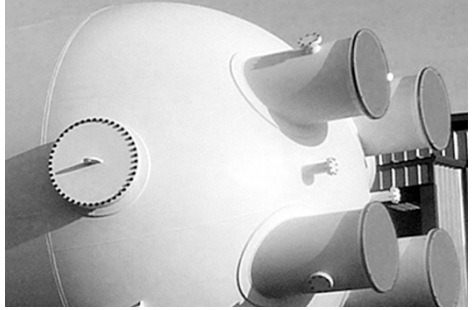
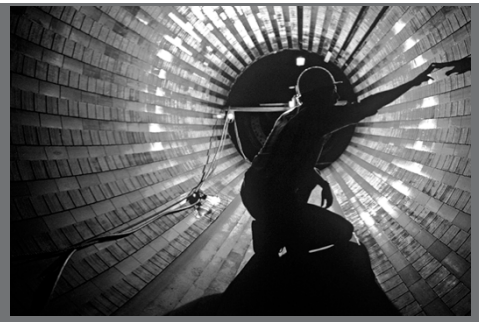


FAMOS - PdP Fleet Conversion



Scientech 2015 User's Group Meeting Aug 11 -13, 2015

PdP Fleet Conversion for Large US Power Producer

- Early adopter of advanced pattern recognition for condition monitoring
- Mix of technology providers due to parentage of assets absorbed into the organization

Advanced Pattern Recognition \ Performance Monitoring Conversion Project Goals

- Implement a low cost and scalable performance monitoring solution across its legacy fossil plants as well as emerging renewable solar thermal, PV, and wind plants
- User Configurable and Customizable – to perform M&D in-house
- Robust solution to handle diverse current and future generating assets
- Consolidate two existing APR systems (FAMOS-PdP and a competitor product) into one standardized system

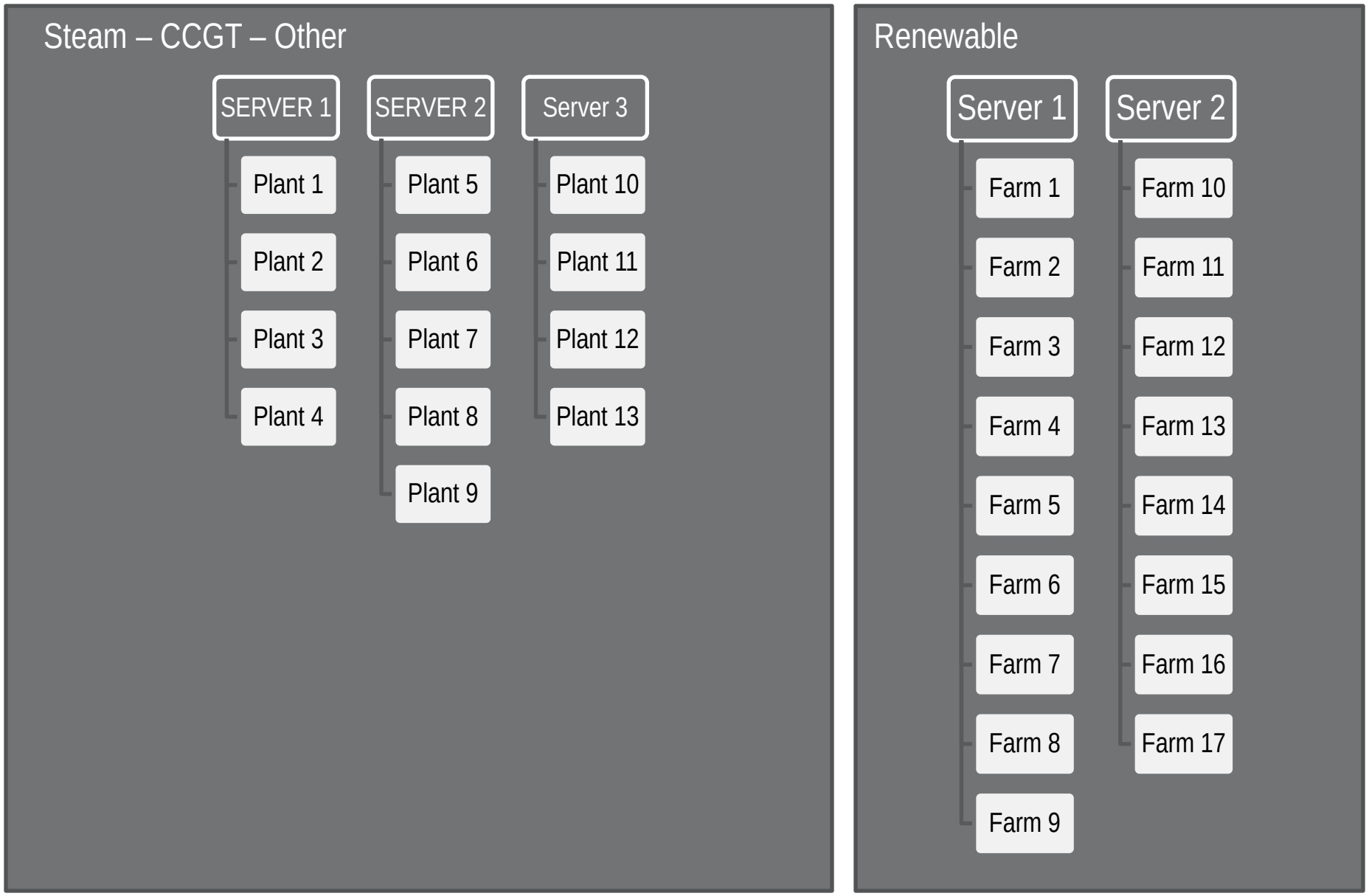
Project Kick-Off – Key Items Addressed – and a Key to Success

