



**2002**  
OSISOFT USERS CONFERENCE



**EXPANDING  
THE POWER OF PI**

**MONTEREY CALIFORNIA**



**OSIsoft™**

# Statistical Quality Control

Before things go wrong in the  
Chocolate Milk Factory



# At OSI we're *SERIOUS* about our chocolate milk



**When things go wrong we say  
“Oh My Goodness!!”**



**Wouldn't you?**



# Quality Drivers

- **Customers**

They want a quality product, time after time

- **Process Knowledge**

Process Flow, Equipment, Measurements, Causes

- **Experience**

Operators, QC Staff, Process Experts

# Tools for the Quality Program

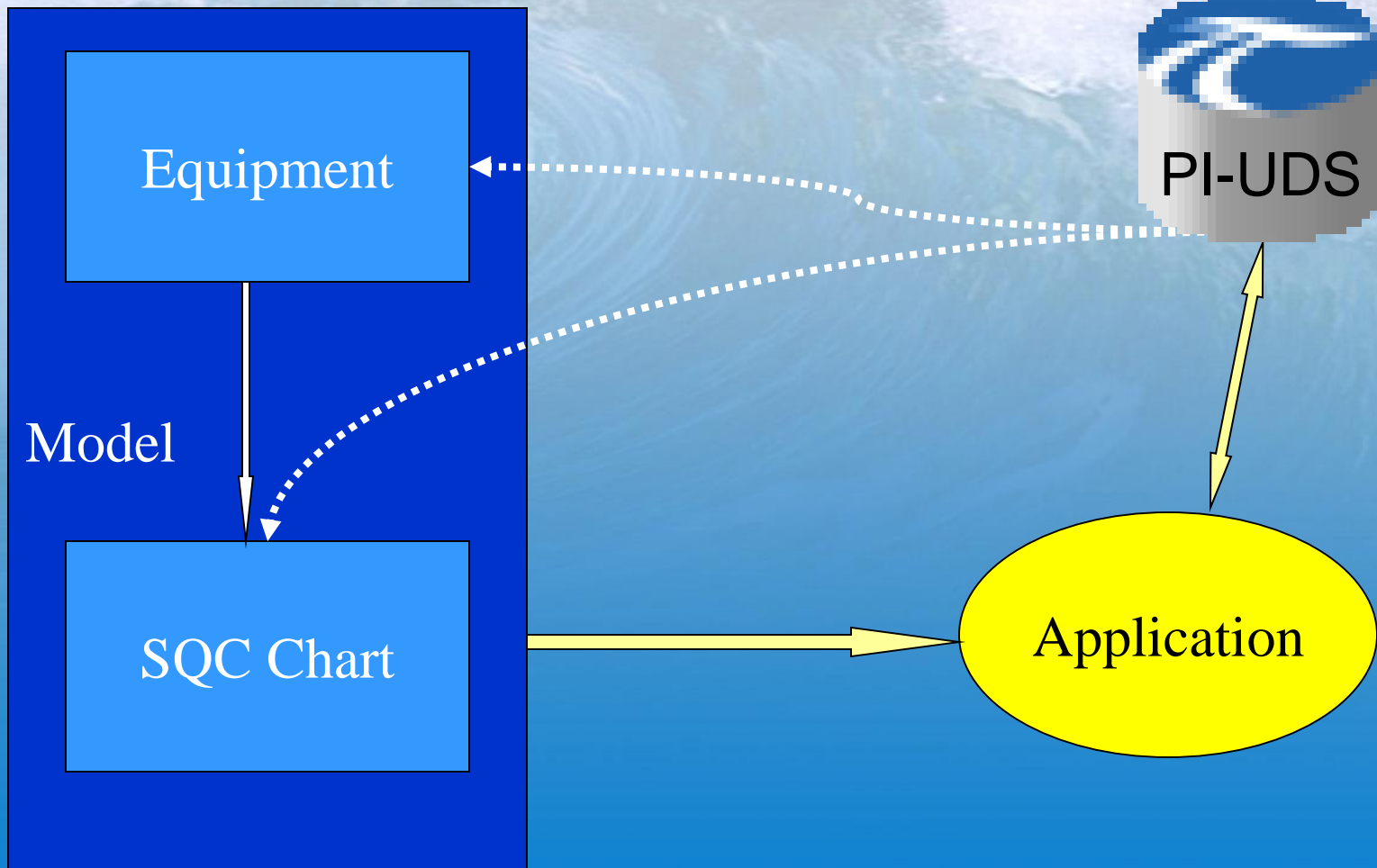
- ProcessBook and PI-SQC
- System Management Tools
- PI Server
- PI Application Framework
- PI ACE

# Using the PI System

- Model the process using the Module Database or Application Framework
  - Module DataBase Editor
  - Application Framework Explorer

Why? You *need* the model. It's a framework for applications that expand the power of PI.

# Model Basics





# SQC Model in ModuleDatabase

The screenshot displays the Butterfat software interface. On the left, a 'Folder Items' tree shows a hierarchy starting with 'aardwolf', containing 'PI BatchDB', 'PI ModuleDB', and 'AllEquipment'. Under 'AllEquipment', there are various equipment types like 'CartonBottomSealer', 'CartonFiller', etc. At the bottom of the tree, 'CMF' contains 'Products', which includes an 'SQC' folder. The 'SQC' folder contains a 'Butterfat' sub-folder, which in turn contains an 'Equipment' folder with 'ChocolatePump', 'ChocoMilkMixer', and 'MilkPump' items.

On the right, a table lists PI Property Names and their values and datatypes:

PIProperty Name	Value	Datatype
Limits	Limits	String
HalfnHalf	<array...>	Single()
LoFat	<array...>	Single()
TwoPercent	<array...>	Single()
Whole	<array...>	Single()

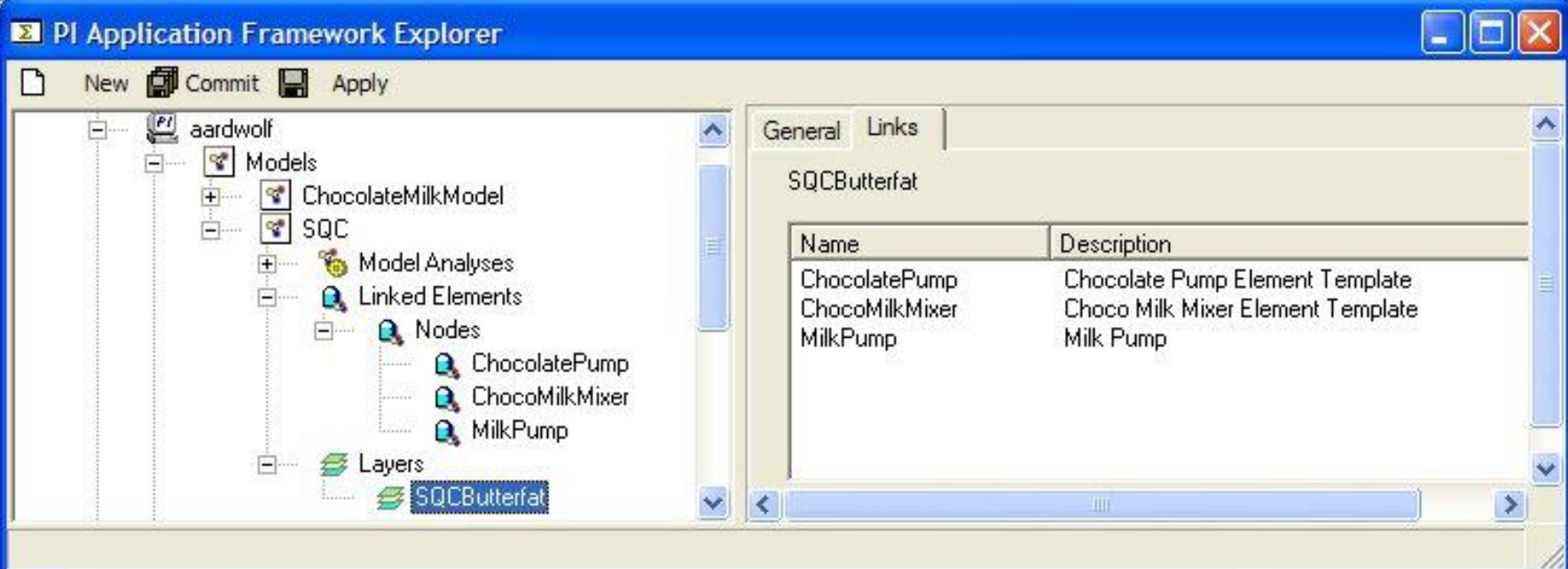
An 'Edit PI Property' dialog is open in the foreground, showing the following fields:

