Poster submission: CampusEnergy 2018

Company: Aeroseal LLC

Presenter: April Lemmert

Title: Innovations In Duct Sealing: Universities Discover New Opportunity For Significant Energy Savings

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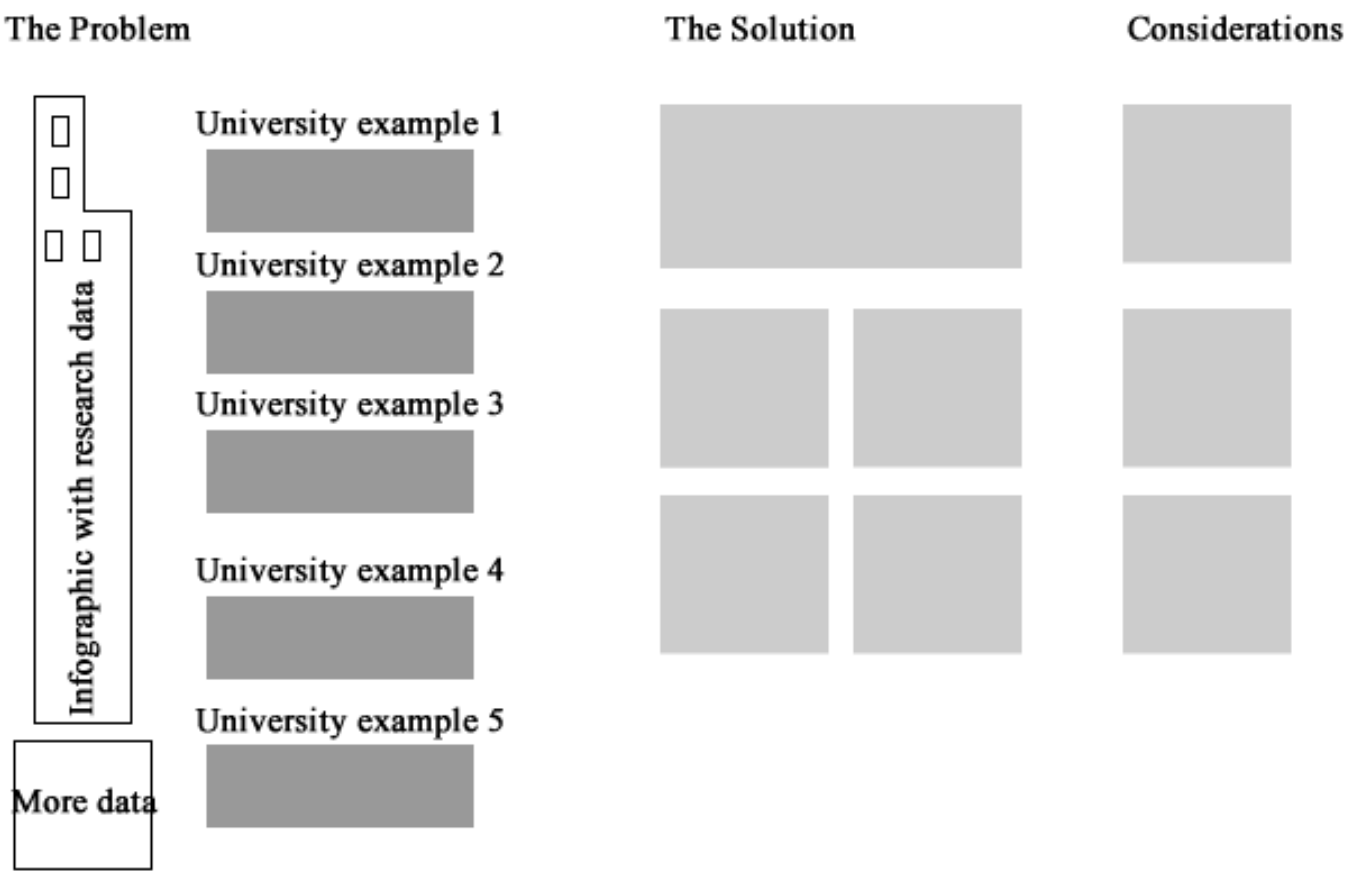
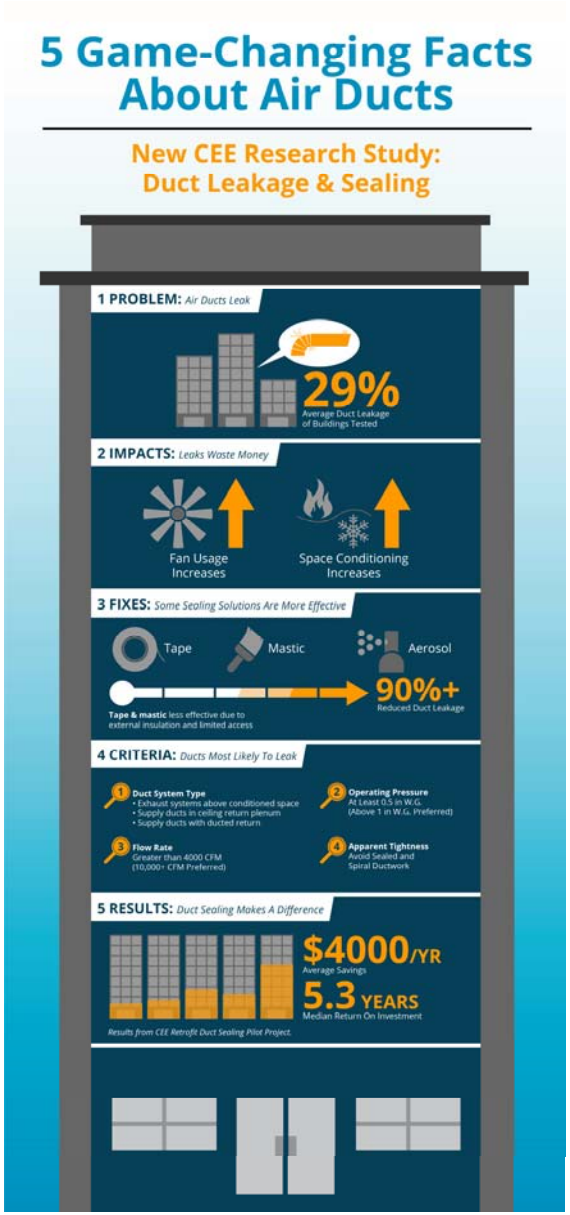
Outline - Layout

