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# Guarantee Your Success

## Part 2

### Applications of SPC

John G. Surak

# Survey

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- Who represents manufacturing companies?
- Who represents food service or retail distribution companies?
- How many individuals represent corporate functions?
- How many individuals represent plant functions?

# Good news – Bad news

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- Good news – SPC is a powerful tool
- Bad news – SPC is not a silver bullet



# Relation between product and process

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- Proper knowledge of process and proper analysis of process data, allows one to accurately predict whether a lot of product will meet customer requirements
- Proper knowledge of the process and proper analysis of product data, allows one to accurately predict whether a process is capable of producing product that will meet customer requirements.

# The SIPOC process model

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Suppliers

Input  
Materials

Process

Output  
Products

Customers

Enablers

Machines

Measurements

Management

People

Procedures

Environment

What happens when  
there is a problem?

# Inspection and SPC

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- Basic assumptions
  - Stable process
  - Proper sampling
  - Proper measuring
  - Proper analysis and reporting of data
- Does not guarantee the detection of surprises
- Continuous improvement is the tool to reduce the risk of surprises

# Power of SPC – Business Analytics

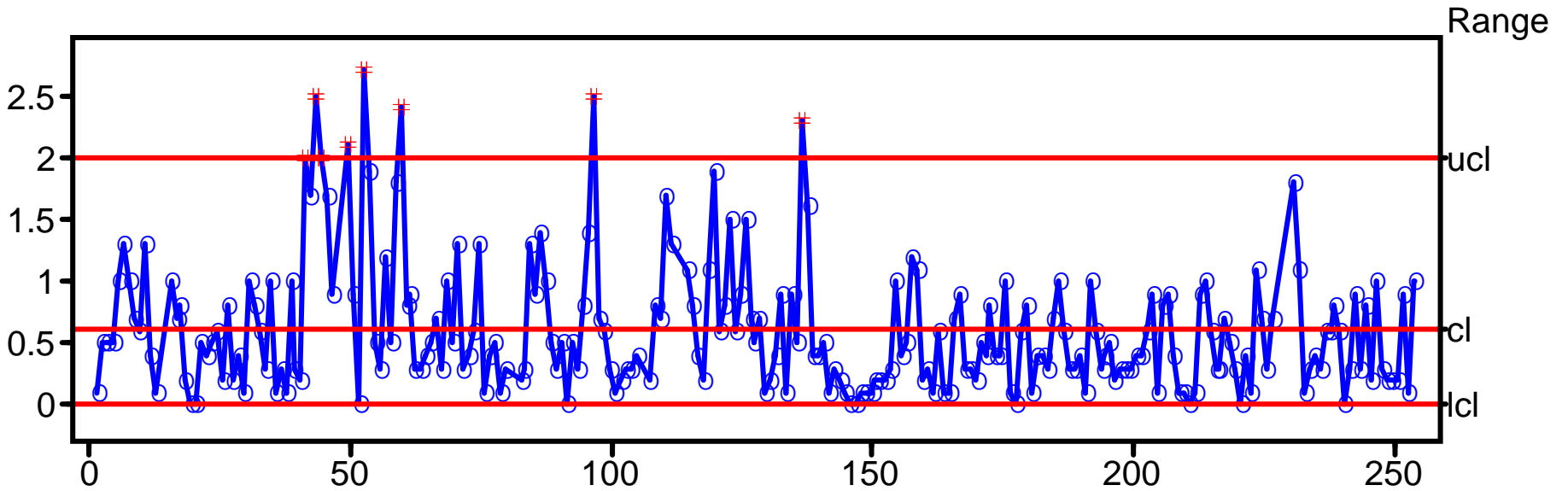
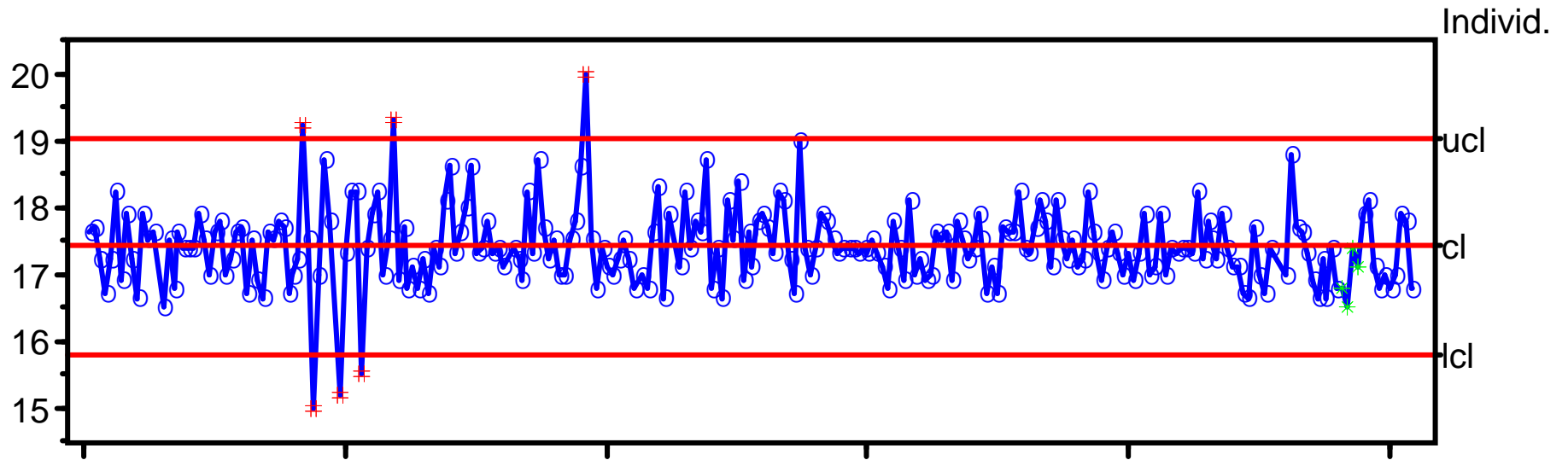
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- Process validation
- Process verification
- Process monitoring
- Supplier performance

