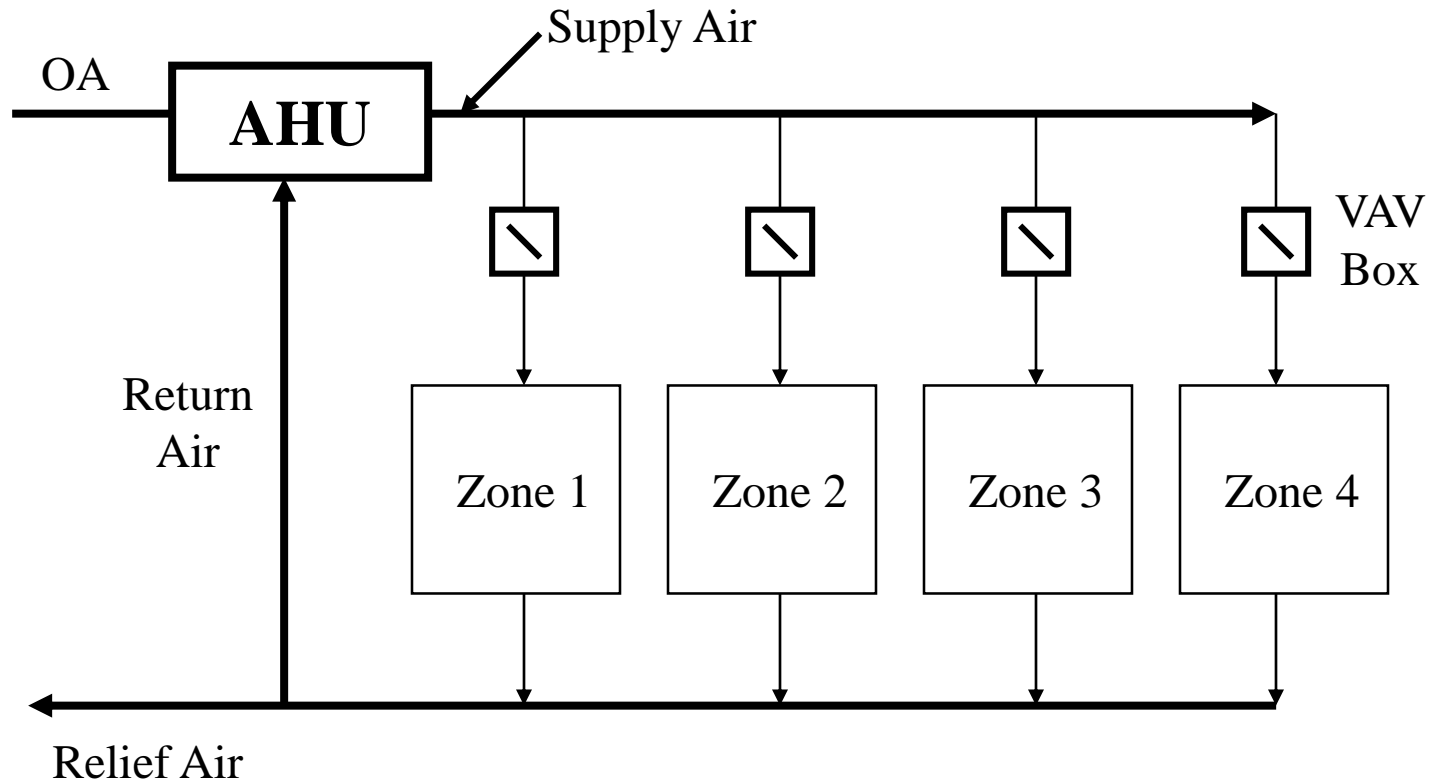


Dedicated Outdoor Air Systems (DOAS)

Overview

- Review traditional VAV system.
 - (4) major problems.
- How does DOAS solves these problems?
 - Working in parallel with sensible cooling equipment.
- Energy savings potential.
- Building cost savings.
- Greenheck solutions.

