TODAY’S WEBINAR SPONSOR

For more info about LFE Protect, contact Keith Pierce -
617-697-8777 - keith@lfesolutions.com
RETURN TO WORK: HOW IAQ & ENERGY SAVINGS FIT IN THE NEW NORMAL
HVAC: A HEALTHY BUILDING FOUNDATION

• Harvard University’s Healthy Buildings Program

• 9 factors influence health, productivity of a facility’s occupants

• HVAC impacts majority of these factors
ASHRAE COVID-19 GUIDANCE

• Changes to HVAC systems, can reduce airborne exposures
• Perform maintenance and run equipment prior to re-occupancy to limit spread of COVID-19
• For building readiness:
  • Flush HVAC system two hours before/after occupancy, operate exhaust fans
  • Run garage exhaust two hours before occupancy
  • Run system on minimum outside air when unoccupied
CDC COVID-19 GUIDANCE

Run HVAC longer to enhance air exchange

Increase outdoor ventilation

Open dampers to reduce or eliminate recirculation
DUCTWORK’S IMPACT ON IAQ

**Good Ventilation:**

- reduces sick building syndrome symptoms
- cuts absenteeism
- reduces infectious disease transmission

− *Harvard Business Review*
MANAGING COVID-19 TRANSMISSION WITH HVAC

Sealed Ducts
Managing COVID-19 Transmission with HVAC

Leaky Ducts

Diagram showing the flow of air through an HVAC system with leaks, distinguishing between fresh, return, and supply air, as well as contaminated room air.
MANAGING COVID-19 TRANSMISSION WITH HVAC

Sealed Exhaust

Exhaust Fan

Sealed Ducts

Exhaust Air

COVID Polluted Toilet Room Air
MANAGING COVID-19 TRANSMISSION WITH HVAC

Leaky Exhaust

Exhaust Fan

Leaky Ducts

Exhaust Air

COVID Polluted Toilet Room Air
IMPLICATIONS OF SUPPLY DUCT LEAKAGE

Fresh air to return/exhaust is short-circuited
- Sent back to supply fan or exhausted from the building
- Air exhausted depends upon need for pressurization/depressurization

Up to 40% of supply air leaked never gets to space

Duct leakage reduces the concentration of COVID-19 in the exhaust air
**AEROSEAL SOLUTION**

- Proven safe and effective
- Seals ducts from the inside out
- Overcomes manual sealing issues
  - No access limitations
  - Dial-In Results
- Payback in 2 to 7 years
- Verifiable & Guaranteed
SAFETY CERTIFICATIONS AND RECOGNITION

- Consumer Reports: 2014
  - Recognized in 2005

  - Approved energy savings

- U.S. Department of Energy
  - 2002 100 most beneficial technologies in 23 years

- EBie award
  - Task force approved measure

- AHR Expo Innovation Awards 2016
  - Product of the Year

- nyseda
  - Certified

- ASHRAE
  - Certified

- Federal Energy Management Program
  - Certified

- planyc
  - Green Buildings & Energy Efficiency

- Urban Green
  - 2011 EBie award
INSTALLATION EXAMPLES

Federal/Military
Healthcare/Surgery Centers
Education: K-12, University
Manufacturing/Clean Rooms
Multi-Family / Hospitality
Critical Applications
Light Commercial
Q&A

Thank you!

April Frakes
(937) 422-2188
April.frakes@aeroseal.com
DOES GOOD IAQ EQUAL INCREASED OPERATING COSTS?

NEEDLEPOINT BIPOLAR IONIZATION TECHNOLOGY
OBJECTIVE:
USING NEEDLEPOINT BIPOLAR IONIZATION TO ACCOMPLISH CLEAN AIR AND ENERGY EFFICIENCY

• WHO
• WHAT
• WHY
• HOW
• WHERE
Our mission at SMP is to provide indoor air quality solutions that lead to healthier occupants, increased productivity and clean, fresh, healthy environments.

Tracy L. Stoner, PE, CEM
Darline Moore, CEO
WHAT is Ionization?

