Cold Storage/Food Evaporator and Condenser Fan VFD Applications

Why Groom for VFDs

- Experienced variable frequency drive Integration
- 20+ years applying, engineering, selecting and installing
- Designed for simplicity and installed to last an average of 20 years
  - Line reactors
  - Output filters
  - Bypass
  - Electrical installation
  - Sizing the correct drive
  - Maintenance
  - Avoiding issues that lead to failures
- More than 2000 VFDs installed at many locations
### Why Use VFDs on Fans?

#### Affinity Laws for Centrifugal Loads

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<tr>
<th>Speed</th>
<th>Volume</th>
<th>Pressure/Head</th>
<th>Horsepower Required</th>
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### Cold Storage/Food Applications

#### Condenser/Tower Fans
- Most larger facilities have them
- Over 5hp fans are best
- These fans can and usually do cycle on and off all year
- They cycle to maintain pressure in the system
- Look for systems with over capacity, meaning all the fans are not running all the time
- Multiple cells and motors will have a quicker payback
- Two fans running at 50% speed, achieve the same cooling as 1 at full, but it saves 75% of the energy

#### Evaporator Fans (VFDs)
- Most all locations have them
- These fans have very high runtime
- Some cycle on and off, but most do not, because some airflow is usually needed all the time
- VFDs can be added and fans slowed down as the desired setpoint in the room is reached or when the refrigerant flow to the evaporator is shut down.
- Usually over 3hp is best (depending on the quantity of fans in the room)
- Payback is usually under 2 years
Evaporator Fans (ECM)

- Smaller locations will have smaller fans that can benefit from ECM motor replacements and ECM controls.
- If the Evap fans are smaller than 1hp, then we can retrofit the motors to ECM technology and slow the fan speed down to 70-50% when refrigerant flow is not flowing thru the evaporator.
- Payback usually under 2 years.

ECM Case Study

Peak day (5/23/11)
Cold Storage Case Study

Cold Storage Example: this example is based on $0.08/KW
6 - 25hp two-speed condenser fans
47 Evaporator fans, (2-30hp, 16-15hp, 1-10hp, 12-5hp, 16-3hp)
• Installed VFDs on the condenser fans and modulated the fans up and down in speed together to maintain system pressure
• Installed VFDs on the evaporator fans and modulated the fans depending on refrigerant flow and room temperature
• $180K project
• Rebate $20K
• $90K electrical savings, $40K refrigeration savings
• Total Savings Annually $130K, 81% ROI

Questions

Ron Cote