Migration of DCS/SCADA Graphics to PI ProcessBook

Presented by

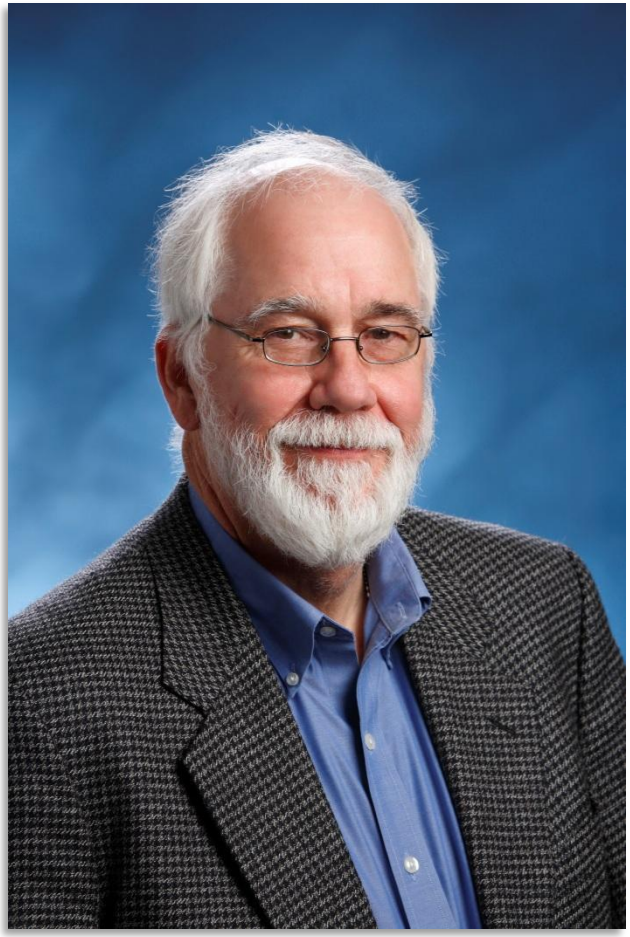
Robert Norman
Vantage Partners/NASA – Glenn Research Center

Aaron Brewer
Data South Systems, Inc.

Agenda

- Review of Agenda
- Introductions
- Webinar Series and Partner Solution Showcase
- PI System Overview at NASA
- Uses of DCS, the PI System and PI Processbook
- Need for graphics in PI ProcessBook
- Discovery of GrITS for ProcessBook at 2002 OSIsoft Users Conference
- Demonstration of solution
- Questions
- Conclusions and Thank You!

Mission



“Our mission is to maximize the Value our customers get from our product and services”

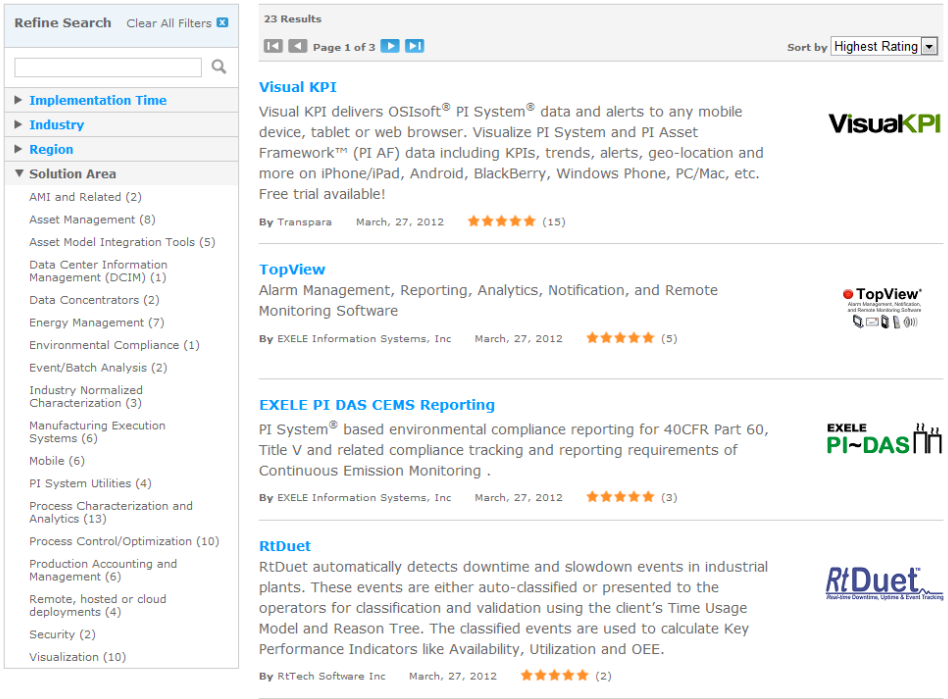
Presenters

- **Robert Norman - Sr. Software Engineer**
  Vantage Partners/NASA Glenn Research Center
  Office: (216) 433-2118
  Email: Robert.L.Norman@grc.nasa.gov
- **Aaron Brewer - Operations Manager**
  Data South Systems
  Office: (912) 369-7350, ext. 105
  Email: aaron@datasouthsystems.com
- **Erika Ferguson - Partner Manager, Americas**
  OSIsoft, LLC
  Mobile: (510) 604- 9053
  Email: eferguson@osisoft.com

OSIsoft Partner Solution Showcase

- Find software solutions from OSIsoft partners with specific industry and domain expertise.
- http://partners.osisoft.com/solutions

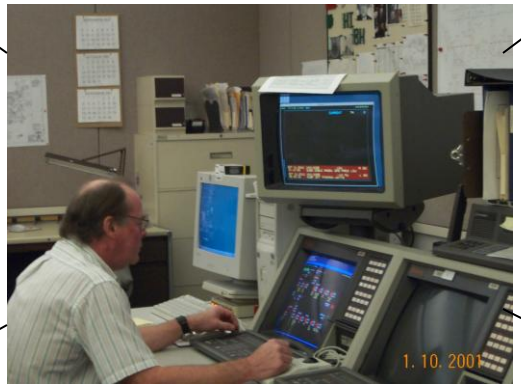
pss@osisoft.com



PI System at NASA Glenn Research Center

Central Process Distributed Control System

ED



CAD

CAEB

ERB

CP-DCS Customers

- Wind Tunnels (10x10, 8x6/9x15, IRT)
- Propulsion Systems Lab
- Icing Research Tunnel
- Engine Components Research Lab
- Rocket Combustion Lab
- Aeroacoustic Propulsion Lab
- Compressor, Turbine and Combustor Test Cells

