

“Plant Intelligence in a Box”

Management Execution System

A cost effective solution to analyse plant performance

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**Rockwell
Automation**
Global Manufacturing Solutions

Plant Intelligence in a Box – Product Overview

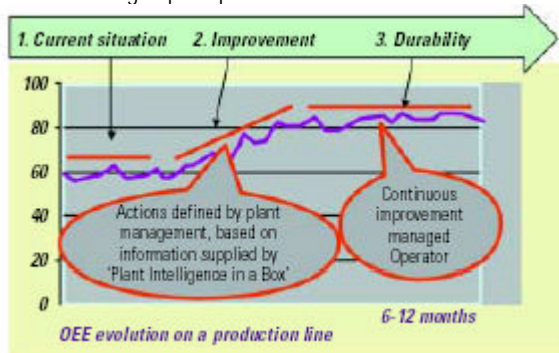
A cost effective solution to analyse plant performance

A better understanding of plant performance is a common requirement for most manufacturers. The ability to clearly identify reasons for downtime and the impact on plant productivity, historical trends of key variables in the manufacturing process and real time efficiency of production assets (OEE), can deliver better plant performance and consequently improved Return on Investment (ROI). Many custom solutions have been developed but have often failed to fulfill expectations, due to problems with deployment, poor operator interface and lack of scalability. Rockwell Automation now has the answer with a totally new approach - the "Plant Intelligence in a Box" solution.

"Plant Intelligence in a Box" consists of a pre-configured system based on state of the art Software and Hardware components that can be deployed on almost any control system, delivering manufacturers a fast solution to monitor performance of critical assets of production.

Benefits of "Plant Intelligence in a Box"

- Automatic data collection to minimize manual data entry and let operator focus on continuous improvements
- Immediate feedback of Efficiency information allows operator to take corrective actions in real time
- Analyse performance of your factory from any location using an Internet browser
- Accurate tracking of micro-downtimes to have a better understanding of plant performance



Automatic data collection and analysis helps identifying problems sooner and fix them faster.

Plant Intelligence in a Box delivers:

- Automatic real-time efficiency (OEE) calculation
- Breakdown reasons logged in real time from the control system
- Historical trends of process variables and performance parameters
- Justification for Breakdown supplied manually by the line operator
- Efficiency Information with Real Time feedback to line operator
- Real-Time WEB production reporting



System Overview

PI Box utilises e-Manufacturing technologies to interface to your plant control system and will automatically collect data during production. The information is made available back to the factory floor in "Real Time" empowering operators with production efficiency information. The production information is also published in "Real Time" into the production office; direct to your desktop web browser.

PI Box consists of a rugged workstation that interfaces to the plant for automatic data collection as well as providing an interface for production.

System Operation – Information Collection

PI Box collects production information direct from your plant. *Automatic* and *Manual* information can be logged by the system.

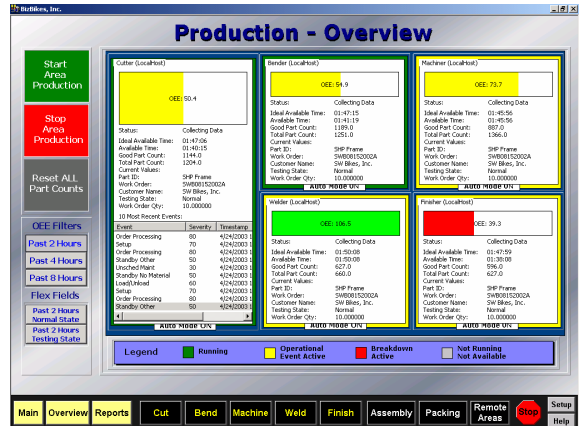
Automatic information typically consists of all machine starts, stops, changeovers, blockages, starve ages, temperatures, pressures etc. Manual information typically consists of order numbers, product types, crew codes, changeover types, downtime codes etc.

All Automatic and Manual information is displayed on the industrial workstation.

PI Box Operator Screens - Manual Data Input

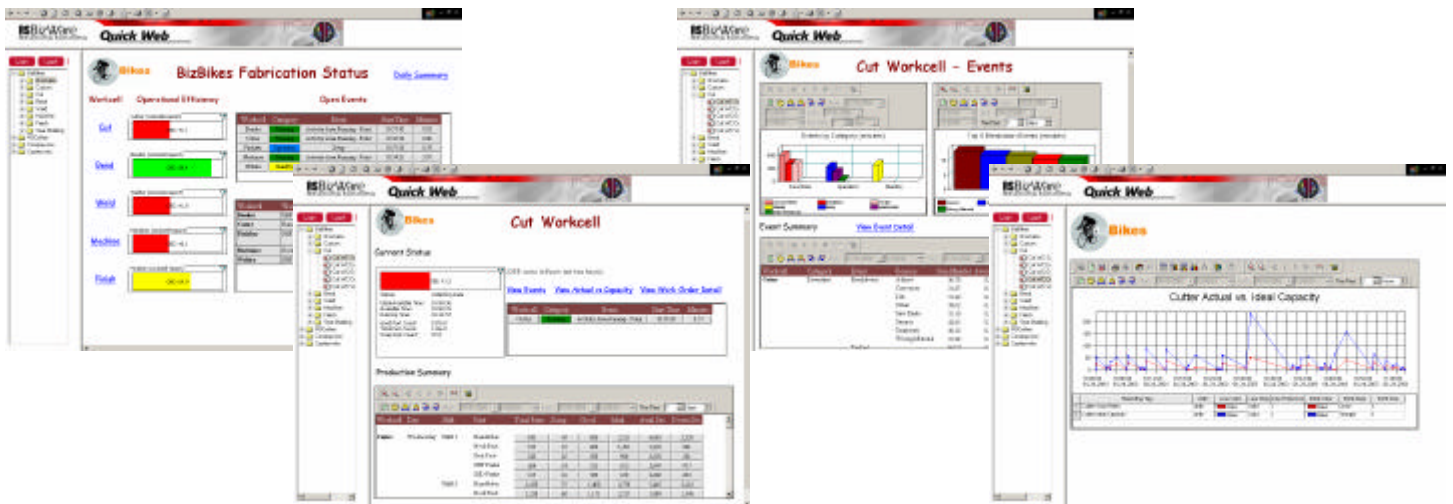
PI Box Operator Screens – "Real Time" Production Status

