

Case Study
College of Coastal GA
Science Bldg
DOAS System

Existing Conditions

- **29,000 SF Two story Science Building**
- **IAQ issues- Environmental & Comfort**
- **40 year old HVAC system**
- **Inadequate funding**
- **High Humidity-Brunswick, GA**

Approach: Phase I

- ◆ Mold sampling/Bldg IAQ remediation
- ◆ Dedicated Outdoor Air system w/desiccant dehumidifier

Dehumidification Calculations

- ♦ Dehumidification Loads:
 - ♦ Ventilation
 - ♦ People
 - ♦ Infiltration
 - ♦ Door openings
 - ♦ Permeation
 - ♦ Moisture sources
 - ◆ **Fountains, pools**
 - ◆ **Cleaning Operations**
 - ◆ **Showers**



**Assumed
to be Zero**

Approach: Phase I I

- ◆ New Central Station AHU
- ◆ DDC Controls
- ◆ Upgrade CH & HW Campus loop connections
- ◆ New VAV/PIU terminal units and air distribution

DOAS Positive Benefits

- ♦ **Decoupling of bldg latent and sensible HVAC loads**
- ♦ **Dry AHU CH coil and condensate pan-No microbial growth**
- ♦ **Increase CH coil Temperature- Sensible only load**
- ♦ **Humidity Control: Bldg controlled against damaging humidity levels 24/7**

Demand Control Ventilation (DCV)

- ◆ **Demand Control Ventilation (DCV):**
 - ◆ 4,200 cfm minimum-Bldg pressurization
 - ◆ 8,000 cfm maximum-Carbon Dioxide sensors in large classroom

Energy Savings

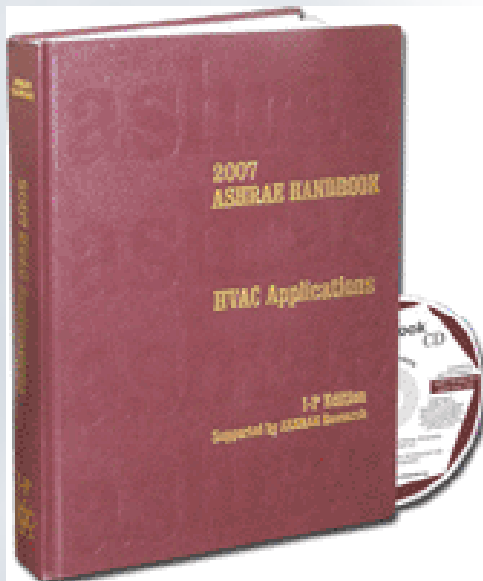
- ♦ **Bldg operated at higher summertime temperature settings-ASHRAE Std 55**
- ♦ **Minimize ventilation rates- ASHRAE Std 62**
- ♦ **Higher CH coil temperatures**

Environmental/Comfort conditons improved

- ♦ **Mold minimized-humidity control**
- ♦ **Larger comfort zone-ASHRAE Std 55**

What is Best Design Practice?

2007 ASHRAE HANDBOOK HVAC Applications



6.7: Dedicated Outdoor Air System (DOAS)

Although most centralized and decentralized systems are very effective at handling the space sensible cooling and heating loads, they are less effective (or ineffective) at handling ventilation air and the latent loads. As a result, a DOAS, should be used.