- PIProperty Name: HalfnHalf
- Data Type: Single()
- Value: 14, 11, 8

Buttons for 'Add' and 'Cancel' are visible at the bottom right of the dialog.



# SQC Model in Application Framework



The screenshot displays the PI Application Framework Explorer interface. The left pane shows a tree view of the project structure under 'aardwolf'. The right pane shows the 'General' tab for the selected 'SQCButterfat' model, which contains a table of elements.

Tree View Structure:

- aardwolf
  - Models
    - ChocolateMilkModel
    - SQC
      - Model Analyses
      - Linked Elements
      - Nodes
        - ChocolatePump
        - ChocoMilkMixer
        - MilkPump
      - Layers
        - SQCButterfat

General Tab - SQCButterfat

Name	Description
ChocolatePump	Chocolate Pump Element Template
ChocoMilkMixer	Choco Milk Mixer Element Template
MilkPump	Milk Pump

# Using the PI System

- Model the process using the Module Database or Application Framework
- Store Process and Quality measurements
  - PI Interfaces
  - DataLink
  - Tag Configurator
  - PointBuilder



# Using the PI System

- Model the process using the Module Database or Application Framework
- Store Process and Quality measurements
- Create and Manage Real Time SQC Alarms
  - SQC Alarm Manager
  - Tag Configurator

PI-SQC Alarm Manager

File Edit View Help

My PI Servers

- [-] aardwolf
  - SQCButterfat
  - SQCTest
  - SQCTestAlarm\_ClearOnStart
  - SQCTestAlarm\_NoClearOnStart
- [+] baggins
- [+] chriscoen
- [+] morpheus
- [+] prabal

Alarm Name	Alarm Status	Value of Source	UCL	CL	LCL	Execution
SQCButterfat	.	5.094047	5.5	4.3	3.1	Normal
SQCTest	OutsideControl	101	100	0	-100	Normal
SQCTestAlarm_ClearOnStart	Alarm-On	101	99	0	-99	Normal
SQCTestAlarm_NoClearOnStart	Alarm-On	101	99	0	-99	Normal



Creating new RTSQC Alarm on \\wardwolf

SQC Alarm:  AutoNames

Chart Type:

Raw Data:

Description:

**Sample Grouping Information**

Sample Group Name:

Event Based Sampling  Time Based

Filter Expression:

Events per Sample:

Creating new RTSQC Alarm on \\wardwolf

**Control Limits**

UCL:  Initial

CL:

LCL:

**Options**

Test Status:

Comment:

**Behavior Control**

Alarm Execution:

Clear the Alarm on Subsystem Start

Clear the Alarm on Control Limit Change

Creating new RTSQC Alarm on \\wardwolf

Pattern Tests	X	Y	Above or Below Center Line or Both
<input checked="" type="checkbox"/> Outside 3 Sigma	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="Both"/>
<input checked="" type="checkbox"/> Outside 2 Sigma	<input type="text" value="2"/>	of <input type="text" value="3"/>	<input type="text" value="Both"/>
<input checked="" type="checkbox"/> Outside 1 Sigma	<input type="text" value="4"/>	of <input type="text" value="5"/>	<input type="text" value="Both"/>
<input checked="" type="checkbox"/> One Side of Center Line	<input type="text" value="8"/>	of <input type="text" value="8"/>	<input type="text" value="Both"/>
<input checked="" type="checkbox"/> Stratification	<input type="text" value="8"/>	of <input type="text" value="8"/>	<input type="text" value="Both"/>
<input checked="" type="checkbox"/> Mixture	<input type="text" value="8"/>	of <input type="text" value="8"/>	<input type="text" value="Both"/>
<input checked="" type="checkbox"/> Trend	<input type="text" value="15"/>	of <input type="text" value="15"/>	<input type="text" value="Both"/>

Cancel

PI-SQC Alarm Manager

File Edit View Help

My PI Servers

- My PI Servers
  - aardwolf
    - SQCButterfat
    - SQCTest
    - SQCTest
    - SQCTest
  - baggins
  - chriscoen
  - morpheus
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Alarm Name	Alarm Status	Value of Source	UCL	CL	LCL	Execution
SQCButterfat		5.094047	5.5	4.3	3.1	Normal
	OutsideControl	101	100	0	-100	Normal
Alarm_ClearOnStart	Alarm-On	101	99	0	-99	Normal
Alarm_NoClearOnStart	Alarm-On	101	99	0	-99	Normal

Edit SQC Alarm  
 -----  
 Edit Control Limits  
 Clear and Restart SQC Alarm  
 Place Alarm in Hold  
 Place Alarm in Normal Operation  
 Delete SQC Alarm

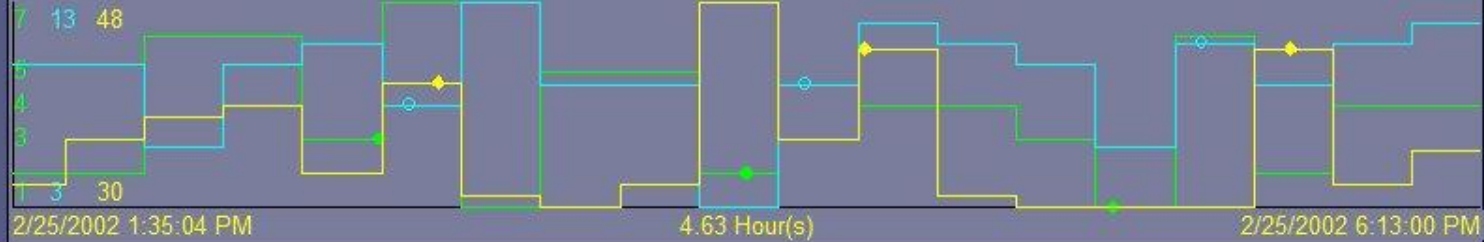


# Using the PI System

- Model the process using the Module Database or Application Framework
- Store Process and Quality measurements
- Create and Manage Real Time SQC Alarms
- Real Time and Ad Hoc SQC Charts
  - ProcessBook and PI-SQC