Plant Intelligence in a Box – Product Overview



System Operation – Production Reports

PI Box utilises web technologies to publish “Real Time” production reports to local and remote users. This gives you a window into your plant from your office, from your head office or from home. Log into the RSBizWare “Quick Web” and drill into your production reports *whenever* and from *where ever* you are.



System Operation – Analysing your information

PI Box utilises Overall Equipment Efficiency (OEE) as the top-level efficiency indicator. OEE summarises your plant’s performance as a percentage. This gives you a quick “Top Level” indicator to the plant’s efficiency. If the plant is performing as expected (a high OEE rating) then you can feel confident the plant is performing to your expectations. If the plant is NOT performing then OEE provides an efficient drill down approach as to why.

OEE – Overall Equipment Efficiency

OEE is a “best practice” way to monitor and improve the performance of your plant. OEE uses a universally accepted method to measure plant performance. OEE consists of three sub-components allowing you to explore the root cause of a poor performing asset.

- OEE = Availability % X Performance % X Quality %
- Availability % Did the plant run when it was planned to run?
- Performance % Was the plant producing at the planned rate?
- Quality % Was the quality acceptable?

OEE programs improve the overall effectiveness and efficiency of manufacturing plants by creating a joint responsibility between operators and maintenance personnel to achieve **zero product defects**, **zero mechanical breakdowns**, and **greatly reduced changeover times**. OEE gives you a consistent way to measure the effectiveness of improvement programs and other initiatives by providing an overall framework for measuring production efficiency.

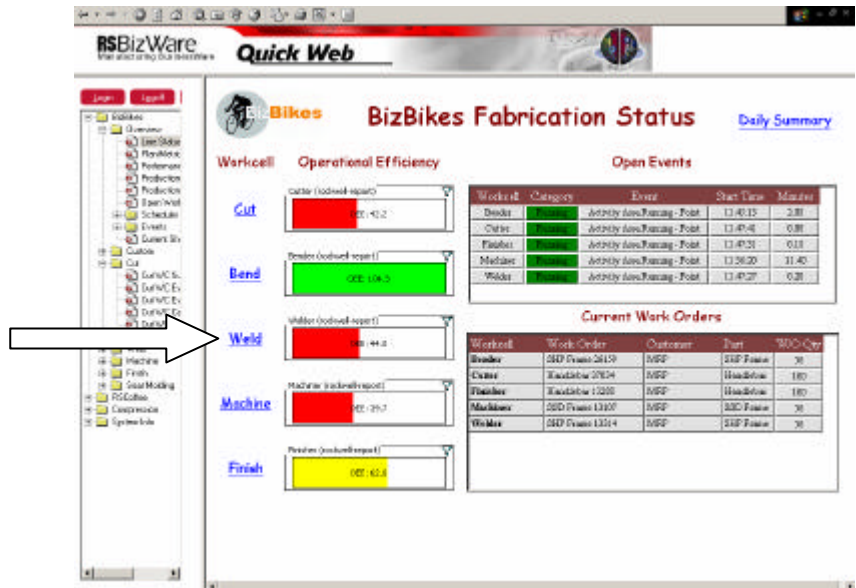
Let’s look at how this is put into practical application with PI Box;

Plant Intelligence in a Box – Product Overview

In our sample system we are monitoring 5 workcells. Cut, Bend, Weld, Machine and Finish. You can see from this top level report that Cut, Weld and Machine all have low OEE values for the last two hours.

We now use PI Box to “Drill Down” into its production information to analyse why.

