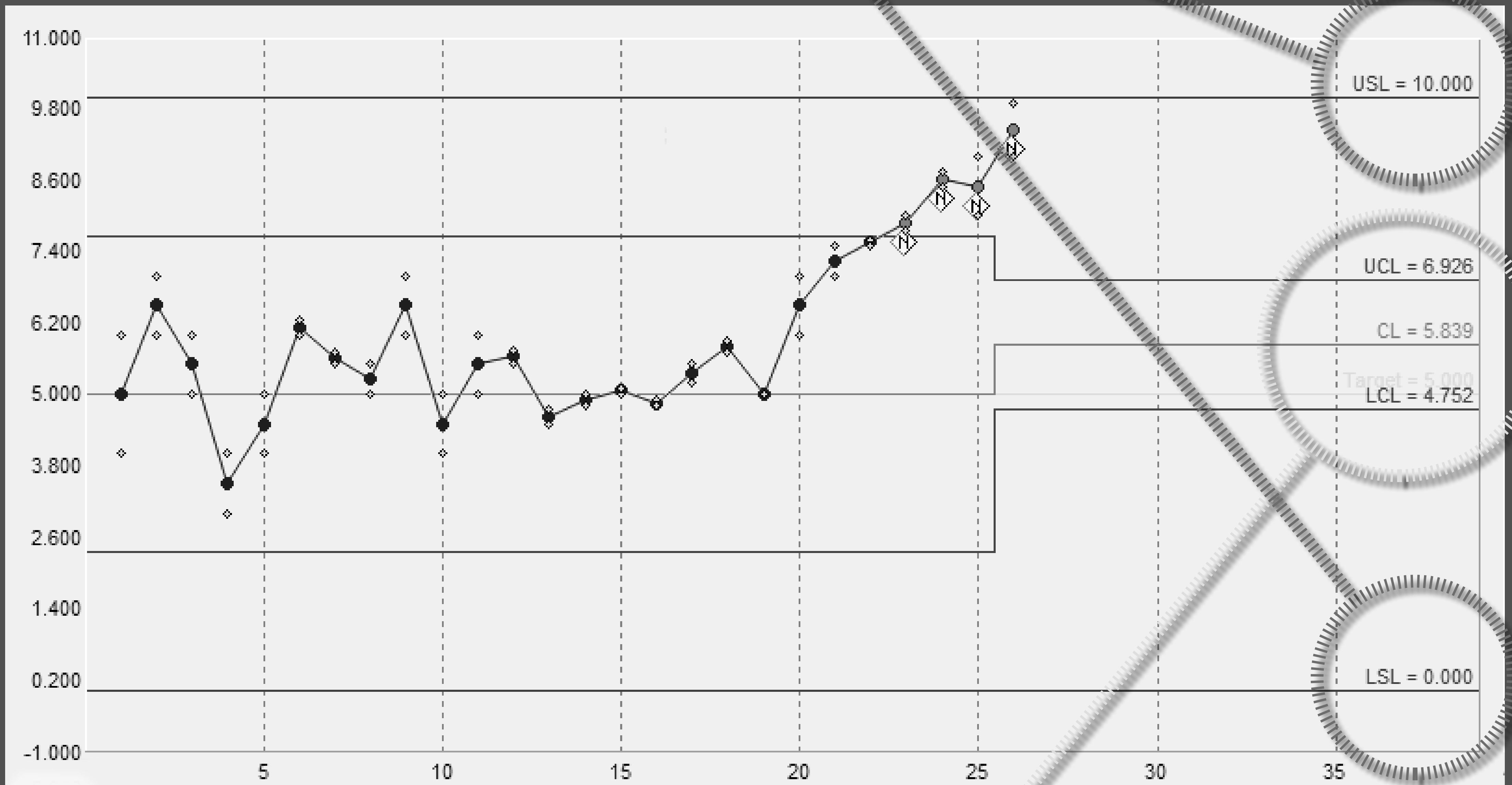
CPK | Indicates the data WIDTH AND CENTERING relative to SPECIFICATIONS (Target Cpk > 1.3)

LIMITS

-- SPECIFICATION LIMITS --

Range of acceptable measurements
from the CUSTOMER

*NOTE: A point outside the specification limits indicates that
the part is out of tolerance (defective).*



