
Energy & Store
Development
Conference
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FMI
FOOD MARKETING INSTITUTE

Energy Retrofits and Condenser Techology

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Harris Teeter

fresh & easy Neighborhood Market

FMI FOOD MARKETING INSTITUTE

Harris Teeter

Harris Teeter is a 206-store regional supermarket operating in 8 states and Washington DC. We operate stores from 72k to 12k square feet with our average square footage of 49K. We have had great success in the past three years reducing our overall energy usage 8.59%.

Challenges

- We have a prototypical design but build very few that have identical footprints.
- Very Low Energy cost – range from 12.7 cents to 5.2 cents with an average cost of 6.4 cents per kWh.
- Aggressive Major and Minor Remodel Schedule

Refrigeration Retrofits

- ECM Fan Motors
- LED Lighting in Cases with Occupancy Sensors
- Digital Discus Compressors

ECM Fan Motor Retrofits

- Selected stores
  - Typically stores that have a 7.5 Cents per kWh or higher.
  - Completed 35 stores
  - All Cases and Walk-ins
  - Typically 280 + Motors per store
- Energy Savings
  - 79.4% on Average

ECM - Energy and Environmental impacts

Store 100 Minor Remodel

- 269 motors
  - Total Install cost - $23,941.00
  - Energy savings – $9,705.00
  - Simple Payback - 2.47 years
- System kWh
  - Existing System Annual kWh 167,782
  - New System Annual kWh 32,990
  - 80.3% system savings
- Annual CO2 Savings
  - 167,142 lbs

LED Lighting in Cases with Occupancy Sensors

- Any Store
  - Completed 100+ stores
  - Frozen door cases and Dairy door case

- Energy Savings
  - 77.8.% on Average

LED Lighting in Cases with Occupancy Sensors

Store 100 Minor Remodel

- 129 LED Units
  - Total Install cost - $19,092.00
  - Energy and Maintenance savings – $9,150.56
  - Simple Payback - 2.09 years
- System kWh
  - Existing System Annual kWh 71,843
  - New System Annual kWh 15,214 (w/OS kWh - 7128.4)
  - 78.8 % system savings (w/OS 88.7%)
- Annual CO2 Savings
  - 70,220 lbs

Digital Discus Retrofits

Benefits

- Excellent capacity matching
- Reduced compressor cycling
  - As much as 80% reduced cycles
  - Reduces contactor wear
- Energy Savings
  - 1-3%

Lighting Retrofits

- MR – 16 LED Retrofits
- Edison Base LED retrofits for track lights
- MH LED Retrofits for track lights

MR – 16 LED Retrofit

- Super flagship wine departments - 67 stores
  - 120 - MR-16 - 35 Watt halogen bulbs
  - 5000 hours rated life
  - Annual Maintenance Relamps
- Solution LED MR-16 Lamp
  - 6.5 watts
  - 60,000 hrs Rated Life
  - 5 year Replacement warranty

MR – 16 LED Retrofit

Store 317

- 144 MR-16 Units
  - Total Install cost - $7200.00
  - Energy and Maintenance savings – $4701.00
  - Simple Payback – 1.5 years
- System kWh
  - Existing System Annual kWh 44,150
  - New System Annual kWh 8200
  - 82.3 % system savings
- Annual CO2 Savings
  - 44,578 lbs

Store 317 Wine Area

Edison Base LED retrofits for track lights

- Flagship wine departments - 69 stores
  - 60 – Par 20 - 39 Watt Metal Halide bulbs
  - 12,000 hours rated life
- Solution LED Lamp
  - 11 Watts
  - 45,000 hrs Rated Life
  - 3 year Replacement warranty

Edison Base LED retrofits for track lights

Store 157

- 50 - Par 30 LED Units
  - Total Install cost - $3100.00
  - Energy and Maintenance savings – $1937.00
  - Simple Payback –1.6 years
- System kWh
  - Existing System Annual kWh 17,739
  - New System Annual kWh 3,614
  - 79.7 % system savings
- Annual CO2 Savings
  - 17,573 lbs

Store 157 Wine Area

MH LED Retrofits for track lights

- Produce departments – 100 stores
  - 75 – Par 38 - 70 Watt Metal Halide Fixtures
  - 12,000 hours rated life
- Solution LED Lamp
  - 22 Watts
  - 45,000 hrs Rated Life
  - 5 year Replacement warranty

Lighting Retrofits

Store 157

- 75 - Par 38 LED Units
  - Total Install cost - $12,600
  - Energy and Maintenance savings – $6,237.00
  - Simple Payback – 2.02 years
- System kWh
  - Existing System Annual kWh 41,884
  - New System Annual kWh 10,841
  - 74.2 % system savings
- Annual CO2 Savings
  - 38,493 lbs

Store 157 Produce Area

In From the Cold

Energy Efficient Glass Doors for Medium Temperature Cases

Glass Door Retrofits

- Save Energy
- Reduce Carbon Footprint
- Maintain Merchandise Visibility
- Improve Product Quality
- Consistent Case Temperatures
- Reduce Food Spoilage
- Warmer Aisles
- Longer Shopper Dwell Times