### Choose Chart Type and set time range

Attribute Chart Data



np-chart

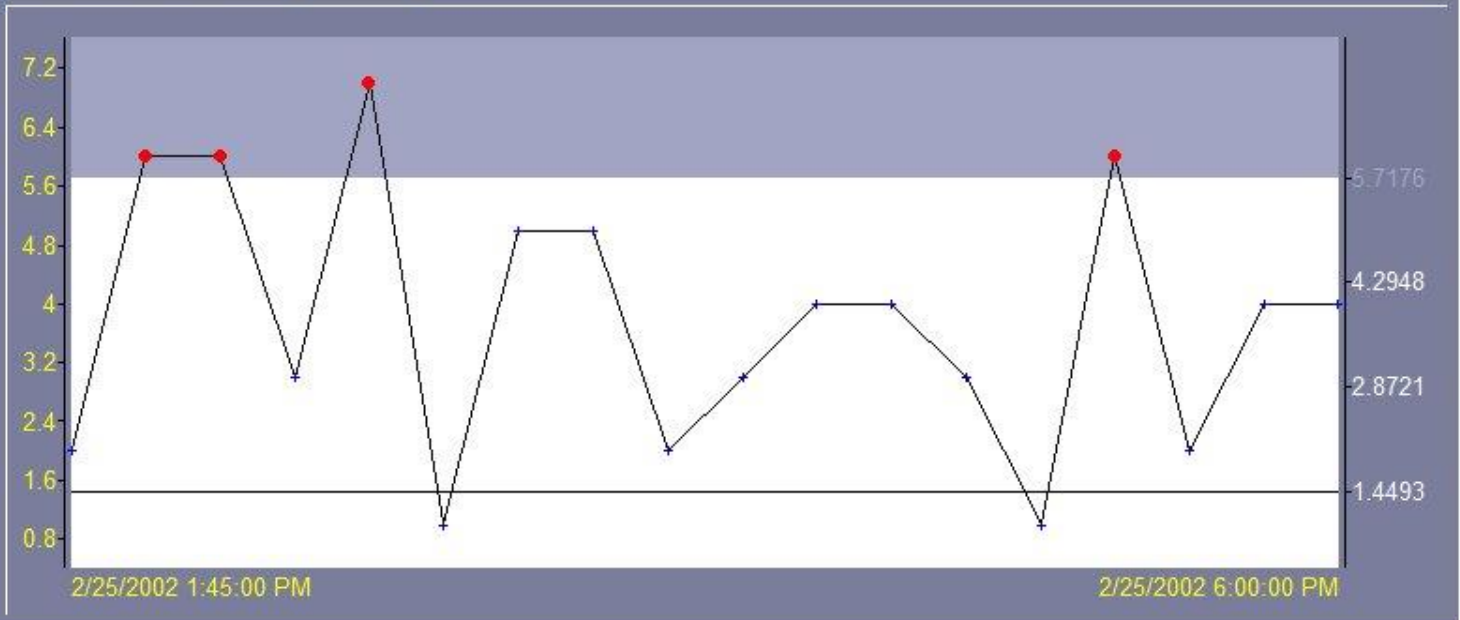
Start: 2/25/2002 1:35:04

< Set at Cursor >

End: 2/25/2002 6:13:00

< Set at Cursor >

np-chart DefectiveCartons : [Individuals]



Charting data from this PI Point

Number of Defective Cartons

Sample Size

UCL: 5.71761

CL: 1.449275

LCL: -2.819059

5.7176

4.2948

2.8721

1.4493

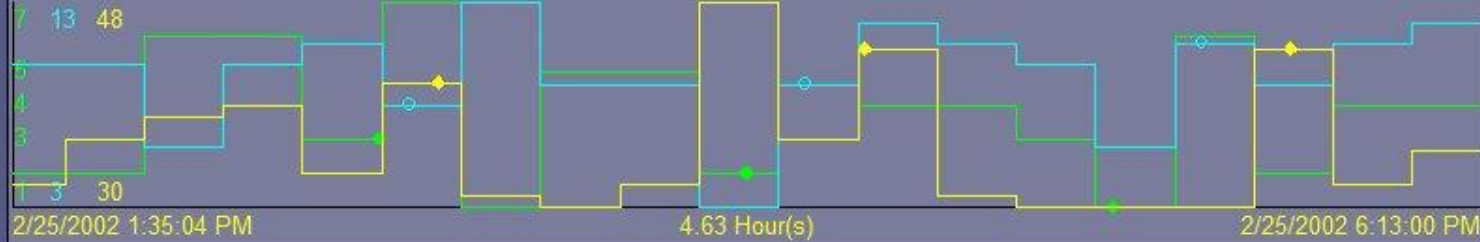


# Carton Quality

- What did you see?
  - ProcessBook Display
  - PI-SQC
  - VBA
- *How did they do that? np Chart*
  - PI-SQC v1.1 Automation Interface
  - VBA calculation of control limits
- If you've done one, more are only a click away

Choose Chart Type and set time range

Attribute Chart Data



p-chart

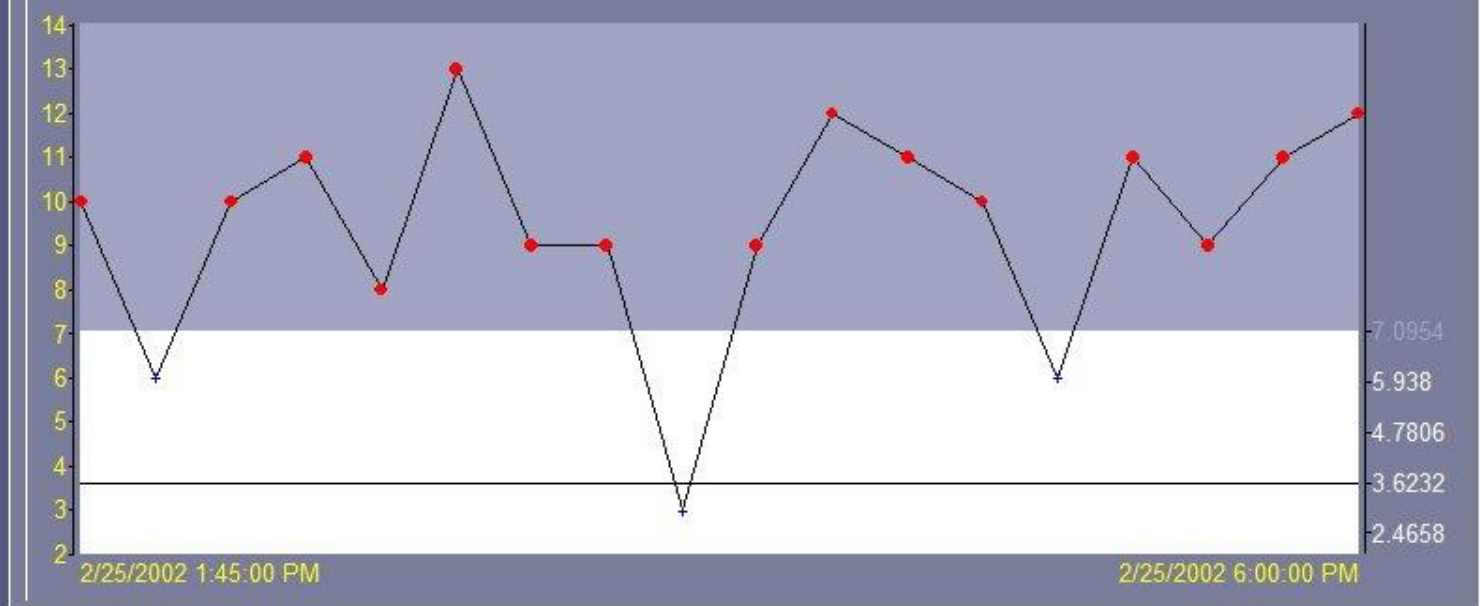
Start: 2/25/2002 1:35:04

< Set at Cursor >

End: 2/25/2002 6:13:00

< Set at Cursor >

p-chart PercentDefectiveCartons : [Individuals]



