ReCommissioning: Solving Arena Problems & Reducing Energy Costs

Center for Energy and Environment

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Why ReCommissioning?

- Solve Arena Performance Problems
- Reduce Energy Costs

The “small details” in design & operation often have a big impact on the performance.
Arena Problems: Dehumidification

- Water dripping from ceiling
- Premature ceiling deterioration
- Dehumidication Equipment
- Desiccant system control
Dehumidification Equipment Problems

Hot, moisture laden air is drawn into the arena in an uncontrolled fashion.

Arena Air Flow Imbalance: Summer, West Arena Only
Dehumidification Equipment Problems
Desiccant/Ventilation Control Problems

- Very Common Problems
  - Adjusting outdoor air for resurfacing
  - Adjusting outdoor air for events
  - User interface

- Site-Specific Problems
  - Controls used desiccant for heating
    - 35-40% efficiency
    - 76% efficiency of duct furnace in system
    - Up to $14,000 annual energy cost impact
Arena Problems: Refrigeration System Control

- Evaporative condenser freeze-up
- Scaling of evaporative condenser
- Repeated compressor failure from liquid slugging
- Excessive vibration at pump start-up
- Accelerated compressor wear
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Reduce Energy Costs

- Major Arena Equipment Upgrades
  - Heat Reclaim
  - Low-emissivity ceiling
  - Demineralized flood water treatment
  - Refrigeration equipment replacement

*Large investments to achieve large energy cost savings.*

*Reduced equipment capacities can offset costs in new construction.*
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- Improving Existing Systems—Focus of ReCx
  - Optimal outdoor air control
  - Optimal condenser control--VFD
  - Glycol pump control
  - Part-load compressor control

Recommissioning is often undertaken to solve problems, and the resulting energy cost savings makes it a great investment too.
Affects how hard compressor works to push heat “uphill”

Fan motor >> pump motor

Condenser Control

- Condenser (high temp. & press.)
- Expansion Valve
- Brine Chiller/Ice Sheet (low temp. & press.)
- Compressors

Heat
Condenser Control: Design Conditions

Hot Summer Day

Compressors
Condenser Control: With High Head Pressure Settings

Cold Winter Day

Compressors
Commissioning: Quality Control For Building System Construction or Upgrades

- Verify that design can achieve what arena wants
- Verify at steps along the way while it's cheaper to make corrections.
- Stave off common problems with coordination.
- Verify performance and control as-installed.
What Are the Solutions & Best Opportunities for Your Arena?

That Depends On:

- Current Performance Problems
- Current Energy Use
- Degree of Space Heating
- Operating Season
- Hours of Operation
- Current Equipment
- Controls Capabilities & Settings
- Building Envelope
- Staff/Contractor Capabilities
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