



Implementation of PI Historian for Substation Equipment Assessment at PECO Energy

**Progress to date, lessons learned,
and next steps**

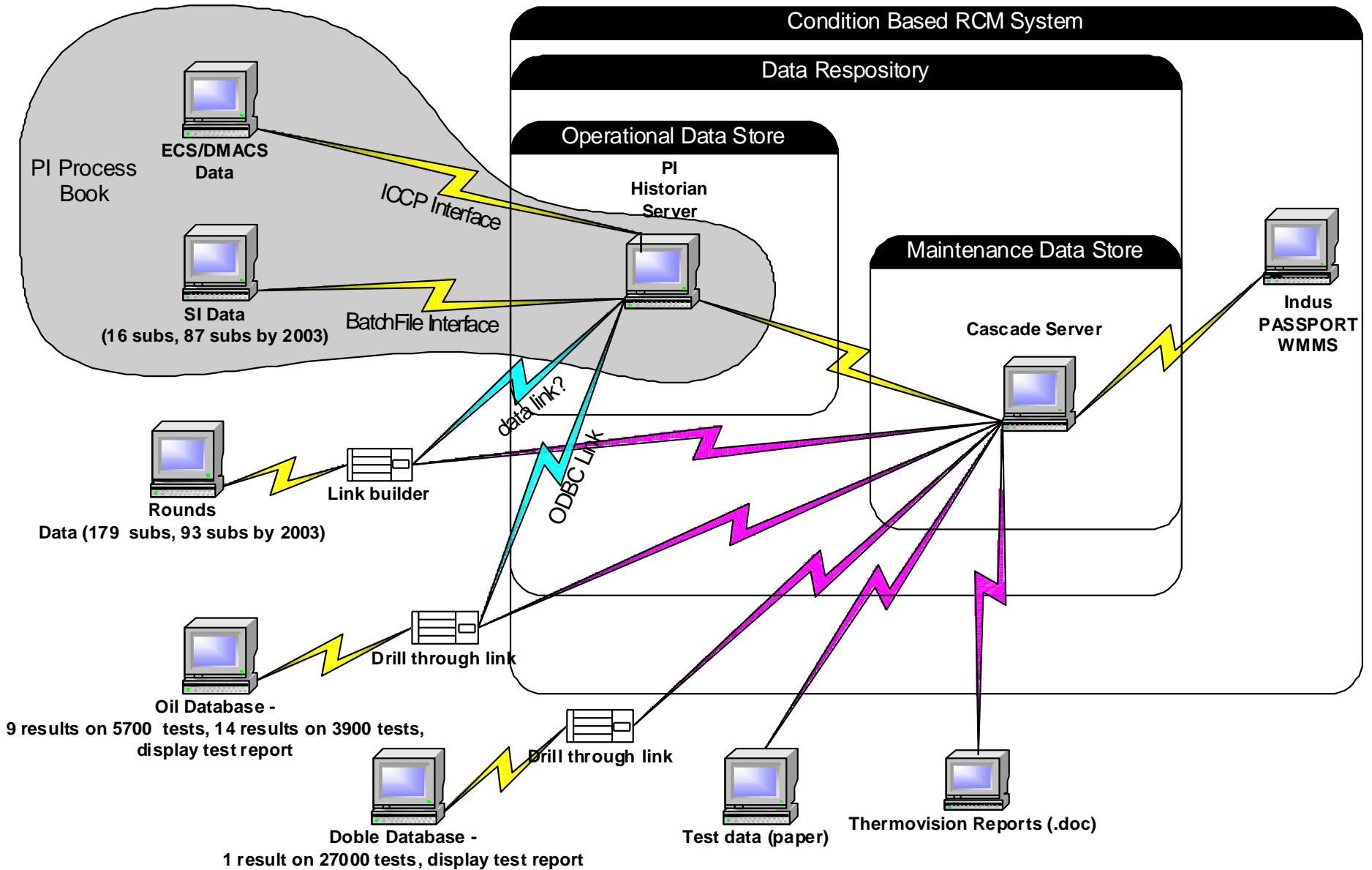
Agenda

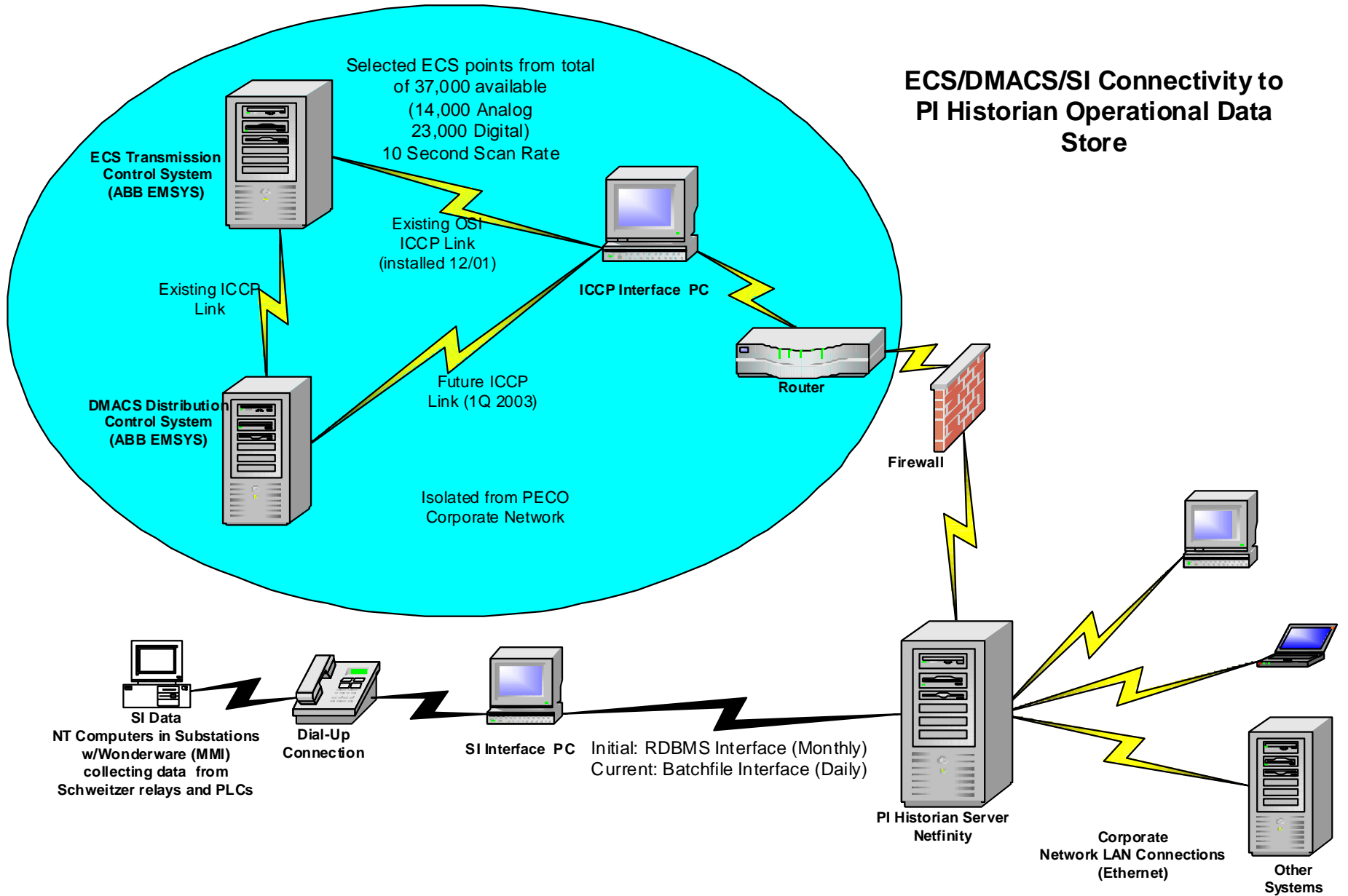
- Maintenance Data Analysis System
 - Background and Goals
 - Current System Architecture
- PI system configuration and history
- Process Book Displays
 - Equipment summary displays
 - Power System ‘batches’
 - IEEE Transformer Standard in Process Book
- Lessons learned to date
- Next steps
- Demo

T&S Maintenance Data Analysis System (MDAS)

- The current maintenance methodology is one that is time based.
- The data analysis system will allow us to store pertinent information (data warehouse) used by the knowledge management system (expert rules) to determine when a piece of equipment requires maintenance.
- Moves us from time based maintenance to condition based maintenance.
- Currently collecting over 48 Million data points per year from 9 SI substations.

