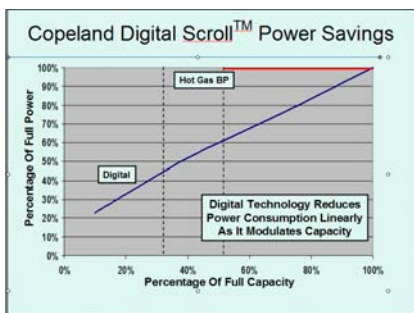


Best Energy Saving Ideas for Schools and Commercial Office Buildings

How do you figure payback when the energy savings are free?

Since 2008 and into the foreseeable future, AAON is offering Digital Scroll technology at a \$0.0 price add, so your energy payback is immediate. The only special provisions to apply this technology is a run enable signal and an analog 0-5volt DC to vary the refrigeration output.



The energy savings over a hot gas bypass system is dramatic. At 55% load a hot gas system is still using 100% refrigeration power while a digital compressor has shed 40% of its full power consumption. The digital compressor can turn down to 10% refrigeration capacity while consuming 22% of its full load power for 78% savings of refrigeration power.

We often field requests from engineers seeking to provide systems with more precise control of discharge air temperature. In packaged rooftop equipment, staging by cycling compressors is a popular way most manufacturers attempt to provide varying output. This all or nothing output modulation comes at the expense of the equipment longevity.

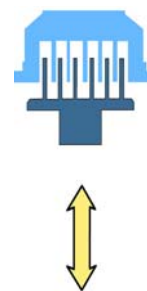
Continuous starting and stopping a compressor to achieve constant temperature output is the shortest way to the junkyard for a compressor. In all size systems, the draw backs of close coupling a chiller to an air handler include having to provide a storage volume to allow the refrigeration system and associated controls reaction time to adjust to abrupt changes in load even with features like hot gas bypass.

We can offer a solution without a premium cost greater than our standard VAV packaged roof top unit—the AAON Digital Scroll Compressor.

In the early 1990s Copeland developed the digital compressor for application in the refrigerated shipping container industry. AAON was the first commercial HVAC manufacturer to offer it in a rooftop packaged system.

The digital compressor works the same as an ordinary scroll compressor except for one feature. The upper scroll which is fixed in an ordinary compressor has the ability to move upward $1/10^{\text{th}}$ of an inch in a digital compressor.

When refrigeration is required, gas from the leaving side of the compressor goes into a reservoir above the top scroll forcing it downward to mate with the lower rotating scroll. The compressor can provide 10 steps of cooling by engaging the top scroll anywhere from one to 10 seconds during a 10 second period. This allows the motor to run full speed, and the compressor to receive constant lubrication.



For more information, please contact Henry Bauer or Stefan Lidington.

HVAC manufacturers continue to strive to make improvements to equipment—increasing energy efficiency.

Our newsletter details what we think are some of the best returns on investing in energy efficiency.



Fanwall Technology Saves More than Energy

Recently, OAR performed an energy evaluation for one of our local industrial customers. In doing so, we discovered a fan running 24/7 at constant volume at the energy cost of \$.66 per cfm/year. We provided a Huntair FWT replacement array to operate at the cost of \$.34 per cfm/year. The total implementation cost of the equipment and installation was \$1.83/cfm. The simple payback for the project is 6.2 years.

After the Energy Trust Incentive, payback is 3.1 years. After applying the state of Oregon Business Energy Tax Credit, the payback is 1.54 years.

Fanwall technology is the simple idea of placing many fans in a common bulkhead to behave and function as a single large diameter fan with respect to air flow and static pressure. The combining of multiple small fans into an array maintains the upstream and down stream distance to allow any remaining turbulent flow to settle into a stable velocity profile. A uniform piston of air evenly loads filters and coils creating less turbulence in the casing and less vibration transmitted to the building supporting the unit. The resulting benefits include:

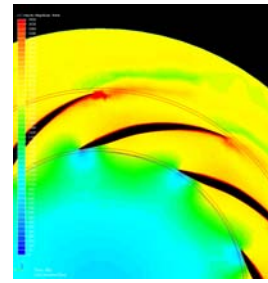
- Reduction in Vibration (eliminating a large single rotating mass)
- Built in redundancy
- Elimination of Belts/sheaves and the associated on going maintenance
- Smaller motor components easily replaceable without extensive rigging
- Reduction in footprint in systems larger than 30,000 CFM
- Easily installed in existing cabinets and systems

Huntair developed a highly efficient, well balanced, small diameter fan for application in fan filter units to accomplish more air movement with less electricity consumption which differentiated their offering from the forward curved fans that were the standard industry offering.

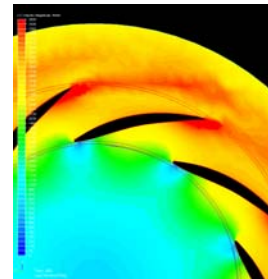
Typically, most small diameter fans are inefficient because the average fan manufacturer would optimize the design of a single fan wheel size and produce other wheel sizes by scaling the original prototype down to create other offerings.