Ionization is the artificial creation of ions that normally exist in nature. Ions can be positively or negatively charged.
WHAT is Ionization?

Naturally occurring IONS exist in high concentrations where the ocean meets the shore....
WHAT is Ionization?
WHAT is Ionization?

…and at very high elevations, such as waterfalls and mountainous regions.

High elevation = 5,000 ions / cc

City = 200 ions / cc

Typical units of measure = ions per cubic centimeter
WHAT is Needlepoint Bipolar Ionization?

Needlepoint: apply a high voltage electric charge to an electrode or needle

Bipolar ionization: creation of millions of both positive and negative ions

Acronym: NPBI
WHY is NPBI Important?
### WHY is NPBI Important?

1 ft³ of Cleaned air

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOW PARTICLES ARE GENERATED (FT³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting or standing still</td>
<td>100,000</td>
</tr>
<tr>
<td>Standing up or sitting down</td>
<td>2,500,000</td>
</tr>
<tr>
<td>Walking</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Horseplay</td>
<td>30,000,000</td>
</tr>
<tr>
<td>Sweeping, grinding, welding</td>
<td>&gt; 1 billion</td>
</tr>
</tbody>
</table>
WHY is NPBI Important?

Particle Movement in the Air

Airborne particles act as a transport mechanism for airborne bacterium.
WHY is NPBI Important?

Airborne Particles Can be Dangerous
ISO 16890 Standard Filter Particle Removal

- Fine grain sand – 90 µm
- Human Hair – 50 to 70 µm

PM₁ – The Smaller the More Dangerous!
Summarizing Airborne Particles:

• Particles act as a transport mechanism for airborne virus and bacteria
• The smaller the particle, the further it can travel in the air
• The smaller the particle, the more harmful the effects can be

WHY is NPBI Important?
Connecting the Dots to NPBI:

Whether ions exist naturally in nature or they are artificially created, ions are nature’s air scrubbers
Artificially created IONs are released into the space through the existing forced air stream via the heating and cooling system.
HOW Does NPBI Work?

The IONs attach to bacteria, viruses, Mold spores, VOCs and other particles, pathogens and gases.
IONs attack pathogens and rob them of the food source they need for survival - hydrogen.

**HOW Does NPBI Work - Pathogens**

Harmless water vapor is created as a byproduct.
HOW Does NPBI Work – Airborne Particles

[Diagram showing the process of how airborne particles agglomerate and are then captured by a filter]
Two sealed plastic containers were equipped with fresh bread and a cup of water. One container is equipped with NPBI. After 12 days, the bread in the NPBI container remained fresh while the bread in the unprotected container is covered in mold growth.
WHAT are the Test Results?

Before NPBI
### WHAT are the Test Results?

**Ask manufacturer for efficacy test results**

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Time in Chamber</th>
<th>Kill Rate</th>
<th>Test Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clostridium Difficile (C Diff)</td>
<td>30 min.</td>
<td>86.87%</td>
<td>EMSL</td>
</tr>
<tr>
<td>E.coli</td>
<td>15 min.</td>
<td>99.68%</td>
<td>EMSL</td>
</tr>
<tr>
<td>Human Coronavirus*</td>
<td>60 min.</td>
<td>90.00%</td>
<td>ALG</td>
</tr>
<tr>
<td>Legionella</td>
<td>30 min.</td>
<td>99.71%</td>
<td>EMSL</td>
</tr>
<tr>
<td>Mold Spores</td>
<td>24 hours</td>
<td>99.50%</td>
<td>GCA</td>
</tr>
<tr>
<td>MRSA</td>
<td>30 min.</td>
<td>96.24%</td>
<td>EMSL</td>
</tr>
<tr>
<td>Norovirus</td>
<td>30 min.</td>
<td>93.50%</td>
<td>ATS Labs</td>
</tr>
<tr>
<td>Staphylococcus (Staph)</td>
<td>30 min.</td>
<td>96.24%</td>
<td>EMSL</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>60 min.</td>
<td>69.09%</td>
<td>EMSL</td>
</tr>
</tbody>
</table>
WHAT are the Benefits of NPBI?