Maintenance Data Analysis System (MDAS) Overview



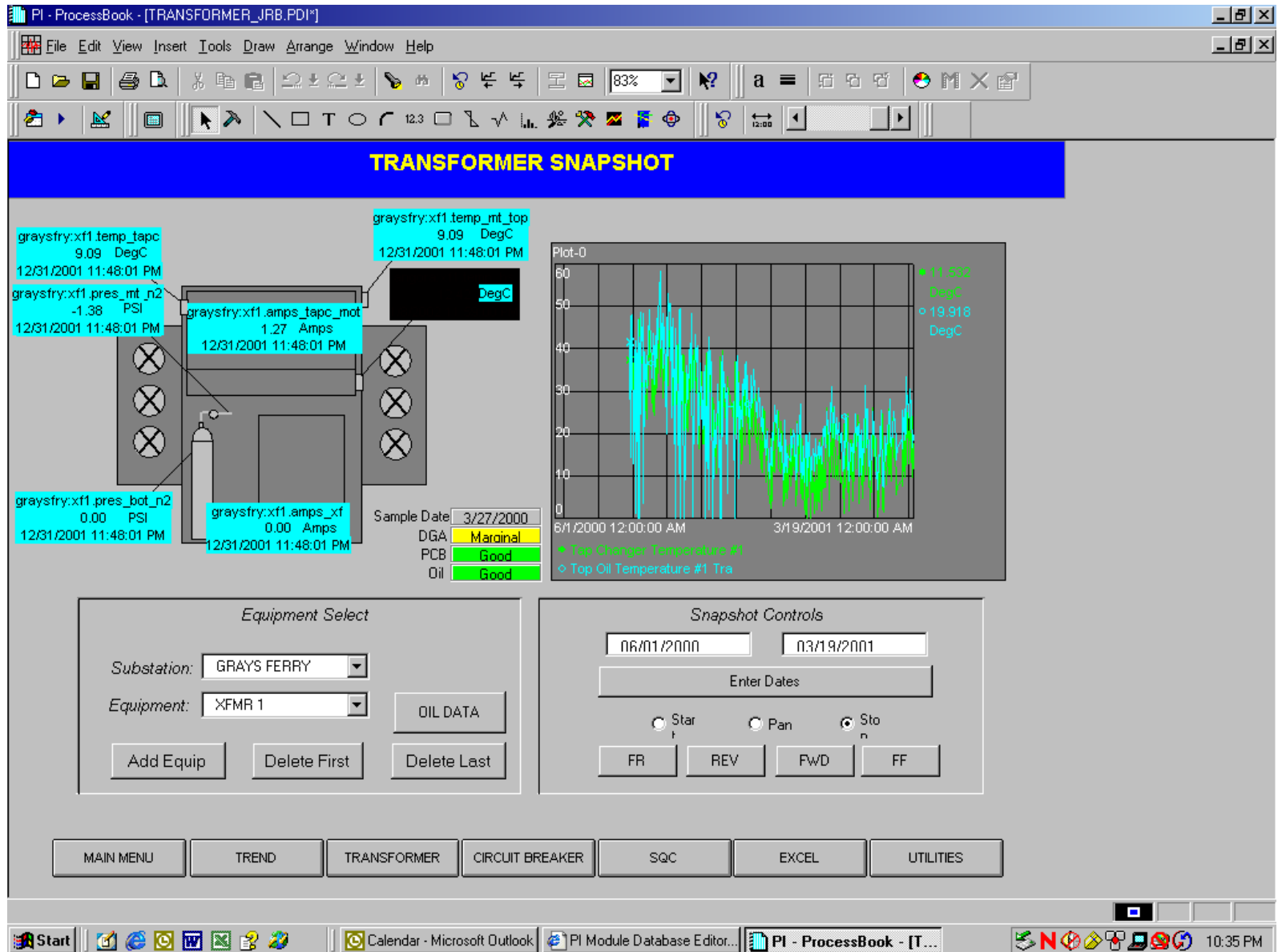


PI Historian Implementation

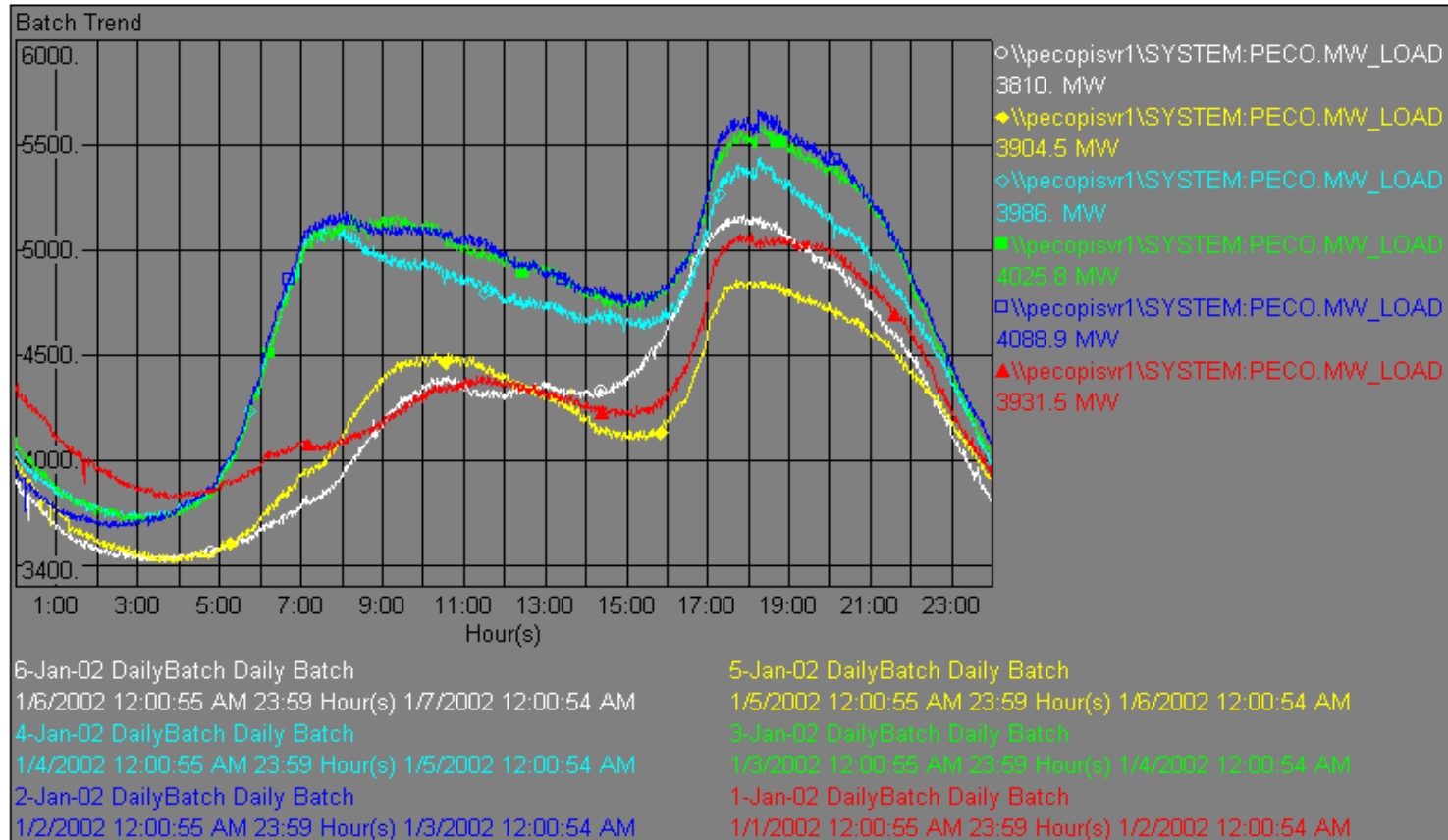
A short history

- Test server (v3.2) delivered from vendor in February 2001.
- Test server rebuilt (v3.3) in July 2001
- Production server configured in August 2001.
- Production server databases rebuilt in November 2001.
- ICCP interface installed in December 2001.
- PI-Ping and Perfmon purchased in December 2001.
- Batchfile interface begins use in January 2002.

