



Benefits of commercial air duct cleaning.

Commercial air duct cleaning represents a tremendous business opportunity as part of the growing indoor air quality field. Since the early 1990's the duct cleaning business growth rate has exceeded 50%. Industry analysts are predicting this to continue for some time. Commercial air duct cleaning offers you many attractive features including:

- Excellent gross margins (40% to 60%).
- Can provide significant add-on revenues with existing customers.
- Can generate new customers for your existing products and services.
- Can help sell other IAQ related products and services.
- Can generate revenues during slow times of the year.
- Can help identify potential HVAC retrofit customers & close equipment retrofit deals.

What is air duct cleaning?

Air duct cleaning is more than cleaning air ducts. A more appropriate term to use would be "HVAC system cleaning" (HVAC means heating, ventilating and air conditioning). The HVAC system includes everything in the air stream including: all of the registers, grilles and diffusers, the supply ductwork, the return ductwork, turning vanes, the air handler or rooftop unit and other components like VAV boxes, in line coils etc.

Is there a need for air duct cleaning?

Yes. The number of nonresidential buildings in your area represents your market potential. Not every building needs to have its air ducts cleaned right now but there is a good possibility that over time the clean air ducts of today will become the dirty air ducts of tomorrow. Inadequate filtration, activities within the building or renovation and construction debris, and microbial contamination are just some of the reasons why air duct systems become dirty and/or contaminated.

This need for cleaning HVAC systems will continue to be strong until we improve the design, installation and maintenance of HVAC systems and the buildings they are in.

Does HVAC system cleaning really work?

Yes, if done properly, HVAC system cleaning can improve the indoor air quality of the building and in most cases can improve the efficiency of the HVAC system. Common sense tells us that if you remove the accumulated dirt, debris and contaminates from the fan, coils, ductwork and other components in a HVAC system the air quality of that building will be improved and the HVAC system should run more efficiently.

Two studies also confirm the benefit of commercial air duct cleaning.

- <u>NADCA Energy Study</u> found an 11% energy savings when a lightly fouled HVAC system was cleaned.
- <u>PG&E/DOE Study</u> found a 30% energy savings when a heavily fouled HVAC system was cleaned

Commercial HVAC Systems & Components

Commercial HVAC systems can be larger and complex . They can be intimidating but they don't have to be. You just break them down into manageable sections. For example, a building could have 5 air handlers/ systems. You deal with only one air handler and it's associated ductwork at a time. You even break down the ductwork in this one system into manageable sections depending on the

capabilities of your equipment.

Commercial HVAC systems also have many component parts that can be can be challenging to clean. Here are the most common components you are likely to find in commercial HAVC systems:

Air Handlers



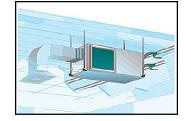


Commercial Air Duct Cleaning Guidelines



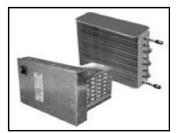
Heat Pumps Units







Reheat Coils





VAV/Mixing Boxes:





Fire Dampers:



Sound Attenuators



Humidifier Pipes



Grilles/Registers/Diffusers





Very Dirty Systems







Cleaning Techniques

There are different cleaning techniques that you can use to clean HVAC systems. These include:

 <u>Air Washing</u> (level 1 cleaning)



Air washing is the use of high-pressure air that comes from your air compressor through an air hose to an air nozzle. This air nozzle delivers the streams of high-pressure air, which dislodges the accumulated dirt and debris. The suction from the vacuum collection system and the highpressure air from the air nozzle move the dirt and debris that has been dislodged from the ductwork into the vacuum collection system.

 <u>Air Whipping</u> (level 2 cleaning)



Air whips is a combination of air washing (high pressure air) with some agitation from the whips. This is a higher level of cleaning because, in addition to air washing, the whips make contact with some of the interior ductwork. Again, the suction from the vacuum collection system and the highpressure air from the air nozzle move the dirt and debris that has been dislodged from the ductwork into the vacuum collection system.

• <u>Power Brushing</u> (level 3 cleaning)



The highest level of cleaning is achieved by power brushing and air washing because it does the best job of removing the accumulated dirt and debris in the ductwork. The brushing does the best job of dislodging the accumulated dirt and debris because it is making physical contact with more of the interior ductwork than the other methods. Air washing after brushing is necessary to help move the dirt and debris out of the ductwork to the vacuum collection system.

• <u>Contact Vacuuming</u> (level 3 cleaning)



Contact vacuuming achieves the highest level of cleaning because like power brushing it makes physical contact with more of the interior surfaces.

The goal is to remove all of the accumulated dirt, debris and other contamination found in the system. This is called source removal.

Different cleaning techniques are used on different parts of the HVAC system. On some surfaces, like the inside of the air handler or rooftop unit, you clean via contact vacuuming. Others, like ductwork, you put under negative pressure with a vacuum collection unit and then dislodge the accumulated dirt and debris with your air washing, air whipping and power bushing tools. This dirt and debris is collected (via the negative pressure or suction from the vacuum collection unit) and blown (via air washing tools) to the vacuum collection unit. Coils can be cleaned via air washing or with coil cleaning solutions and water. If microbial contamination is a concern, the HVAC system can be cleaned and then sanitized.

Basic Commercial Cleaning Process

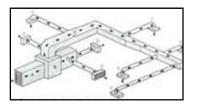
Commercial projects, especially the large ones can be very intimidating. It becomes much more manageable however when you break it down into smaller segments. Just remember that you will be cleaning one air handler and its associated ductwork/

components at a time.