Charting data from this PI Point

% Defective Cartons

Sample Size

UCL: 7.095432

CL: 3.623188

LCL: 0.1509443

7.0954  
5.938  
4.7806  
3.6232  
2.4658

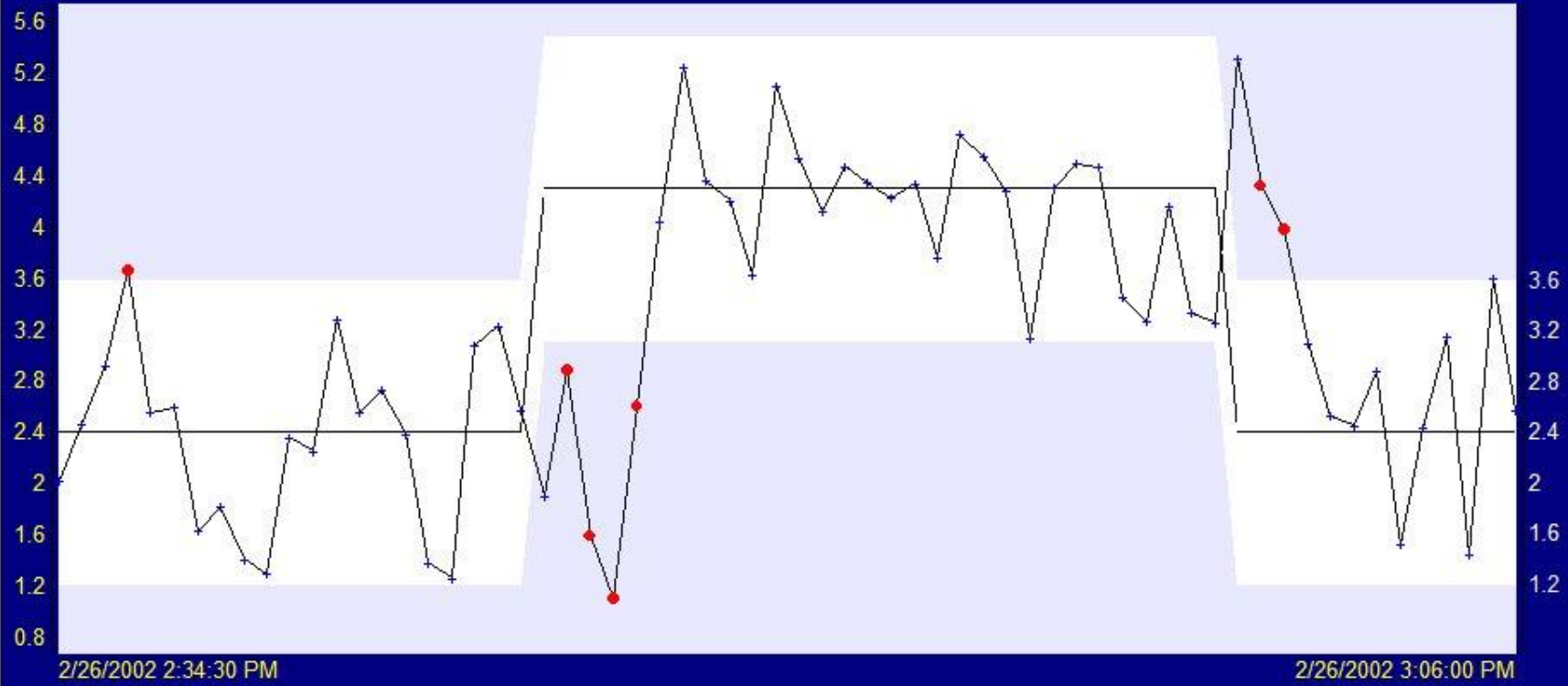
# SQC in real time...

- We know the Butterfat plays in chocolate milk quality.
- We use our Sophisticated Butterfat Sensor (SBS) to monitor in real time.





\\waardwolf\SQCButterfat



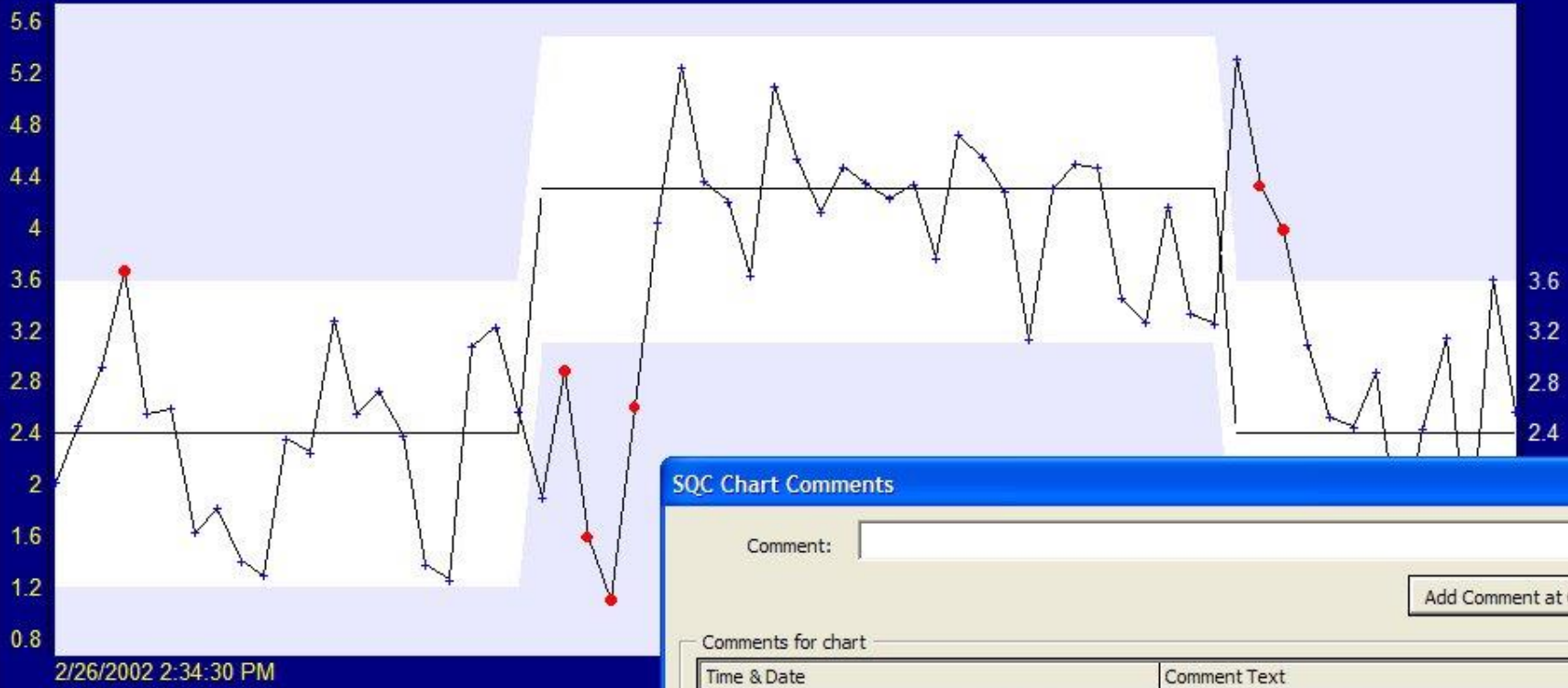
Choose an SQC Alarm

Free Form Comments

Assign Cause

Pareto Chart(s)

