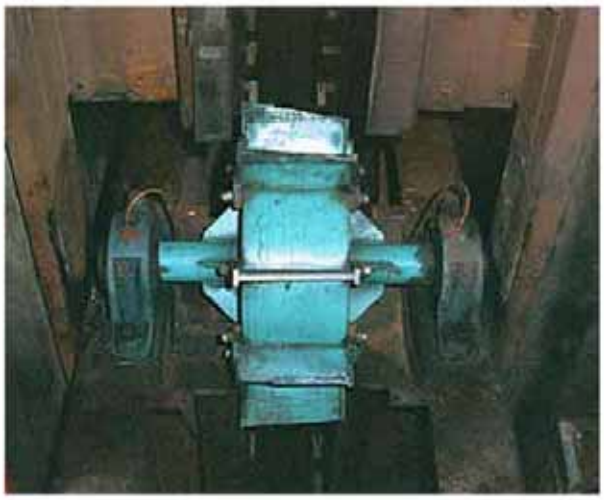
THERMOTECH
Energy Recovery Wheel Systems
ENTERPRISES INC.
Technical Information

OVERVIEW OF AN ENERGY RECOVERY WHEEL REPLACEMENT:
At Thermotech we have an extensive database of all manufacturer's products. We ship direct all the components required to replace your existing wheel with a THERMOWHEELTM.* We then remove the old wheel and perform the structural changes as required to support the new installation. We then assemble the rotor, and supporting hub and bearing assembly. Next we load the new media and tension each piece with our unique rim tensioning system. After the new wheel is in place we set the seals in place and install the motor, control panel and sensors as required. Below is a step by step guide through the process.

REMOVAL:
First we remove the existing rotor, media, hub, spokes and rim.



We prepare the old components for removal from the site.

FRAME INSTALLATION:
In many retrofits creating a sound structure to support the wheel is the key to a successful job. We install new supports as needed to keep the bearing and rotor assembly held firmly in place.

The Structural supports and frame are installed to minimize wheel deflection and the safing ring is installed to prepare for seal installation.

BEARING INSTALL
Here you can see the hub and bearing assembly positioned in the frame. You can also see the prepared surfaces that the seal

The hub and bearing assembly differ depending on the type on unit being replaced. As you can see we provide easy access to lube fittings on the bearings. Once the structure is complete and the hub is in place the spokes can be installed.

SPOKE INSTALLATION:
Each spoke must be precisely positioned on the hub. The THERMOWHEEL hub has keys which align each spoke in place. Once the spoke is in place it is measured for proper position and torqued securely to the hub. Note the groves in the spokes. Each groove will correspond to grooves machined in the media. The media will be positioned by these grooves to provide an extremely flat and strong wheel assembly.

ROTOR ASSEMBLY:
The rotor assembly is now completed and ready to receive the media. Note the seals have been installed and act as guides as the media is positioned in the rotor. Typically each section of media is shaped like a piece of pie and are positioned in place one at a time.

SEAL INSTALLATION:
The seals are bolted securely to a solid steel safing ring. The seals are of a labyrinth design comprised of an extruded aluminum mounting plate and an extruded rubber seal.

MEDIA INSTALLATION:
Each pie section is carefully positioned in the rotor. Once the sections are in place the rim is mounted to hold the media with minimal tension. After all the media sections are in place, the rims will be gradually tensioned individually to provide a very flat and round wheel surface.

MEDIA SECTIONS:
As the media is loaded you will note that we install each section of the rotor so that the rotor stays balanced. Because of our unique rim tensioning system we can then tension the rims separately. Here you can see 2 sections loaded. Note that they are opposing each other. This keeps the rotor balanced during media installation. By doing this we eliminate stress on the spokes and build a flatter stronger wheel.

COMPLETION OF MEDIA INSTALLATION:
As each section of media is installed secondary spokes are positioned in place to limit any shifting of the media.

We then position the media so that it is within + or - 1/32"of overall flatness. Each rim is given enough tension so that the media can be moved into position for the desired flatness.

RIM TENSIONING:
Rim tensioning and getting a flat wheel are interrelated. With the exclusive, THERMOWHEELTM.* tensioning system, tension can gradually be applied to each section of the media independently. Here you can see how the rim tension bolts act to pull the rims together so that we can get the proper tension on each section.

COMPLETING THE ROTOR:
Here the completed rotor is seen as the rim tensioning is in progress. We position the media so that it is within + or - 1/32"of overall flatness. We then torque each rim in place and permanently install the secondary spokes. Now that the rotor is complete we can move on to the motor drive and belts.

DRIVE INSTALLATION:
The motor drive is mounted on a hinged plate which allows the motor to move vertically. It is the weight of the motor that tensions the twin "V" belts. This configuration is foolproof. There is no need for springs or adjustments. We let gravity do the work.

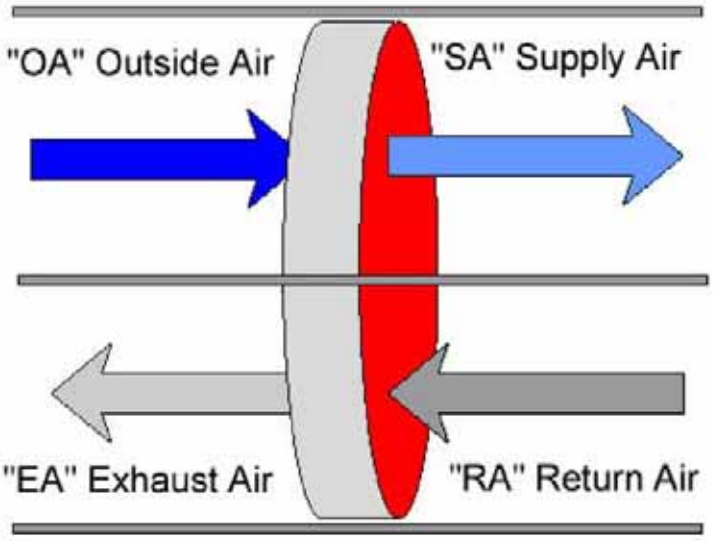
Note how the motor is very accessible. We provide a sealed compartment for the drive. The drive is a variable frequency design that provides the full range of rpm needed.

CONTROL INSTALLATION

The controls are usually mounted on the outside of the air-handler. Depending on the type of unit we can provide sensors in all 4 air-streams and interface to any existing control system. We can provide the right control for any facility. After the controls are installed the unit is operated at all specified speed settings and the controls are set so that the proper supply air temperature is met. That does it, the installation is complete.

Principal of operation:

Heat recovery wheels attain high levels of efficiency by transferring total heat or enthalpy between two air-streams. Enthalpy is both the heat and moisture energy in the air. Simply stated, In summer the outside air is hot and wet. The inside air is cool and dry. The wheel spins through the two air-streams and transfers the energy contained in the return air from the building to the supply air which becomes cooler and dryer. This cooler and dryer air is the supply air which then goes to the cooling coils lowering the need for cooling capacity.



In winter the opposite state occurs. The Outside air is cold and dry the Inside air is warm and wet. The wheel again transfers the energy contained in the return air from the building to the supply air which becomes warmer and wetter lowering the need for heating in the building. In both cases the desiccant coating on the wheel is the primary driving force of this transfer.