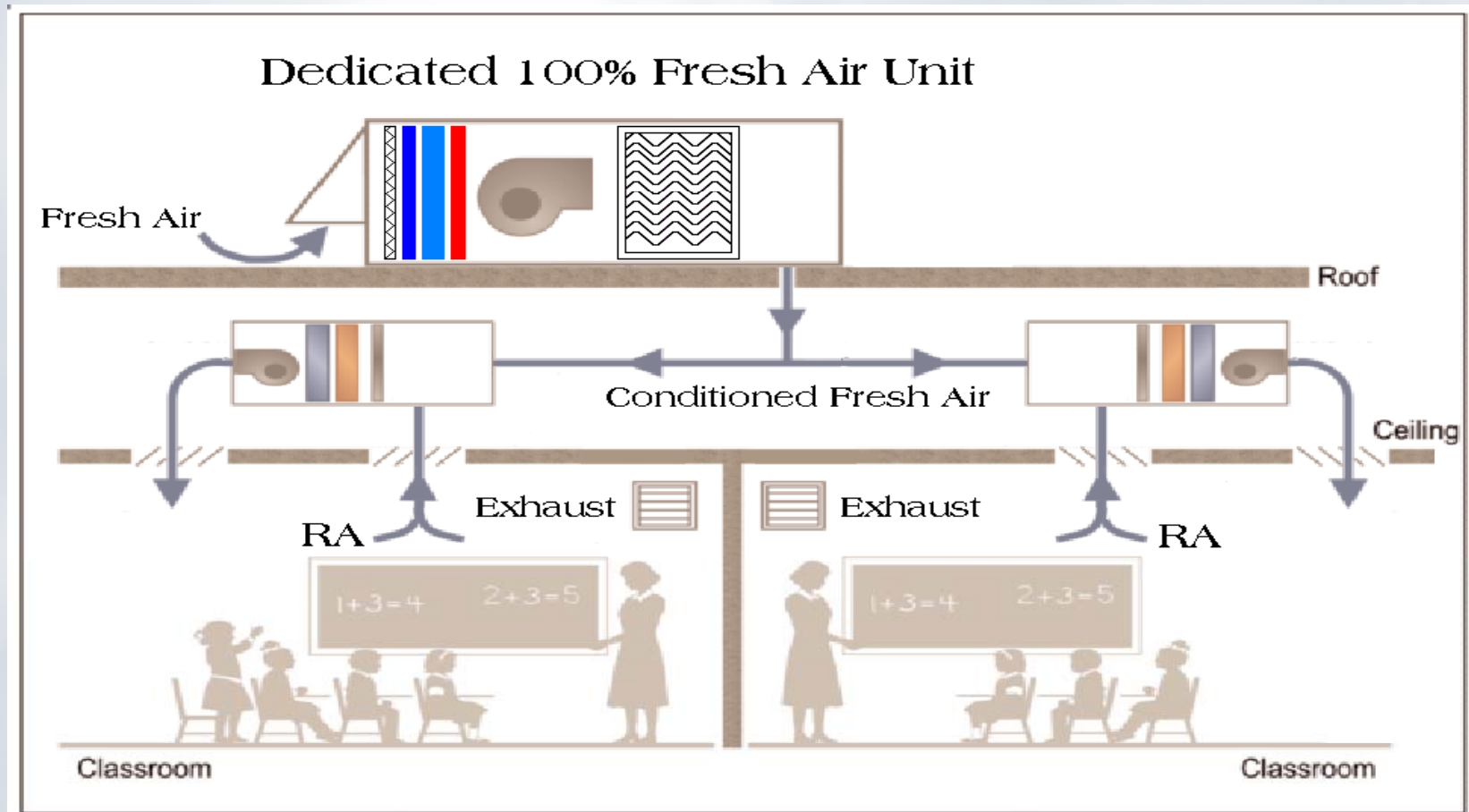
It is preferable, however, to introduce the OA at a lower humidity ratio (*dewpoint*) than the desired space humidity ratio (*dewpoint*), to allow the zone HVAC unit to handle only the space sensible cooling load.