# Supplier Performance

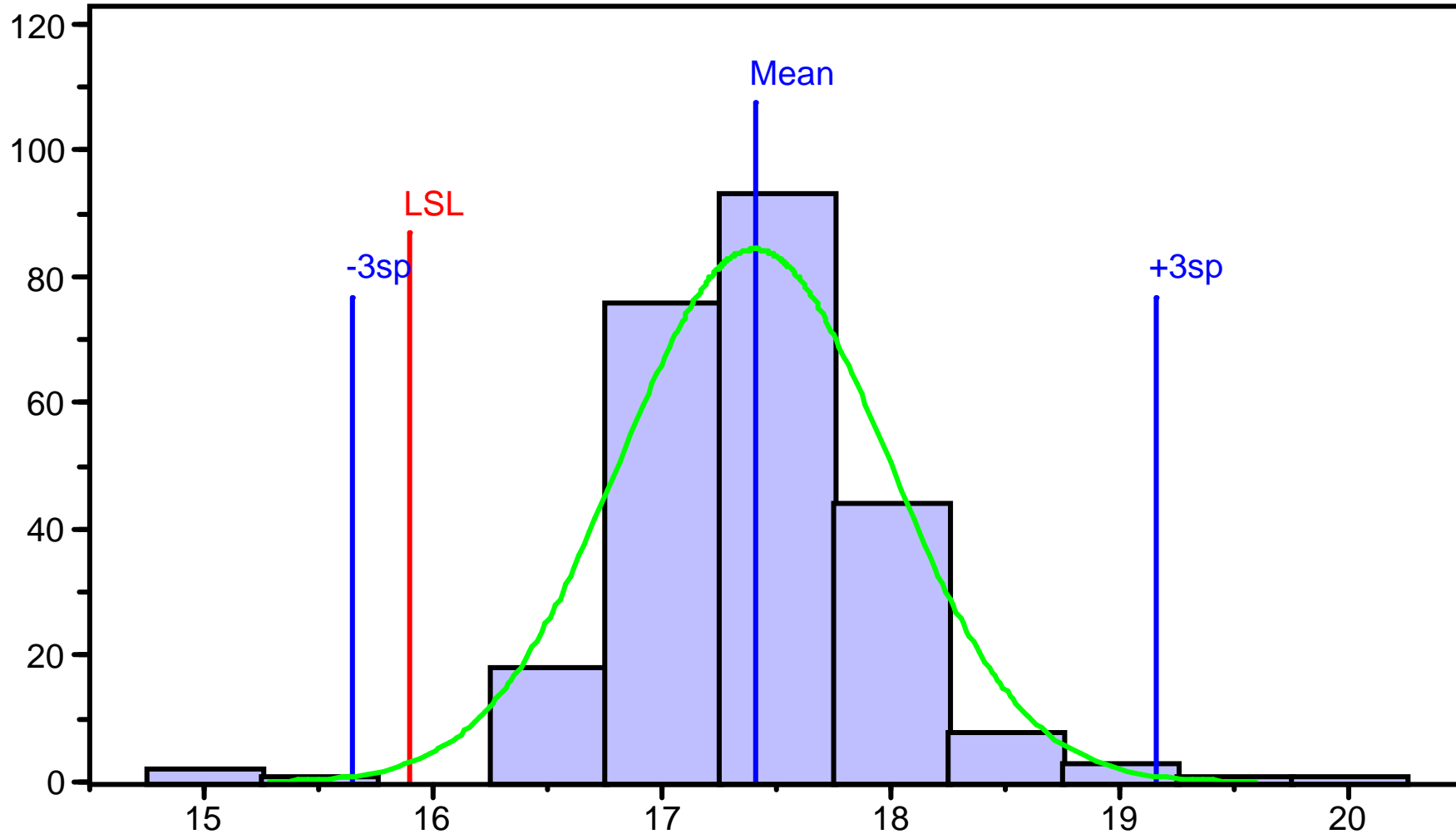
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**Corn soy blend  
[protein]  
COMPANY = B**