Transformer Process Book Display with ODBC links



Batch Trends



IEEE Standard in Process Book

PI - ProcessBook - [PI IEEEEX.PDI*]

File Edit View Insert Tools Draw Arrange Window Help

88%

Testing PI Implementation IEEE Standard C57.91-1995 Appendix C

| | | | | | |
|--------|-------|--------|-------|------|----|
| XKVA1 | 28000 | TAR | 30 | LCAS | 1 |
| TKVA1 | 75 | MC | 2 | THS | |
| PW | 51690 | PUELHS | 0 | TVV | |
| PE | 0 | TALVV | 5 | TTO | |
| PS | 21078 | HHS | 1 | TTDO | |
| PC | 36986 | WCC | 75600 | TBO | |
| XKVA2 | 52267 | VTANK | 31400 | MA | 2 |
| THKVA2 | 65 | MF | 1 | MPR1 | 1 |
| THEWA | 63 | GFLUID | 4910 | DTP | 15 |
| THEHSA | 80 | MCORE | 0 | JJ | 97 |
| THETOR | 55 | TIMCOR | 0 | | |
| THEBOR | 25 | PCOE | 36986 | | |

Test Date: 8/16/00

| Time point | Ambient Temp | Per Unit Load | Calculated | | | Measured | |
|------------|--------------|---------------|-----------------|---------------|--------------|---------------|--------------|
| | | | Time | Per Unit Load | Ambient Temp | Hot Spot Temp | Top Oil Temp |
| 0 | 31.5 | 0.266 | 16-Aug-00 00:00 | 0.266 | 31.5 | 47.84 | 44.8 |
| 15 | 31.4 | 0.263 | 16-Aug-00 01:00 | 0.253 | 31.0 | 47.11 | 44.2 |
| 30 | 31.2 | 0.259 | 16-Aug-00 02:00 | 0.247 | 30.7 | 47.62 | 44.7 |
| 45 | 31.0 | 0.255 | 16-Aug-00 03:00 | 0.243 | 30.3 | 47.80 | 45.0 |
| 60 | 31.0 | 0.253 | 16-Aug-00 04:00 | 0.243 | 29.5 | 47.87 | 45.0 |
| 75 | 30.9 | 0.250 | 16-Aug-00 05:00 | 0.254 | 29.3 | 47.71 | 44.8 |
| 90 | 30.7 | 0.248 | 16-Aug-00 06:00 | 0.279 | 29.1 | 48.06 | 44.6 |
| 105 | 30.6 | 0.248 | 16-Aug-00 07:00 | 0.307 | 29.3 | 48.61 | 44.7 |
| 120 | 30.7 | 0.247 | 16-Aug-00 08:00 | 0.329 | 30.1 | 49.50 | 45.1 |
| 135 | 30.7 | 0.245 | 16-Aug-00 09:00 | 0.362 | 29.3 | 51.19 | 46.1 |
| 150 | 30.6 | 0.245 | 16-Aug-00 10:00 | 0.373 | 29.5 | 52.03 | 46.5 |
| 165 | 30.5 | 0.243 | 16-Aug-00 11:00 | 0.383 | 29.5 | 52.84 | 47.1 |
| | | | 16-Aug-00 12:00 | 0.379 | 31.7 | 52.90 | 47.2 |
| | | | 16-Aug-00 13:00 | 0.374 | 33.0 | 53.89 | 48.5 |
| | | | 16-Aug-00 14:00 | 0.370 | 32.6 | 55.09 | 49.7 |
| | | | 16-Aug-00 15:00 | 0.367 | 32.9 | 55.49 | 50.1 |
| | | | 16-Aug-00 16:00 | 0.358 | 33.2 | 55.55 | 50.4 |
| | | | 16-Aug-00 17:00 | 0.347 | 32.2 | 55.74 | 50.7 |
| | | | 16-Aug-00 18:00 | 0.321 | 31.4 | 54.72 | 50.2 |
| | | | 16-Aug-00 19:00 | 0.296 | 30.4 | 53.27 | 49.2 |
| | | | 16-Aug-00 20:00 | 0.292 | 30.2 | 51.94 | 48.0 |
| | | | 16-Aug-00 21:00 | 0.289 | 29.7 | 51.11 | 47.3 |
| | | | 16-Aug-00 22:00 | 0.294 | 29.0 | 50.64 | 46.8 |
| | | | 16-Aug-00 23:00 | 0.259 | 27.9 | 49.50 | 46.0 |