Traditional VAV System



VAV Systems

Problem #1: Ventilation Air Distribution

- ASHRAE 62
 - Depicts CFM/person requirements.
- Outdoor air & return air mixing.
 - Engineers can't be sure where the ventilation air is distributed.

VAV Systems

Problem #1: Ventilation Air Distribution

- Proper ventilation distribution is a function of:
 - VAV box minimum settings.
 - Space sensible loads.
 - Local exhaust & exfiltration.
 - Short circuiting paths.
 - Inter-zonal air transfer.
- Complete knowledge of all functions at design is not possible.
- **BOTTOM LINE**: Engineers cannot defend compliance of ASHRAE 62.

VAV Systems

Problem #2: Excess OA Flow & Conditioning

- ASHRAE 62: Multiple spaces equation.
 - Forces each space to have the same percentage of OA as the critical space.
- **BOTTOM LINE:**
 - 20-70% more OA is required.

VAV Systems

Problem #3: High VAV Minimum Box Settings

- Example:
 - Given;
 - 200 CFM OA required.
 - Supply air is 40%.
 - Proper setting of VAV box.
 - 500 CFM Supply (200 CFM OA/40%)

- BOTTOM LINE:
 - Potential for considerable terminal reheat.

VAV Systems

Problem #4: Inability to Decouple Space Sensible & Latent Loads

- Leads to high relative humidity (RH) at low sensible loads.
 - Uncomfortable for employees.
 - Moisture related IAQ problems.
- **BOTTOM LINE:**
 - System lacks control over humidity.