Overview – 19th and Baseline

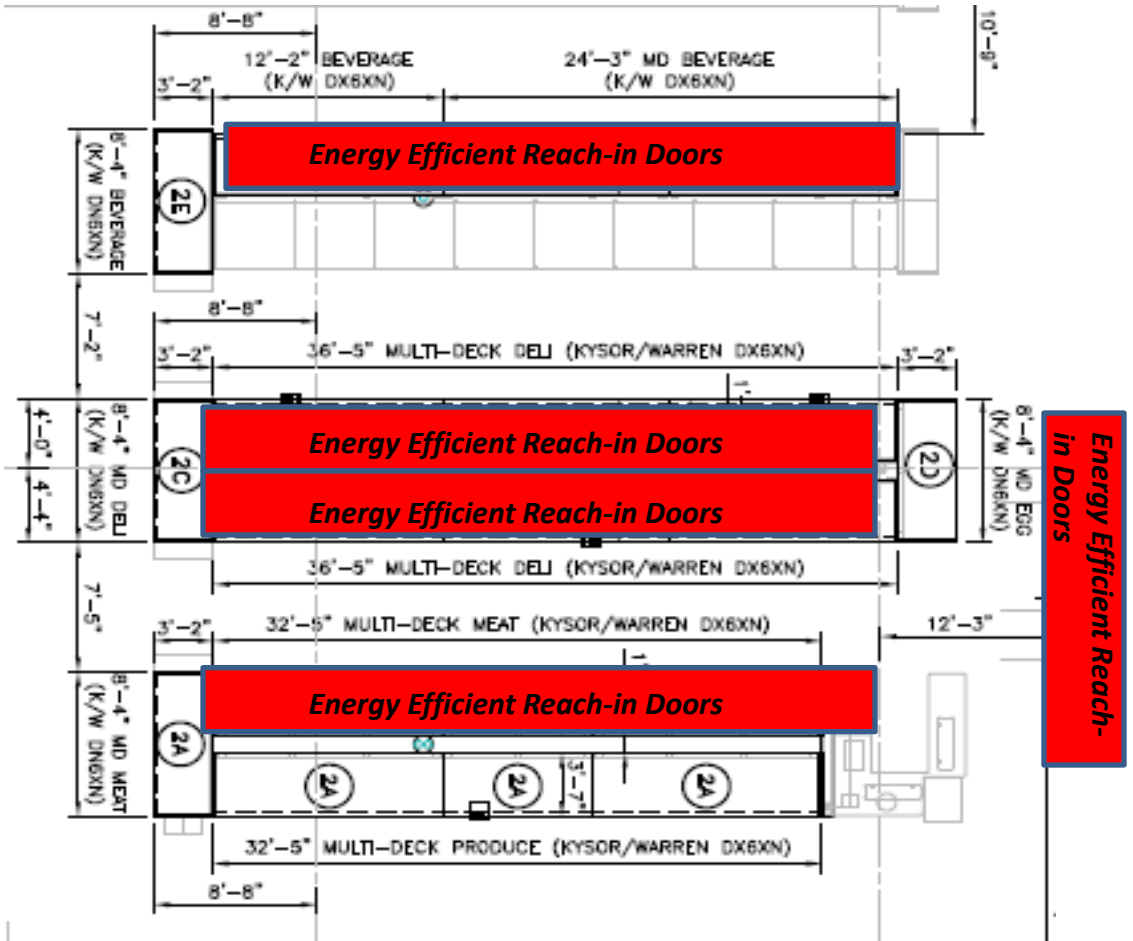
Retro-fitted with Framed Doors.

Framed doors allow anti-fog film and gas to prevent doors from sweating and fogging.

There is no in-door heat required.

Proposed Fixture Selection

- ❖Beer and Wine Cases
- ❖Packaged Deli Cases
- ❖Fresh Meat
- ❖Non-liquid Dairy Cases



Overview - Criteria

Install reach-in glass doors on medium temperature open cases:

- Two stores selected
  - 19th and Baseline – Arizona
  - Firestone and Downey – California
- Two different type doors selected
  - Framed doors – Arizona
  - Frameless doors – California
- Scope limited to BEVERAGE, DELI, MEAT, PACKAGED MEALS and Non-Liquid DAIRY, does not include fresh produce cases, bakery case, and end cap cases.

Overview – Pre-Installation Assumptions

- Currently, the 164 feet of 5-deck dairy, deli, and beverage cases in the stores utilize approximately 137,970 KWH annually.

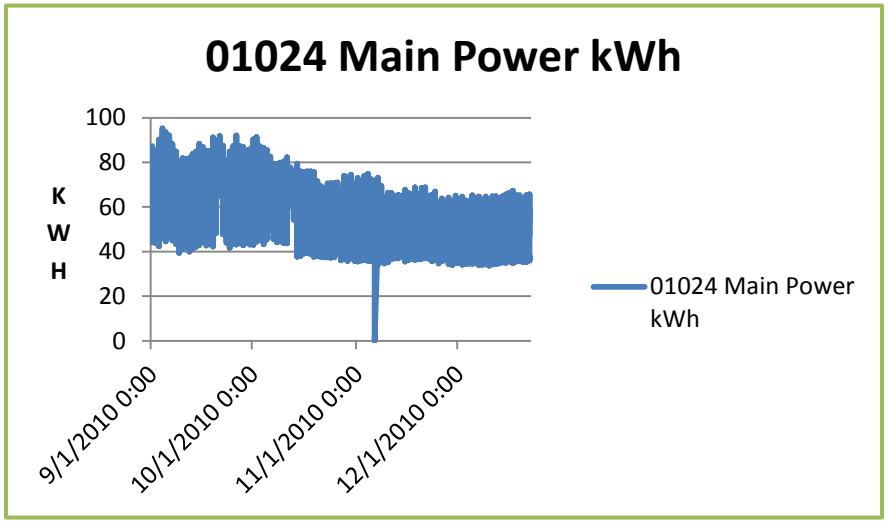
- Installing Energy efficient glass door cases for deli, meat, dairy, packaged meals, and beverage would reduce energy consumption to 71,148 KWH annually.