Major Systems (ED & CAD)

- ED (Electrical Dispatch)
  - 13 Substations ==> 138,000V to 2400V
  - Max Power Available = 370MW
  - Base (Institutional Load) = 21MW
  - 212,000 MWHR ==>Annual Usage
- CAD (Central Air Dispatch)
  - Over 600+ Remotely Operated Valves
  - Combustion Air Distribution Piping => 16,000 Ft
  - Exhaust Distribution Piping ==> 7,000 Ft

Major Systems (CAEB)

- CAEB (Central Air Equipment Building)
  - 7 Compressors (107,000Hp)
    - 40, 150, 450 Psig
    - Flow ==> 400 lb/sec @ 150Psig
  - 8 Exhausters (106,000 Hp)
    - Altitude ==> 90,000 Ft.
    - Flow ==> 700 Lb/Sec @ 19,000 Ft.
  - 2 Variable Frequency Mg's (5000 Hp)
  - 1 Static Frequency Converter (7500 Hp)
  - 3 Turboexpanders
    - -90 Deg F

Major Systems (ERB)

- ERB (Engine Research Building)
  - 9 Compressors (29,100 Hp)
    - 40, 150, 450, 1250 Psig
    - Flow ==> 88 lb/sec @ 40Psig
  - 1 Turboexpander/Compressor
    - -70 Deg F
  - Variable Frequency
    - 9 Rotating Converters
      - 15,000 Hp
      - 10 Hz ==> 120 Hz

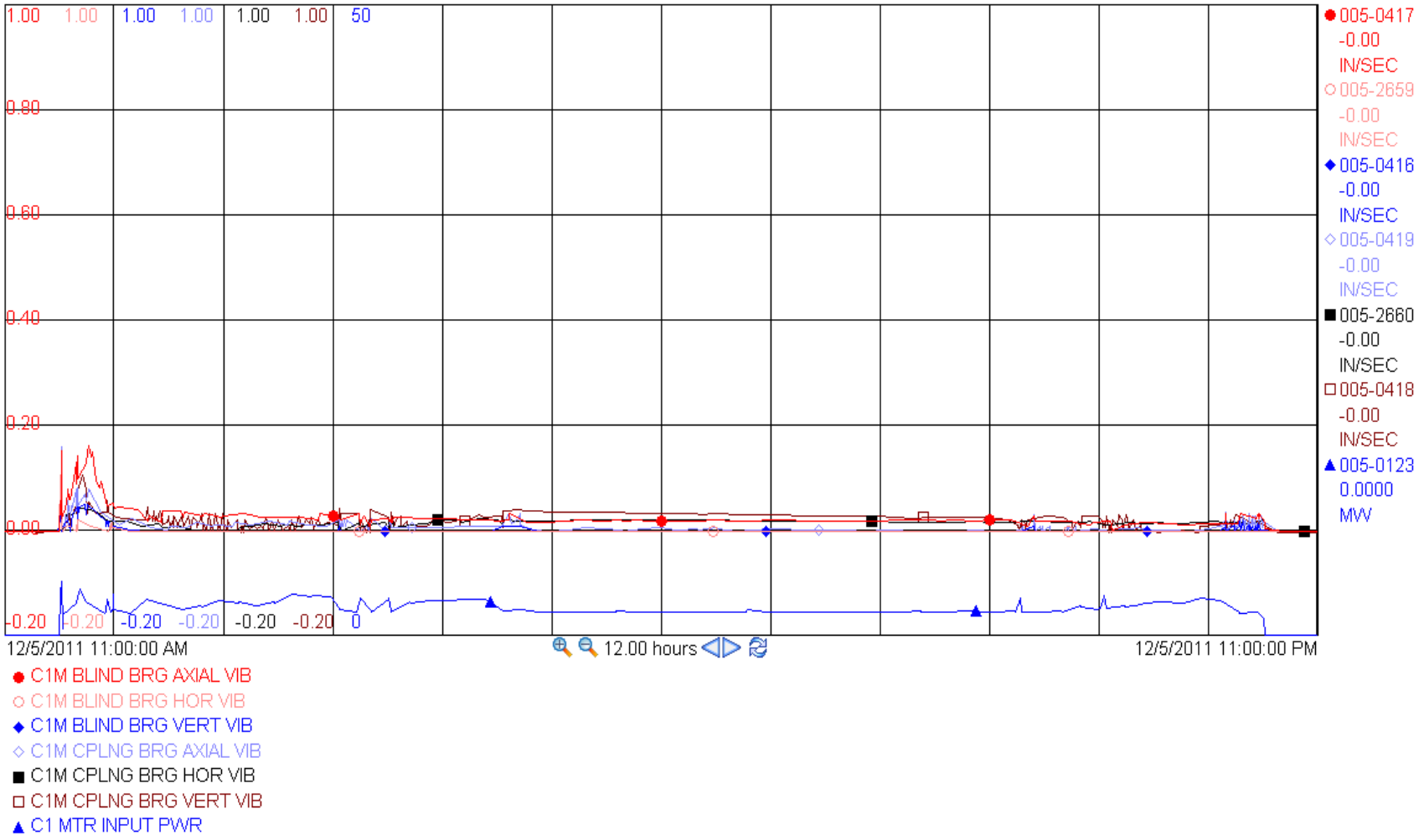
The OSIsoft PI System at NASA

- Problem existing Bailey Historian was obsolete, not Y2K compliant
- Contacted OSIsoft sale/tech reps on 2/6/99
- Visited the site, did preliminary software load, converted database overnight
- System online since 2/7/99
- Uses trending, data analysis, predictive maintenance, event/upset review using playback

