Essential Insight® System Overview

Integrated
Systems
Engineering

Introduction

What exactly is Essential Insight®? Essential Insight is a suite of software applications designed for manufacturers to increase profitability and add capability. Essential Insight provides unparalleled visibility into your manufacturing process to expose the opportunities to increase your profit margins.

The versatility of Essential Insight allows it to span the manufacturing execution system (MES) and plant floor automation layers of your manufacturing facility as shown in Figure 1.
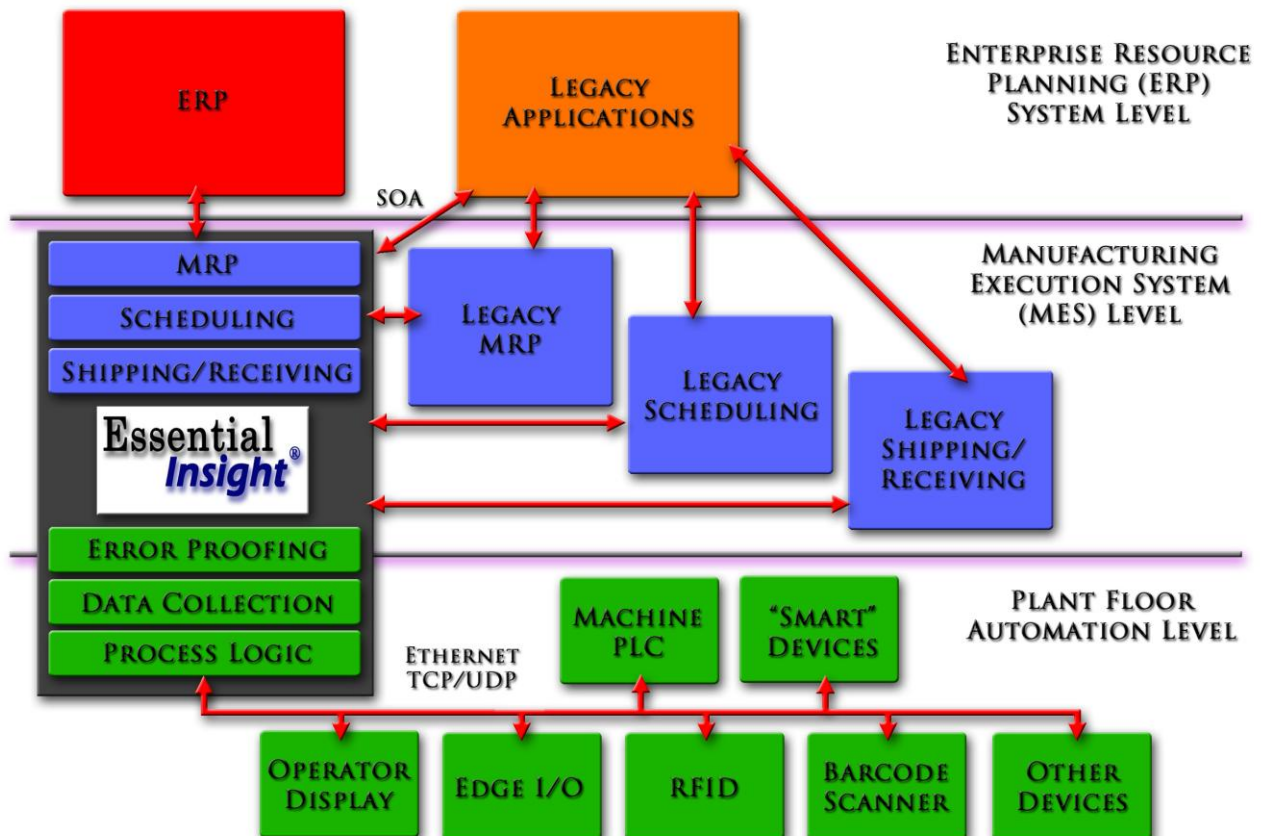

Figure 1

Essential Insight performs configured functions at the plant floor automation layer by communicating with plant floor devices to provide error proofing, data collection, and process information to the operators. Essential Insight also performs functions in the MES layer by connecting to devices and other applications to perform the configured functions, such as scheduling, assigning unique work piece identifiers, and providing operator instructions and other information. Essential Insight is configurable

to provide operational data to higher level ERP systems or legacy applications to help provide an enterprise wide view of operations.

Essential Insight Versions

The Essential Insight system is available in two (2) versions, Essential Insight Lite and Essential Insight Server. The differences between the two Essential Insight versions are driven by the limitations of computer resources available as shown in the following table.

Feature	Essential Insight Lite	Essential Insight Server
Computer Operating System	Windows 2000, XP, Vista	Windows Server 2000, 2005, 2008
Database Management System	Windows SQL Sever Express	Windows SQL Server 2000, 2005, 2008
Number of Equipment Connections	16	45000
Number of Workstations	4	Unlimited
Portal Capability	Limited to Transactional Data	Transactional and Aggregate Data
System Role	Primary Only	Primary or Backup
All other features	Identical to Essential Insight Server	Identical to Essential Insight Lite

Essential Insight Lite is available for small installations where your interest is primarily on error proofing, data collection, and providing feedback to an operator at a limited number of workstations. It is an very cost effective choice as an alternative to a PLC/HMI at a workstation as only a single PC is required. However, if you are interested a broader range of functionality, such as, many lines with many workstations, the ability to generate aggregate reports across product stock keeping units, lines, workstations, then, Essential Insight Server is the right choice.