- Reduce & Control Viruses
- Reduce & Control Bacteria
- Reduce & Control VOC
- Reduce & Control Mold
- Reduce & Control Airborne Particles
HOW Can NPBI be Used for Energy Efficiency?

ASHRAE Standard 62.1:

6. PROCEDURES

6.1 General. The Ventilation Rate Procedure, the IAQ Procedure, the Natural Ventilation Procedure, or a combination thereof shall be used to meet the requirements of this section. In addition, the requirements for exhaust ventilation in Section 6.5 shall be met regardless of the method used to determine minimum outdoor airflow rates.

Informative Note: Although the intake airflow determined using each of these approaches may differ significantly because of assumptions about the design, any of these approaches is a valid basis for design.

6.1.1 Ventilation Rate Procedure. The prescriptive design procedure presented in Section 6.2, in which outdoor air intake rates are determined based on space type/application, occupancy level, and floor area, shall be permitted to be used for any zone or system.

6.1.2 Indoor Air Quality (IAQ) Procedure. The performance-based design procedure presented in Section 6.3, in which the building outdoor air intake rates and other system design parameters are based on an analysis of contaminant sources, contaminant concentration limits, and level of perceived indoor air acceptability, shall be permitted to be used for any zone or system.
WHERE – Large Arena

Renovation Challenge:
• Improve energy efficiency
• Reduce Outside Air (moisture issues due to humid climate)
• Maintain occupant comfort

PROJECT SUMMARY
NPBI Project Cost: $350,000
HVAC Equipment Savings: > $1,000,000
Annual Energy Savings: $115,000
NPBI ROI: Immediate

Tour of Amalie Arena (home of The Tampa Bay Lightning) five years later - coils looked new!
WHERE – Jump Park

Renovation Challenge:
• Existing vacant building purchase
• Conversion of space to an indoor trampoline park
• Mechanical engineer: approx. 55 tons of HVAC equipment must be added to meet IAQ standards

PROJECT SUMMARY:
NPBI Project Cost: $ 50,000
HVAC Equip. Savings: $ 63,100
Utility Rebate: $ 5,300
Annual Energy Savings: $ 33,000
NPBI ROI: < 1 month
School district implementing NPBI throughout the district.

Schools benefit from reduced OA, utility rebates and energy savings.

Additional Benefits Experienced by Identical K-12 Schools, different cities:
• School with NPBI reported 3 absences for week of 01.10.2020
• School without NPBI reported 80 absences for week of 01.10.2020

Less sick days = More funding!
WHERE: Airport Renovation

Challenge:
• Mitigate airplane exhaust fumes
• Decrease operating costs
• Improve energy efficiency
• Address mold issues
• Maintain occupant comfort

PROJECT SUMMARY

NPBI Project Cost: $ 70,000
Utility Rebate: $ 15,500
Annual Energy Savings: $ 35,000
NPBI ROI: < 2 months
WHERE: Medical Office Building

Challenge:
• Mold present throughout the facility
• Remediation costs estimated $100,000 to clean / seal HVAC ducts
• Clients working remotely while problems addressed

PROJECT SUMMARY
• Noticeable improvement after 1st week of operation
• Post testing showed mold eliminated after 5 months
• Outside Air introduced into the building was reduced
• Energy savings from reduced OA = $12,500 annually
WHAT are the Benefits of NPBI?

Reduce & Control Viruses

Reduce & Control Bacteria

Reduce & Control VOC

Reduce & Control Mold

Reduce & Control Airborne Particles

Energy Savings: OA Decrease

Capital Savings: New Construction

Capital Savings: HVAC Downsize, Replacements

Energy Savings: Clean Coil

O&M: Less Time Cleaning Coils

Capital Savings: HVAC Downsize, Replacements
Thank you for your attention!
FOR CEU CREDIT
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Nina.Kogan@NAESCO.org