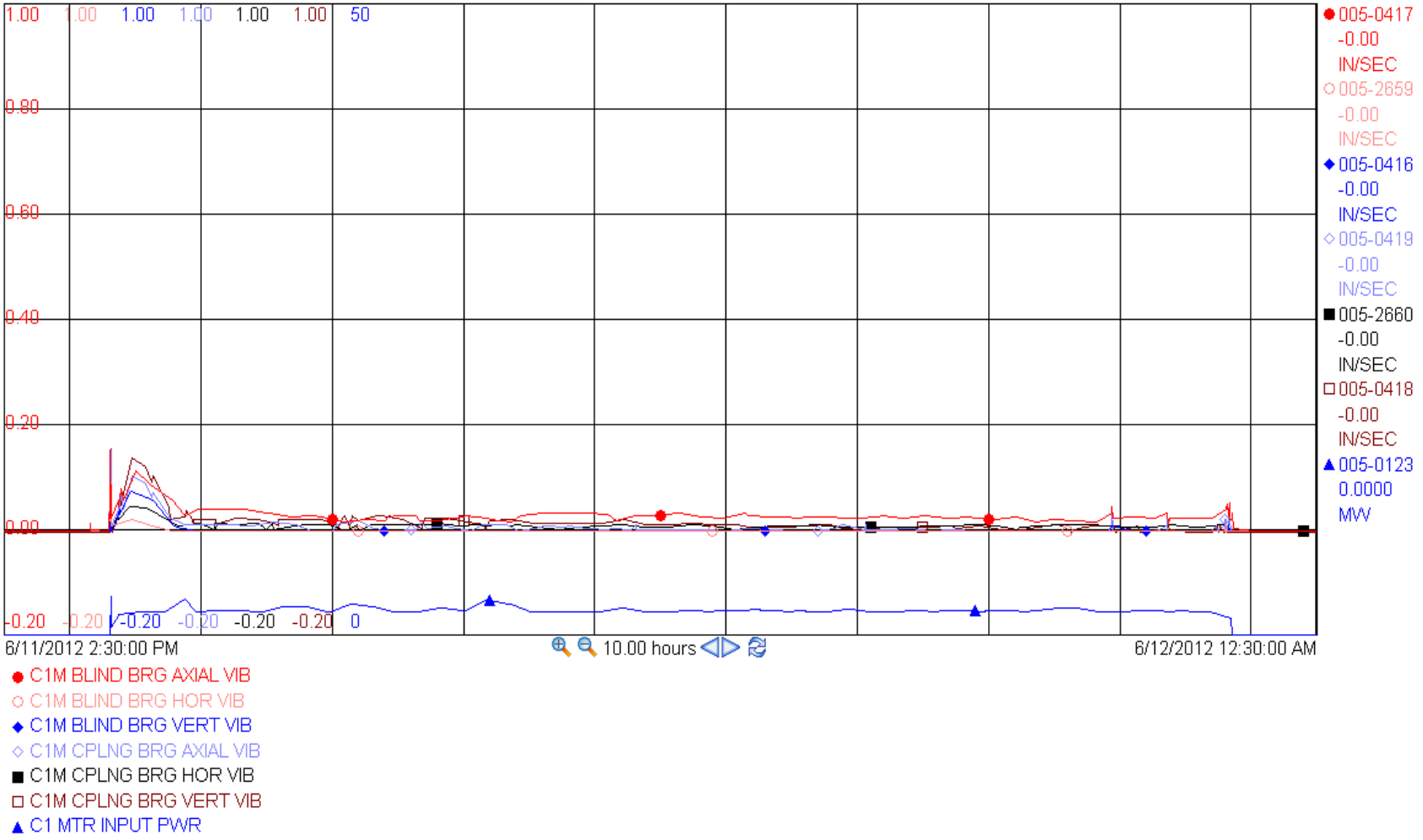
Predictive Machine Maintenance

- Problem: NASA Online Vibration system obsolete
  - Need to review vibration and temperature readings
    - Predict future problems
  - Funding not available
  - Data already existed in the PI System
  - PI DataLink solution proposed
  - NASA Engineers wanted visual trend displays
  - PI ProcessBook automation used to build baseline and current run trends of a machines, VB app cycles through over 300 trends which are saved as Powerpoint slides