Essential Insight Components

The Essential Insight system consists of three components, the Engine, the Studio, and the Portal, regardless of version. The Engine does the work, the Studio is a graphical user interface for configuring and controlling the work the Engine does, and the Portal is a graphical web interface for retrieving reports from the data collected by the Engine and entering reference data used by the Engine.
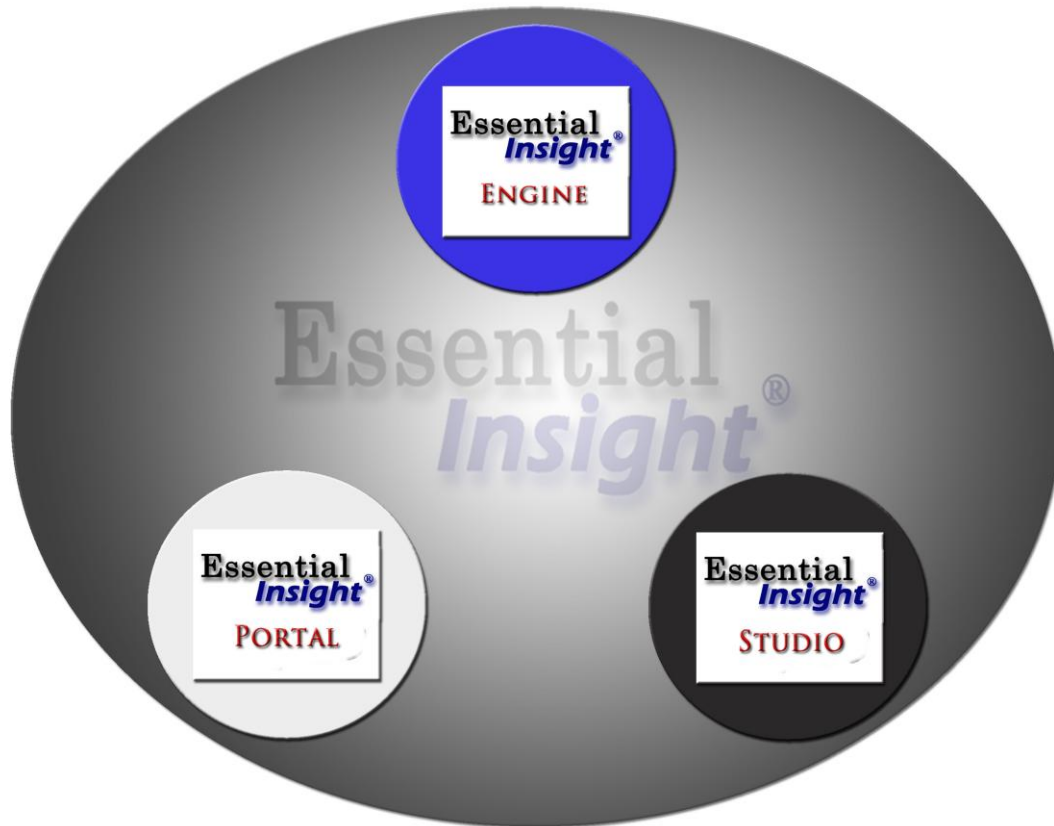
Figure 2

Essential Insight Engine

The Essential Insight Engine is the heart of the Essential Insight System. The Engine executes the functions assigned to it, such as production process data collection and/or error proofing logic for each of the workstations or work cells defined in a configuration. The Engine runs on the computer as a Microsoft Windows system service, which means, when the computer runs the Engine runs. When the computer starts, the service loads its last configuration, connects to the devices defined in the configuration, and starts executing the logic associated with the workstations defined in the configuration. The instance of the Engine running on a machine can be configured to be a primary system, or a backup system (see the *Essential Insight Scalable Archecture* white paper). The primary system communicates with the devices and runs the workstation logic. A backup system receives data from a primary system and stores the data in the database creating a coherent data set between the two systems.

Essential Insight Studio

The Essential Insight Studio is the graphical user interface (GUI) used to create and maintain the configurations run by the Engine. The Studio is the tool used to define devices in the configuration, combine the devices into workstations, to define the logic used by the workstation, and to start and stop the workstations, and view the status of workstations.
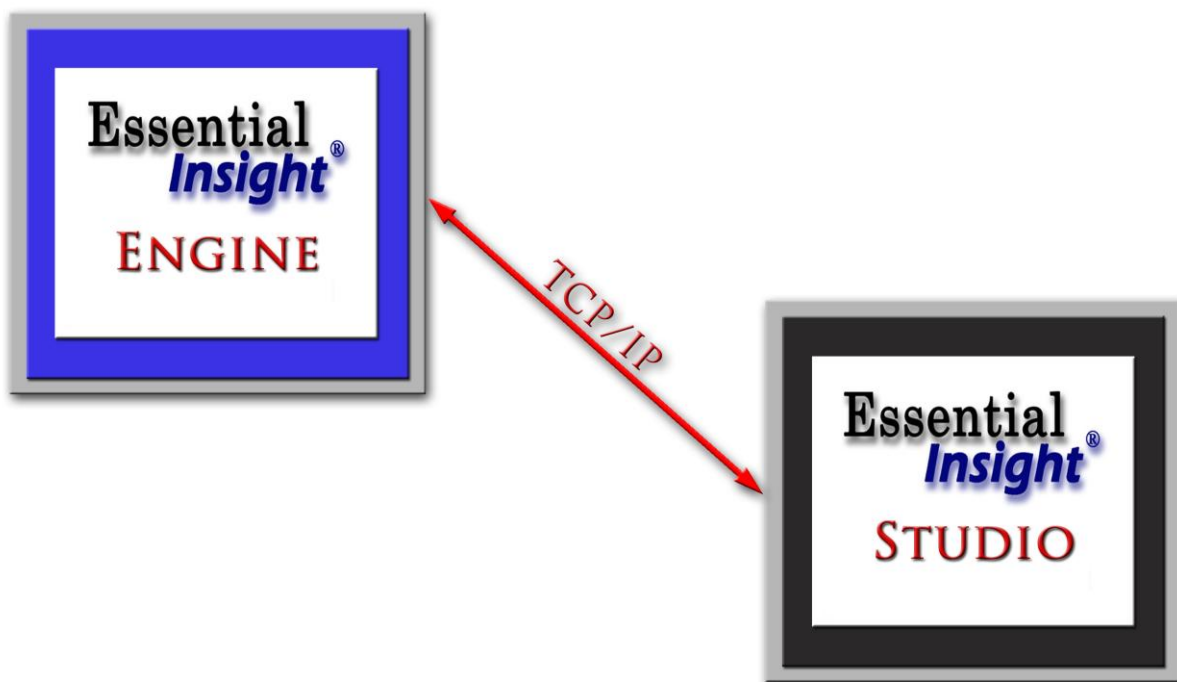

