

# Getting Comfortable with Designer Air

## WEBINAR SERIES



**Bart Powelson**

Director – Commercial Air  
Conditioning Marketing  
Emerson Climate Technologies



**Jacob Groshek**

Director – Global Commercial  
Scroll Engineering  
Emerson Climate Technologies

## Modulation Technologies: Designing Great Commercial Spaces

# Today's Presenters



**Bart Powelson**

- Director - Commercial Air Conditioning Marketing
- 20+ Years Experience in HVACR Industry
- Responsible for Monitoring Industry Trends/Standards And Specifying and Launching New Compressor and Compressor Electronics Products for Commercial Air Conditioning Applications



**Jacob Groshek**

- Director – Global Commercial Scroll Engineering
- 11+ Years Experience in HVACR Industry
- Responsible for New Product Engineering and Engineering Management; Provides Design and Technical Leadership of Large Commercial Fixed Capacity and Modulating Scroll Platforms Including Variable Speed, Digital And Multiples

# Agenda

**1 Designer Air – What Is It And Who Benefits?**

**2 Defining Comfort**

**3 Comparing Constant Volume Versus Variable Air Volume Systems**

**4 The Types Of Modulation Technologies**

# Many Upgrades Available In Commercial Spaces

- Designer Lighting
- Designer Faucets
- Designer Countertops/Surfaces
- Designer Flooring
- Designer Wall Finishes



**Why Not Consider “Designer Air”?**

# Who Benefits From Designer Air?

	<b>Occupant</b>	<b>Employees</b>	<b>Owners</b>
<b>Restaurant</b>	Diners	Wait/Kitchen Staff	Building Owner
<b>Retail</b>	Shoppers	Sales Staff	Building Owner
<b>School</b>	Students	Teachers/ Faculty	School District Taxpayers
<b>Benefits</b>	Comfort Satisfaction Customer Loyalty Retention	Employee Productivity  Employee Retention	Improved Efficiency  Reduced Operating Costs  Increased Sales & Profits

# Benefits Of Designer Air Systems

## Improved Operating Costs

- Increased Efficiency → Lower Energy Spend



## Reduced Maintenance Costs

- More Frequent Service Agreements Or Scheduled Maintenance



## Financial Payback

- Reduced Life Cycle Cost
- Improved Total Cost Of Ownership
- Possible Utility Or Tax Benefits



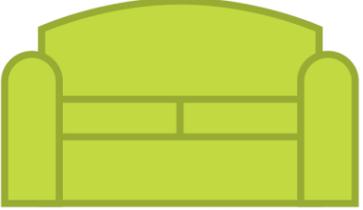
# What Is Comfort?

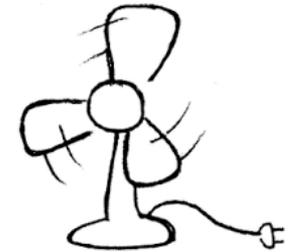
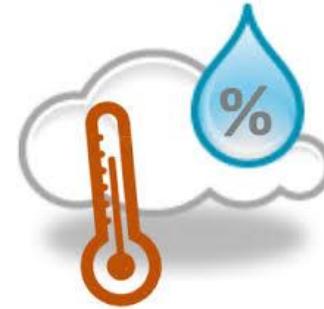
- **It's A Perception**
- **Can Be Different For Everyone**
- **Can Be Ambiguous And Difficult To Define**
- **Discomfort Is Easier To Identify Than Comfort**
- **Tends To Be Stable And Not Fluctuating**
- **Goldilocks Effect**
  - Not Too Hot, Not Too Cold, It's Just Right



# Comfort Has Many Aspects

- **Temperature**
  - Tighter Temperature Control
- **Humidity**
  - Reduced Humidity Levels
- **Air Speed**
  - Ability To Adjust Fan Speed
- **Noise / Sound Quality**
  - Reduced Air Flow And System Cycling

**53%**   
of contractors will use  
**INCREASED COMFORT**  
as a benefit to upsell their customers.



# Challenges To Achieving Comfort

- **Budget / Competing Upgrades**
- **Initial Cost Versus Total Cost Of Ownership**
- **HVAC Is Out Of Sight, Out Of Mind**
- **Changing Loads**
- **Shifting Schedules**
- **Traditional Technologies**
  - Fixed Capacity Compressors
  - Fixed Speed Fans

**New Technologies Are Available To Address These Challenges And Achieve Enhanced Comfort**

# Poll Question

## How Familiar Are You With Variable Air Volume (VAV) Systems?

1. Unfamiliar With VAV Systems
2. Not Very Familiar
3. Familiar – But Infrequently Specified
4. Very Familiar – Frequently Specified And Installed