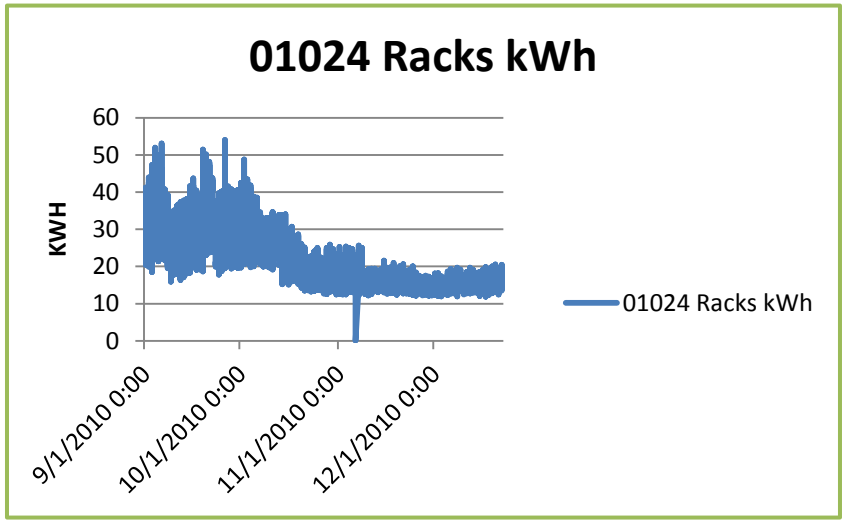
- Compressor load will be reduced from 216,480 BTUH to 48,722 BTUH

- Refrigeration Energy Savings of 52%

- Cost avoidance of $7,115 annually ($0.10 / Kwh)

Overview – 19th and Baseline – Metered Data





The medium temperature compressor rack was reduced from three compressors to two compressors. Compressor Rack power was reduced by approximately 50%.

<u>Results for two weeks prior to installation and two weeks after installation:</u>
Main power Demand was reduced from 95.4 KW to 83.4 KW
Main Power Average Usage was reduced from 16.8 KWH to 14.1 KWH
Total usage during 2 weeks was reduced from 24,150 KWH to 20,297 KWH
Two weeks avoided usage = 3,853 KWH or @ $.10 / KWH <u>$385.3</u>

Overview – 19th and Baseline – Metered Data

After Installation

Reporting Period: From 10/14/2010 to 10/28/2010
Selection: 01024 19th & Baseline: 01024 Main Power

01024 Main Power

Meter Reading Statistics

Max (¼ h) Demand	83.400 KW at 10/16 18:45	Peak ¼ hour	20.850 kWh at 10/16 18:45
Min ¼ hour	8.640 kWh at 10/27 04:30	Total	20,297.160 kWh
Avg	14.095 kWh	LF	67.60%

Historic Reporting Period: From 09/29/2010 to 10/13/2010
Selection: 01024 19th & Baseline: 01024 Main Power