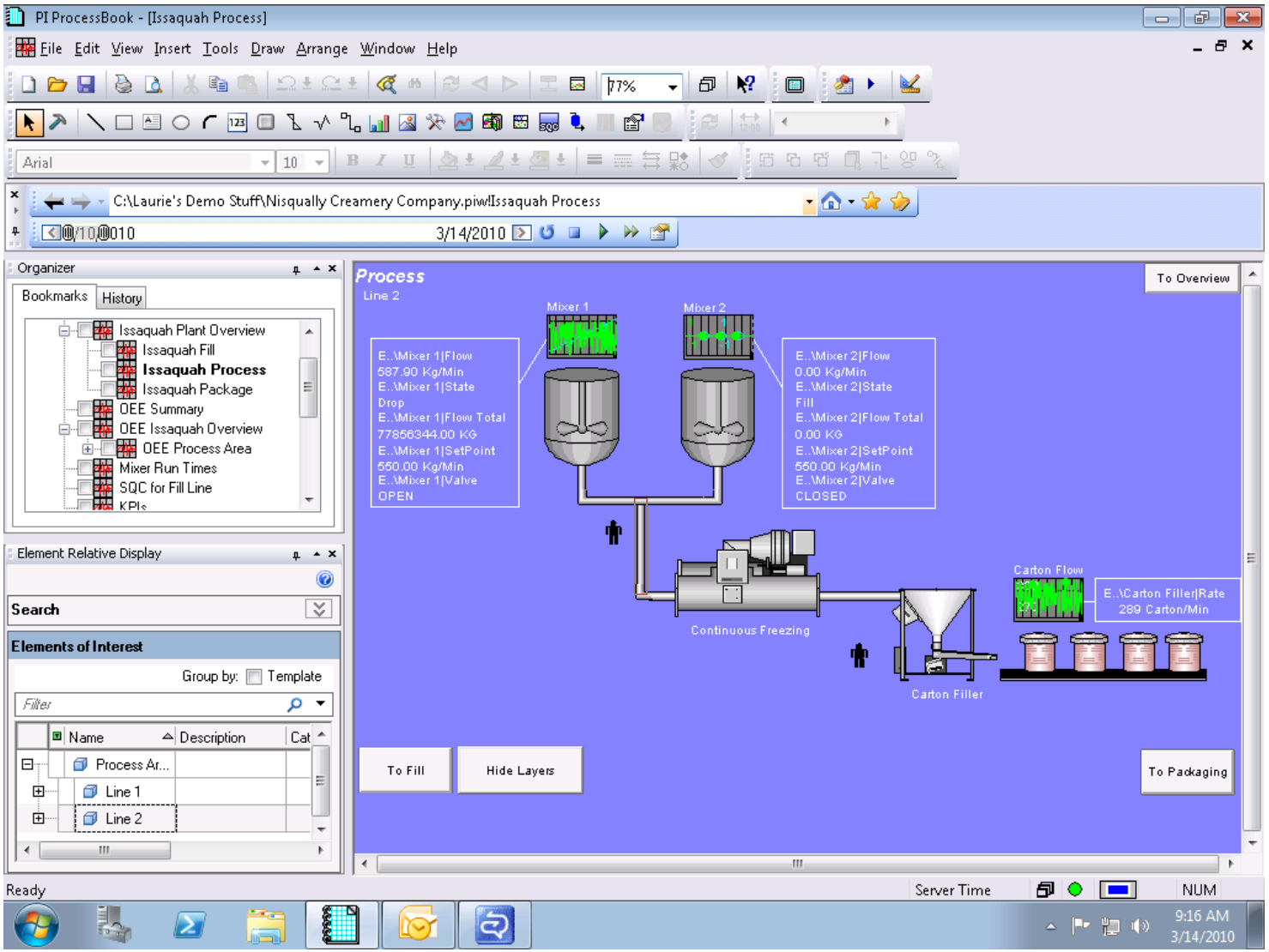
CC01M BRG VIB Baseline



CC01M BRG VIB Recent

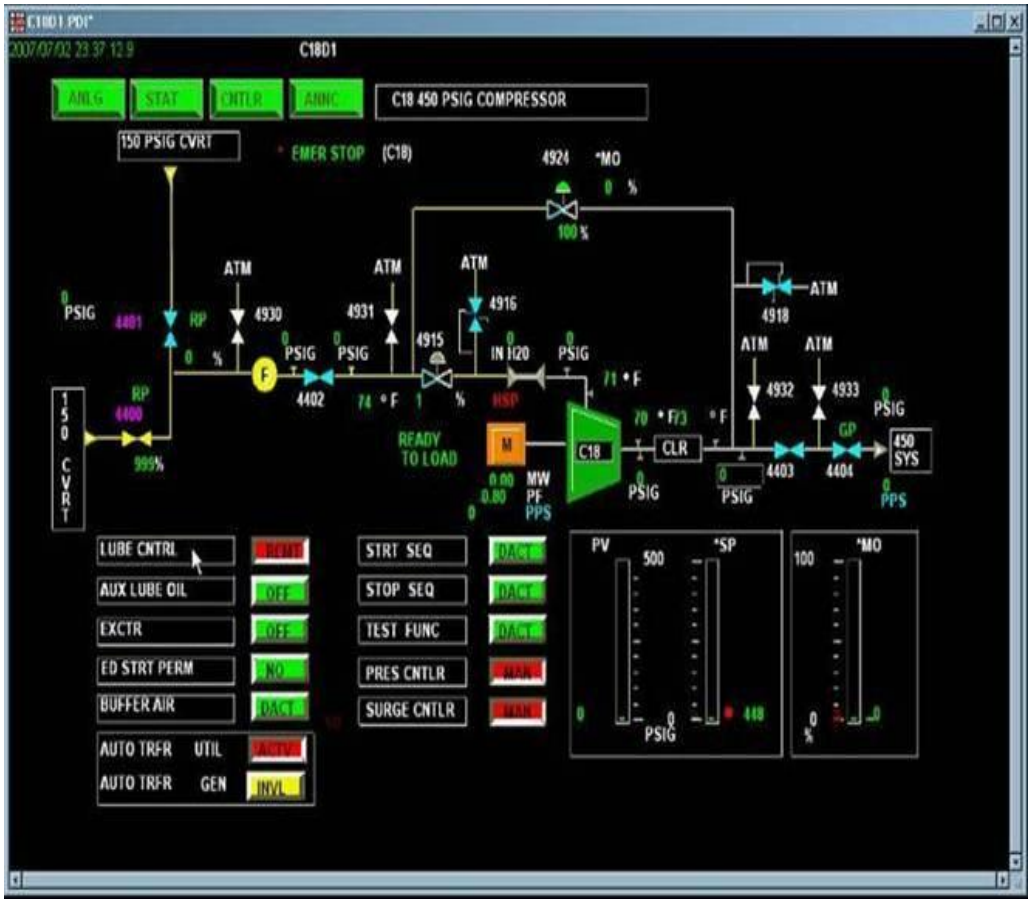


Graphical Visualization in PI ProcessBook



Uses for the PI System - Diagnostics

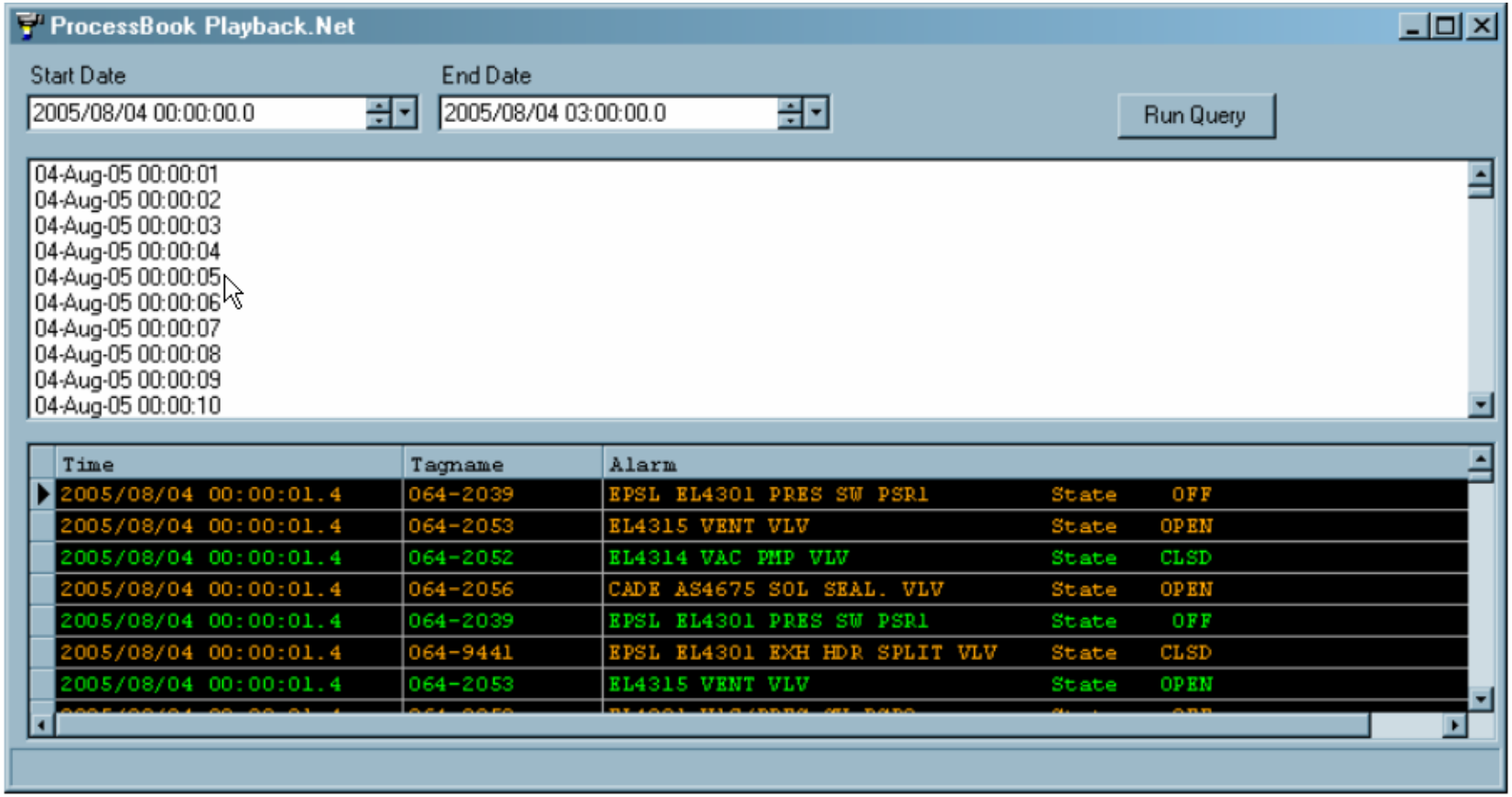
- End users frequently need to review archived DCS screens.
- Site utilizes PI Archive Playback of Process Graphic.
- Originally used a bit map image of the operator console graphic.
- Dynamic symbols had to be built and updated by hand.
- Tags were mapped by hand.
- Time consuming.
- Graphics were frequently out of sync with DCS.



PI Archive Playback

- Custom tool written by NASA contractor
- Leverages existing technologies
- VCR Playback not necessary
- Event-based replay of process graphics
- Works with any PI ProcessBook display

PI Archive Playback



Playback

Code Examples

Start PI Processbook

```
StatusBar1.Text = "Starting Processbook Application"
Application.DoEvents()
On Error Resume Next
pbApplication = GetObject(, "PIProcessbook.Application")
On Error GoTo errorhandler
If pbApplication Is Nothing Then
    pbApplication = CreateObject("PIProcessbook.Application")
End If
' Bring Processbook to foreground
AppActivate("PI ProcessBook")
doc = pbApplication.ProcBooks.Open(OpenFileDialog1.FileName)
StatusBar1.Text = "Connected to PI Server"
RunQuery()
AppActivate("PI ProcessBook")
```

Update Display time

```
    Private Sub UpdatePI()
        Dim isnamed As Boolean
        Dim DisplayTime As Object
        On Error GoTo CreateSymbol
        DisplayTime = pbApplication.ActiveDisplay.Symbols.Item("PIDisplayTime")
        GoTo SymbolExists
CreateSymbol:
        On Error GoTo errorhandler
        DisplayTime = pbApplication.ActiveDisplay.Symbols.Add(PBObjLib.pbSYMBOLTYPE.pbSymbolText)
SymbolExists:
        isnamed = DisplayTime.SetName("PIDisplayTime")
        DisplayTime.Contents = lstValues.Items(lstValues.SelectedIndex)
        DisplayTime.LineColor = PBSymLib.pbTrendCOLOR.pbLtGreen
        DisplayTime.BackgroundColor = RGB(0, 0, 0)
        DisplayTime.EnableScript = True
        Exit Sub
```

Code Examples

Building Trend from HMI screen

```
Sub ProcessBook()
Dim appX
Dim disY
Dim tndZ
Dim tag1
dim success
        success = getPropertyValue( _
                                        "NAME", _