# Comparing Constant Volume Systems And Variable Air Volume Systems

## Constant Volume

- Constant Supply Air Flow Rate
- Compressor And Fan Operate At Full Capacity
  - Cycles On/Off To Meet Load
- Temperature Control Achieved Through:
  - On/Off Cycling To Meet Load
  - Terminal Reheat Option
  - Mixed Air Stream Option

## Variable Air Volume (VAV)

- Variable Air Flow Rate
  - Achieved With Stepped Or Variable Speed Motor
- Compressor Modulates To Maintain Supply Air Temp.
  - Options Include Multiple Compressors, Mechanical Modulation, Variable Speed
- Advantages Include:
  - Precise Temperature Control
  - Increased Dehumidification
  - Enhanced Comfort
  - Energy Savings
  - Increased Reliability

# Variable Air Volume Systems Enhance Comfort

Modulation Technologies Enable Precise Climate Control

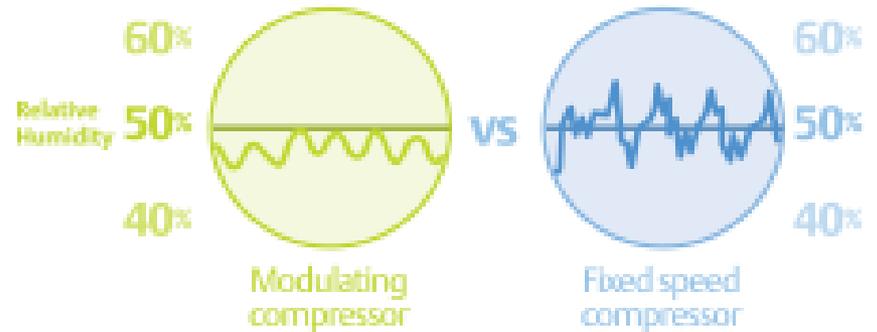
## Temperature Control



- Variable speed compressor
- Standard Air Cond./Heat pump

Capacity Modulation Technologies Maintain More Even Space Temperature

## Humidity Control



Modulation Technologies Achieve Longer Run Cycles And Decrease Relative Humidity

# Variable Air Volume Systems Offer Several Advantages Over Constant Volume

	Constant Air Volume	Variable Air Volume
Compression: Indoor Fan: Outdoor Fan:	Fixed Speed None None	Modulated Stepped Or VS Stepped Or VS
<b>Load Matching (Comfort)</b>	✓	✓
<b>Dehumidification</b>	✓	✓
<b>Part Load Efficiency</b>	✓	✓
<b>Sound</b>	<b>X</b>	✓
<b>Vibration</b>	<b>X</b>	✓

# Types Of Modulation Technologies

## Mechanical Modulation

- Multiple Compressors → Tandems/Trios
- Stepped/Two-Step → UltraTech
- Continuous → Digital

## Speed Control

- Variable Speed
- Tandems With Variable Speed + Fixed



Tandem / Trio



Copeland Scroll  
UltraTech



Copeland  
Scroll Digital



Copeland Scroll Variable Speed

As a result of new efficiency regulations,  
**66%** of contractors expect  
AN INCREASE IN THE  
SALES OF MODULATING SYSTEMS.



# Copeland Scroll UltraTech™

## Two-Step Modulation

- By Mechanically Unloading, Compressor Operates At 67% And 100%
- Optimized For High Part-Load Efficiency
- Offers Improved Temperature And Humidity Control
- 2-5HP Range
- Ideal For Mid-Tier SEER And IEER Based Light Commercial Split And Package Applications



