



One-Stop:
Analysis
Planning
Construction
Management
Verification

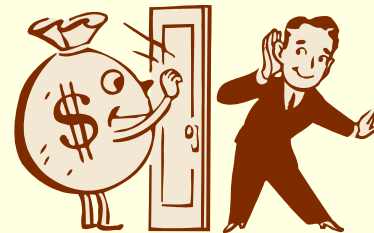
ReCommissioning: Solving Arena Problems & Reducing Energy Costs

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Why ReCommissioning?

- Solve Arena Performance Problems
- Reduce Energy Costs



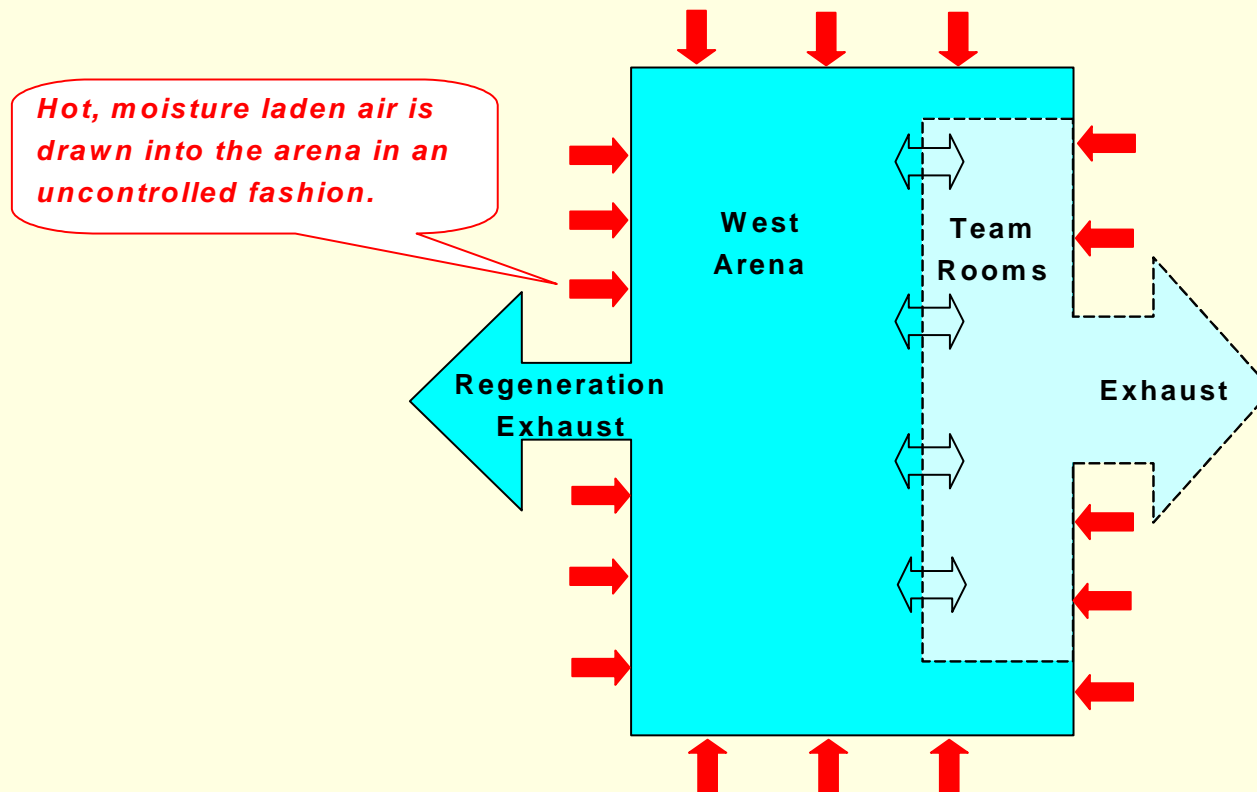
The “small details” in design & operation often have a big impact on the performance.