                                        "{EC24EFE2-DE1A-11D3-A926-00600829B130}", _
                                        "Control Connection", _
                                        tag1)
    tag1 = "\\PISERVER\" & tag1
        ' If ProcessBook is not already open, launch it.
    On Error Resume Next
    Set appX = GetObject(, "PIProcessbook.Application")

        If appX Is Nothing Then
            Set appX = CreateObject("PIProcessbook.Application")
        End If

        'Add a new display to the displays collection.
        Set disY = appX.Displays.Add(tag1)
        Set tndZ = disY.Symbols.Add(10)  ' Adds a trend symbol to the display.
        'Add a trace to the trend.
     tndZ.addtrace (tag1)  ' Add the tag to the trend created above.
        'Set the display so that the user will not be prompted to save on exit.
     disY.Modified = False
        'Change the shape and location of the new trend to fit the display.
     appx.maximize
     appx.ActiveDisplay.Zoom = "FitAll"
     appx.ActiveDisplay.Maximize
     appx.ActiveDisplay.Refresh
     disY.Maximize
     tndZ.Maximize True
End Sub
```

PI System-For Diagnostics (From 2002 OSIsoft UC)

- PI Archive Playback of Process Graphic used for Diagnostic/troubleshooting of problems/operator errors
- Process graphic uses a bit map image of the operator console graphic
- Dynamic points (Analog & Digital) populate the graphic from the PI Server history file.
- Future enhancement includes a method where two graphics will not have to be maintained (the operator console graphic & the archive bit map image)

GrITS for ProcessBook

- GrITS: Graphic Import Tool Set
- DCS/SCADA displays converted to PI ProcessBook
- PI Tags substituted for DCS Tags
- Dynamic and Static Elements
- Values
- MultiStates
- Navigation Links
- Supports PI ProcessBook & PI WebParts

Conversion Process

- Conversion can be run in batch or single screen
- Takes only seconds per screen
- Kick off conversion and walk away
- Refresh graphics whenever you want
- Full diagnostic logging of conversion
- Matched/Unmatched Tags listed in logs

100% PI ProcessBook Compatible

- NOT A BITMAP SCREEN SHOT!!
- Polygons
- PolyLines
- Lines
- Ellipses
- Arcs
- Rectangles
- Values
- Bars
- MultiStates
- Navigation Links
- NO CONTROL ELEMENTS ARE REPLICATED!!