Figure 3

The Studio communicates with the Engine via TCP/IP which allows communication between any two computers which are able to communicate via a network as shown in Figure 3. This feature is especially important for remote access to the system which allows configuration maintenance from remote locations or centralized support for multiple systems (Figure 4).
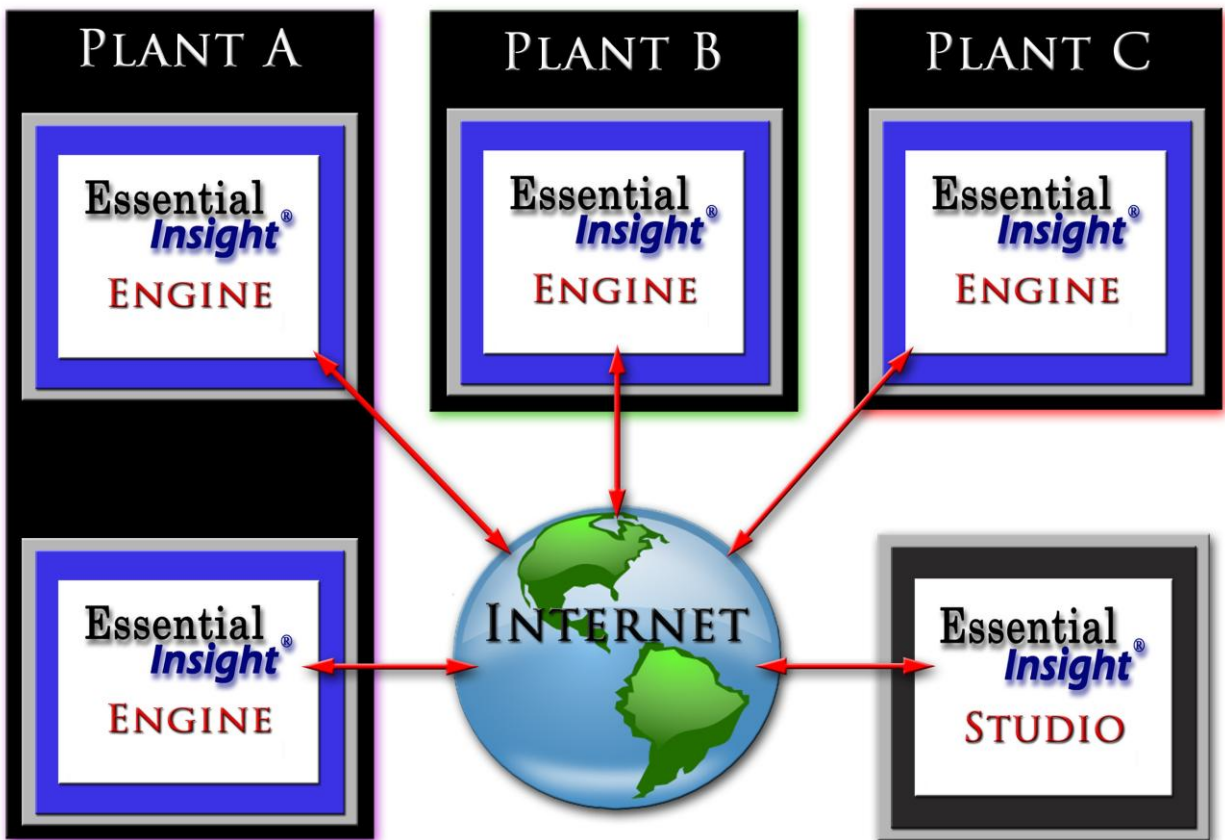
Figure 4

The Studio has built in tools to start and stop workstations, create and assign devices to workstations, layout objects and assign tags with a WSYWIG (What You See Is What You Get) operator display object editor, create and edit process logic used by workstations, and debug workstation process logic (more detail is available in the *Essential Insight Studio Users Guide*).
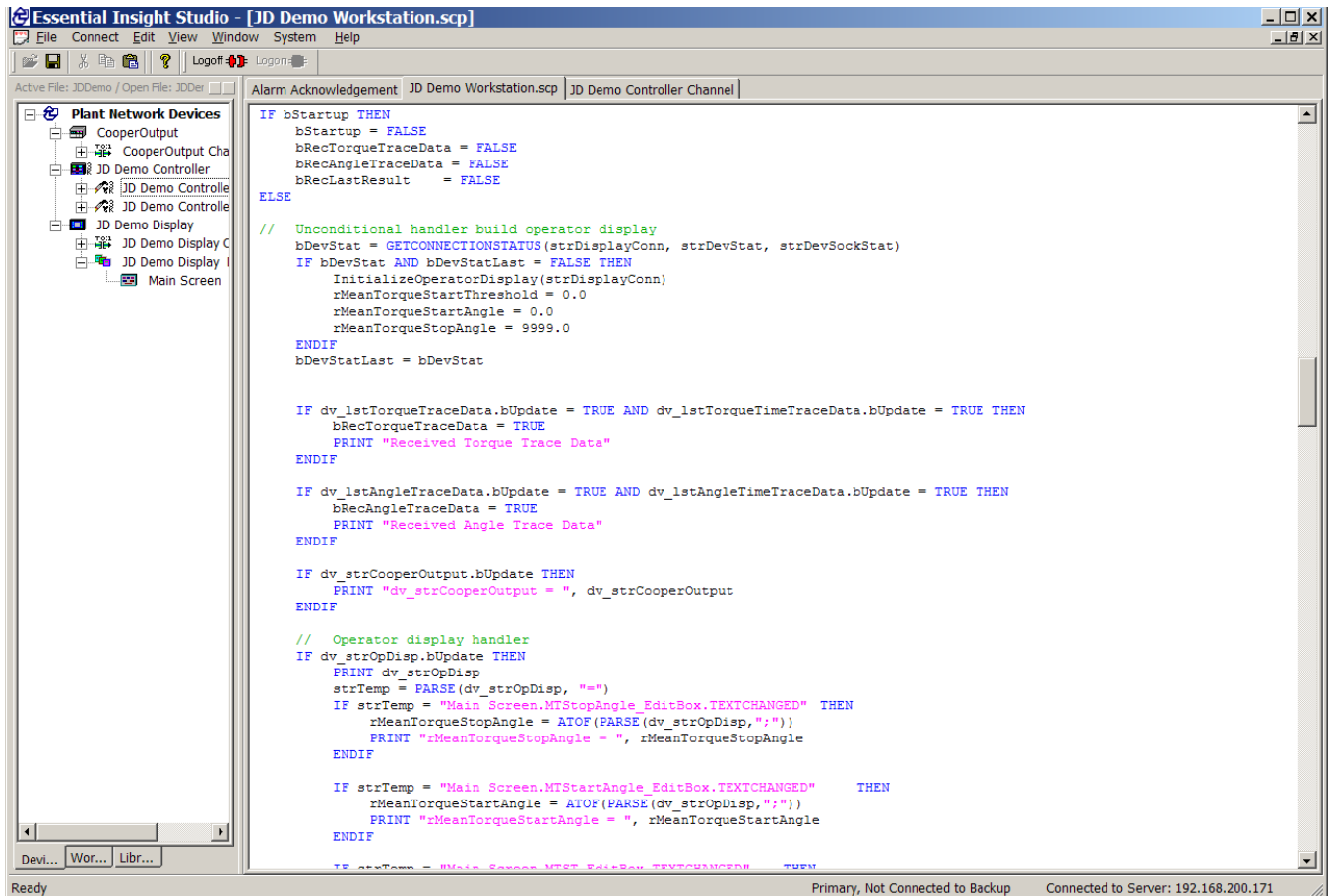
Figure 5