Individ.:	cl: 17.4053	ucl: 19.0276	lcl: 15.7829	* Rule violation
Range:	cl: 0.610001	ucl: 1.99305	lcl: 0	Subgrp Size 1

**Corn soy blend  
[protein]  
COMPANY = B**

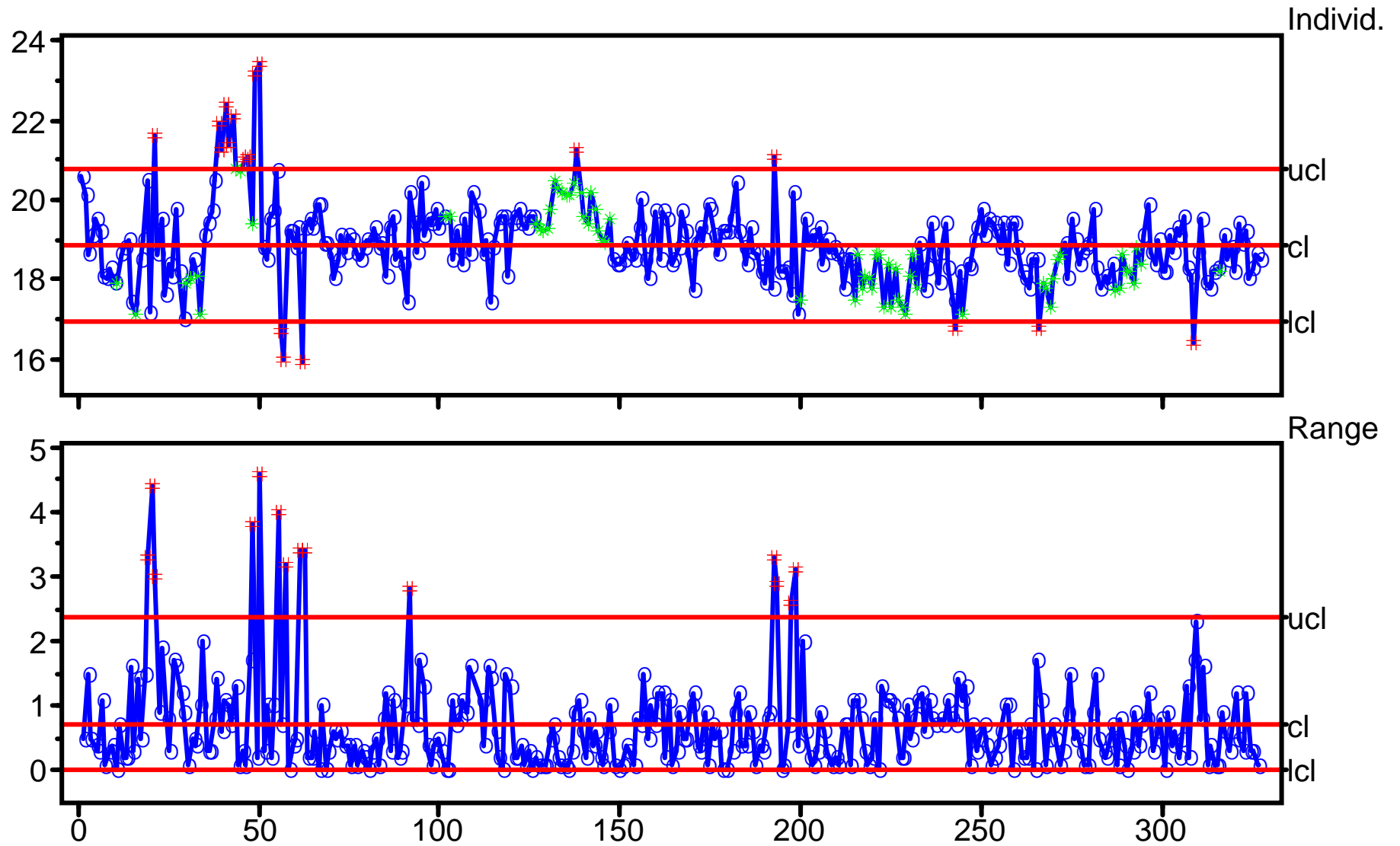