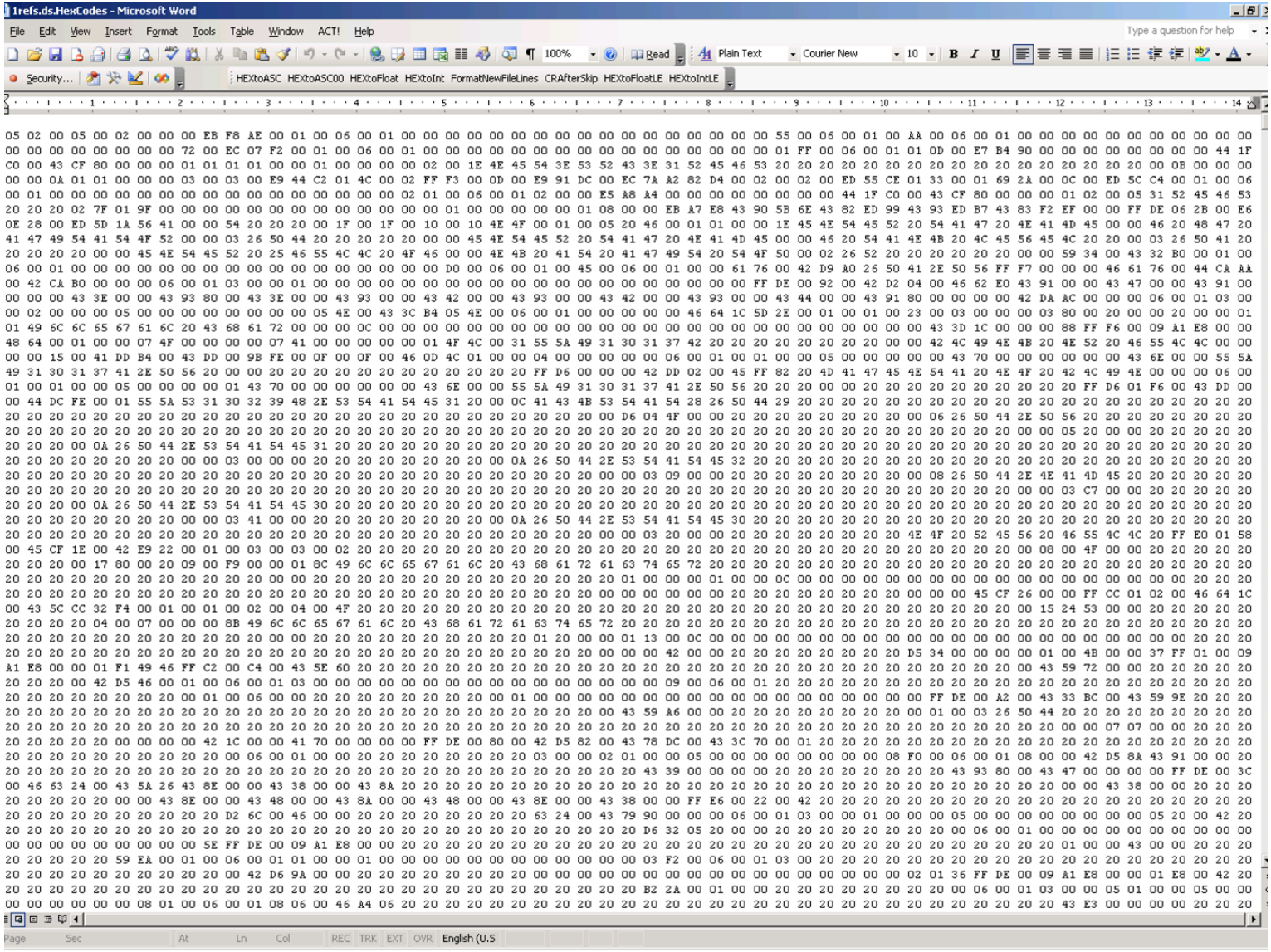
DEMO

GrITS for ProcessBook

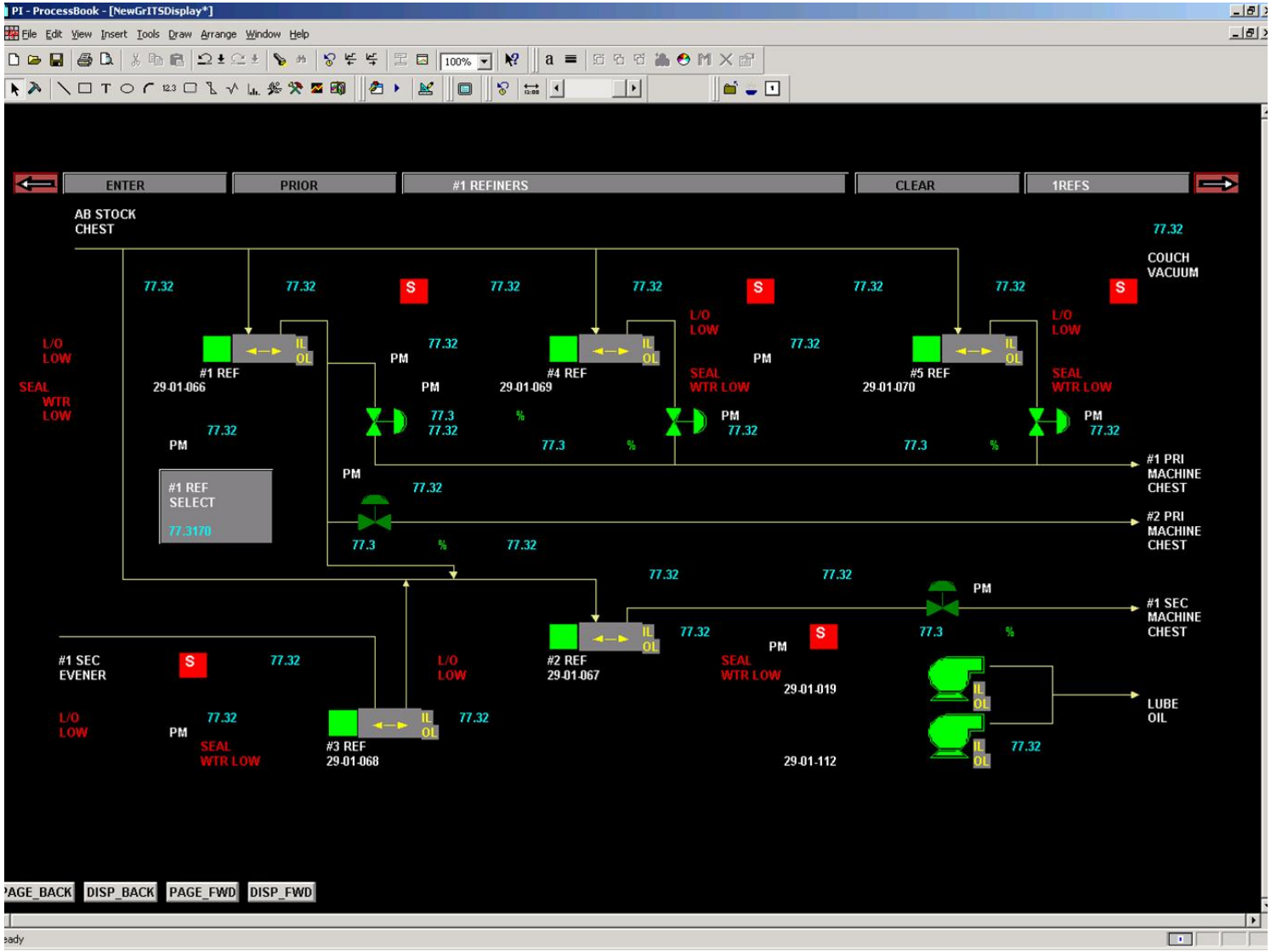
Conversion Technology

- Graphic file formats
- Pattern recognition
- Rosetta Stone
- “The Matrix”