- Technology
  - Servers
  - Software (New Servers and Upgrades)
- Schedule and Scope
  - Scope (Plants to be Included)
  - Conversion Process
  - Training
  - Roles and Responsibilities
- Project Controls
  - Communications
  - Weekly Status Meetings

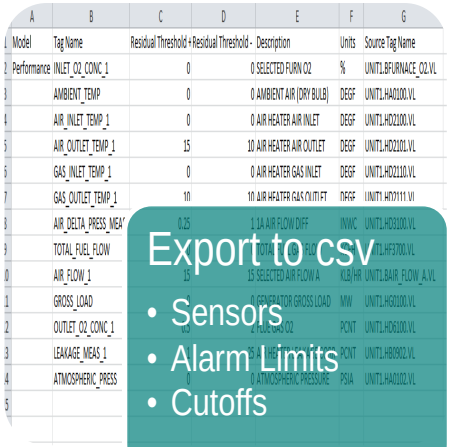
Final Scope

- Convert fleet running on competitor APR platform to FAMOS v19
  - Many (possible 1000+) models and associated reference file data to convert
  - Install on new 2012 R2 servers (room for additional databases to be built by Client)
- Upgrade Legacy FAMOS Steam Units from v16 to v19
  - Merge existing separate PdP and PMAX databases into common
  - Reduce number of databases from to minimize # servers required
- Migrate PdP databases to new 2012 R2 servers running v19
  - Large number of assets (possibly 1000+)
- Install new 2012 virtual servers and retire old 2003 servers

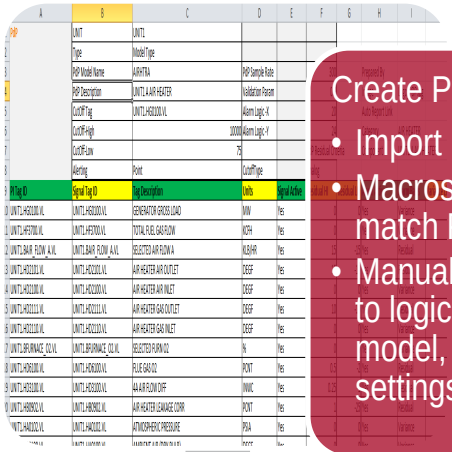
Client Servers



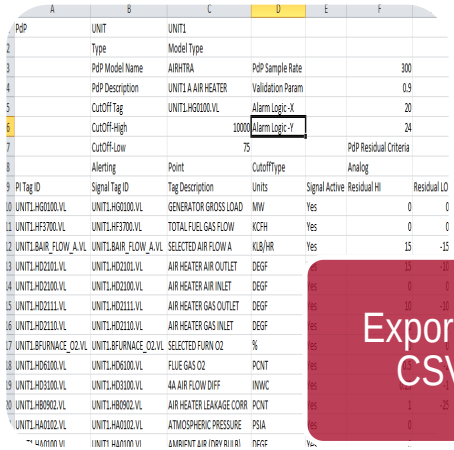
Model Conversion Process



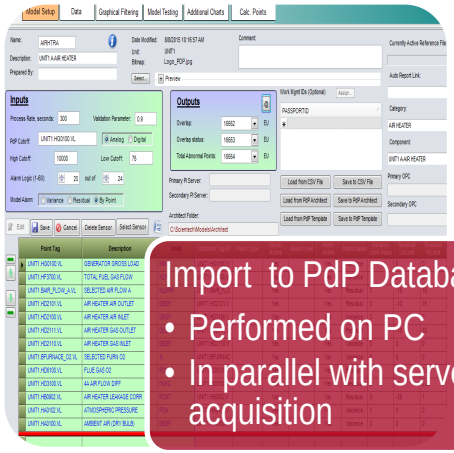
Export to csv
- Sensors
- Alarm Limits
- Cutoffs