Samples: 247  
Mean: 17.4053  
Std Dev: .58457

Cpk: .8583

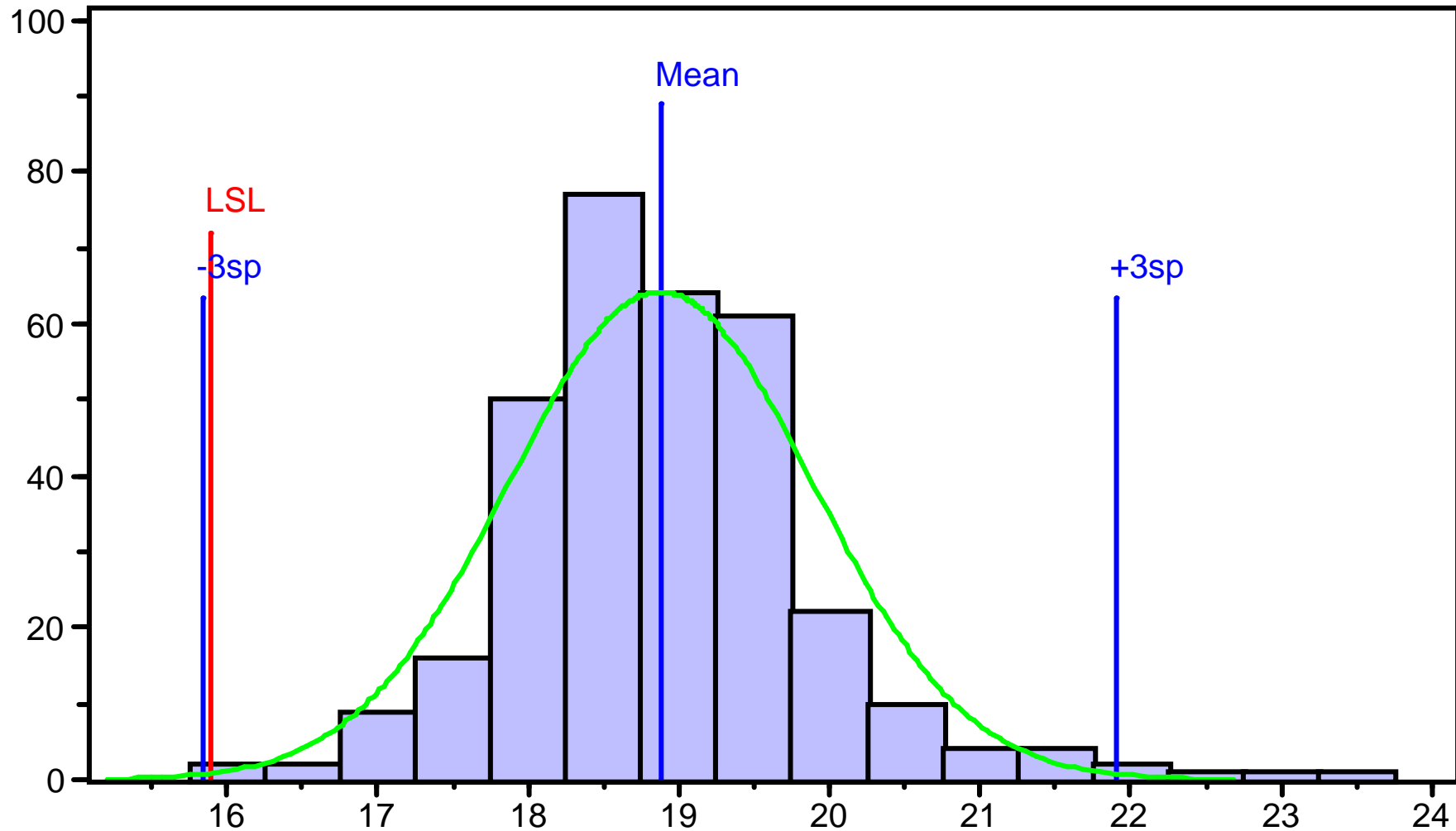
Spec Lim: ( 15.9, )  
Min, Max: ( 15, 20 )  
Act % out: ( 1.2146, .0000 )