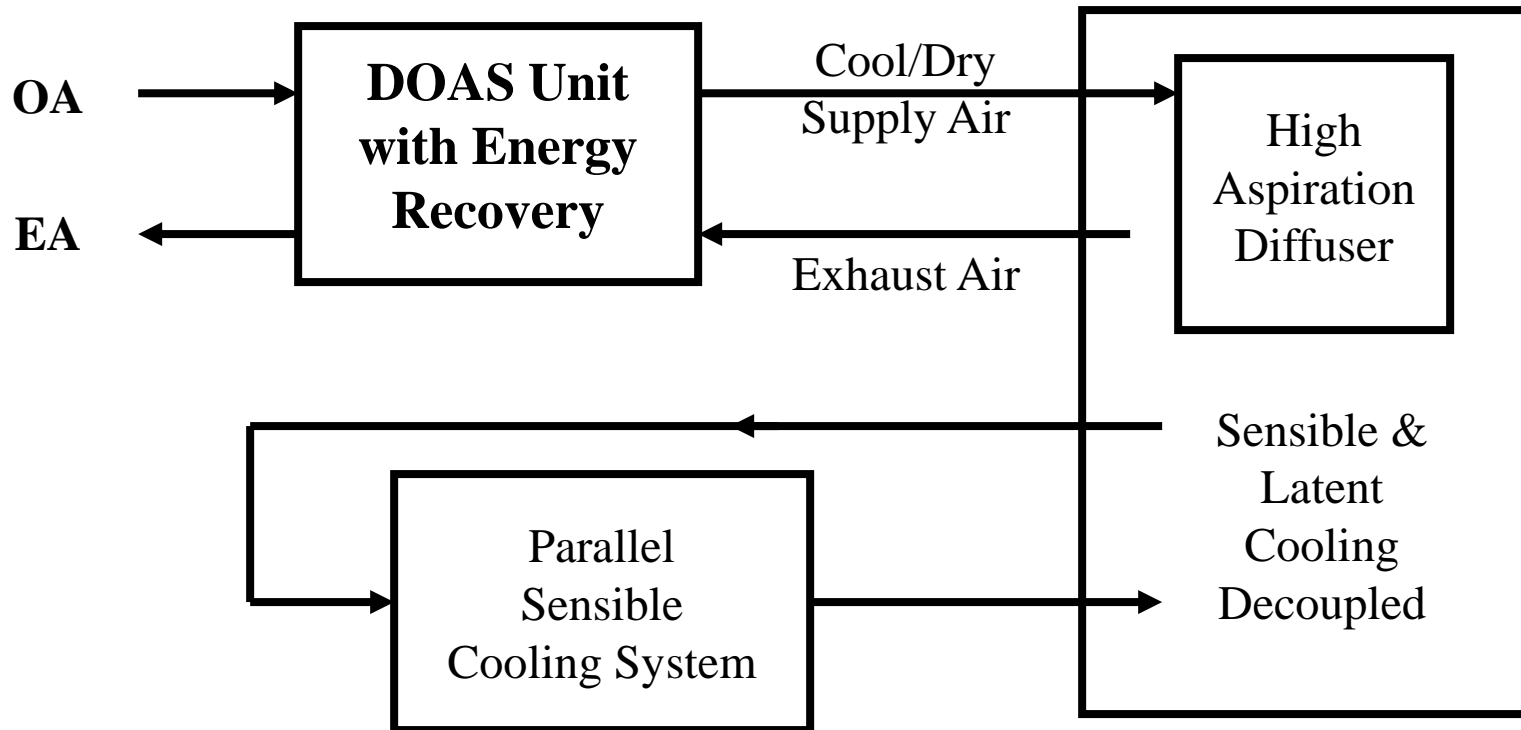
VAV Systems

Bottom Line Summary of Problems

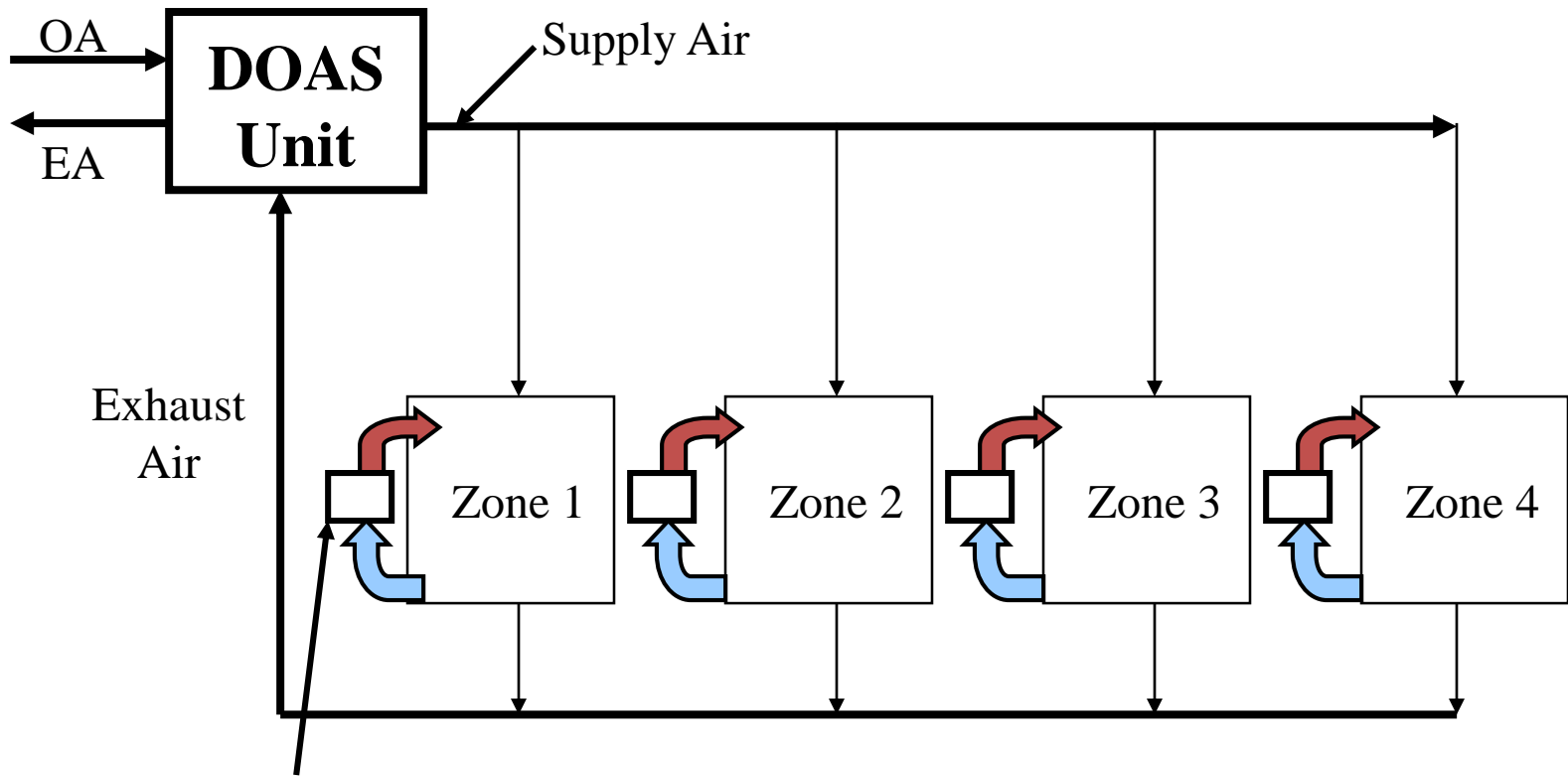
- Engineers cannot defend compliance with ASHRAE 62.
- 20-70% more OA is required.
- Potential for considerable terminal reheat.
- System lacks control over humidity.