Historic 01024 Main Power

Meter Reading Statistics

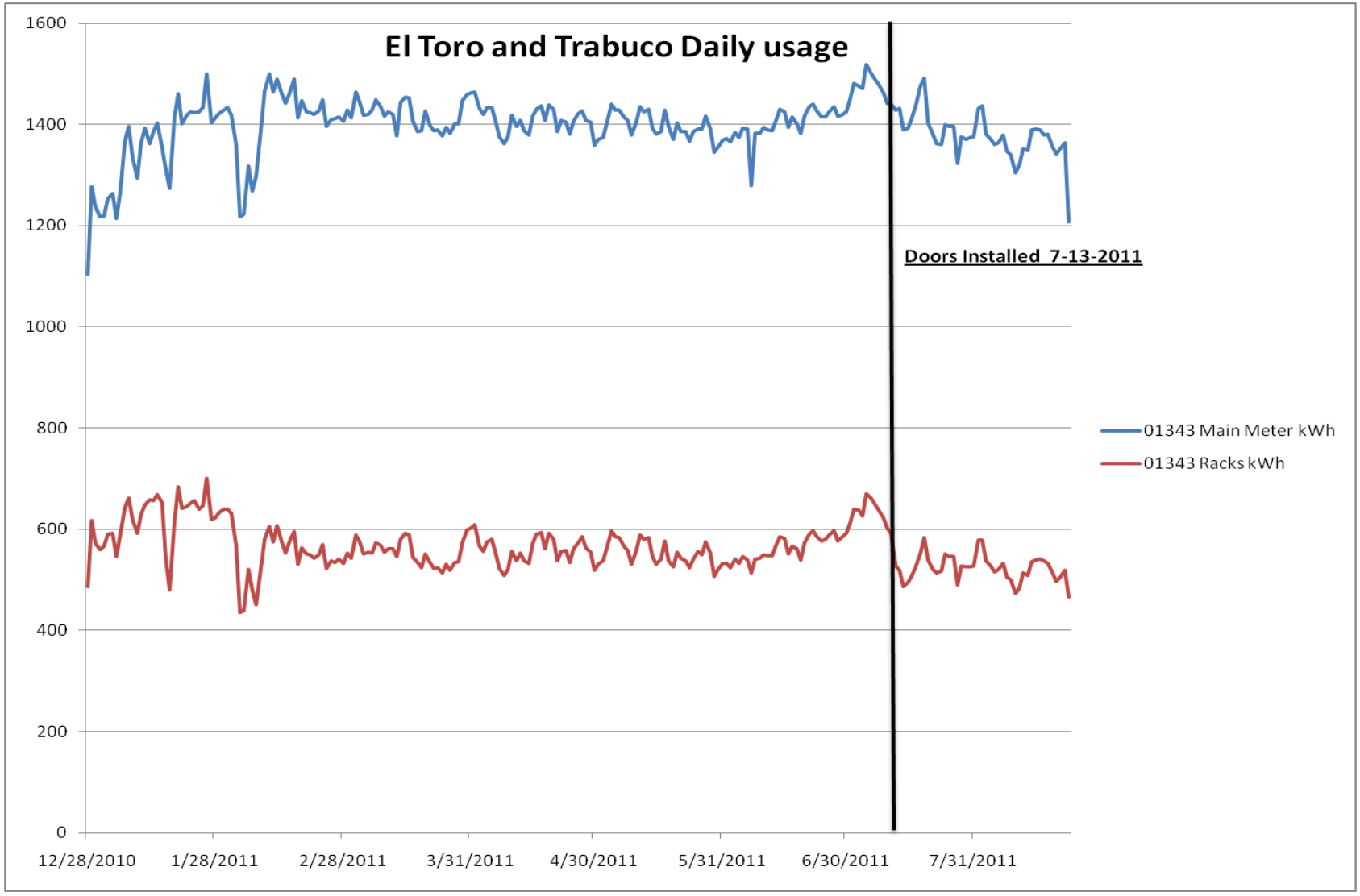
Max (¼ h) Demand	95.400 KW at 10/02 14:45	Peak ¼ hour	23.850 kWh at 10/02 14:45
Min ¼ hour	10.290 kWh at 10/11 04:30	Total	24,149.970 kWh
Avg	16.771 kWh	LF	70.32%

Actual Data vs Pre-installation Assumptions

- Pre-installation Assumption = 71,148 KWH Avoided annually
  - 71,148 KWH * $.10 = $7,115 per year

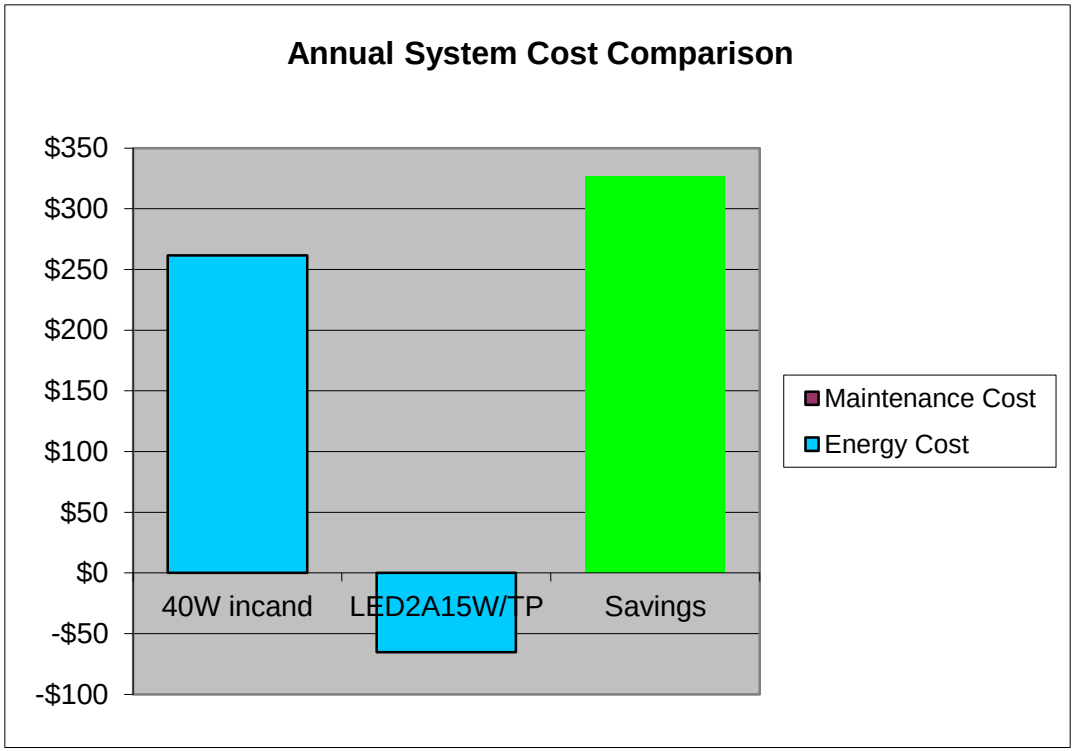
- Metered Data
  - Metered Power = 100,375 KWH Avoided annually
  - 15.9% Savings
  - Annual Avoided KWH = 100, 375 * $.10 = $10,037 per year