INNOVATIONS IN DUCT SEALING:
Universities Discover New Opportunities For HVAC Fixes / Energy Savings



The Problem



⇐ (New study results)

⇐ (The problem: commercial ducts leak)

⇐ (The impact: increased energy use)

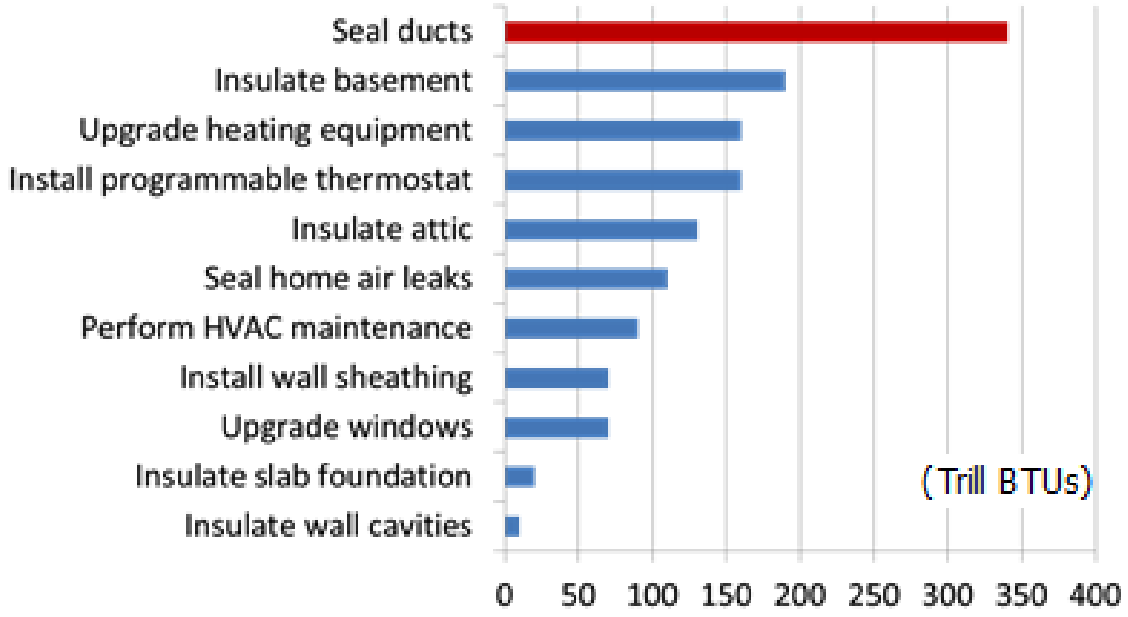
⇐ (Fixes: current solutions available)