However, Huntair employed Computational Fluid Dynamics (CFD) to optimize the smaller fans. CFD allowed them to quickly evaluate trade offs between the spacing of blade elements, angle of attack and shape of the air foil element. They have also been employing other manufacturing advances. For instance, laser cutting of the fan back plate and impeller inlet to receive the fan elements in a precise fit for a higher degree uniformity to avoid noise and vibration from air buffeting and rotational imbalance.

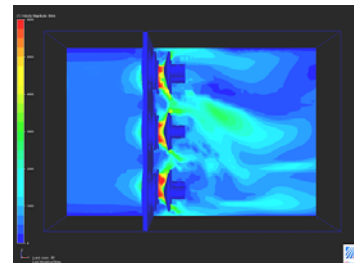
Currently, Huntair is offering both price and lead-time savings. To find out more information please contact Henry Bauer or Stefan Lidington in our Portland office.



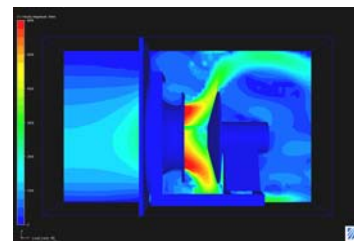
Fanwall cross section in CFD



Single plenum fan cross section in CFD Highest velocities are shown



Side view of fanwall in CFD



Side view of single plenum fan in CFD

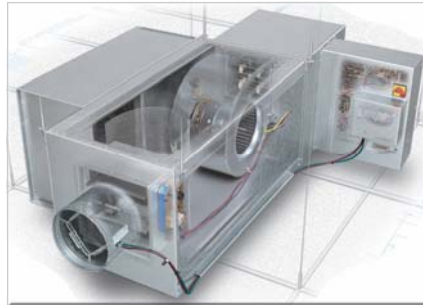


EPIC/ECM technology on fan-powered boxes and fan coil units offers lower operating costs and significant energy savings

Normal Payback is 6 to 18 months. Investment is approximately \$350/box

Nailor Industries developed the ECM (Electronically Commutated Motor) with on-board EPIC controller providing unparalleled comfort, control, and ease of balancing.

The ECM is an ultra high efficiency programmable brushless DC motor utilizing a permanent magnet rotor and a built-in inverter. DC motors are significantly more energy efficient than AC motors and much easier to control.



Nailor's Stealth series fan-powered terminal unit

Reasons why you'll want to use ECMs:

- Full-load ECM motor efficiency is approx 80%. PSC motor efficiency is approximately 60%
- Ability to turn-down while maintaining efficiencies between 65-72%. A PSC motor with an SCR controller will have efficiencies in the 12-45% range through its narrower turn-down ratio.
- Operates at a cooler temperature because of their higher efficiencies, therefore reducing heat gain from the motor.
- ECM motors along with the on-board controller reduces the time required by a balancer to adjust FCU airflow and measure each diffuser output
- Provide pressure-independent fan operation, thus higher space comfort.

To find out more information please contact: Henry Bauer or Stefan Lidington in our Portland office.

DAIKIN water cooled VRV system

As a complete package solution for heating and cooling, we believe this is one of the most Energy Efficient products on the market today. Efficiency range at full load is 15 to 17.5 EER cooling and 4.9 to 5.8 COP heating. In normal operation, the EER is in the 25 to 35 range since it is transferring heat in the space.

Estimated Cost Per Ton: \$2,250 to \$3,250 including controls

(Price will vary based on the amount of FCU's and other parts, accessories and controls included in the project)

Estimated Payback: 3 to 5 Years

Water Cooled VRV – The Next Generation of VRV

Daikin's Water Cooled VRV offers an Energy Saving alternative to traditional centralized equipment. It's remarkable compact and lightweight structure makes installation of VRV technology in large buildings possible. At 330 lbs. and less than 40" high, the VRV-WII can take a ride up the elevator to be installed in the machine room. Offering state of the art comfort for hotels, offices and large commercial applications. The VRV system keeps running costs at an absolute minimum by controlling each zone individually and being able to shut down completely in unoccupied areas.

Continued on next page



DAIKIN water cooled VRV system continued

Benefits of Daikin VRV-WII

- VRV-WII is 30 to 40% more Energy Efficient than a conventional VAV System
- Heat Recovery reclaims heat rejection from the FCU's in cooling and transfers it to the FCU's in heating for substantial Energy Savings
- Inverter Scroll Compressor uses less energy
- R410 Refrigerant
- Ideal for high-rise applications – floor by floor installations using limited space for condensers (28 tons fits in a 25 Sq. Ft. Area)
- Can be used in Geothermal Applications with entering water temps down to 25 degrees

For more information contact Zach Trainer in our Portland office.