Create PdP Model in Excel
- Import Client csv
- Macros to reformat to match PdP requirements
- Manually reorder sensors to logical order, name model, update other PdP settings



Export to CSV

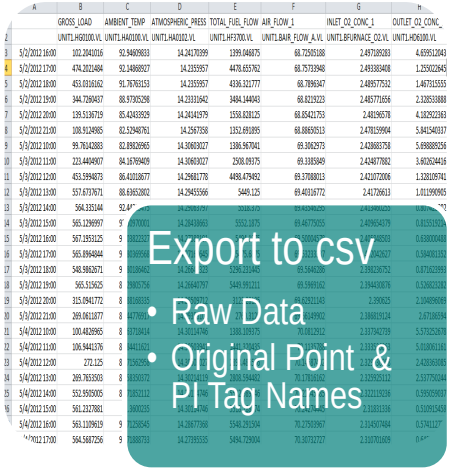


Import to PdP Database
- Performed on PC
- In parallel with server acquisition

Client

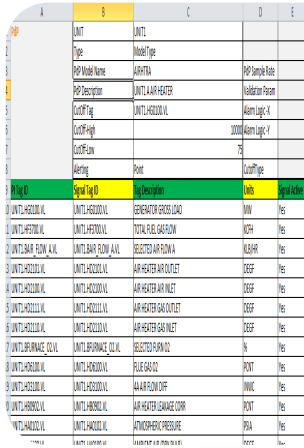
Curtiss-Wright

Reference File Conversion Process



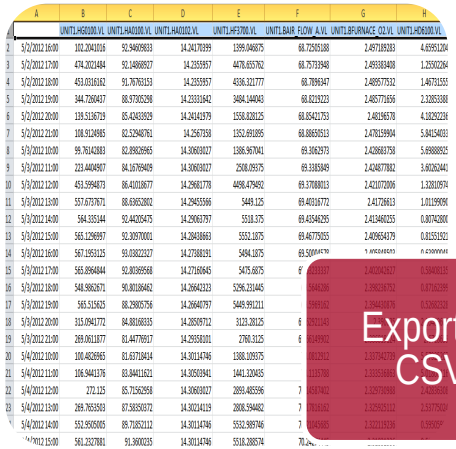
Export to csv

- Raw Data
- Original Point & PlTag Names

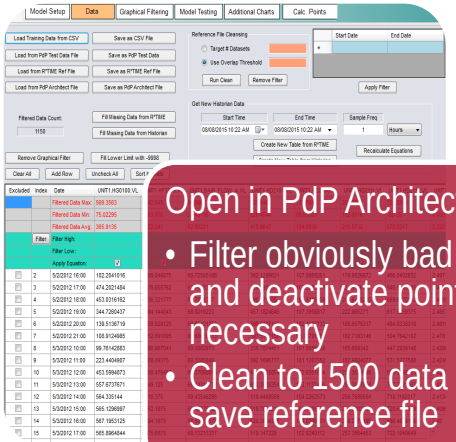


Modify Data CSV in Excel

- Macros to rename tag names to new PdP sensor names
- Eliminate row of Original Point Names
- Replace text and Blank Cells with -9999



Export to CSV



Open in PdP Architect

- Filter obviously bad data and deactivate points as necessary
- Clean to 1500 data sets and save reference file

Client

Curtiss-Wright

Data Conversion Process – Overlapping Parallel Effort for Large Fleet

• Week 1 - Week 8	• Client Data Provided to Curtiss-Wright
• Week 1 - Week 12	• Curtiss-Wright Converts Data
• Week 11- Week 15	• Client Installs Server
• Week 12 - Week 16	• Curtiss-Wright Installs and Configures Software
• Week 14 - Week 18	• Curtiss-Wright Installs New Databases/Models
• Week 15 - Week 22	• Client/Curtiss-Wright Validate Models
• Week 18 - Week 23	• Client Communicates Start Up to Plant
• Week 19 - Week 28	• Client Trains Plant End Users
• Week 15 - Week 29	• Parallel Run with Legacy System
• Week 23 - Week 29	• Client Plant Accepts Performance
• Week 25 – Week 31	• Legacy Server Shutdown

Conversion from legacy APR to server ready PdP Models approximately 11 Weeks at a pace of 5 units per week

Demo

Convert Generic Model and Data CSV files into functional PdP Model and Reference File

Keys to Success

- Productive Kick Off Meeting
  - Well defined scope
  - Achievable milestones
  - Clear roles and responsibilities
- Project Team Collaboration
  - Weekly Project Progress calls highlighted any bottlenecks
  - Mutual support between Client and Curtiss-Wright Data Conversion and Server teams to address any issues in a timely fashion to keep to schedule

Questions