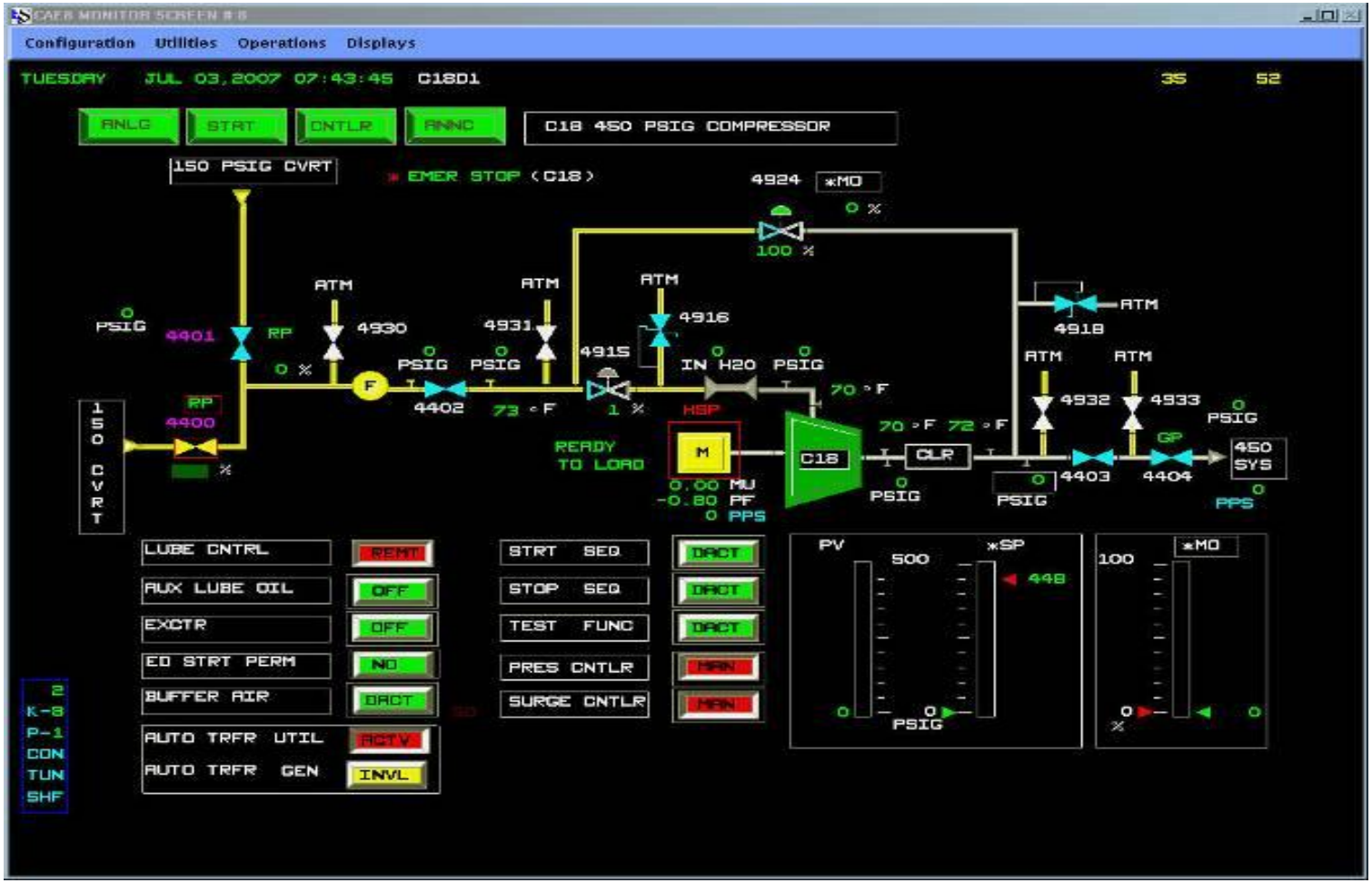
Graphic Binary File



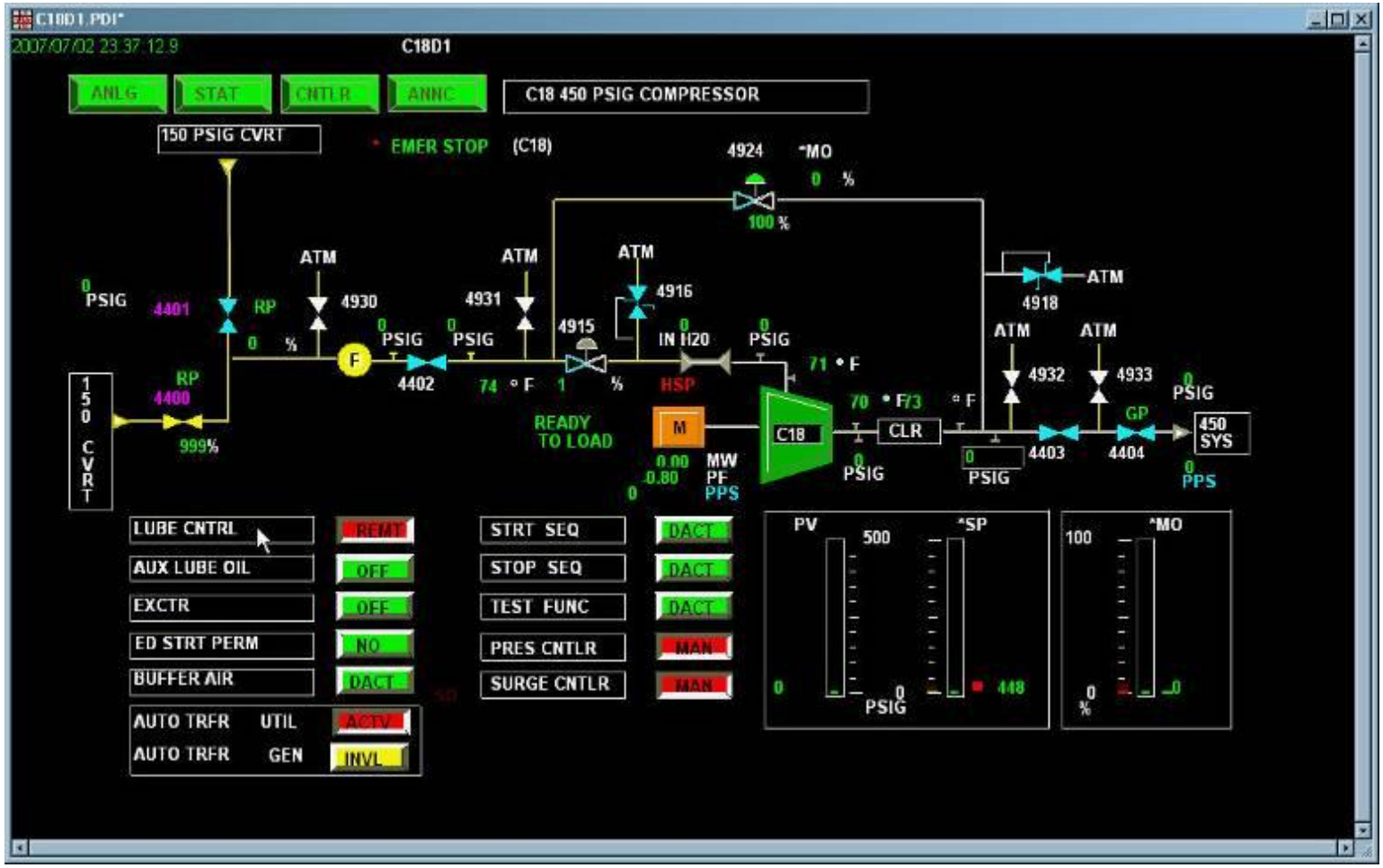
The Converted Graphic



Original Bailey OIS Screen



GrITS for ProcessBook Conversion



Summary

- View operator graphics in real-time or historically
- Find objects and data without knowing tag names
- Leverage the PI System and DCS investment
- Bridge the DCS and PI System environments
- Navigate through PI ProcessBook Displays just like in DCS
- Operator Graphic Mimics

Questions?

Supported Formats

ABB Conductor NT Graphics
ABB Process Portal B Graphics
Bailey OIS SODG Graphics
Bailey System Six Graphics
Emerson DeltaV Graphics
Emerson Ovation/WDPF
Foxboro IA (FoxDraw/FoxView) Graphics
Honeywell PHD ProcessTrends
Honeywell TDC3000 (US Graphics)
Honeywell Experion HMIWeb
Intellution iFIX
Rockwell Automation RSView
Wonderware InTouch

Conclusion

By utilizing Data South Systems GrITS technology, PI Processbook displays are created and re-created depicting endlessly changing input files from originating systems thus enabling more efficient use of engineering time while also eliminating errors. Additionally the ability to re-play alarms and events captured in a different system utilizing the PI SDK allows for enhanced Process upset analysis.

Contacts – Follow up

What would your display look like after a conversion by Data South Systems?

Aaron Brewer - Operations Manager

Data South Systems
Office: (912) 369-7350, x105
Email: aaron@datasouthsystems.com

Charles Campbell - Lead Developer

Data South Systems
Office: (912) 369-7350, x101
Email: charles@datasouthsystems.com

For OSIsoft questions please contact your representative or

Erika Ferguson - Partner Manager, Americas

OSIsoft, LLC
Mobile: (510) 604- 9053
Email: eferguson@osisoft.com

Upcoming Webinars

September 19 - Tag Tuning to Optimize Information Retained in the PI ServerFind objects and data without knowing tag names

October 3 - One Way PI System Data Transmission from Secure to Business NetworksBridge the DCS and PI System environments

October 17 - Overall Equipment Effectiveness in the PI System Ecosystem

November 7 - Process Calculations and Characterization embedded in PI Asset Framework

December 5 - KPIs, Data and Events On Any Mobile Device

Thank you

777 Davis St., San Leandro, CA 94577