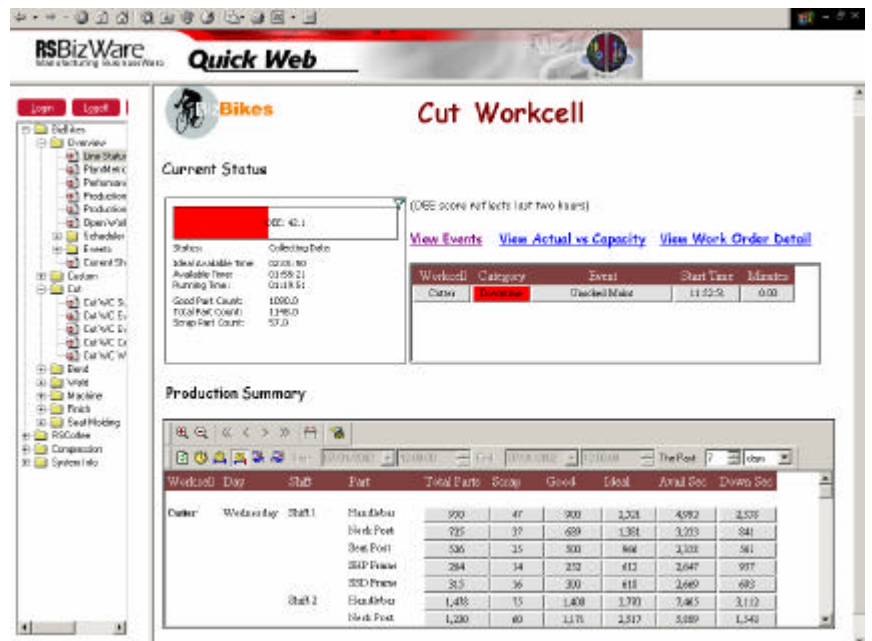
For each workcell we select the hyperlink



Cut Workcell – Downtime Issues

Our overview report for the Cut workcell shows the “Ideal Available Time” for this workcell as 2 hours, however the “Running Time” is nearly half this. Clearly the machine is suffering from substantial “Downtime”.

The machine status window also shows the workcell is currently stopped.



Plant Intelligence in a Box – Product Overview

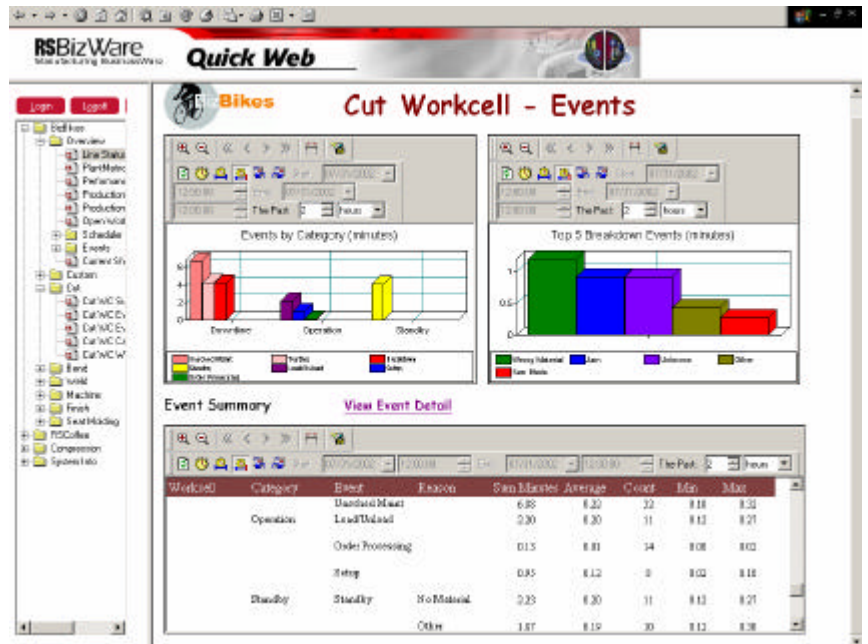
We now select the Hyperlink “View Events” to drill into the report that summarises the machine events

We can see that the workcell stoppages are summarised into three categories “Downtime”, “Operation” and “Standby”

Unscheduled Maintenance clearly has the bulk of the stoppage time

The event summary also indicates that this downtime event has occurred **32 times!**

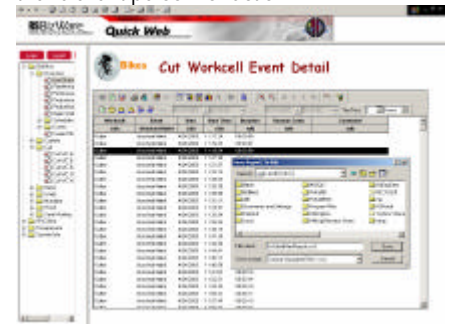
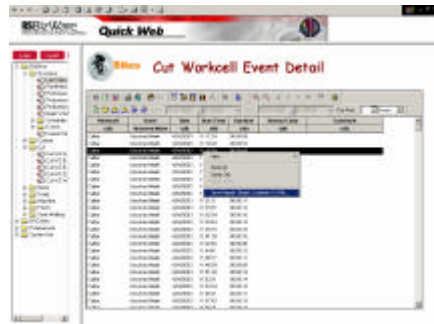
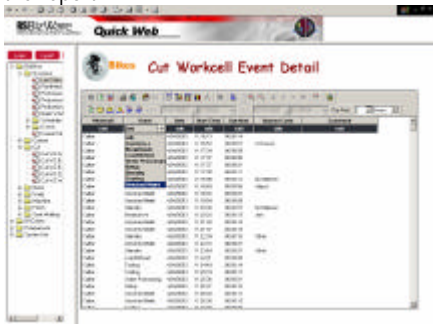
We now select the Hyperlink “View Event Detail” to drill into all the events on the workcell



From the event detail report we filter out all the other events from the drop down window on the report