\\aardwolf\SQCButterfat



Choose an SQC Alarm

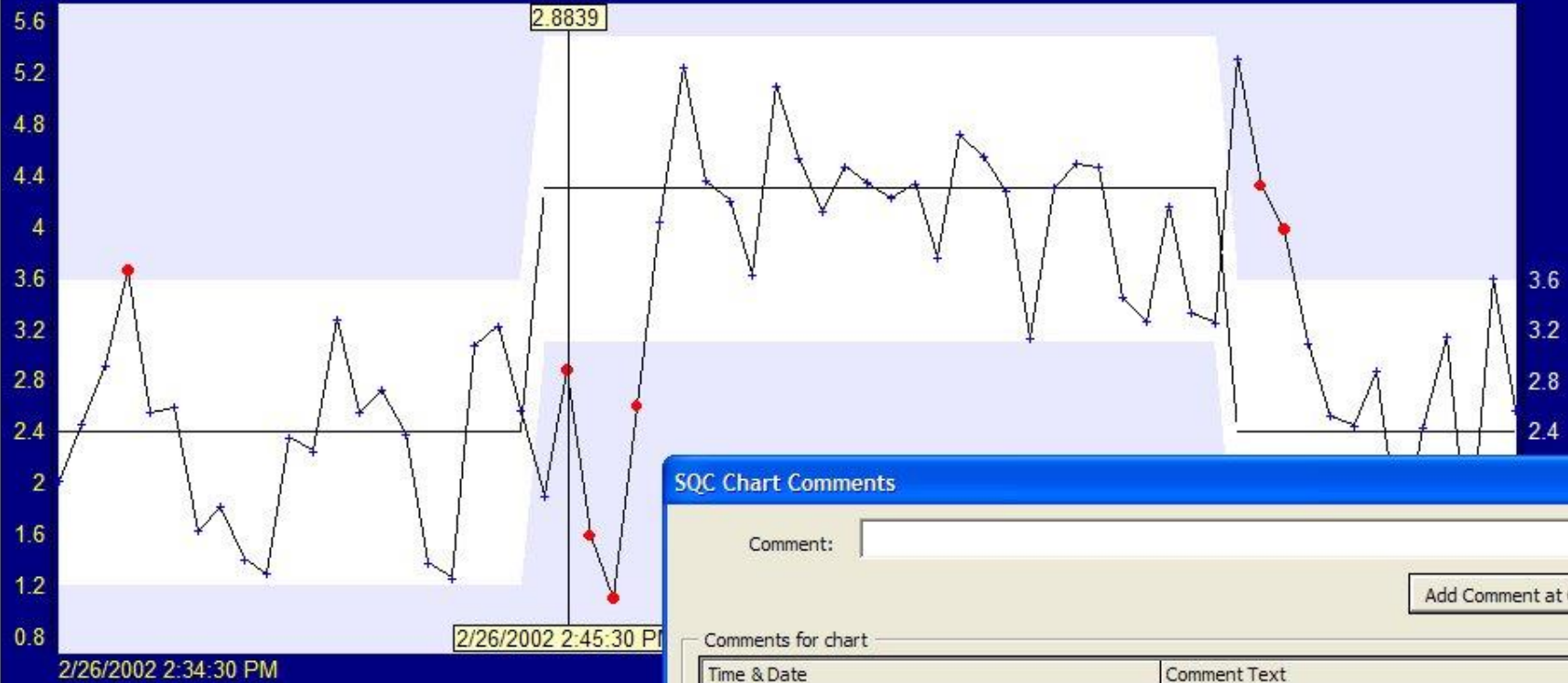
### SQC Chart Comments

Comment:

Add Comment at Cursor

Comments for chart

Time & Date	Comment Text
2/26/2002 2:45:30 PM	Poor Milk blend control
2/26/2002 2:46:00 PM	Blend control getting worst
2/26/2002 2:46:30 PM	Now it's worst, not before, that was just a typo
2/26/2002 2:47:00 PM	Recovering



Choose an SQC Alarm

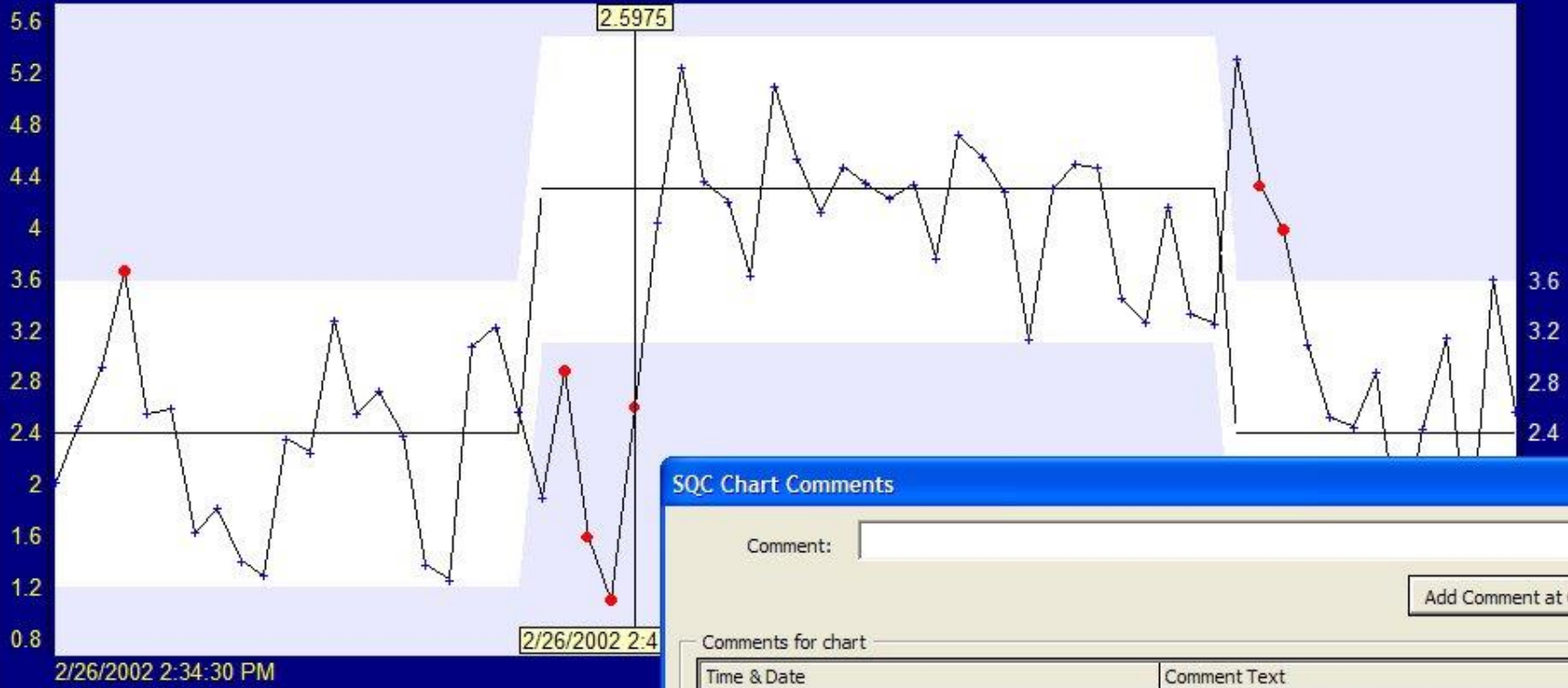
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Choose an SQC Alarm