DOAS System

DOAS – Single Space Summer Operation



DOAS – Multiple Spaces with VAV



Parallel Sensible Only
Cooling System

DOAS

Solution to the Problems

- Problem #1:
 - Engineers cannot defend compliance with ASHRAE 62.
- Solution:
 - With DOAS, the outdoor air stream is completely separate, allowing precise distribution.

DOAS

Solution to the Problems

- Problem #2:
 - 20-70% more OA is required.
- Solution:
 - NO additional air is required since the prescribed amount is easily verified.

DOAS

Solution to the Problems

- Problem #3:
 - Potential for considerable terminal reheat.
- Solution:
 - Terminal reheat is always at the minimum with DOAS since only the prescribed amount of ventilation air is brought to the space (i.e. the least amount of overcooling potential).

DOAS

Solution to the Problems

- Problem #4:
 - System lacks control over humidity.
- Solution:
 - DOAS decouples the space sensible and latent loads.
 - DOAS handles 100% of latent load and a portion of the sensible load.
 - Combine with a parallel sensible only cooling system.

DOAS

Energy Savings

- 1) Reduced OA conditioning.
- 2) Reduced OA fan BHP.
- 3) Reduced space conditioning.
 - Allows the parallel cooling system to have:
 - Higher CW tempers (55°F versus 40-45°F).
 - An increase in COP of the A/C compressor.
- 4) VAV is ideal and allows the space conditioned airflow rate to vary in proportion to the net load.
- 5) Energy recovery is readily incorporated and can reduce OA conditioning costs by up to 75%.

DOAS

Building Cost Savings

- Reduced chiller (or DX) tonnage.
- Reduced condenser water pump capacity.
- Reduced ductwork size & reduced floor height.
- Smaller air distribution plenums and terminal boxes.
- Air handler size reduction.
- Reduced electrical service.
- Less “rentable” space consumed by equipment.