0.0212 Equilivant Aging 24 Load Cycle Duration 0.0009 Eq. Aging Factor

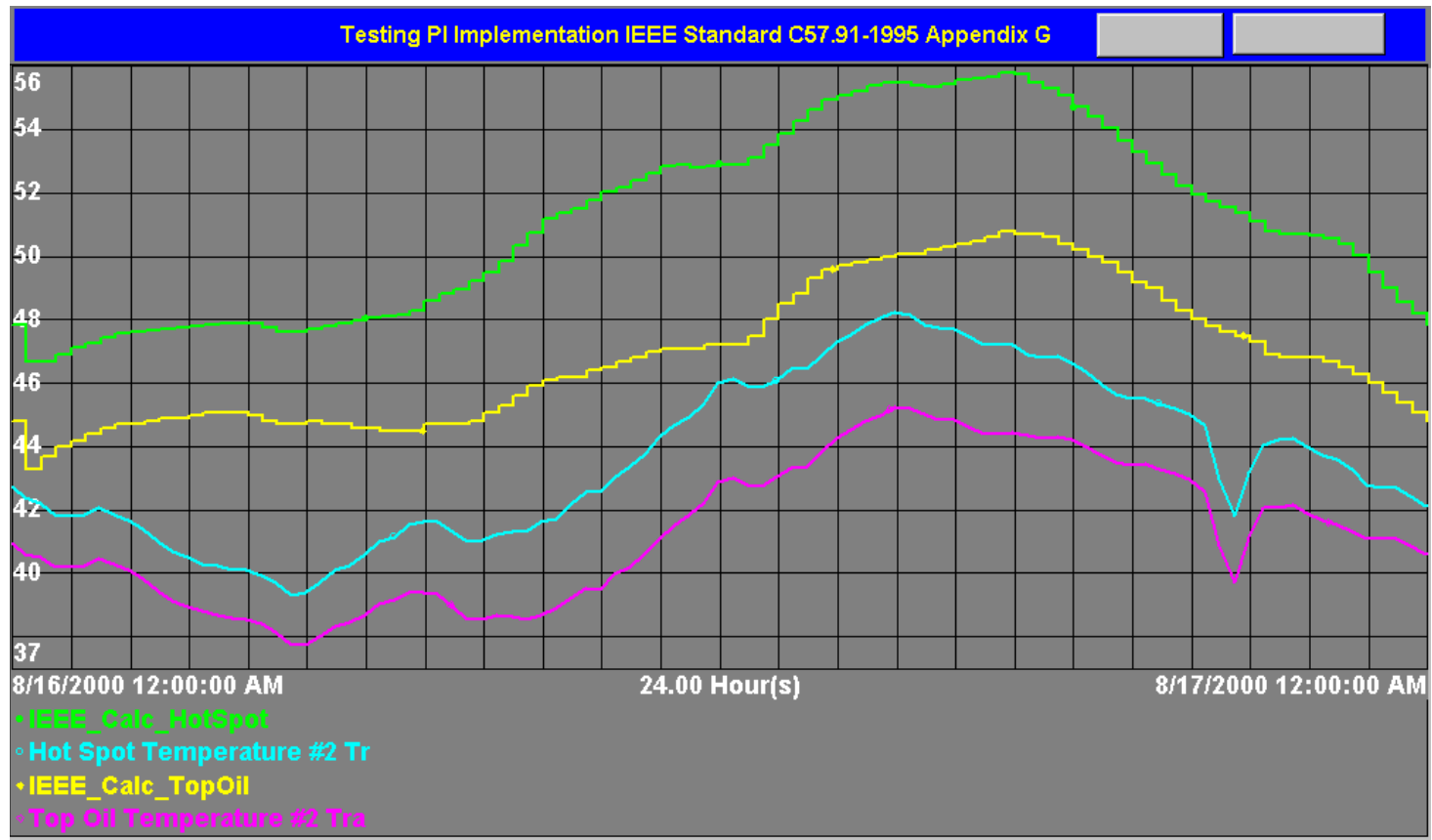
View Trends

Clear

Ready

Start | Calendar - Microsoft... | PI Module Database... | PI - ProcessBoo... | Microsoft PowerPoin... | 10:41 PM

IEEE Standard Graph



Lessons Learned

- Train early and often.
 - Initial training held, but ongoing training needed.
- Define PI point naming convention earlier.
- Use DevNet to jumpstart development.
- Spend the time up front to verify all data and compression settings.
 - OSI provides a good set of tools to modify and update archives.
- ICCP link is difficult to set-up initially, but once configured it runs well.
 - Be sure to have access to EMS vendor during install.
- Batchfile interface is simple and reliable.

Next Steps

- Use Module Database for ODBC links to other systems.
- Use Module Database for Equipment displays
- PI ACE?
- Web displays.

Demonstration of Displays