**Corn soy blend  
[protein]  
COMPANY = C**



Individ.:	cl: 18.8779	ucl: 20.8036	lcl: 16.9522	* Rule violation
Range:	cl: 0.724074	ucl: 2.36576	lcl: 0	Subgrp Size 1

**Corn soy blend  
[protein]  
COMPANY = C**



Samples: 326  
Mean: 18.8779  
Std Dev: 1.0121

Cpk: .9808

Spec Lim: ( 15.9, )  
Min, Max: ( 15.9, 23.4)  
Act % out: ( .0000, .0000)

## Case study – analyzing supplier performance

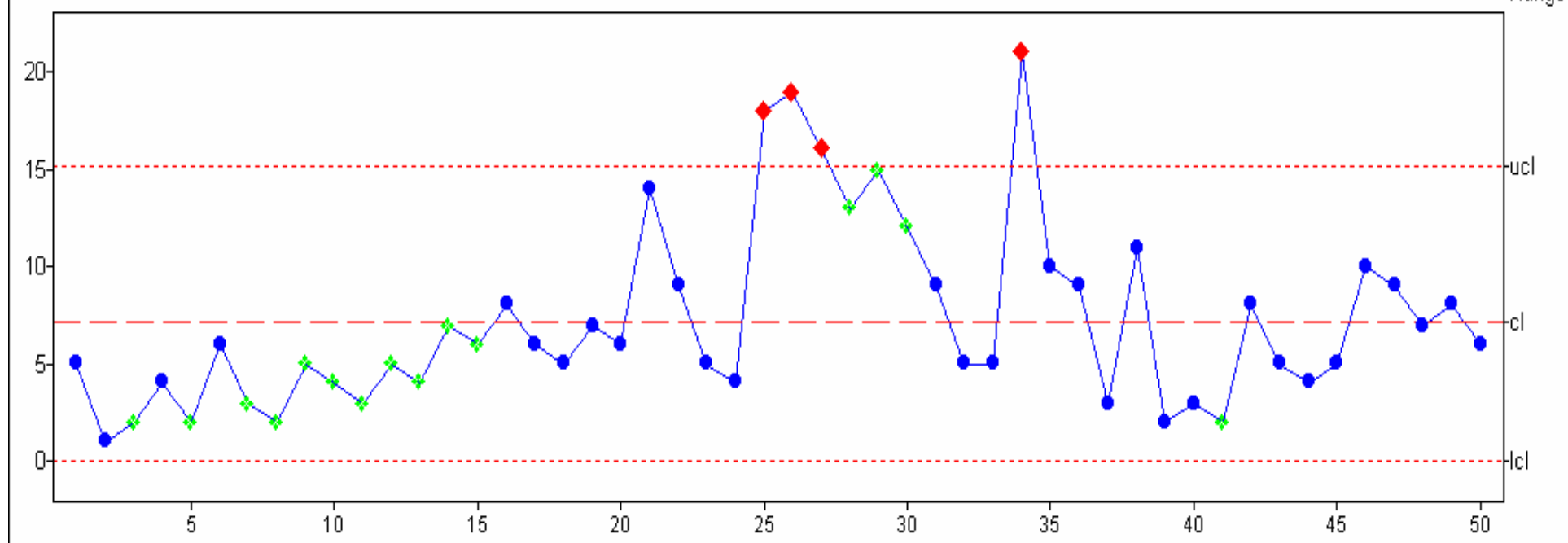
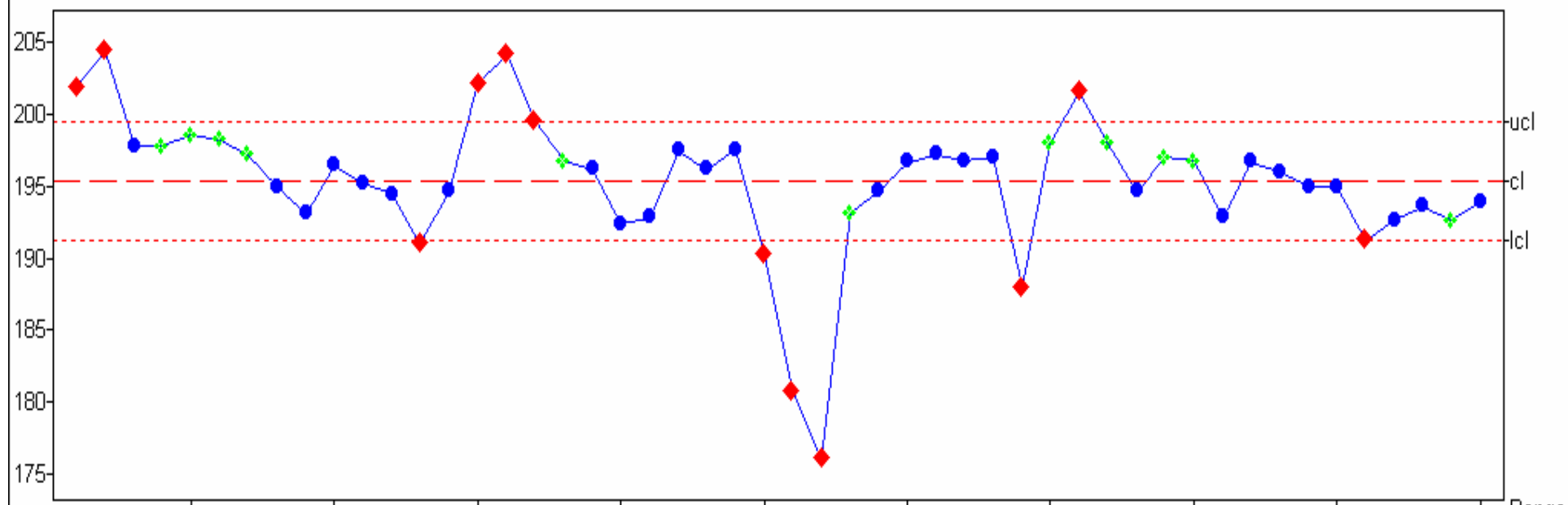
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- Supplier B had a more stable process than supplier C
- This resulted in the ability to produce more product that is closer to the protein limit
- As a result, supplier B's product was least costly to produce and was of higher quality.