⇐ (Criteria: identifying ducts most likely to leak)

⇐ (Results: energy savings, ROI)

The Problem

McKinsey: Energy Efficiency Potential



Source: *Unlocking Energy Efficiency in the US Economy*, McKinsey and Company, 7/09

Example 1

PRINCETON UNIVERSITY – Jadwin Hall

Situation:

- 6-story physics building
- HVAC renovation project
- Had to use existing exhaust shafts

Problem:

- Leaks in existing exhaust shafts
- Unable to balance
- Increased fan speed / energy use

Solution:

- No demolition needed to access duct
- Completed in 2 ½ days

RESULTS

- 98% reduction in duct leakage
- Allowed balancing
- Reduced fan usage / speed

"My 30 years of experience as a forensic engineer and a TAB technician has taught me that once an existing duct system has leakage, there is not practical, cost effective way to fix the problem. This new technology changes all that."

Project's TAB Expert

Example 2

Syracuse University – Campus West

Situation:

New 4-story dormitory

Need to meet < 10 CFM per floor NYSERDA specs

Problem:

Average 120 CFM of leakage post install

New construction barred access for re-sealing

Solution:

No demolition needed to access duct

Completed in 3 days

- All ducts tested below 10 CFM of leakage
- Met stringent NYSERDA requirements

RESULTS

"As energy efficiency standards become increasingly stringent, we will need to turn to new technologies like this. It was a game-changer for this project and a key to our ability to meet the NYSERDA requirements."

Project Manager

Example 3

Harvard University – Girguis Labs

Situation:

Installed new 8,500 CFM air handler using existing ductwork

Problem:

Fan was running at 97% capacity yet treated air was not reaching all target areas. With ducts under insulation and behind layers of pipes, traditional sealing was deemed unviable.

Solution:

Aerosol sealing completed in 3 days

- Reduced leakage by 98%
- Lowered fan speed by 60%
- Complete HVAC coverage throughout

RESULTS

"This was a project saver. Our only other option was to tear down walls and demolish the building structure in order to access the leaky ductwork."

Project Manager

Example 4

Ohio State University – William Hall

Situation:

New 6 story dormitory
existing ductwork

Problem:

All 19 ventilation shafts failed pressure tests
Couldn't pass fire code or receive LEED silver
Estimated +$95k annually in additional energy costs

Solution:

Aerosol sealing completed in 2 weeks

- Sealed 98% of leaks
- Passed fire code. Earned LEED silver
- Saved estimated $100,000 annually

RESULTS

"The aerosol sealing process easily solved one of the biggest challenges we had. Without it, the project would have been delayed by months and it would have added an astronomical cost to the project."

General Contractor

Example 5

Cornell University – William Hall

Situation:

New 26-story residential building
World's largest passive house

Problem:

Needed to achieve < 1% CFM overall leakage

Solution:

Completed aerosealing 55 risers and more than 1,600 individual trunk lines in just 8 days.

- Average leakage after aeroseal .7% CFM
- Helped make world's largest passive house possible.

