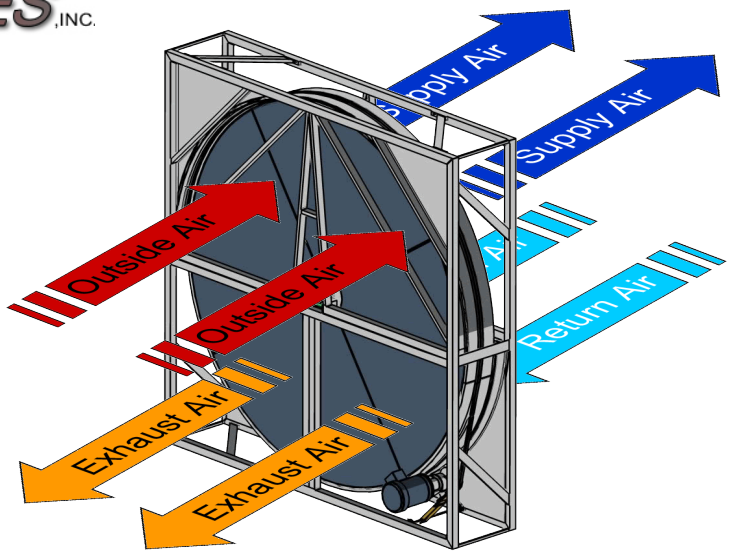
THERMOTECH
Energy Recovery Wheel Systems
ENTERPRISES, INC.
TECHNICAL INFORMATION

Principle of Operation



Rotary energy recovery wheels operate by exchanging energy from two opposing airstreams. Known as a heat wheel, it is a simple mechanical device that if designed and constructed properly can afford a high degree of energy recovery -- up to 90 percent.

The building's exhaust air preconditions supply air. Heat recovery wheels attain high levels of efficiency by transferring total heat, or enthalpy, between, two airstreams. *Enthalpy* includes the energy of both the heat and moisture in the air.

In summer the outside air is hot and wet. The inside air is cool and dry. The wheel rotates through the two airstreams 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 enters the cooling coils and lowers 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 transfers the energy contained in the return air from the building to the supply air, which becomes warmer and wetter and lowers the need for heating capacity. The desiccant coating on the wheel is the primary driving force of this transfer.

Failures
There are two reasons for wheel failures:

- **Mechanical:** The wheel is not turning.
- **Thermodynamic:** The media is not transferring energy.

With proper design, both types of failures can be eliminated. By engineering the rotor for a twenty-five-year minimum life, mechanical failures are reduced to near zero and maintenance is reduced to a simple biannual greasing of the bearings.

Depending on the environment proper filtering of the airstreams can extend media life to twenty years or more.

Performance is dictated by the media substrate, flute size, wheel size, and rotational speed. There are many combinations of these factors, each with advantages and disadvantages. For most applications, aluminum media with a width of 200 mm and a flute size of 12 flutes per inch provides excellent performance with a minimum of pressure drop. A desiccant coating based on a 4 Å or 3Å molecular sieve can provide for equal sensible and latent recovery with a minimum of contaminant carry over. Total effectiveness of up ninety to percent is possible.