**Part-Load Capacity**

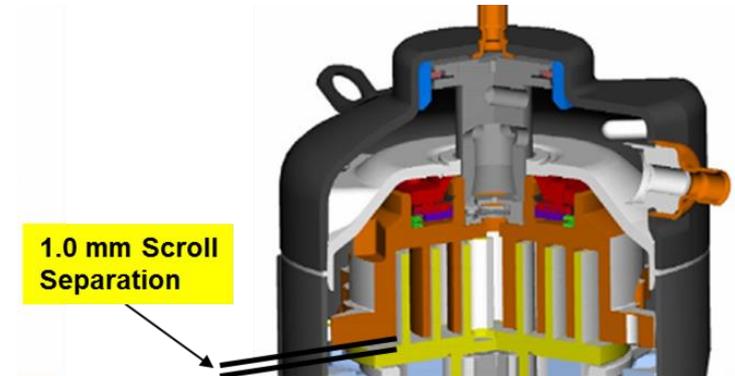


**Full-Load Capacity**

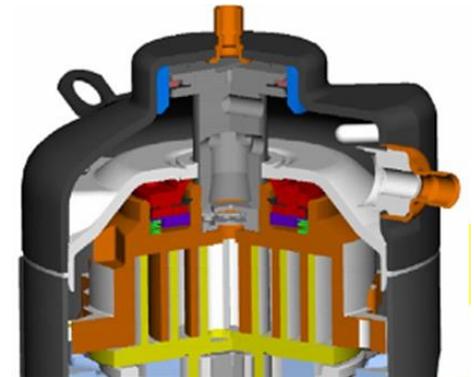
# Copeland Scroll Digital™

## Continuous Modulation

- Separation Of Scroll Elements Alternately Loads And Unloads Compressor
- By Controlling Separation Times, Compressor Is Precisely Operated Between 10-100%
- Precise Temperature & Humidity Control
- 3-15HP Range (Tandems Up to 30HP)
- Ideal For Mid-Tier Comfort Light Commercial Split, Package And Chiller Applications



Unloaded State



Loaded State

# Tandems And Trios

## Multiple Compressors

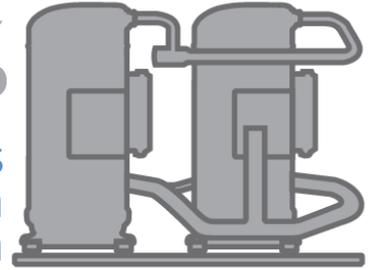
- Multiple Steps Of Capacity
- Independent Operation – No Lead/Lag
- Extensive Reliability Testing In Every Design
- Over 150 Even And Uneven Combinations
- High Part-Load And Full-Load Efficiency
- 3-120HP Range
- Ideal For Commercial Splits, Rooftops And Chillers

As a result of new efficiency regulations,

**45%**

of contractors  
expect an  
increase in

**SALES OF TANDEMS/TRIOS.**



# Copeland Scroll™ Variable Speed

## Next Generation Variable Speed

- Variable Frequency Drive Dynamically Controls Compressor Motor Speed
- High Efficiency Embedded Magnet Motor Delivers Breakthrough Part-Load Efficiency
- Wide 20-120% Speed Range Provides Superior Temperature And Humidity Control
- Proven Reliability Enhanced With CoreSense™ Technology In Drive
- 2-10T Range
- Ideal For Premium Light Commercial Rooftop, Chiller And Geothermal Applications



2-5 Ton  
Copeland Scroll  
Variable Speed

10 Ton  
Copeland Scroll  
Variable Speed

# Compressor Modulation Technology Comparison

Modulation Technology	Products	Range	Part Load Efficiency	Full Load Efficiency	Comfort	Applied Cost
UltraTech (Two-Step)		2-5HP	High	Medium	Medium	Best
Digital (Continuous)		3-15HP	Low	High	High	Better
Variable Speed		2-10HP	Highest	Low	Highest	Good
Multiples		3-120HP	High	High	High	Best

# Hybrid Modulation Technologies Options

For A 10 Ton RTU...	10%	50%	100%	110%	Over-Speed
Single, Digital Compressor		ZPD103			
Tandem, Fixed Speed + Digital		ZP54K5 + ZPD54K5			
Single, VS Compressor			ZPV063		
Tandem, Fixed Speed + VS		ZP54K5 + ZPV038			

**Combining Technologies In Multiples  
Unlocks Additional Modulation Range**

# Summary



## **Consider “Designer Air”; Elevate The HVAC Decision**

- Numerous Benefits To Occupants And Building Owners



## **Designer Air Systems Provide Enhanced Comfort**

- Temperature Control, Humidity, Variable Air Flow, Sound Quality



## **Consider Advantages Of Variable Air Volume Systems**

- Enabled By Modulation Technologies



## **Understand Modulation Technology Options Available To You**

- Variable Speed Systems Deliver Superior Comfort And Excellent Efficiency  
- Mechanical Modulation Can Affordably Provide Enhanced Comfort



# INTRODUCING DESIGNER AIR

To Learn More On “*Getting Comfortable With Designer Air*”, Please Visit Our Webpage At [emersonclimate.com/designerair](http://emersonclimate.com/designerair)

Stay Tuned For More Emails Containing Information And Timing On Our Next Webinar!