- Power Bill Data
  - November Billing = 4,800 KWH Savings
  - 10.9 % Savings
  - 2009 Total Annual Spend = $46,874
  - 10.9% Savings = $5,109

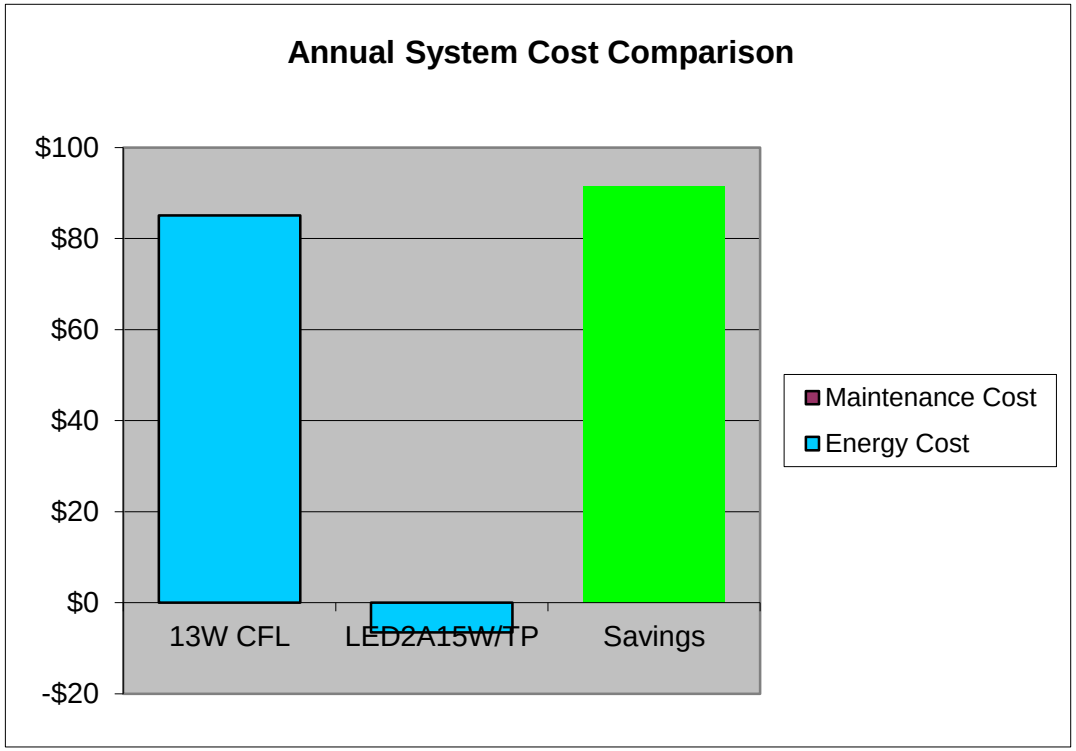

El Toro and Trabuco Daily usage
Doors Installed 7-13-2011
01343 Main Meter kWh
01343 Racks kWh
1600
1400
1200
1000
800
600
400
200
0
12/28/2010
1/28/2011
2/28/2011
3/31/2011
4/30/2011
5/31/2011
6/30/2011
7/31/2011