Essential Insight Portal

The Portal provides web interface for accessing reports and entering reference information (think bills of material, component bar code format, etc.). Essential Insight Portal provides a dashboard immediately after logon configured to show status of production operations. The dashboard is easily configured to reflect the key performance indicators associated with your production process.
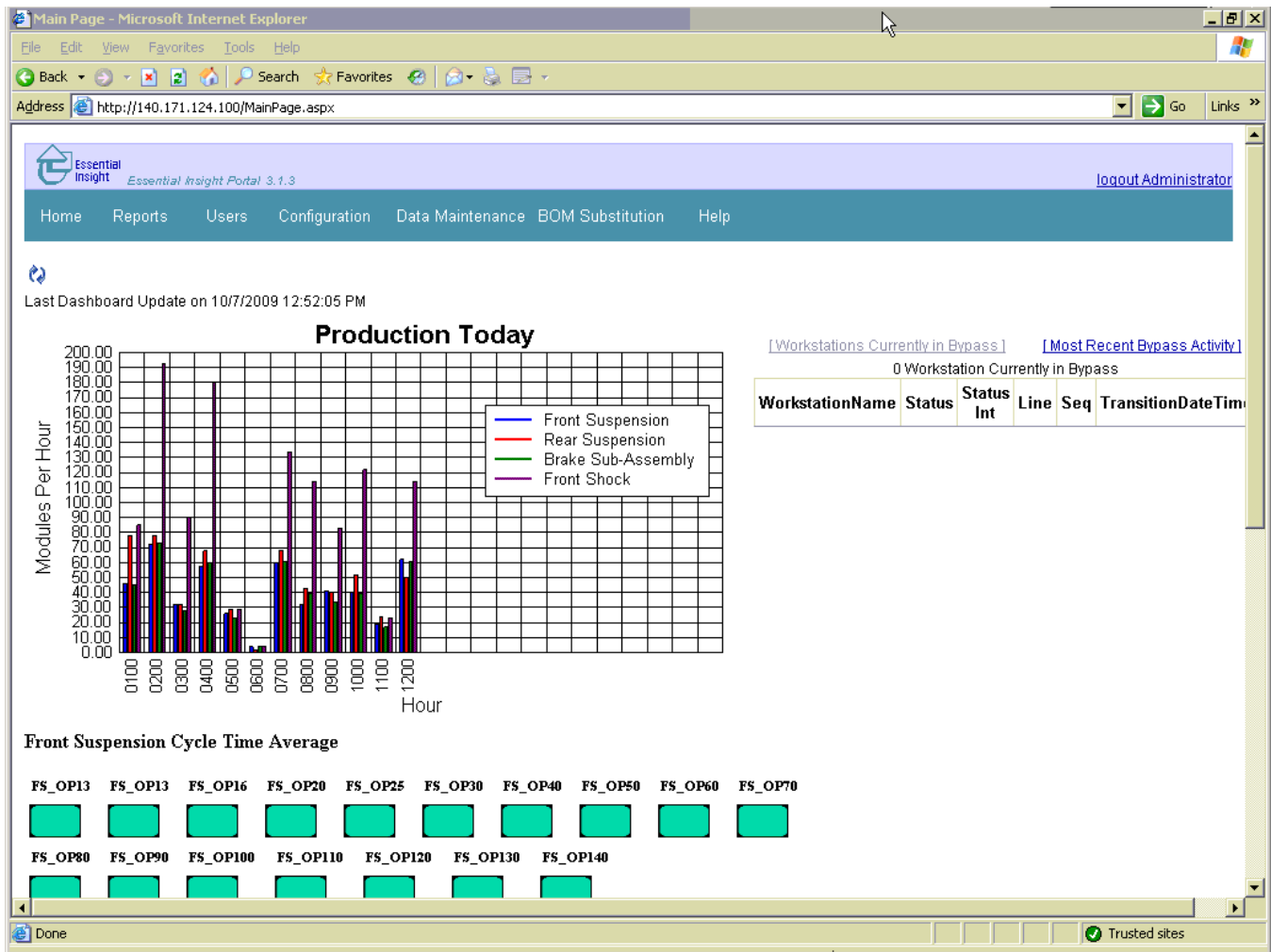
Figure 6