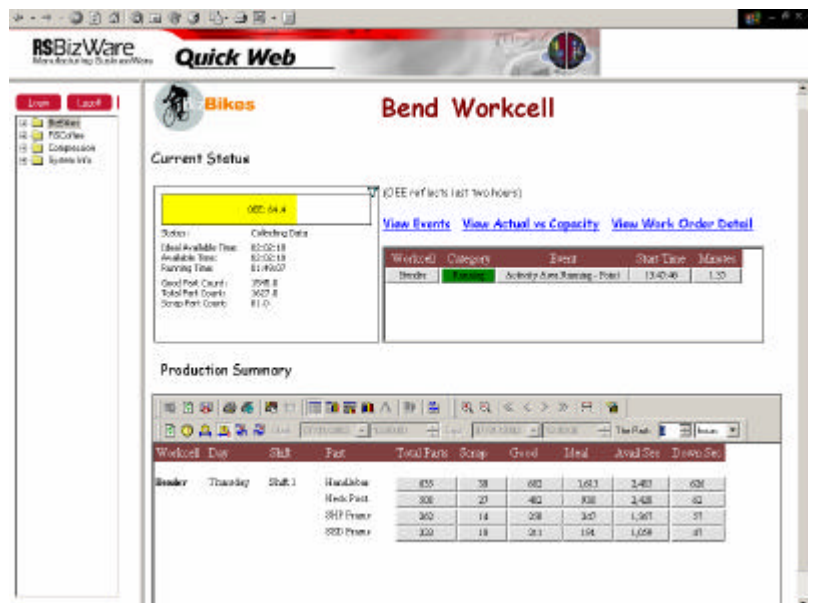
Right click on our filtered event information and select “Save Report To File”

Save the report to our local machine to use locally in a production issues report or email to the relevant person for action



Bend Workcell – Performance Issues

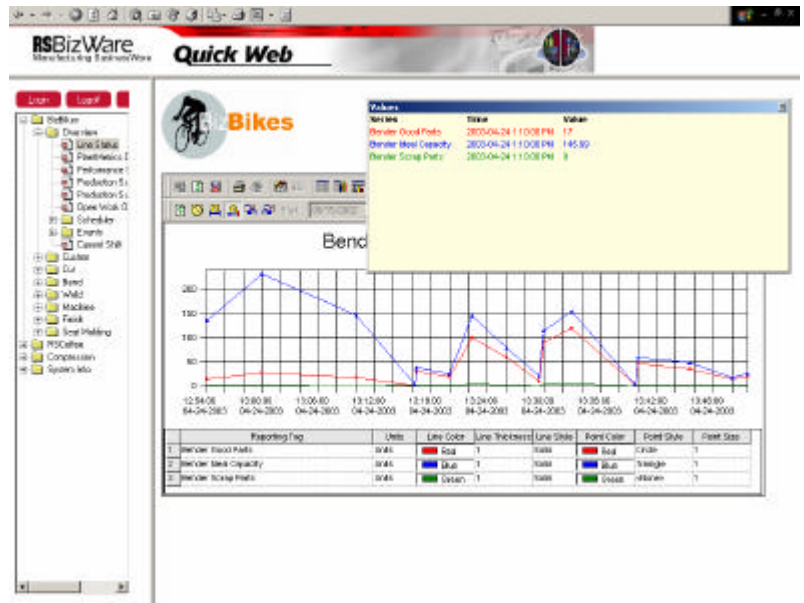
Our overview report for the Bend workcell shows acceptable Downtime and Scrap values, however the Good parts vs Ideal Parts for this workcell indicate the issue is a performance one. Clearly the machine is suffering from “Performance” issues.



Plant Intelligence in a Box – Product Overview

If we follow the “View Actual vs Capacity” Hyperlink we can drill down into the time series detail for the workcell. The “Ideal Capacity” is derived from the individual types of product run on the workcell and their specific *Ideal* production rate.

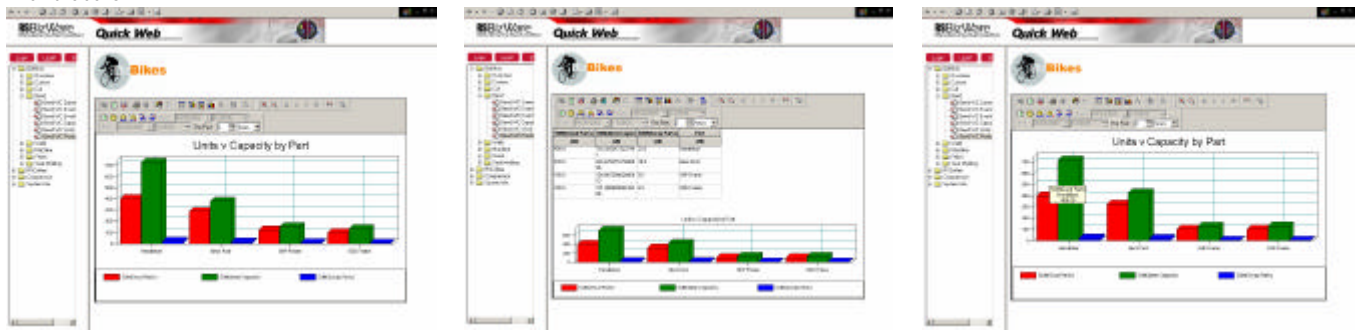
Here we can see that the issue with performance was mainly for production before 13:16.