A simple lighting retrofit

Converting Checkstand Lighting 40W Incandescent to LED

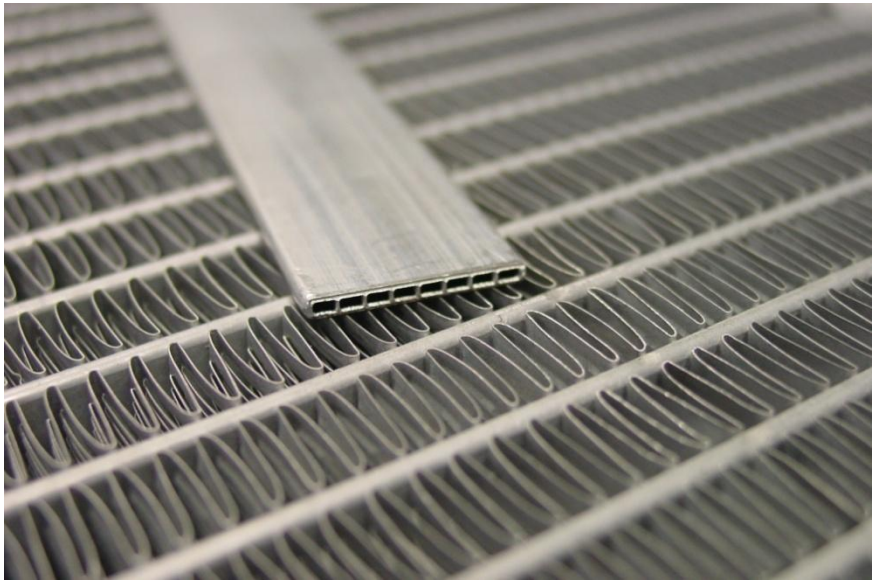


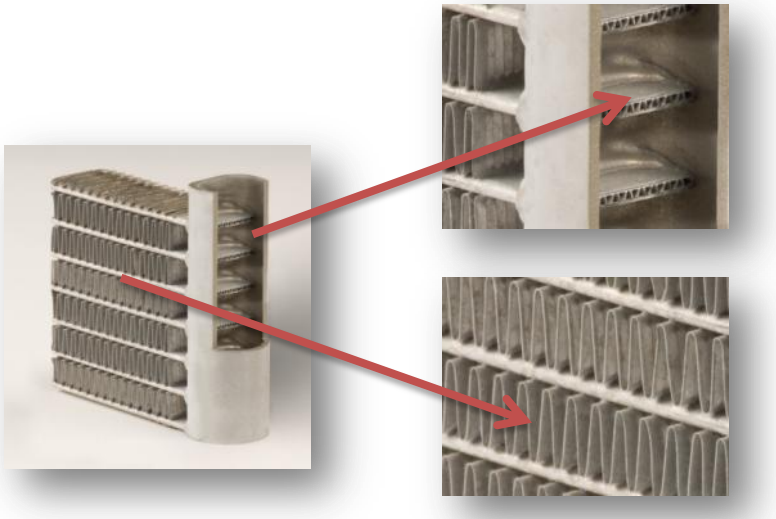
Converting Checkstand Lighting 13W CFL to LED

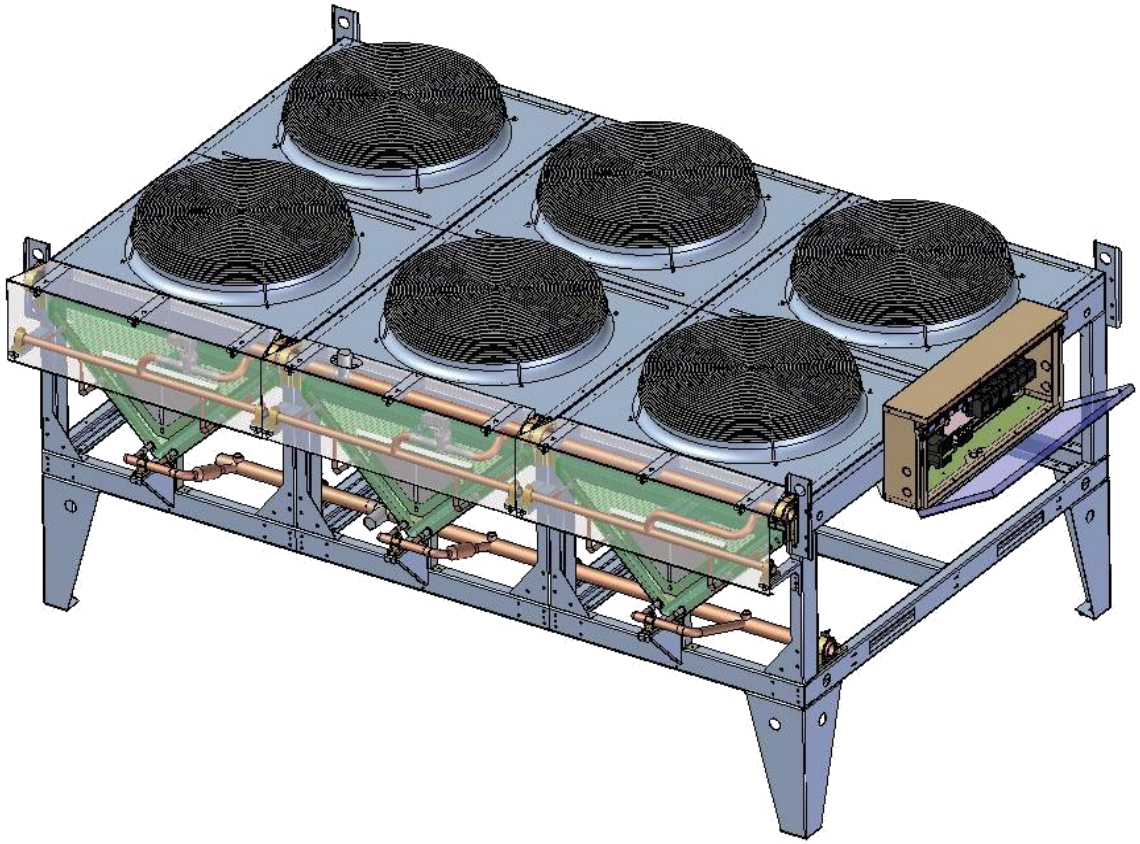


Microchannel Air Cooled Condensers

- Micro-channel technology is the use of flat aluminum tubes with multiple passages which reduce the need for refrigerant while continuing to enhancing system performance.
  - Proven technology being used in the automotive industry for over 15 years
  - Used in your car as the air conditioner condenser