The Portal is used to retrieve reports on a specific instance of a product or batch. These reports are configured to provide a complete production process history of the product or batch. The report shown in Figure 7 reflects the build data for a specific instance of a product.
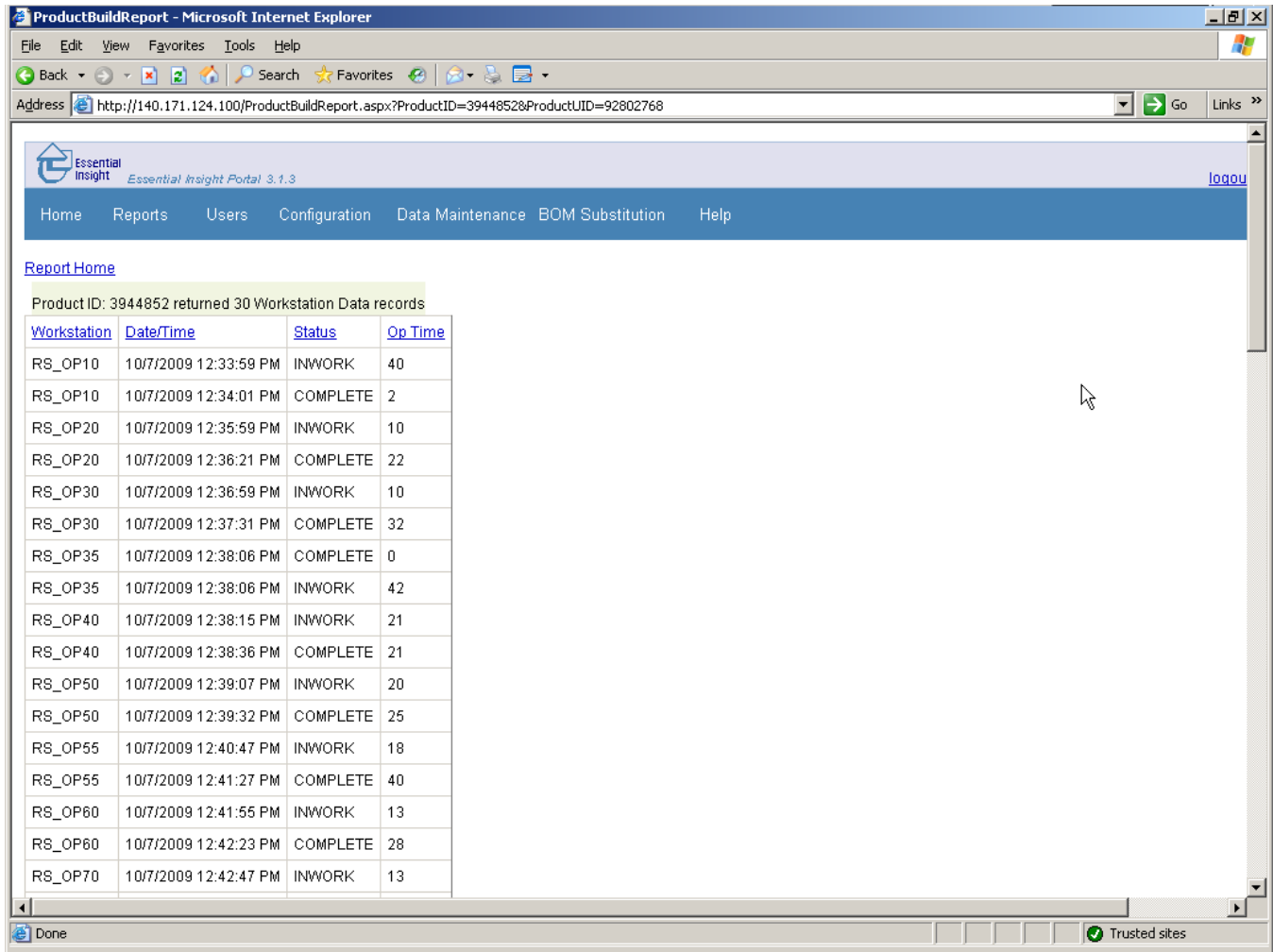
Figure 7