We look at a report that shows the performance information “By Part” identification and the issue is clearly with the “Handlebars”

The report can be changed to show the bar chart and the underlying data

Placing the cursor over the report will also display the value that makes up the report

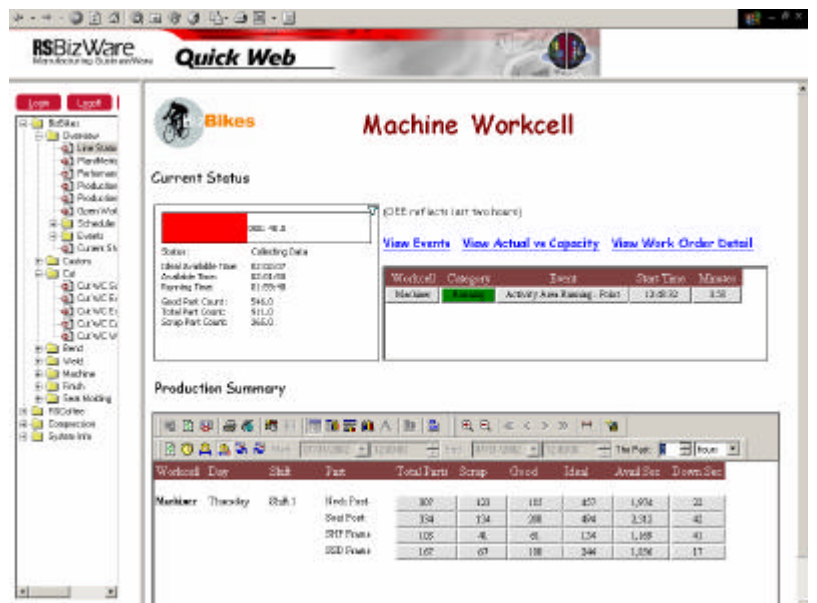


Machine Workcell – Quality Issues

Our overview report for the Machine workcell shows the Scrap part count at nearly half the Total parts counter. Clearly the machine is suffering from substantial “Quality” issues.

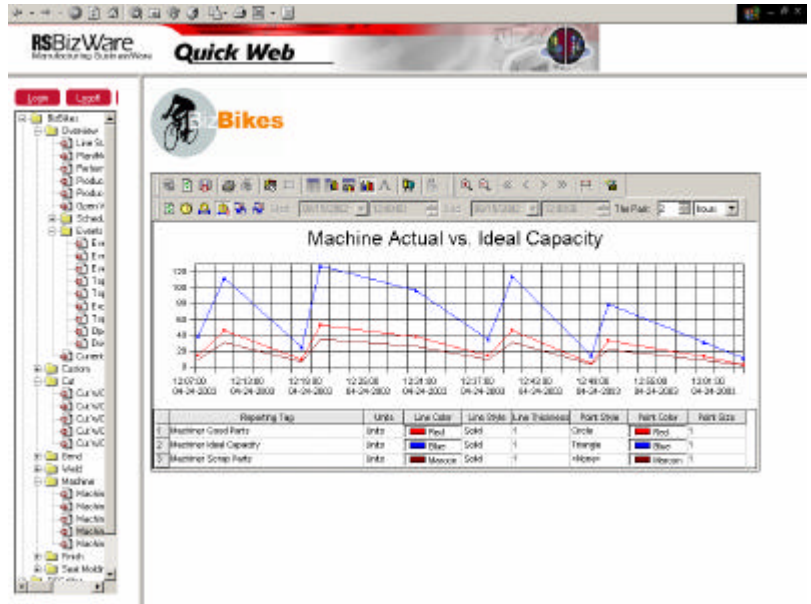
The machine status window also shows the workcells Production Summary report that shows the workcells Total Parts, Scrap Parts, Good Parts and Ideal Parts counter. This report shows the summary information for each product run on the workcell.

While the Total Parts is below the Ideal Parts, scrap is clearly the main issue on this workcell.



Plant Intelligence in a Box – Product Overview

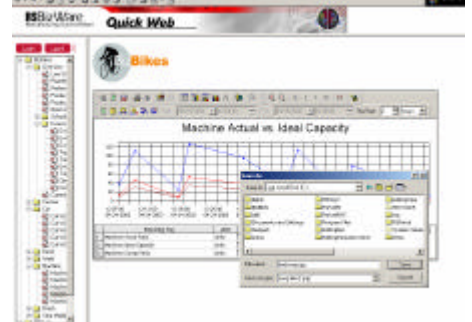
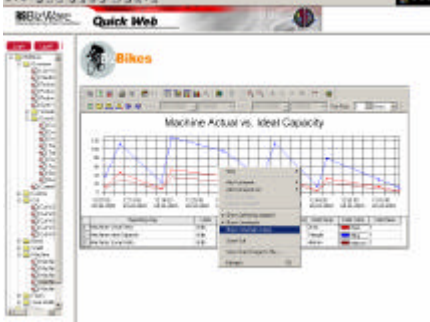
If we follow the “View Actual vs Capacity” Hyperlink we can drill down into the time series detail for the workcell. The “Ideal Capacity” is derived from the individual types of product run on the workcell and their specific *Ideal* production rate.