DOAS Summary

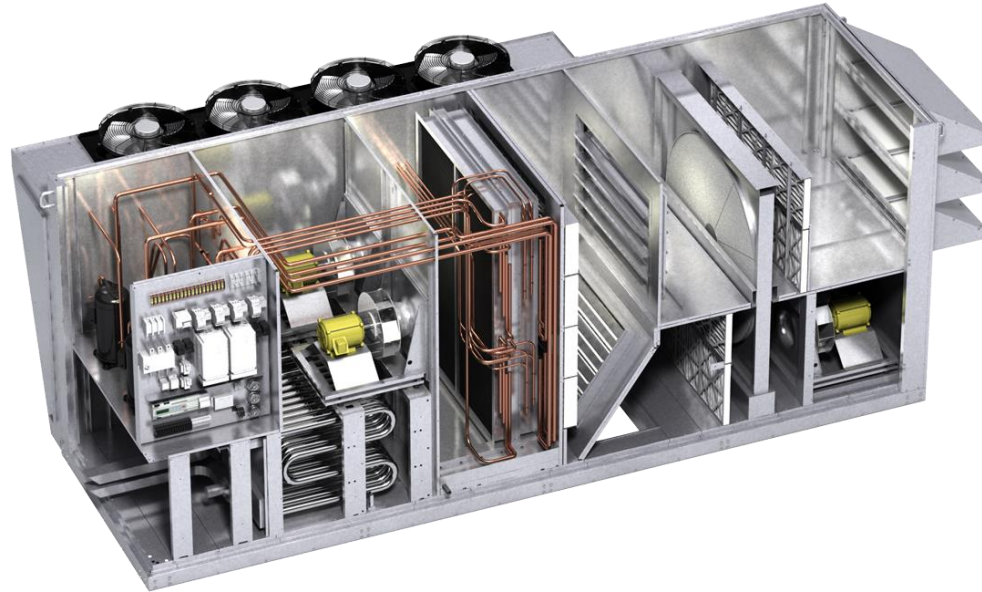
- Potential exists for DOAS implementation with no first cost penalty.
- Energy cost savings.
- Greatly improved humidity control.
- Improved occupant productivity.
- Continued savings.

**So, what does Greenheck
have to offer for DOAS?**



RV/E Solution

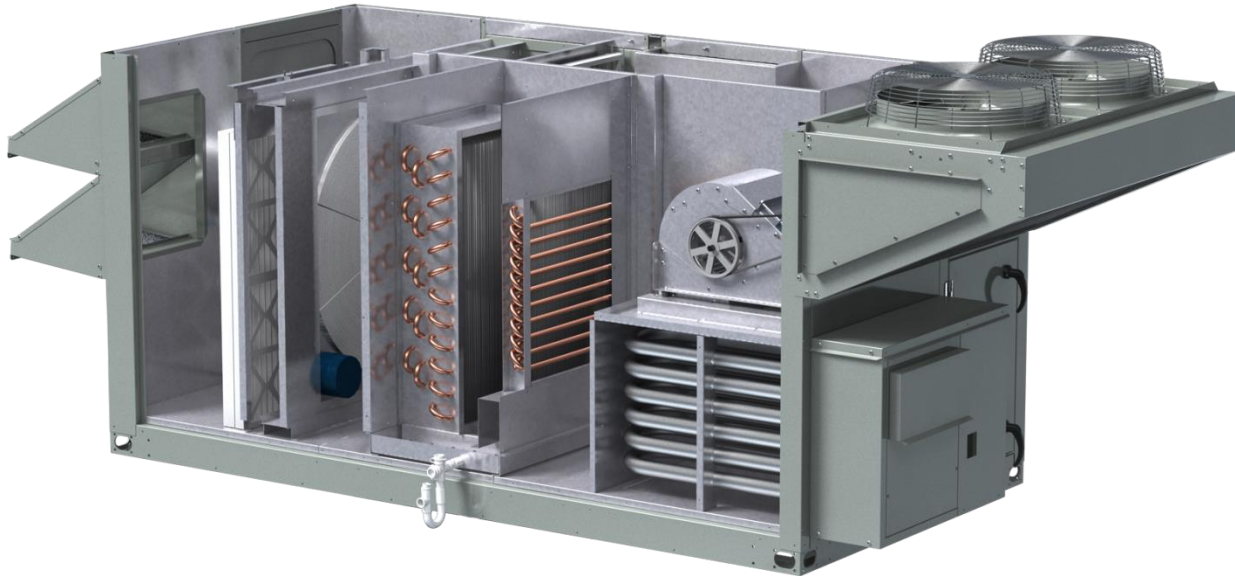
Rooftop Ventilator (w/ Energy Recovery)