Historical production reports are provided, for example, by SKU, production period, or user specified time range as shown in Figure 8. The results are shown in Figure 9. This information includes data to aid in computing Overall Equipment Effectiveness (OEE). The Portal uses On Line Analytic Processing (OLAP) techniques to allow the user to drill down into the data providing analytical information to identify opportunities for quality and process improvements, cost reductions, and more.
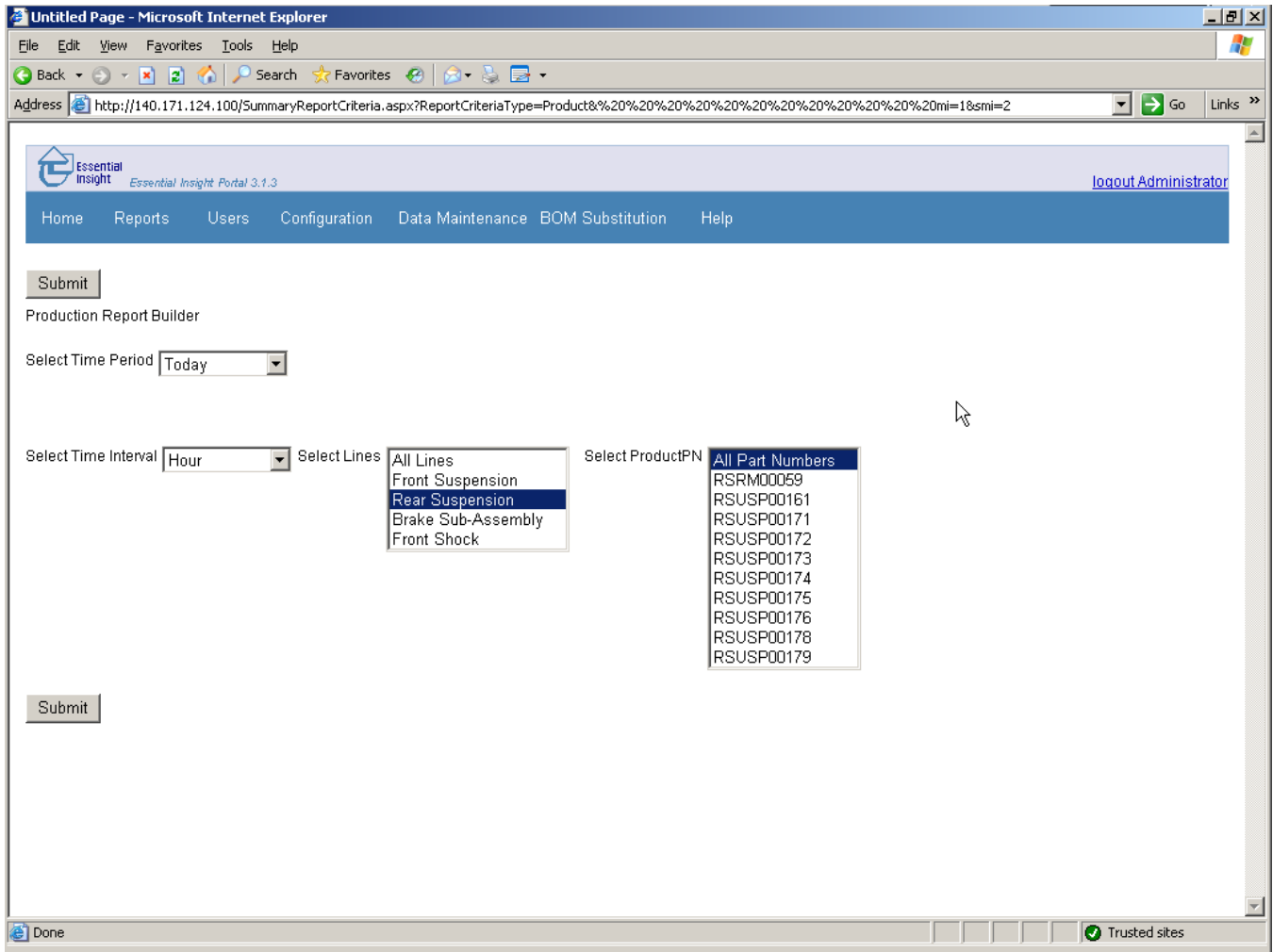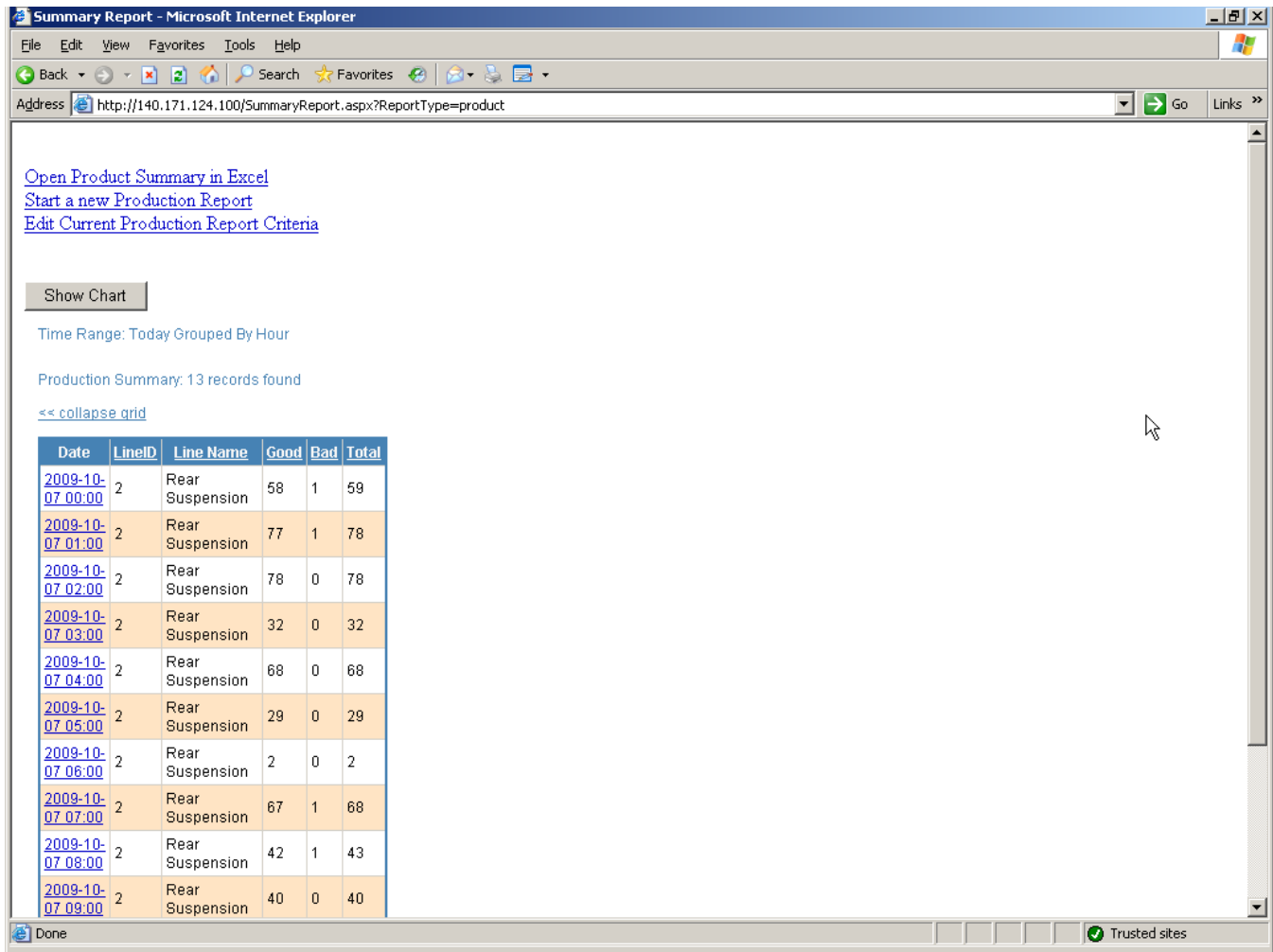
Figure 8

Figure 9

Essential Insight Accessories
There are two accessories available to the Essential Insight system, the Essential Insight Edge View application and the Essential Insight Edge I/O appliance.