### SQC Chart Comments

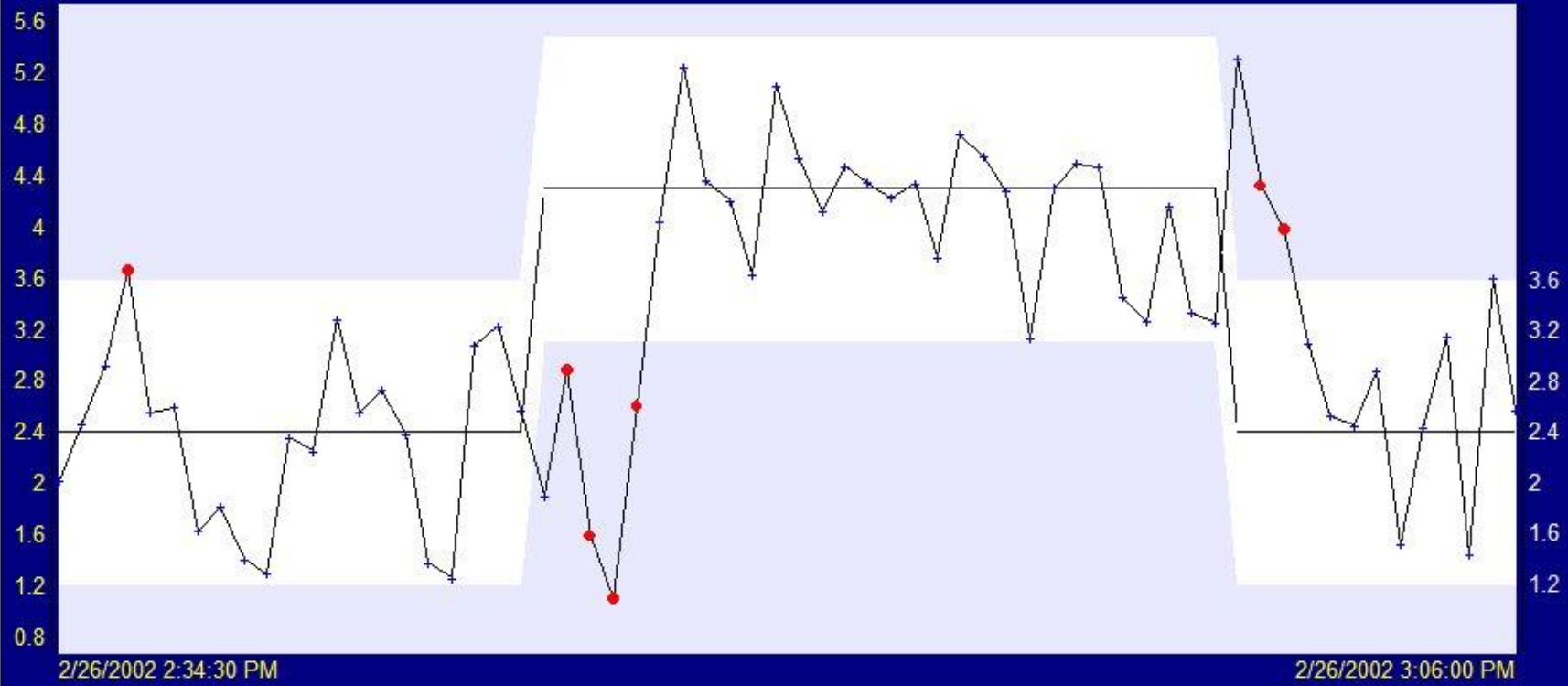
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Add Comment at Cursor

Comments for chart

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\\waardwolf\SQCButterfat

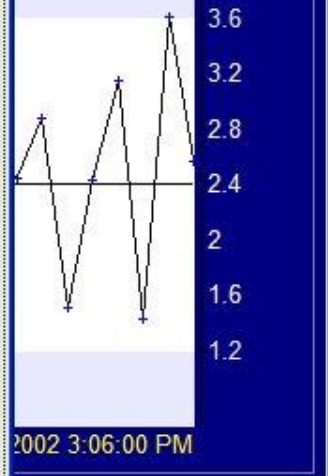
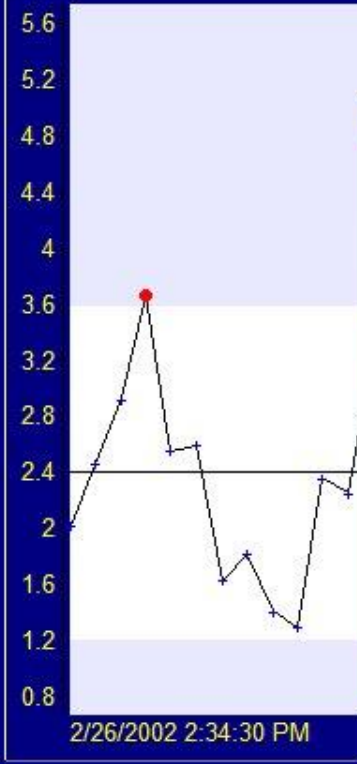


Choose an SQC Alarm

Free Form Comments

Assign Cause

Pareto Chart(s)

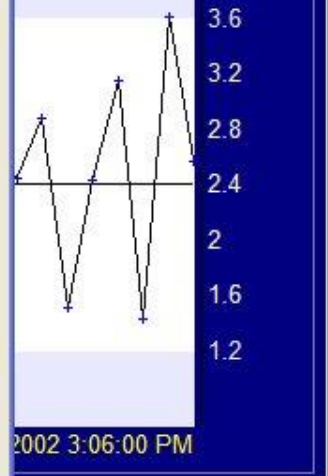
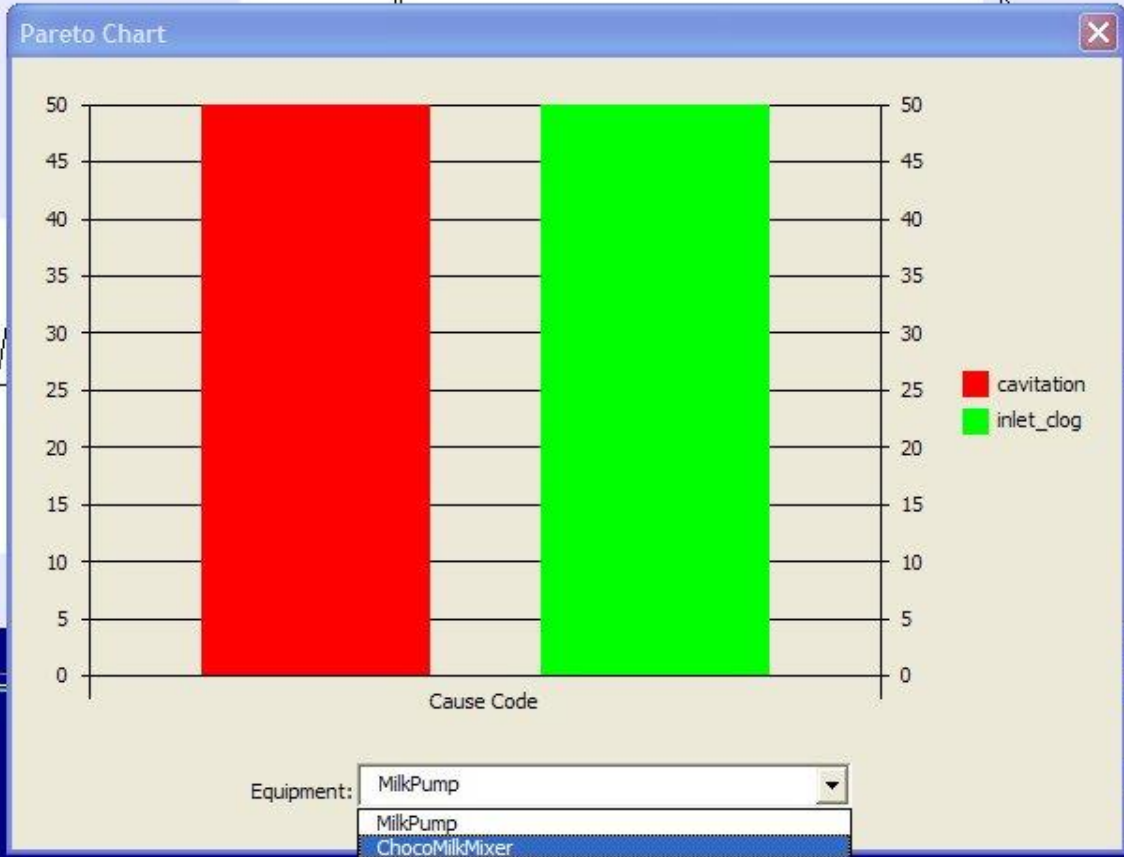
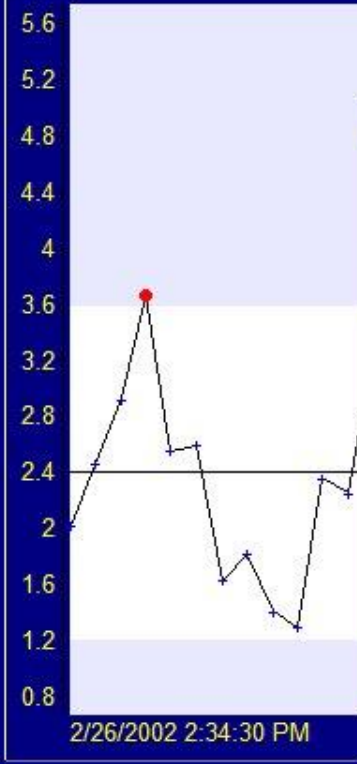