From the Actual vs Capacity report we can right click and select “Show Crosshair Cursor”

This displays the Crosshair window that displays the actual counts in more detail”

As with all reports the information can be output to your local machine.



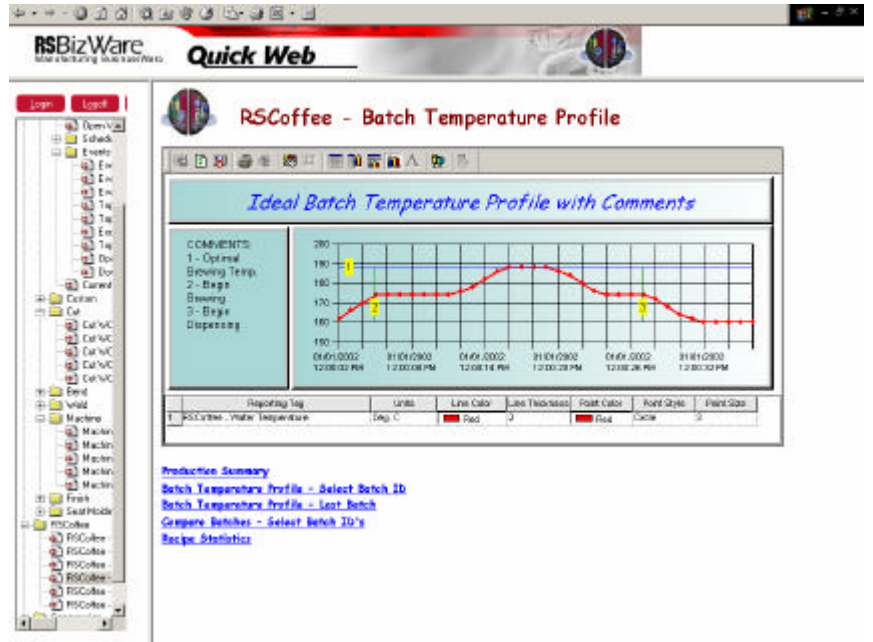
Process Control Analysis

PI Box provides advanced Process Control Analysis with RSBizWare Historian. Attack process variability by analysing a wide variety of process and production data such as temperatures, pressures, and flow rates.

A complete solution for collecting, analysing, viewing and reporting data

- Time-series data analysis
- Easy-to-use drag-and-drop environment
- Powerful query and analysis tools
- Expandable to analyse data from *any* data source

Plant Intelligence in a Box – Product Overview



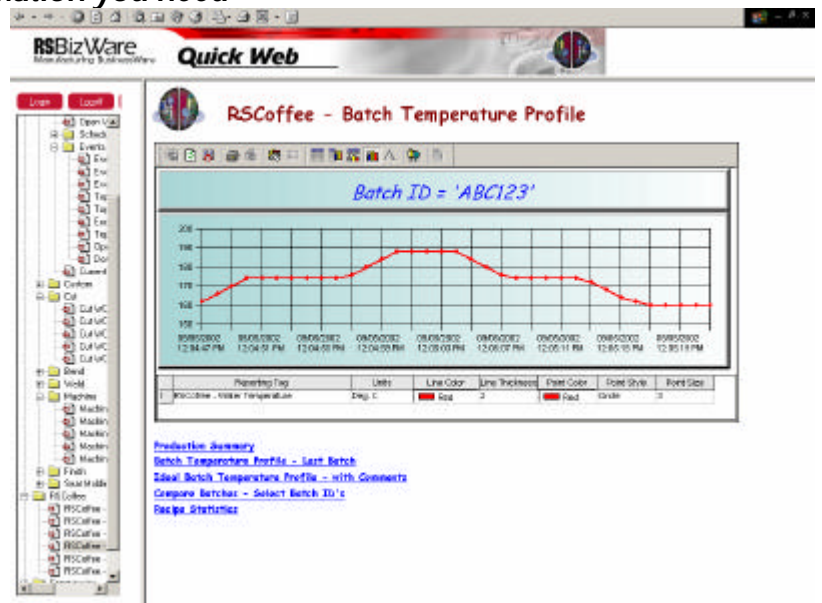
Filters provide fast access to the information you need

Filter down to your specific batch or run with custom filters and prompts

Runtime Report Criteria

Batch ID(=):