# Verification SPC

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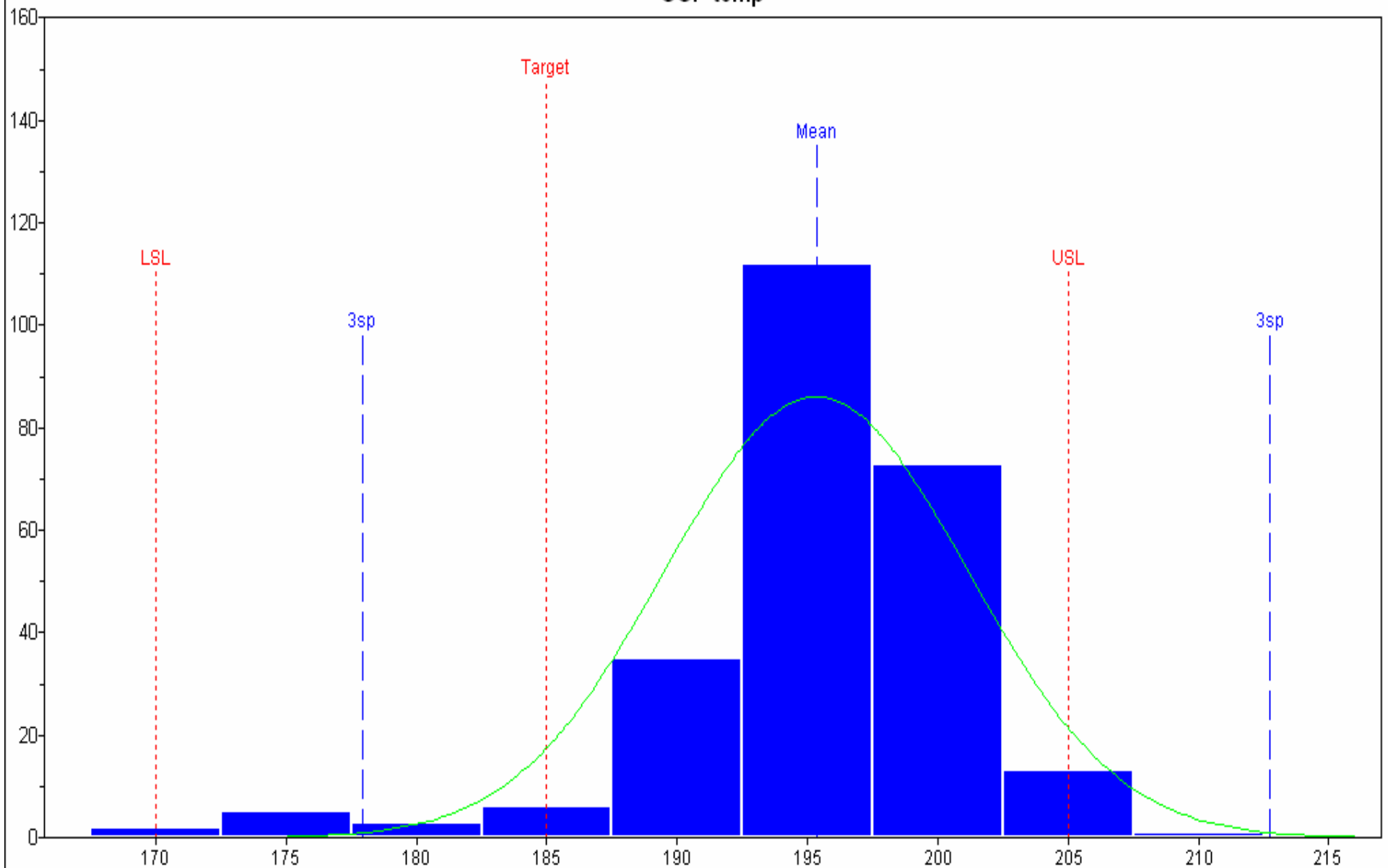
### CCP temp



X-bar: cl: 195.336 ucl: 199.466 lcl: 191.206  
Range: cl: 7.16 ucl: 15.1397 lcl: 0

Subgrp Size 5  
◆ Rule Violation

# CCP temp



Samples: 250      Cpk: .5557      Target: 185  
Mean: 195.336      Cp: 1.006      Spec Lim: (170, 205)  
Std Dev: 5.797      Est % out: (6.2025E-04, 4.7751)  
Skewness: -1.5959      Act % out: (.0000, 1.6)  
Min, Max: (170, 208)

# Real time SPC

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- SPC provides signals that the process has changed
- Who is accountable for taking actions when a signal occurs
- What actions will the individual take?
- The investigation must start while change is affecting the process



# Summary

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- SPC provides a powerful tool to monitor process performance and product capability of both the plant's processes and the suppliers processes.
- The key issues in SPC is the following
  - Stable process
  - Capable product
  - Continuous improvement to reduce variation

# Thank you

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Contact information

John G. Surak

Surak and Associates

Tel: 864-506-2190

Email [jgsurak@yahoo.com](mailto:jgsurak@yahoo.com)