Choose an SQC Alarm

Assign Cause

Pareto Chart(s)

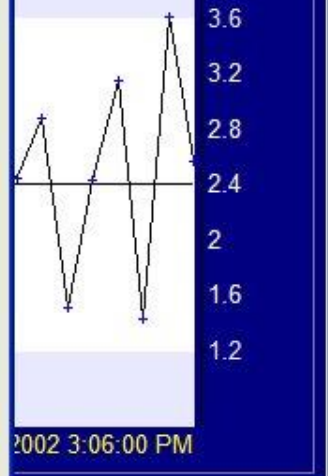
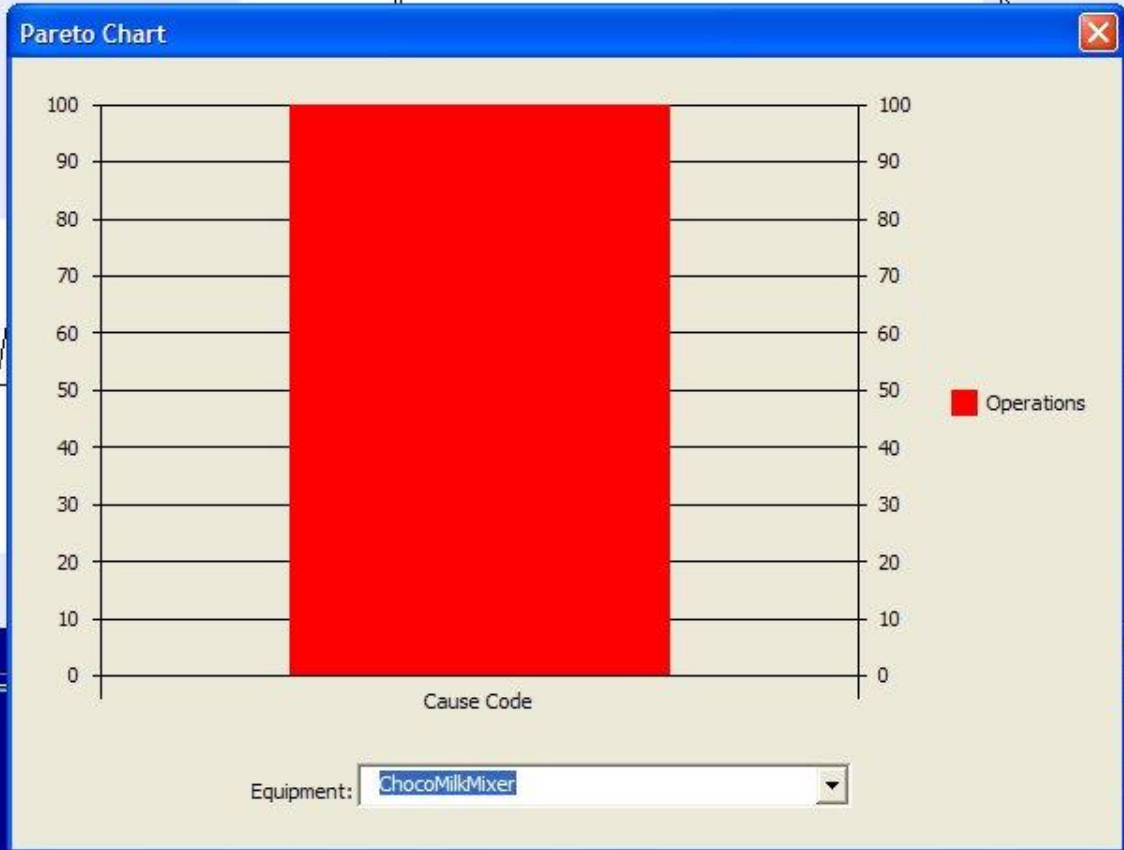
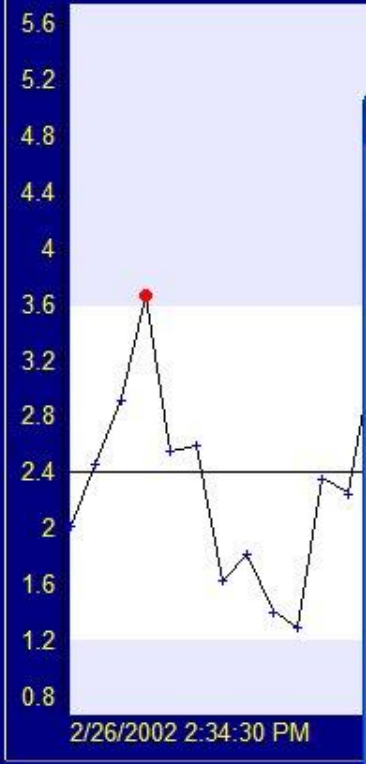




Choose an SQC Alarm

Assign Cause

Pareto Chart(s)