- .Ideal Batch
- ABC123
- ABC456
- BAS789

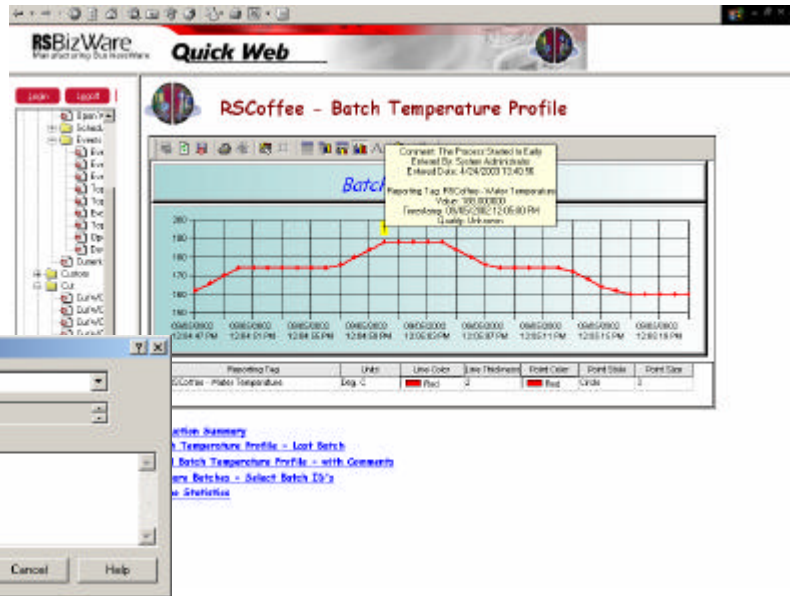
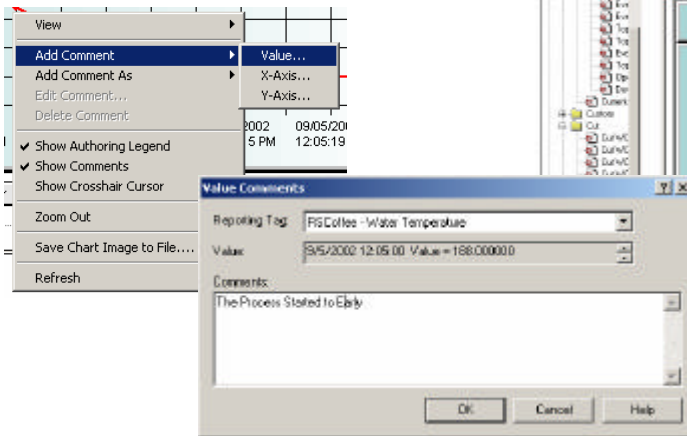


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Add comments to your data to track events or issues

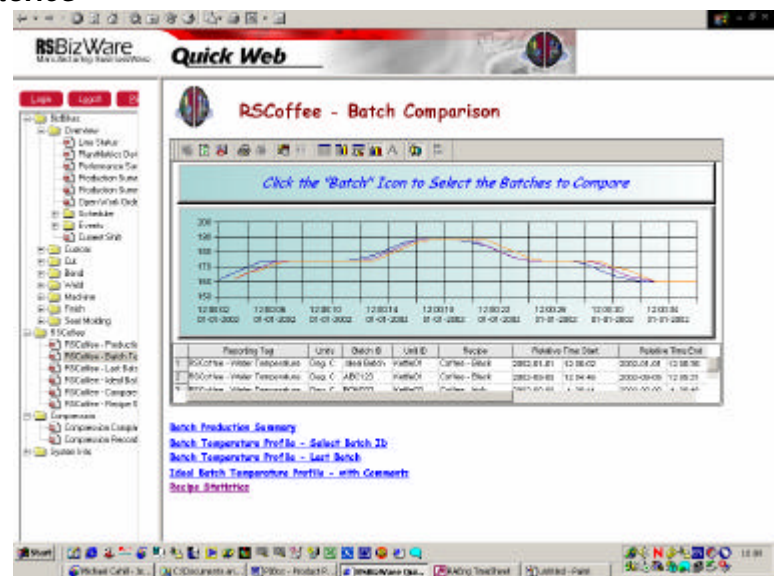
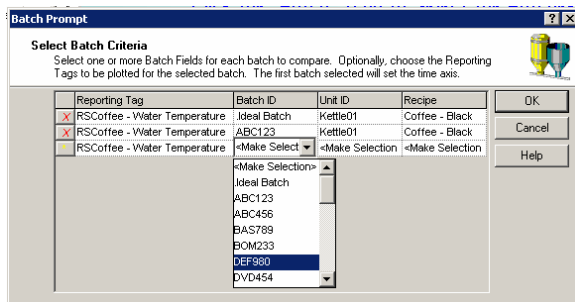
Comments can be added to process data for operator comments, tracking process issues or confirming operator actions.