Essential Insight Edge View
The Essential Insight Edge View application is an operator display which provides a rich set of graphical user interface (GUI) objects to convey process information to and receive feedback from humans, for example, work instructions, current work piece process status, and/or error proofing status. The Edge View GUI object set used to create screens which consists of buttons, editable fields, lists, meters, graphs, images, and more (see Figure 10). The Edge View runs on any computer utilizing the Microsoft Windows operating system.
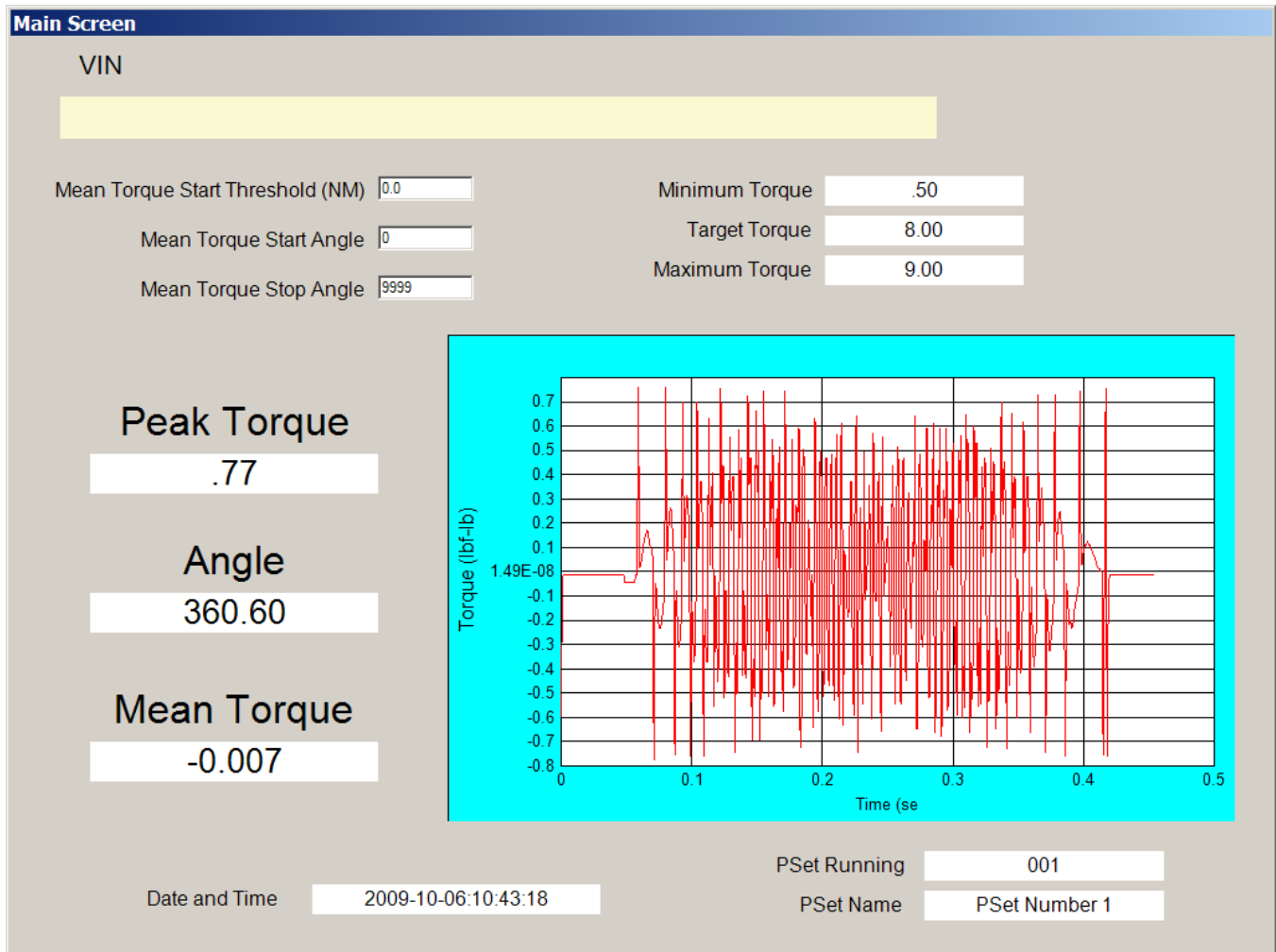
Essential Insight® System Overview

Figure 10

Because the application was constructed with touch screens in mind, all of the objects can be used to return information to the system. In cases where numerical data or alphanumeric data must be entered, the editable fields when touched invoke a number keypad or QWERTY keyboard on the screen to allow the operator to enter data without a physical keyboard as shown in Figure 11. Most importantly, all of the attributes of the objects on the display can be manipulated from the workstation scripting language (detailed information is available in the *Essential Insight Viewport Programmers Reference*).
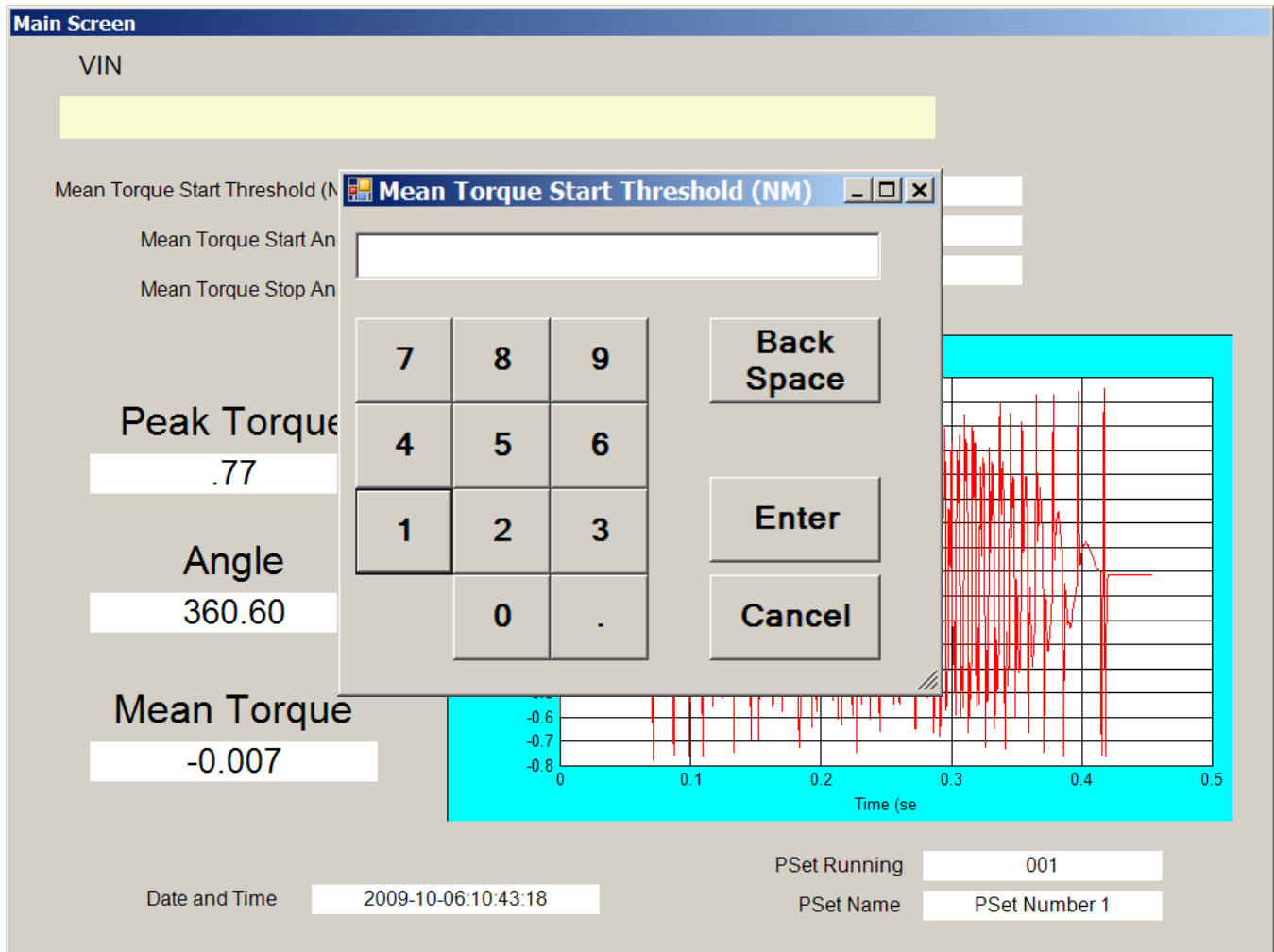
Figure 11