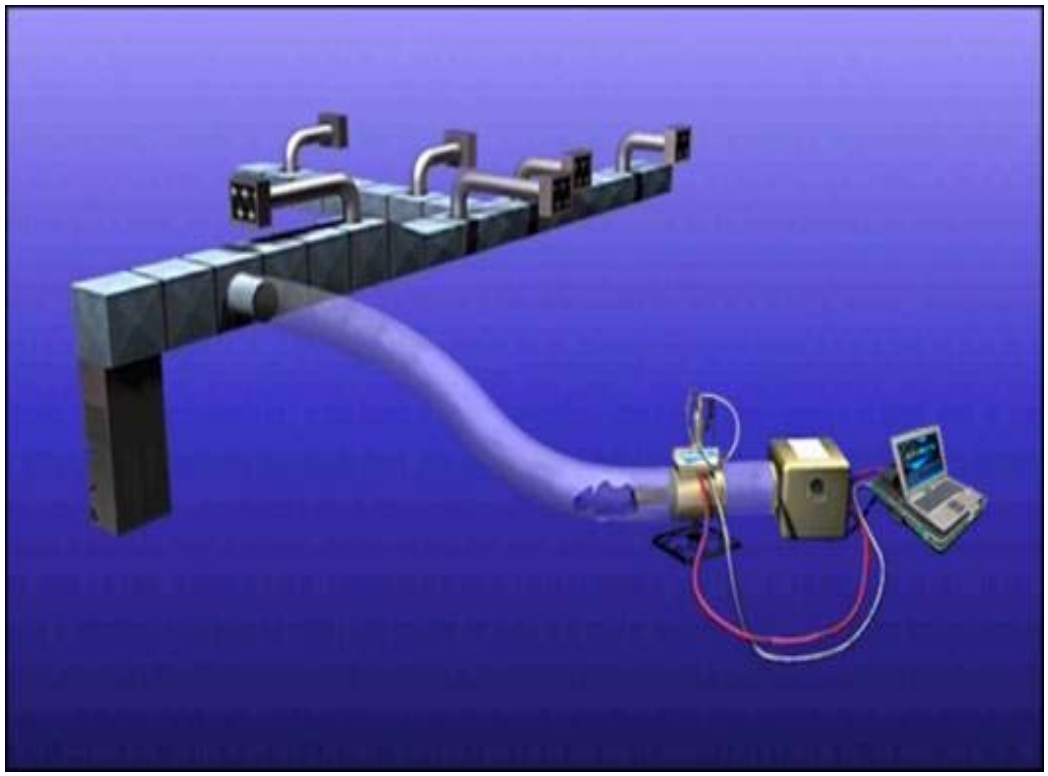
RESULTS

"After aerosealing, leakage was less than a percent. Aerosol sealing alone may be the future of duct sealing."

Project Engineer

The Solution

Aerosol-based Duct Sealing



- Developed by U.S. Department of Energy
- Sealing from the inside
- 98% effective at sealing all leaks
- No demolition required

The Solution

Sealing from the inside

The Solution

Harvard University reducing fan requirements…and energy usage.

The Solution

Pensacola Christian College

The Solution

Alternative access via rooftop fan outlet

The Solution

Doesn’t coat the duct interior. Accumulates solely around the leaks.

The Solution

Computer-controlled process

Final printout report generated upon completion.

AEROSEAL
Duct Sealing From The Inside

Certificate of Completion

Duct Sealing Performed for:

Larry Brenner
123 SW 17th Ave.
Chicago, IL 60611

Overall Sealing Results

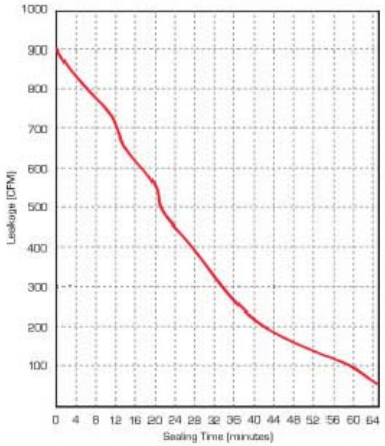
When we arrived
YOUR DUCTS HAD:
899.83 CFM of Leakage, equivalent to
124 Square Inch Hole

After we finished
YOUR DUCTS HAVE:
83.73 CFM of Leakage, equivalent to
3.5 Square Inch Hole

This corresponds to a 91% Reduction in Duct Leakage

Note: Duct leakage results are calculated in cubic feet per minute (CFM) measured at a standard OPERATING PRESSURE of 25 Pa (0.10 in. water).