Process comments can be electronically signed for initial entry and modification

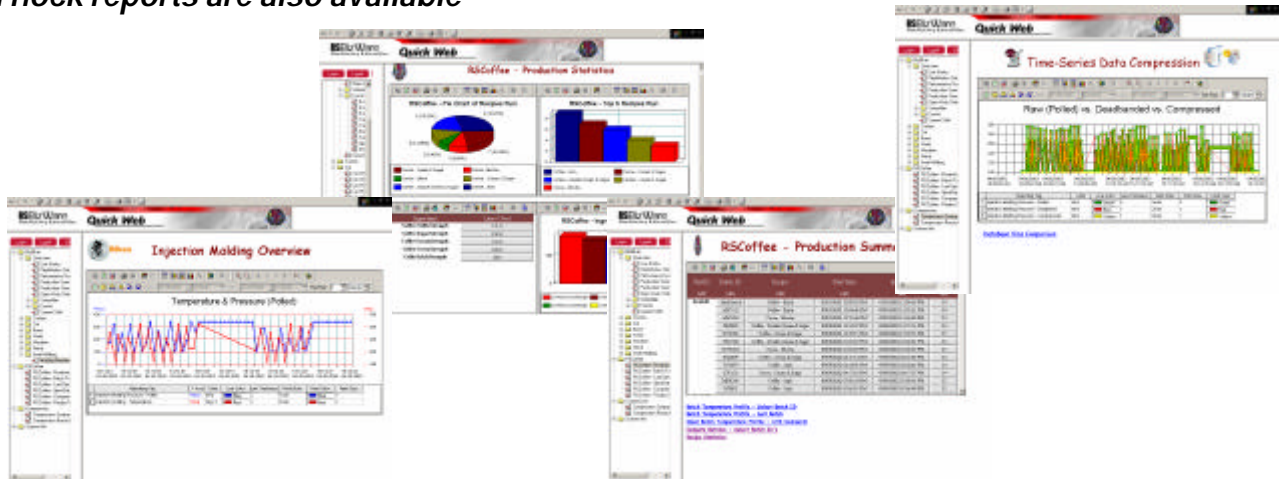


Compare the performance of multiple batches

Compare batches by super imposing batch information on top of one another



Ad hock reports are also available



Plant Intelligence in a Box – Product Overview

PI Box detail – Dedicated Server & Stand Alone Operator Interface

The PI Box can be ordered to include:

- Tower Server (c/w screen, mouse & keyboard)
- Windows 2000 Server
- Panel View Plus (700 colour / keypad)
- PI Box core system



PI Box - Core System

- RSBizWare
 - PlantMetrics (5 cells)
 - Historian (25 points)
 - RSBizWare Author / Read only Client Access License (for one user – Additional users can be purchased separately)
 - RSSql (Lite)
 - RSBizWare Web Server
 - RSBizWare Task Scheduler
 - RSBizWare Security Server
- RSLinx
- Microsoft SQL Server 2000 (Restricted Edition)
- Consulting and Project Management
 - Your B-R Controls engineers will ensure the system delivers the functionality that fits your requirements and you get the most from the system
 - All activities are managed by our project manager
- System Development
 - Initially our RSBizWare consultant will contact you to scope your requirements and the interface details with your control system
 - Automatic data points are identified and built into the PI Box
 - Manual data points are identified and configured into the operator screens
 - The system is developed and tested prior to shipment to your plant. You are invited to review the system at our office prior to shipment.
- System Commissioning
 - B-R Controls engineers will attend your site to commission the system
 - One of our qualified training instructors will attend your site to assist you with system use
- System Review
 - Our B-R Controls engineers will return to your site for one day within one month of you going live with the PI Box to review the system
 - Recommendations, enhancements and other e-Manufacturing improvements will come from the review process.

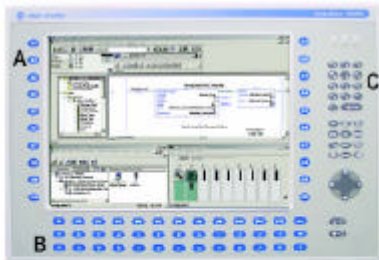
Plant Intelligence in a Box – Product Overview

“Plant Intelligence in a Box” Utilises best of breed mix from Rockwell Automation

PI Box combines the best from Rockwell Automation. The PI Box systems comprise Allen Bradley hardware, Rockwell Software, Consulting & Training services all brought together with one part number. Each system consists of the following best of breed mix

VersaView™ 1500W Industrial Workstation

With the Allen-Bradley VersaView™ 1500W industrial workstation, users now can run visual interface, maintenance, control, and basic information applications all from one machine. Use the 1500W computer with its integrated keypad and pointer to control machinery or a process; display information necessary to repair, maintain, or start up a process; and gather basic production information for making informed business decisions.



System Components	
A	32 Function Keys
B	Full Alpha Input
C	Numeric Keypad

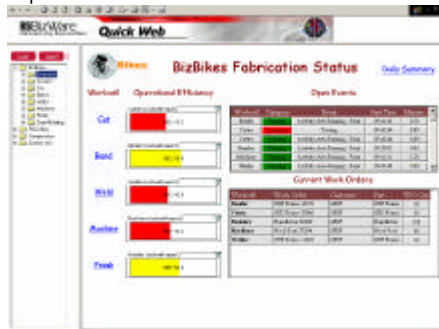
The Workstation includes Microsoft Windows 2000 Server and a limited edition Microsoft SQL Server 2000

Rockwell Software

RSView32™ is an integrated, component-based HMI for monitoring and controlling automation machines and processes.



RSBizWare™ PlantMetrics™ is a complete, Windows-based solution for evaluating the performance of critical production assets in today's networked and distributed enterprise. PlantMetrics provides users with a powerful, yet simple set of tools with which to analyse the performance of production assets by building on the reporting, analysis, and management capabilities of the RSBizWare framework.



Consulting & Training Services

B-R Controls engineers help customers review their current operations in order to improve and increase efficiency. B-R Controls engineers help customers install and automate new lines, undertake major retrofits, and establish green-field process plants. Information managers help customers integrate plant floor information into their enterprise resource planning (ERP) and supply chain management (SCM) systems, thereby converting plant floor data into useful, decision-making information.

Training

To help B-R Controls' customers gain optimum value from their investments, B-R Controls provides training in the operation and maintenance of Rockwell Automation products. Computer-based training and on-line courses provide flexibility that allows students to determine the pace and location of their classes. B-R Controls also provides on-the-job resource guides that support employee training and reinforce correct and consistent job performance, together with analysis services to help customers identify and meet specific training and performance needs.

Contact your authorised Rockwell PI Box systems integrator:



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