As mentioned previously, Essential Insight Studio contains a WSIWIG (what you see is what you get) layout editor to assign the tag names and locate the GUI objects on the screen as shown in Figure 12.
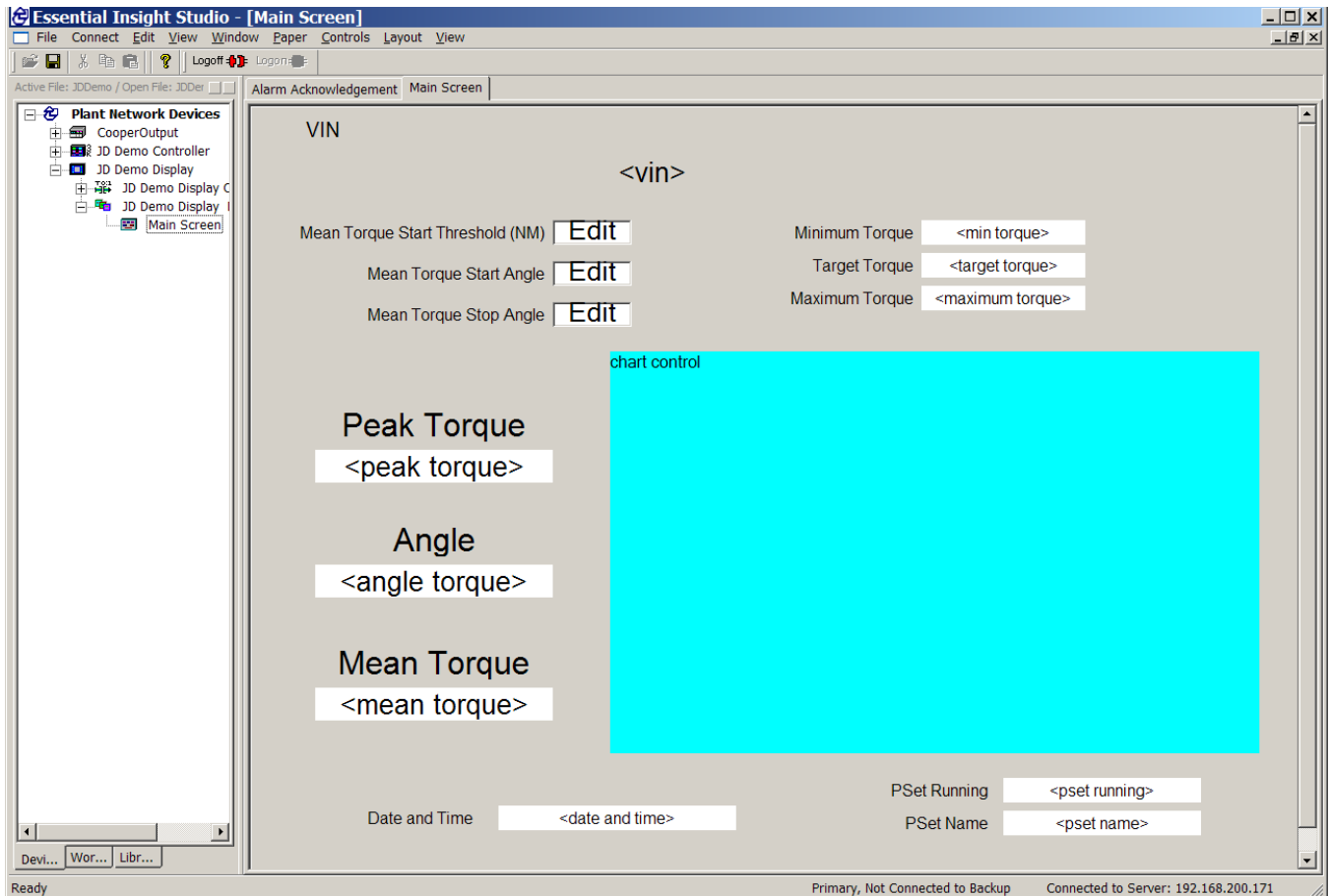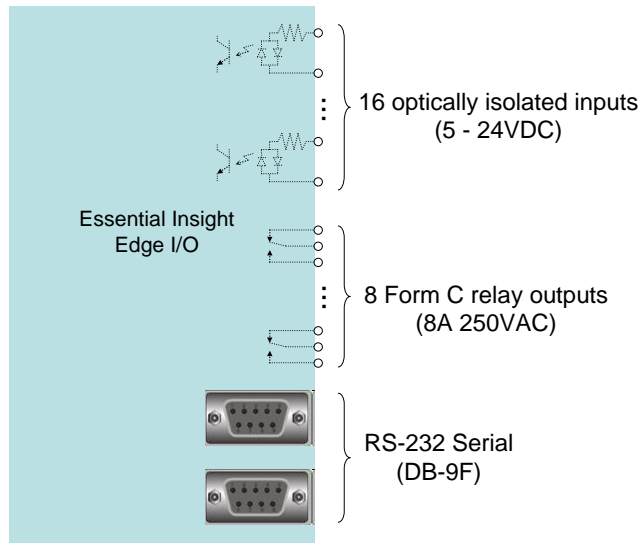
Figure 12

Essential Insight Edge I/O Appliance

The Essential Insight® Edge I/O provides an inexpensive I/O solution to interface the Essential Insight system to other devices and equipment using discrete signals or serial interfaces. The Essential Insight Edge I/O appliance is a hardware device which provides eight (8), 2A, Form C dry contact outputs, sixteen (16) 5 – 24 VDC inputs, and two serial ports, all accessed and controlled by TCP/IP connection via the network.

16 optically isolated inputs
(5 - 24VDC)

Essential Insight
Edge I/O

8 Form C relay outputs
(8A 250VAC)

RS-232 Serial
(DB-9F)

The Edge I/O communicates the changes of the input and ouput states to Essential Insight workstation logic, and the workstation logic writes to the device to set the output states. The data from the two serial ports are converted from serial to TCP/IP and communicated via individual TCP/IP ports.

Conclusion

This document provided an overview of the Essential Insight® System, it's versions, it's components, and optional accessories. That said, we've only touched on the capabilities of the system to provide information and control to improve your process efficiency, increase quality, and lower your production costs. More documentation about each of the components and accessories may be obtained from www.essentialinsight.net or by calling Integrated Systems Engineering, Inc. at 888-580-6024.