Microchannel Primary Benefits

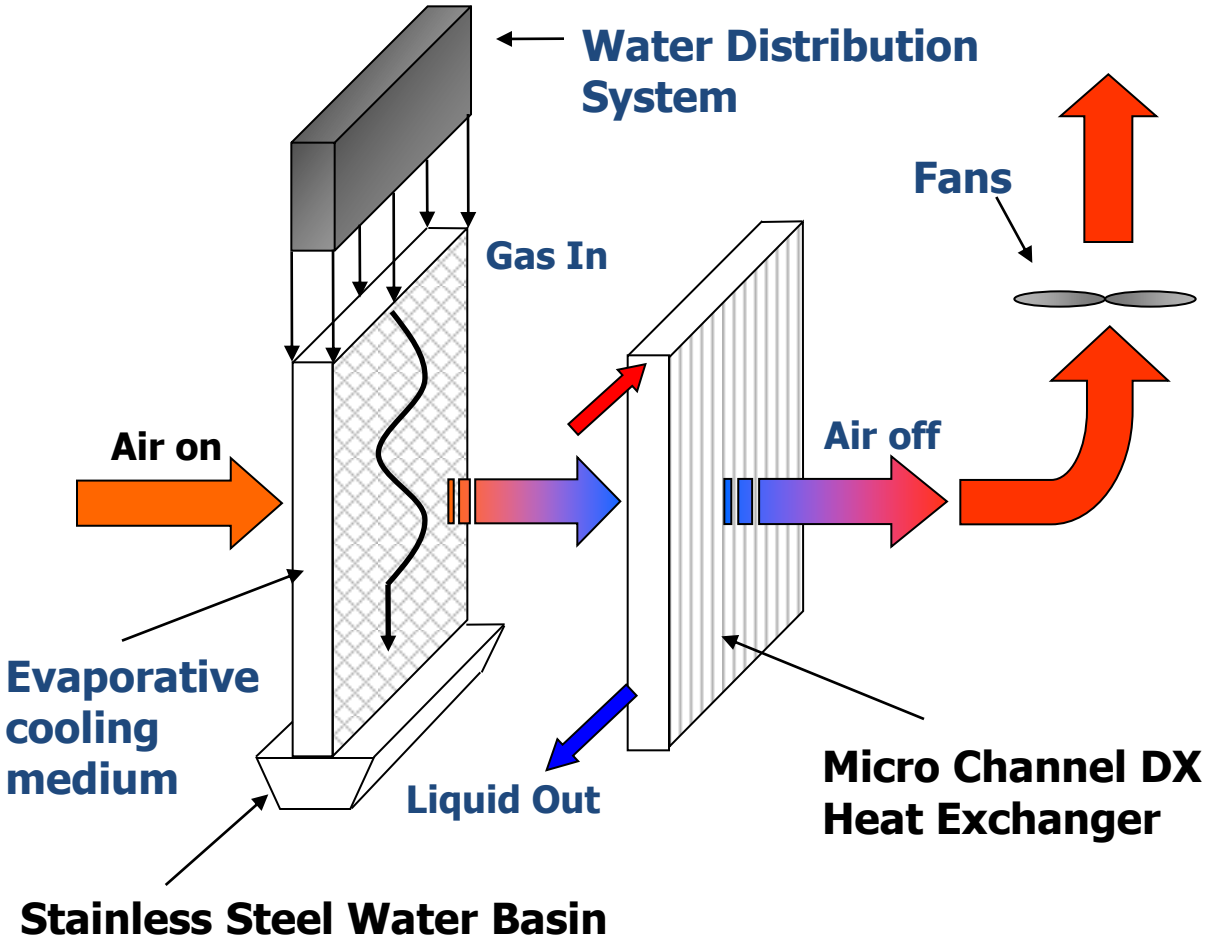
- **Reduced Refrigerant Charge**
- **Energy Efficiency**
- **Corrosion Resistance**
- **Lighter Weight**
- **Quieter**

The "Hybrid" Condenser

The definition of a hybrid is the crossing of two separate technologies to get the best from both and make the result more energy efficient!

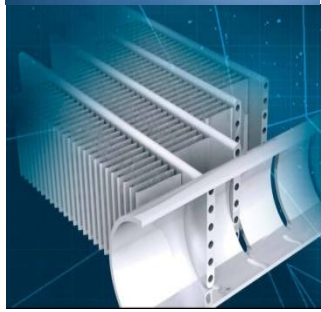
The vast majority of commercial buildings use air cooled condensers!

"Hybrid" Working Principle – Precool Mode



Summary for the "Hybrid"Condenser

- *Reduced refrigerant charge in condenser.*
- *Lower operating costs due to lower condensing temperatures vs air.*
- *Low annual water consumption (up to 75% reduction over water cooled systems)*
- *No water treatment chemicals required*
- *Slim design reduces air side pressure drop by at least 25%*
- *Smaller unit size reduces construction costs.*
- *Simple , but effective operation.*
- *Mono-material – 100% recyclable*
- *Lower emissions resulting from lower power and reduced refrigerant charge*
- *It's a no-brainer with a lower life cycle cost, with payback in under 2 years*