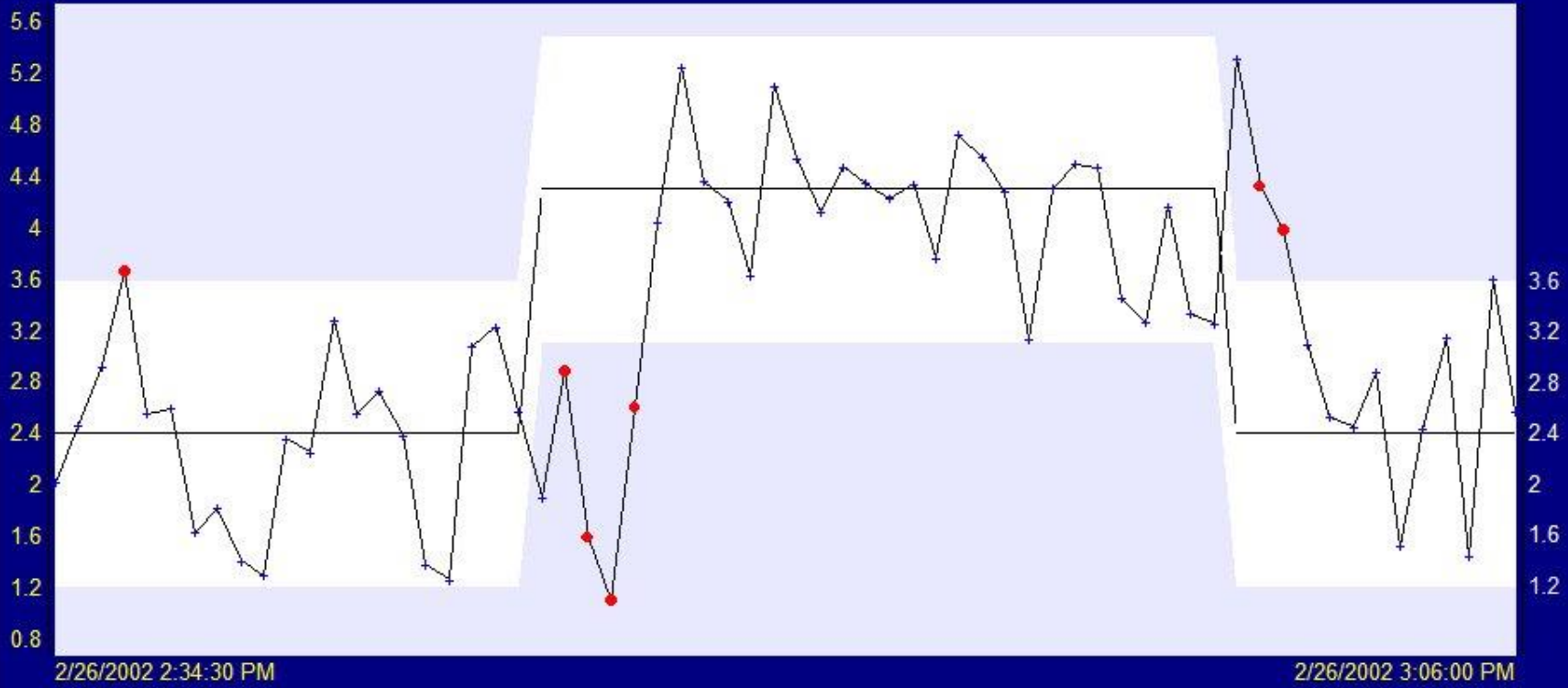


Choose an SQC Alarm

Assign Cause

Pareto Chart(s)

\\waardwolf\SQCButterfat



Choose an SQC Alarm

Free Form Comments

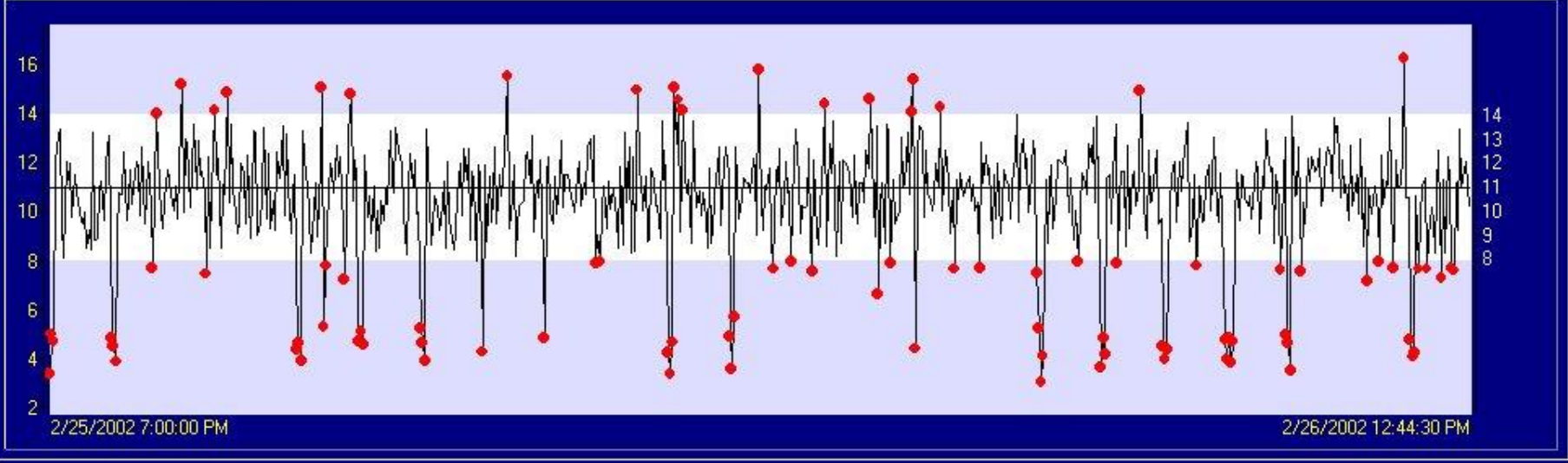
Assign Cause

Pareto Chart(s)

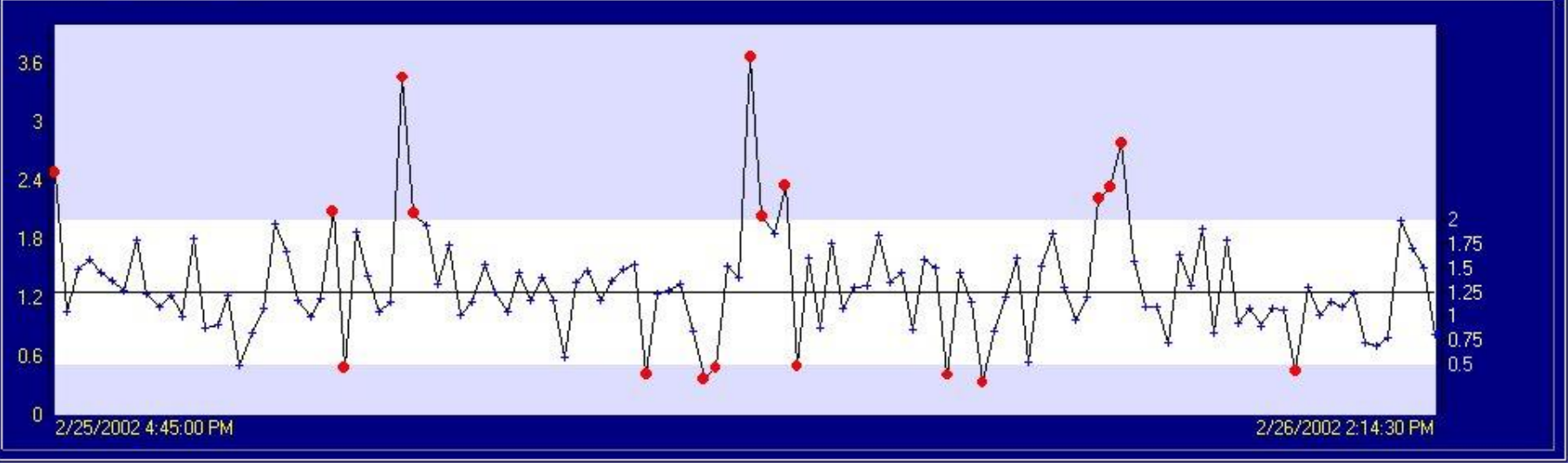




Past 24 Hours HalfnHalf : [Individuals]



Past 24 Hours LoFat : [Individuals]



# What next?

- Come to the demo room and see how it's done. Get hands on experience.
- Comprehensive demo with documentation and apps to build the infrastructure, data simulation, code examples, & displays *Soon*
- Application Framework integration and other enhancements are under study.