



O&M Training Key to Successful Startup & Commissioning

Training = Safety

District Energy, Second Quarter 2015

"The Silver Tsunami", Tim Griffin, PE LEED AP, Principal, RMF Engineering Inc.; and Kathryn Ramsted, Editorial Associate, District Energy

PricewaterhouseCoopers:

"52 percent of skilled engineers needing to be replaced by 2020"

Challenges	Goals
New Hires	Safely Operate Equipment
Younger Staff	Safe Startup
Lack of Experience	Safe Shutdown
No Dedicated Institutional Training	Safely Manage Emergency Situations

New Technology



Heat Recovery
Steam
Generator
(HRSG)

SCR Catalyst
 NH_3 Injection



Steam Turbine
Generator

Condensing
Cond/Extraction
Back Pressure



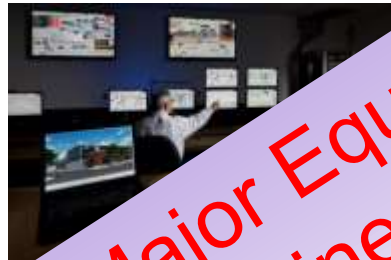
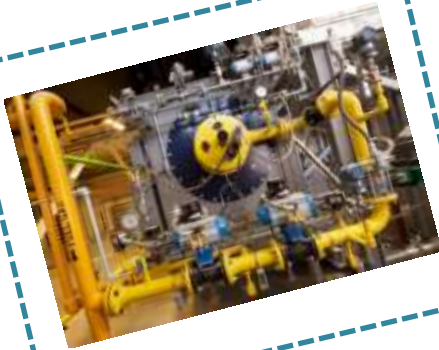
Aeroderivative
Combustion Gas
Turbine
Generator

DLE (Dry Low
Emissions)
Technology

New Equipment - New Controls



Required by Specifications



Major Equipment Training
Contained in Specifications

Millions of Dollars Invested

JACOBS

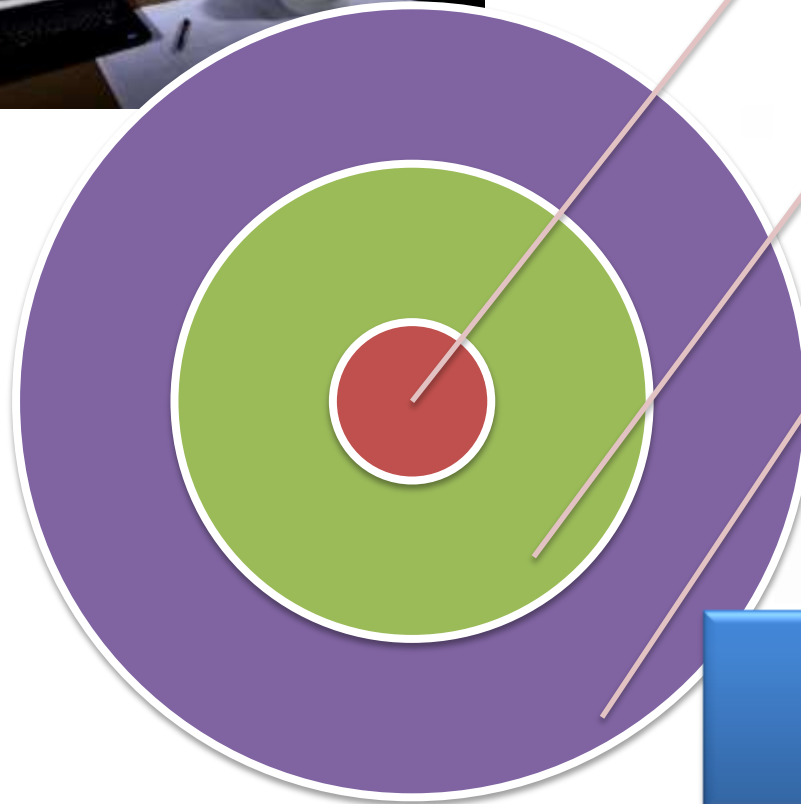
Why Systems Training?



Connecting the Dots



Train For- State of the Art Facility



21st Century State of
the Art CHP Plant

'40s '50s & '60s
Steam & Electric
Equipment

Outdated Inefficient
Vintage Power Plant

Multi-Million Capital
Investment

O&M Staff Training

Two Parts

Vendor Training

Systems Training



Equipment Specs



By Contract

O&M Staff Training

Linking the Two Together

Vendor Training

- Chillers
- Cooling Towers
- Combustion Turbines
- HRSGs
- RO/Water Treatment
- Switchgear



Systems Training

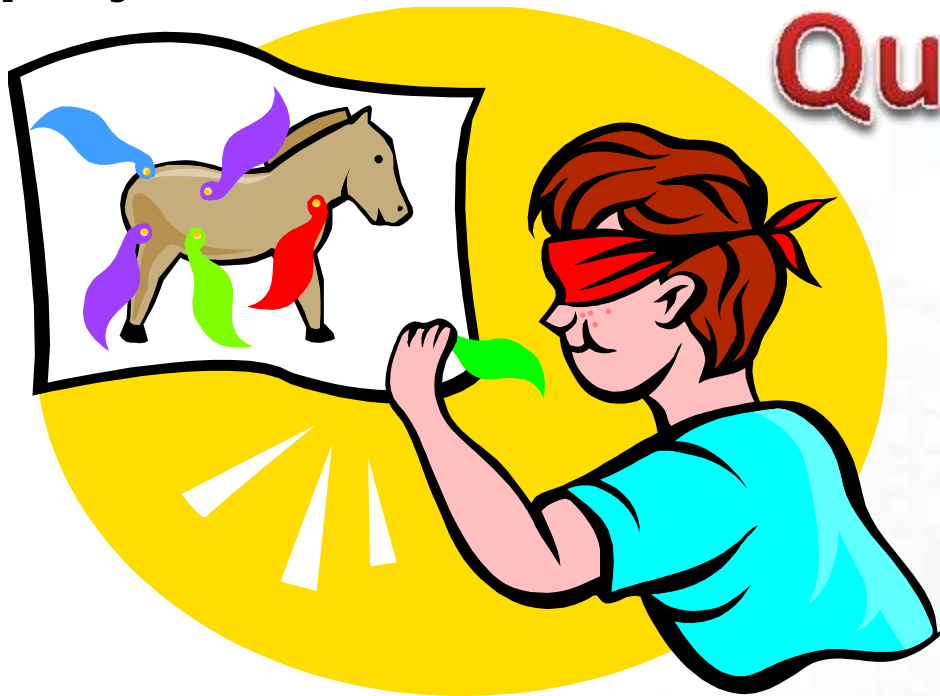
- Chilled Water System
- Condenser Water System
- Power Generation Systems
- Steam System
- Makeup Water
- Electrical Systems

O&M Staff Training - Elements

- Write training requirements into Specs
- Begin early in design process
- Coordinate with Cx
- Be realistic in estimating project scope
- Account for Vendor Participation (no shows)
- Accommodation for multiple shifts

Training Approach

- Don't leave training to end of project...!!



Questions..?

Pin the Tail on the Donkey Approach
Not the way to go...!!!