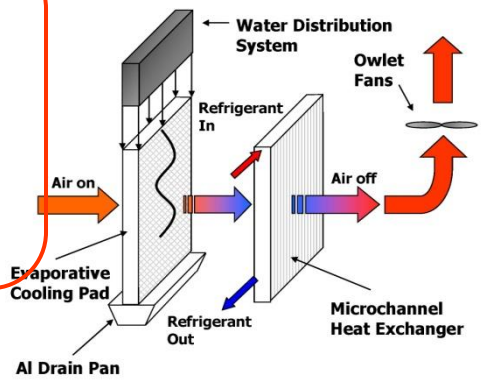


Highest overall efficiency condenser

ECM variable speed "Smart" Fan Systems

Micochannel Heat Exchangers

High Efficiency Evaporative Cooling Pads



Simple Sequence of operation

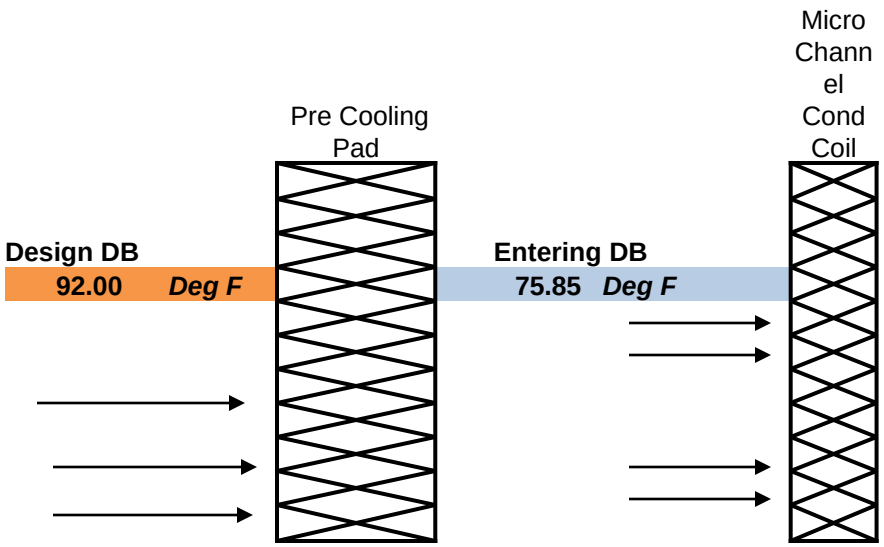
Fan Operation

Load (above pressure set point) → Signal increased from 0V to 2V. → Signal varied from 2V to 10V depending on head pressure.

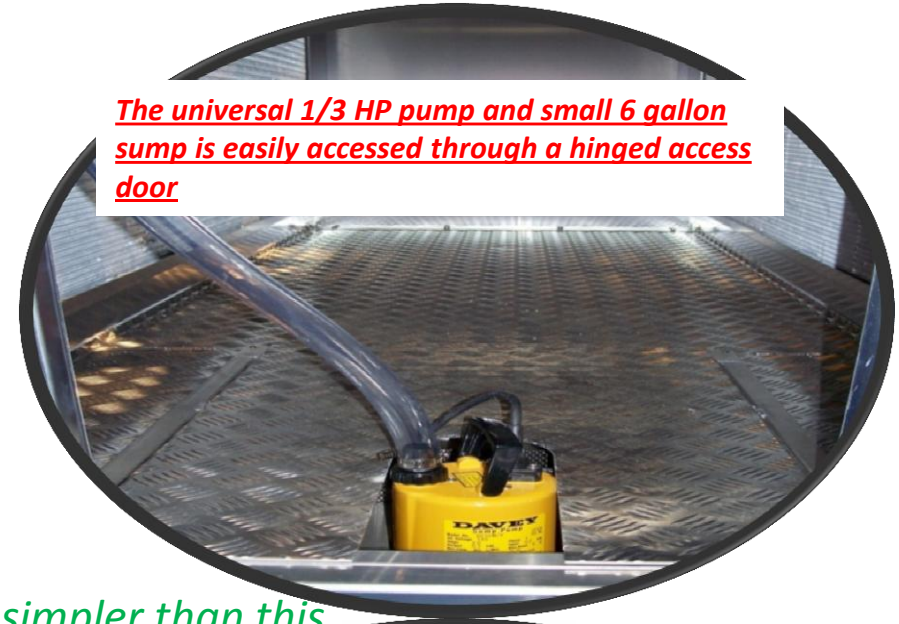
Water – Pre Cooling

Ambient air (DB) rises above set point. → Signal sent to close dump valve. → Signal sent to open solenoid. → Delayed run signal (30sec) sent to pump.

Ambient drops below set point. → Pump / solenoid signal switched off. → Dump valve remains closed until set dump time. → Signal sent to open dump valve at pre set time in day (Pref 5:00am)



Universal evaporative pads can be removed by simply lifting the hinged top



The universal 1/3 HP pump and small 6 gallon sump is easily accessed through a hinged access door

It doesn't get much simpler than this

The dump or drain valve is easily accessed and works opposite the fill solenoid valve

The water fill valve turns on to fill the sump when the ambient temperature reaches about 70 degrees

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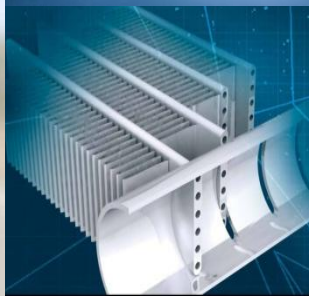

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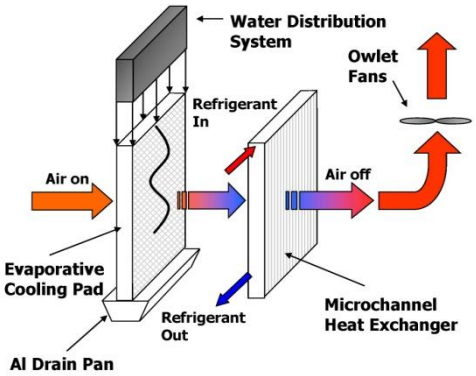

Questions?

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