- 800 to 13,500 CFM
- Wheel preconditions outdoor air.
- Cooling coil provides final dehumidification.
- Heating coil tempers air for comfort.

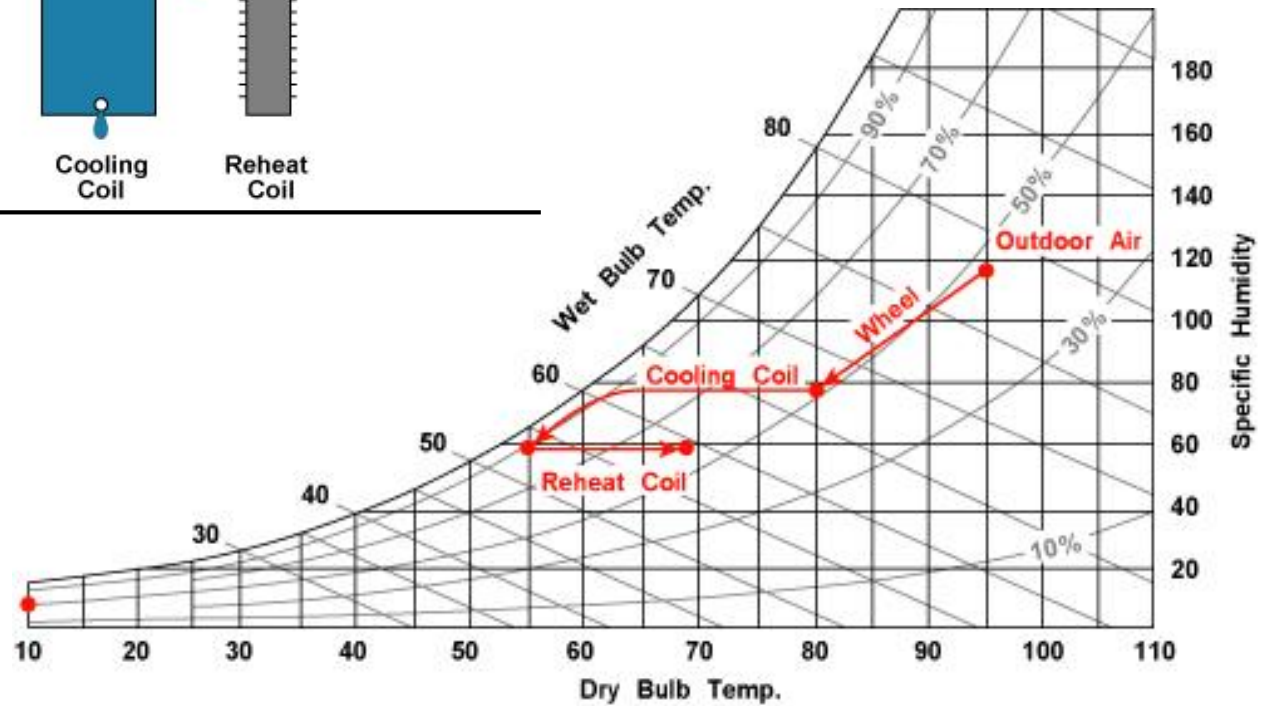
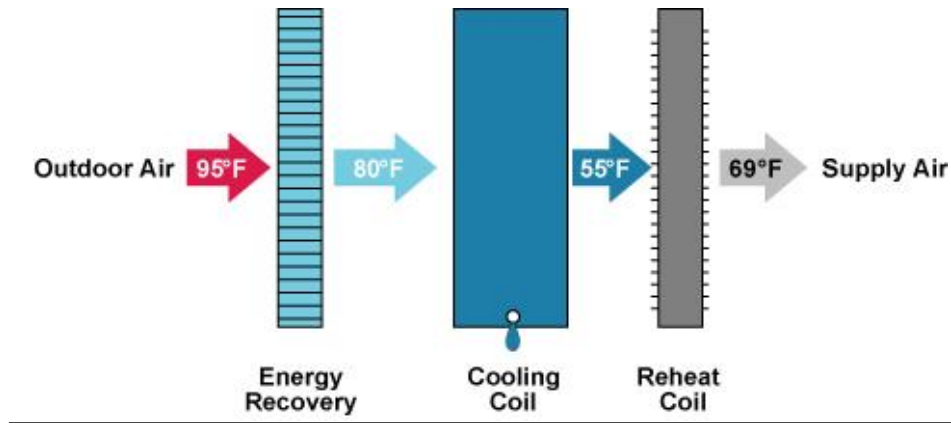
ERCH Solution

