

Digital Era Controls That "Take The Load Off Your Buildings"

Demand Based Controls





Today's Expectations

Increased tenant comfort

Faster response

Better stability

Increased system efficiency

LEED / GRIHA Certification





Conventional PID Feedback Loop Control



Challenges:

- Multiple reset points
- · Comfort
- · Hunting
- Silo operation not plant efficiency





Traditional PID controls

TYPICAL PID CONTROL SEQUENCES

- · Capacity Based sequencing
- · Constant flow cooling towers, CWT setback
- · 3 system feedback PID loops Demand Based Control







Digital Era controls for Plant Automation

What is "Different"?

· All variable speed plant with variable speed tower pump, tower fan, primary pump.

CONTROL SEQUENCES

- · Natural curve sequencing
- · Equal marginal performance principle
- · Demand Based Control







Variable Speed Devices Are More Efficient At Part Load By Design



Different Performance Curves Different Method Of Control





Part Load operation is the key!

1.8 1.6 1.4 •55 Deg F 65 Deg F 1.2 75 Deg F kW/ton 1 -85 Deg F 0.8 0.6 0.4 0.2 0 0% 20% 40% 60% 80% 100% % Chiller Load

VS Chiller kW/ton (Centrifugal)





Natural Curve Effect With Variable Flow and Variable Speed Tower



Lower approach
temperature
provides the
opportunity to
operate on the
lower curves on the
previous slide (ie
higher chiller eff.)





Plant Health Monitoring & Verification

Why Monitoring is important.

- Saves the owner money.
- Confirms that plant operates as predicted

 Eliminate risk of human nature – cannot humanly monitor all trends to detect system issues







Case Study - All Variable Plant Control for a Hotel Project

- · Predicting 8760hrs Load profile.
- · Weather profile.
- · Equipment efficiency at various Load conditions.
- Energy analysis / calculations with permutation and combination.
- · Selecting equipment based on the results.





Energy Analysis





Percent Plant Design Load



Estimated savings And Payback on Incremental project cost

- · Estimated Base case plant annual kw/TR 0.71
- · Proposed case plant annual kw/TR 0.598
- Savings by demand based controls 12%
- · Payback on Incremental cost 16 months





Performance Monitoring



ENERGY MAKING SENSE



Performance Monitoring

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- 23 plant performance and trending views
- Accessible through remote connection
- Downloadable dataset that holds 1 year of operating datapoints
- · Alarms from plant events recorded
- · Alerts Sent through email.





Armstrong Solutions: Two Configurations

IPC 11550 System

OPTI-VISOR[™]



(IPC) System





ECO*PULSE™ Health Management System

- · Web Based Asset Management Service
- Real time predictive performance assessments
- · Quarterly Reports
- · Data compliance for 189.1
- · Trouble shooting recommendations
- · Time of use utility rate schedule
- · Scheduled Event Pre-conditioning
- · Comfort Assessment
- · Environmental Impact Trending
- · Bench Marking

IPC 11550 System



OPTI-VISOR[™]





Thank You