Aerosol Sealing Profile



Aeroseal Technician: **Robert**
Aeroseal Equipment Serial #: **1012X000089**
Date of Seal: **March 27**

Considerations

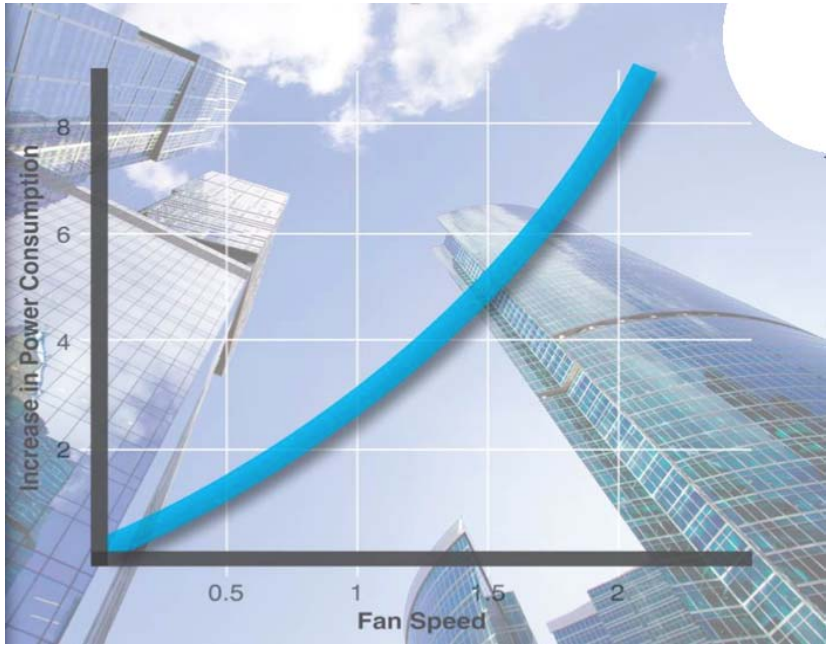
Internal Leaks – A Triple Threat

Internal Leaks – A Triple Threat

1. **Increased fan use**
2. **Increased internal heat**
3. **Increased outside air**

Increased fan use:

20% increase in fan speed = a 73% jump in energy use.



Considerations

Rate your building for possible duct leakage.

Duct Leakage Scorecard

Choose a value that best describes each situation. Write the value in the box. Add the values to determine your Duct Leakage Assessment. Complete one worksheet for each air distribution system.

Building Name

Building Address

Air Handler or Fan Tag Number(s)

LEGEND

Fractional Leakage Score:

- <50 points: 7%
- 51 to 80 points:15%
- 81 to 99 points: 20%
- >100 points: 25%+

Your total:

Examples of visible signs of duct leakage:

Tracing at corners of flanges

Unsealed holes at hangers

Duct tape blown away

Condensate leak at flange

Tracing at door

1. Main air duct and riser construction:

Rectangle	Round	Flexible Duct	Other*
10	0	5	40

*(i.e. masonry, gypsum)

2. Branch air duct construction:

Rectangle	Round	Flexible Duct	Other
5	0	5	30

3. Variable air volume or terminal boxes:

Yes	No	Unknown
5	0	0

4. Dual duct system:

Yes	No	Unknown
10	0	0

5. Slot diffusers:

Yes	No	Unknown
10	0	0

6. Balance dampers:

Yes	No	Unknown
5	0	0

7. Access doors:

Yes	No	Unknown
5	0	0

8. Main air duct connection type:

Welded	Flanged	Other
0	5	15

9. Branch air duct connection type:

Welded	Flanged	Other
0	5	10

10. Inflated externally insulated air ducts (mattress effect):

Yes	No
15	0

11. Is duct damaged or disconnected:

Yes	No
60	0

12. How is duct sealed:

Mastic	Metal Tape	Cloth Tape	None
0	15	50	50

13. If sealed with mastic or metal tape, how well is it sealed:

Considerations

Evaluation, contract & installation all completed by sealing contractor