-- CONTROL LIMITS --

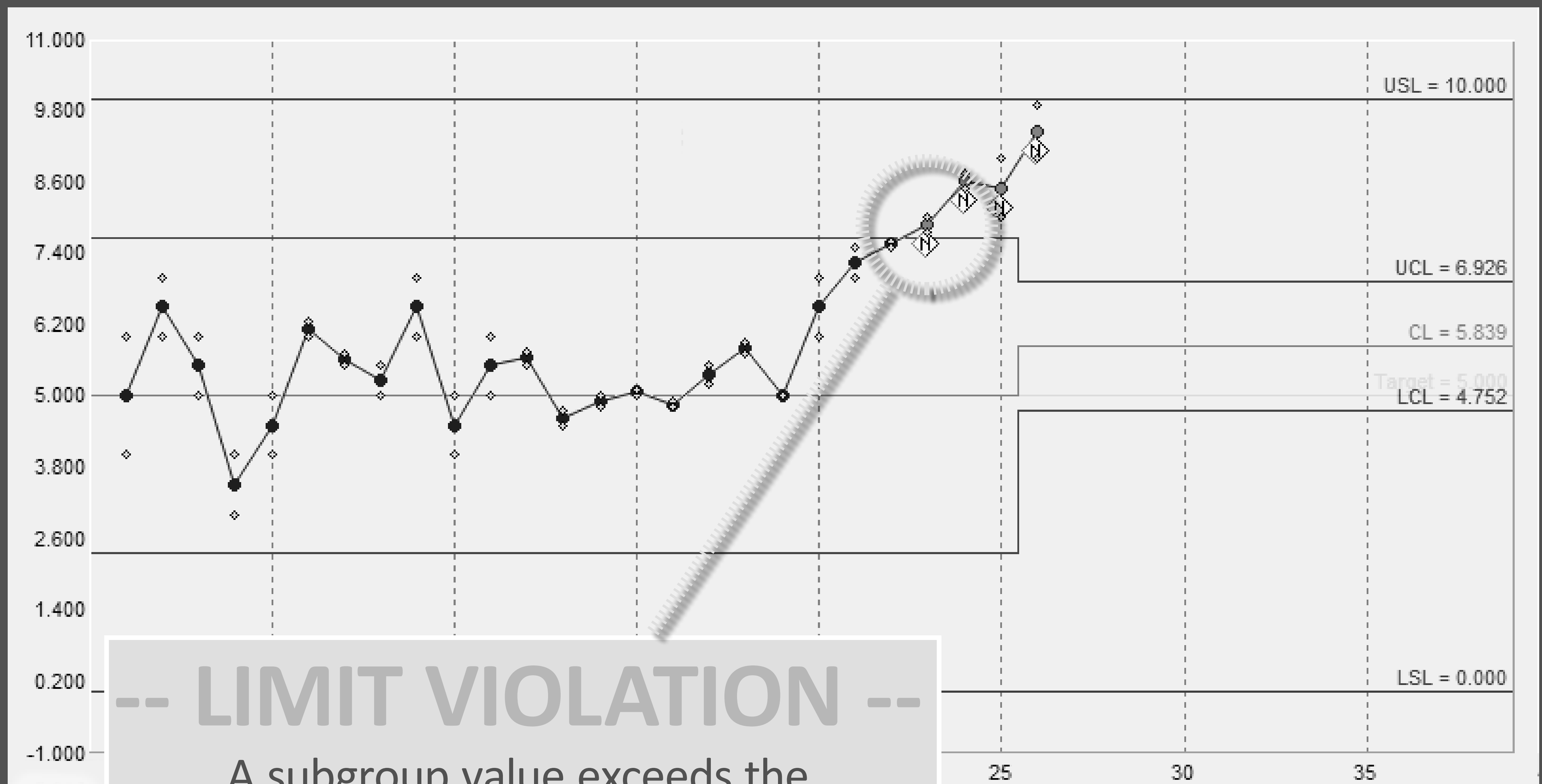
Region based on SPC theory to guide
PROCESS IMPROVEMENT

*NOTE: A point outside the control limits indicates that
the process is out of control.*

CONTROL CHART

A chart to visualize process performance against calculated control limits and to reveal variation among measurements.

A PLOT OF DATA AGAINST CONTROL LIMITS



A subgroup value exceeds the **UPPER CONTROL LIMIT (UCL)** indicating that the process is **OUT of CONTROL**.

KEY TERMS

XBAR Chart | PLOTS the **AVERAGE** of a subgroup's measurements

Range Chart | PLOTS the **RANGE** between a subgroup's high and low members

X Chart | PLOTS each **INDIVIDUAL** measurement on its own

MR Chart | PLOTS the **MOVING RANGE** between successive measurements