Energy Recovery w/ Cooling & Heating

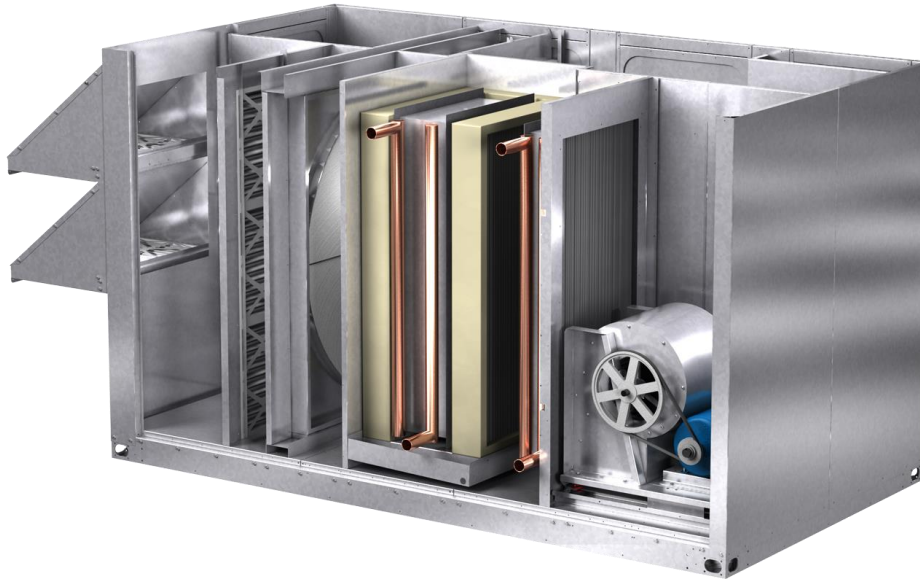


- 1,000 to 10,000 CFM
- Wheel preconditions outdoor air.
- Cooling coil provides final dehumidification.
- Heating coil tempers air for comfort.