Arena Problems: Dehumidification

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



Dehumidification Equipment Problems



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

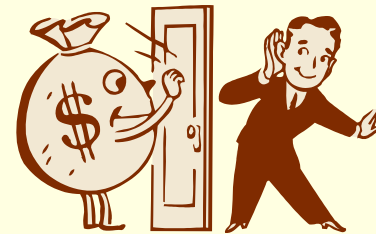
- Evaporative condenser freeze-up
- Scaling of evaporative condenser
- Repeated compressor failure from liquid slugging
- Excessive vibration at pump start-up
- Accelerated compressor wear



Why ReCommissioning?

☑ Solve Arena Performance Problems

☞ **Reduce Energy Costs**



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



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.



Reduce Energy Costs

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Reduce Energy Costs

- Improving Existing Systems—
Focus of ReCx
 - Optimal outdoor air control
 - Optimal condenser control--VFD
 - Glycol pump control
 - Part-load compressor control

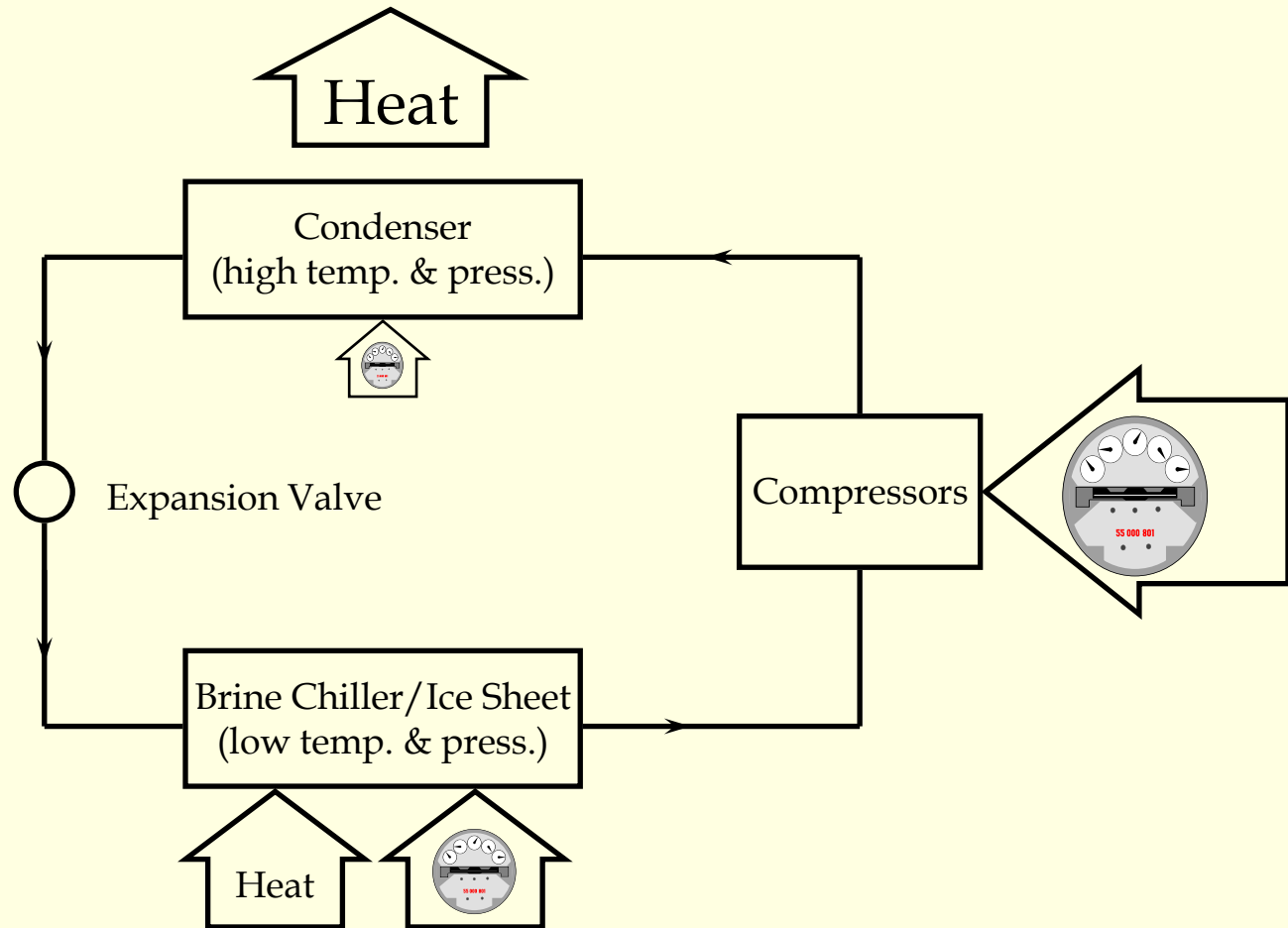


Recommissioning is often undertaken to solve problems, and the resulting energy cost savings makes it a great investment too.



Condenser Control

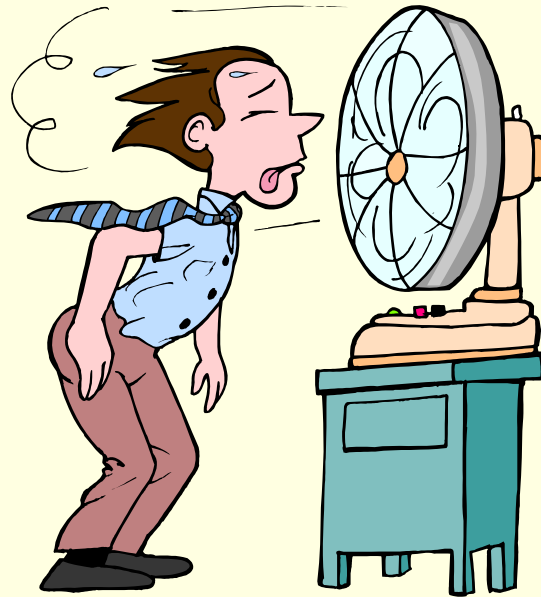
- Affects how hard compressor works to push heat “uphill”
- Fan motor >> pump motor



Condenser Control: Design Conditions

Hot Summer Day

Compressors



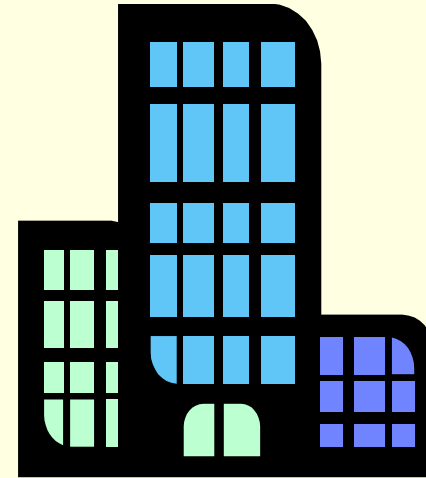
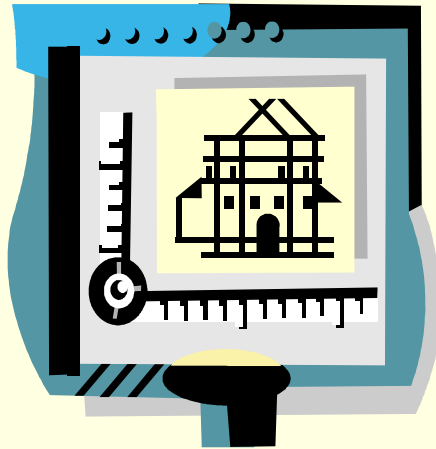
Condenser Control: With High Head Pressure Settings

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 its 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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