DOAS Arrangement Options

- ♦ Deliver ventilation air Directly to the space or Indirectly to other units

Neutral or Cold Air to Other Units

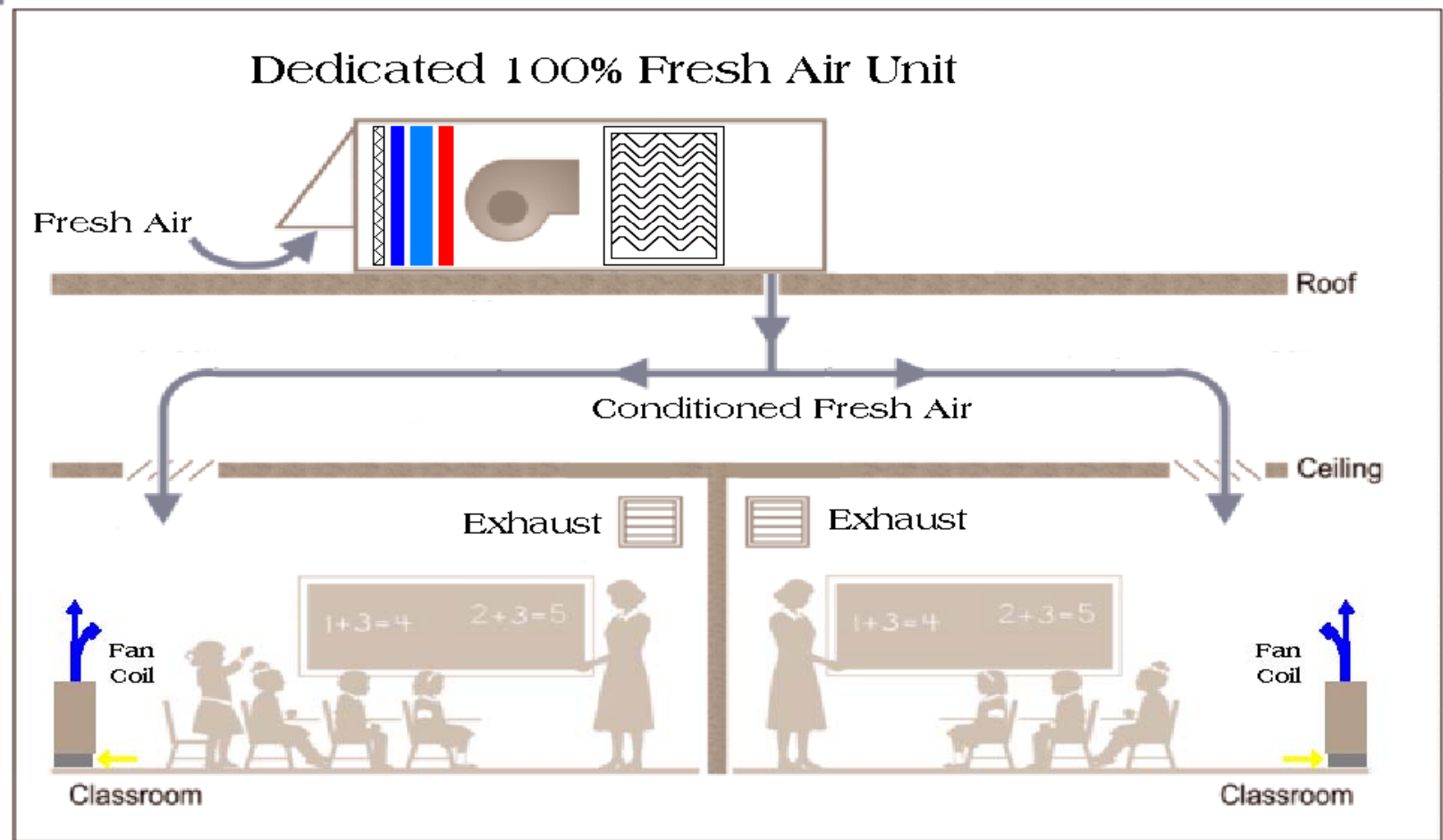
Indirect DOAS Design



Advantages of Ventilating to Other Units

- ♦ **Lower initial cost (potentially) due to less ductwork and diffusers to deliver the air to the space**
- ♦ **Easier to achieve uniform thermal comfort throughout the space (Mixing of airstreams)**

Neutral or Cold Air to Space Direct DOAS Design



Advantages of Ventilating Directly to the Space

- ♦ Easier to assure the outside air reaches the occupied zones
- ♦ No outside air load is imposed on the terminal units
- ♦ The space terminal units can be turned off when the space sensible load is satisfied



Thank you!