RV/E & ERCH Solution

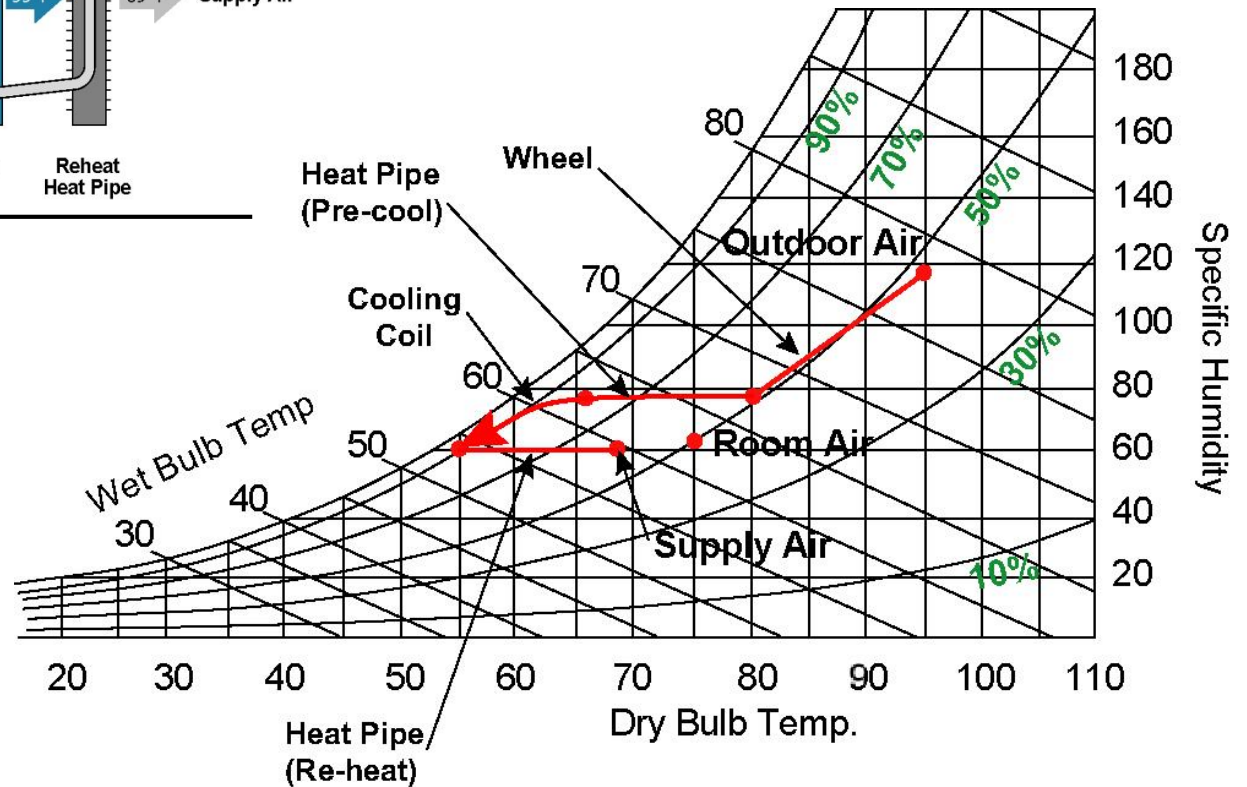
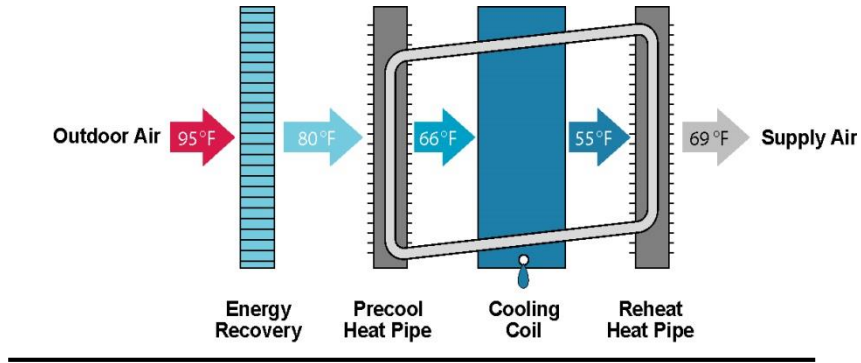


ERT Solution



- 2,000 to 10,000 CFM
- Wheel preconditions outdoor air.
- Wrap around heat pipe & cooling coil provide final dehumidification and reheat.

ERT Solution



Questions?





The mission of Greenheck is to be the market leader in the development, manufacture and worldwide sale of quality air moving and control equipment with total commitment to customer service.