Your Oregon Air Contacts:

Dick Schweiger, President—dicks@oregonairreps.com

Henry Bauer, Engineering Sales—henryb@oregonairreps.com

Stefan Lidington, Engineering Sales—stefanl@oregonairreps.com

Bob Fassiotto, ABB Sales—bobf@oregonairreps.com

Kirk McGraw, Industrial Sales—kirkm@oregonairreps.com

Ben Wallace, Engineering Sales, Eugene—benw@oregonairreps.com

Rob Grace, Contractor Sales—robg@oregonairreps.com

Tyson McGraw, Contractor Sales—tysonm@oregonairreps.com

Kurt Schultheis, Contractor Sales—kurts@oregonairreps.com

Greg Oberle, Inside Sales—grego@oregonairreps.com

Noel Taucher, MK / Phoenix Sales—noelt@oregonairreps.com

Zach Trainer, Daikin Sales—zacht@oregonairreps.com

Steve Patnode, Sales Support—stevep@oregonairreps.com

Dan Feuz, Part Sales—danf@oregonairreps.com

Portland Office

15860 SW Upper Boones Ferry Road
Lake Oswego, OR 97035
Phone: 503-620-4300

Eugene Office

3990 Roosevelt Blvd. Suite A
Eugene, OR 97402
Phone: 541-232-2576



Oregon Air represents the following product lines

AAON—Rooftop A/C Units, Condensing Units, AHU's, Chillers, Modular AHU's, Coils, Split Systems
www.aaon.com

ABB—Variable Frequency Drives
www.abb-drives.com

AEROTECH & TWA—Radiant Cooling/Heating Panels
www.aerotechmfg.com www.twapanel.ca

AEGIS—Shaft grounding bearing protection
www.est-aegis.com

AIRCUIITY—Indoor Air Quality Controls
www.aircuiity.com

AIREDALE—Vertical classroom A/C units
www.airedaleusa.com

AMERICAN AIR FILTER (AAF) - Unit Ventilators
www.mcquay.com

ARCTICHILL—Modular Chillers, Process and Medical Chillers
www.arctichill.com

BLENDER PRODUCTS—Air Blending Units
www.airblender.com

DAIKIN— Multiple mini-split heat recovery system
www.daikinac.com

DATA-AIRE—Computer Room Air Conditioning
www.dataaire.com

DRI-STEEM—Humidifiers
www.dristeem.com

EBTRON—Air Flow / Temperature Measurement
www.ebtron.com

GRISWOLD—Self-balancing Hose Kits, Stainless Steel Hoses, Automatic Flow Control Valves, Manual Balance Valves, Pressure Independent Valves, Coil Piping Packages
www.griswoldcontrols.com

HEAT HARVESTER—Heat pump
www.heatharvester.com

HUNTAIR—Custom Air Handling Units: Clean-room, Penthouse, multi-zone, stacked AHU's, Fan Wall Systems
www.huntair.com

MAMMOTH—Water Source Heat Pumps, Custom Rooftop Unit 3-265 Tons, Custom Penthouses to 1000 tons
www.mammoth-inc.com

MK PLASTICS—Fiberglass Fans/Fume Exhaust Systems
www.mkplastics.com

MCQUAY—Water Source Heat Pumps, Terminal Air Conditioners, Air Handlers, Rooftop AC Units, Condensing Units, Modular AHU's Split Systems, Fluid coolers, Chillers: Evap / Magnetic bearing & Centrifugal / Screw / Scroll, Water Cooled VAV Units
www.mcquay.com

NAILOR INDUSTRIES—VAV Boxes and Fan Coils
www.nailor.com

NELSON HEAT TRACE—Heat Tracing Cables
www.nelsonheaters.com

PERMALERT—Liquid Leak Detection Systems

PHOENIX CONTROLS—Laboratory Fume Hood Controls, Isolation Room Controls
www.phoenixcontrols.com

RUNTAL RADIATORS—Hydronic Radiant Heat
www.runtalnorthamerica.com

STERLING—Fin-tubes, Convectors, Unit Heaters, Radiant Cooling/Heating Panels
www.sterlingheat.com

STRIONAIR—Merv 16, high-performance, low-resistance, cost effective, germicidal active air filtration technology
www.strioniar.com

TEMTRON—Custom Air Handling Units: Central Station, Rooftop, Penta-Post, Fan Wall Systems
www.temtron.com

TRANS-COIL—Line Reactors and Protection for Drives
www.transcoil.com

UNITED COOL AIR—Specialty AC Units, 1-20 tons, Gas Heat PTAC Units
www.unitedcoolair.com

VENMAR—Custom Energy Recovery Units, Heat Pipe, Flat Plate Heat, Wheel Heat Exchangers
www.venmarces.com

UV RESOURCES—Ultra Violet lamps and bulbs
www.uvresources.com

XETEX—Air to Air Plate and Heat Wheel Heat Recovery
www.xetexinc.com