In most cases you will not complete a commercial project in one day so it's important that you always clean in the direction of the air flow so you don't contaminate an area that you have already cleaned.

Typically you clean in the following order:

- Fresh air intakes and return ductwork
- Air handling unit
- Supply ductwork and components



Commercial Air Duct Cleaning Guidelines Commercial projects will require a lot of service access openings and zoning off of ductwork. You will need service openings on both sides of each turning vane and other components. To insure you have adequate air flow and suction to move the loosened dirt and debris you will zone off the ductwork into manageable sections.

Defining what constitutes "clean" is determined by the cleaning specification on that project. There are three different cleanliness verification methods that could be specified:

- Visual agreement
- Side by side comparison
- NADCA vacuum test

Dealing with Fiberglass

You have choices when you encounter damaged or deteriorated fiberglass insulation in HVAC systems. In air handlers you can:

- Remove the insulation and clean the air handler (you loose the acoustical and thermal benefits of the insulation plus its very hard to get all the fiberglass fibers out)
- Remove the insulation and replace with new insulation (over time the new insulation will degrade just like the insulation you just removed)
- Clean and coat the insulation (economical solution that extends the life of the air handler).
- Remove insulation and replace with close cell liner (longest lasting solution)



In ductwork you can:

- Replace the duct system (too costly)
- Clean the insulation or ductboard and leave it (it's clean but you haven't done anything to improve the surface for longer life)
- Clean and coat the insulation (economical solution that extends the life of the ductwork).



Coating HVAC Systems

Coating HVAC systems is becoming more and more common. You may be asked to coat both fiberglass insulated surfaces as well as sheet metal surfaces. The benefits of coating HVAC systems include:

- Cleaning/coating ductwork is 1/3 to 1/2 the cost of replacement.
- Coating extends the useful life of the HVAC system
- Coatings locks down any loose fiberglass fibers
- Coatings lock in and isolates mold spores and smoke particulate remaining after cleaning
- Coated surfaces are more resistant to air erosion and moisture
- Coated surfaces are easier to clean

You typically coat fiberglass insulation/ductboard when it has been degraded by:

- Air erosion
 - Mold contamination
 - Smoke/fire contamination

You typically coat sheet metal surfaces when it has been degraded by:

- Mold contamination
- Smoke/fire contamination

Coating HVAC system require specialized equipment and products. You will typical need:

- Commercial airless sprayer (that is sized to handle the coating you want to apply)
- Cart or robotic spray system
- Coating product

For a full discussion of coating HVAC system request our "Introduction to Coating HVAC System Guide" at www.vacsysint.com or call 855-Vac-Systems.

Cleaning Specification

The Cleaning Specification is a document prepared by an Engineer or IAQ Professional that tells you what you have to do.

Commercial Air Duct Cleaning

Guidelines

Many cleaning specifications follow the format and intent of National Air Duct Cleaners Association's (NADCA) General Specification. This NADCA Specification includes the following sections and topics:

Part 1. Special Provisions 1.01 Qualifications

- Membership
- Certification
- Supervisors qualifications
- Experience
- Equipment, materials & labor
- Licensing

1.02 Standards

- NADCA ACR Standard
- 1.03 Documents
- Mechanical drawings

Part 2. Cleaning Specifica-

tions & Requirements 2.01 Scope of work

Scope

2.02 System inspection & site preparation

- HVAC system evaluation
- Site evaluations and
- preparations
- Inspector qualifications

2.03 Cleaning requirements

- Containment
- Particulate collection
- Controlling odors
- Component cleaning
- Air volume control
 devices
- Service openings
- Ceiling sections
- Air distribution devices
- Air handling units, terminal units, blowers and exhaust fans
- Duct systems

2.04 Health & safety

- Safety standards/ manuals
- Occupant safety
- Disposal of debris

2.05 Mechanical cleaning methodologies

- Source removal
- Methods of cleaning fiberglass insulated components
- Damaged fiberglass material
- Cleaning coils
- Biocidal agents and coatings

2.06 Cleanliness verifica-

tion

- General
- Visual inspectionVerification of coil
- cleaning

2.07 Pre-existing HVAC system damage

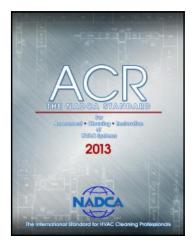
2.08 Post project report 2.09 Applicable standards and publications As you can see there are many steps and details in commercial HVAC system cleaning and restoration.

For a free copy of NADCA's General Specification go to www.nadca.com. (under Quick Links select Commercial - FAQ, then select "Specifications")

The Cleaning Standard

The Cleaning Specification tells you what to do and the Cleaning Standard tells you how to do it. "ACR The NADCA Standard - 2013" is recognized worldwide as the standard for the assessment, cleaning and restoration of HVAC systems. It states:

"It is the intent of this document to provide consumers and specifies of HVAC system cleaning and restoration services with the information needed to help ensure that cleaning is performed to acceptable standards and in such a manner that the service contributes to the improved system cleanliness and /or system performance. "



The NADCA Standard covers the following topics:

- Determining the Need for HVAC Cleaning & Restoration
- Inspections
- Work Plans
- Engineering Controls
- Cleaning & Restoration Procedures
- Cleanliness Verification
- Definitions
- Reference Documents

It is highly recommended that you read, understand and apply the contents of this cleaning standard.

For a free copy of The NADCA Standard - 2013 go to www.nadca.com.

What qualifications do I need ?

The ability to learn and understand how HVAC systems works, the ability to learn how to inspect, clean and decontaminate a HVAC system, and the commitment to doing quality work.

Many people start out doing residential air duct cleaning since residential HVAC systems are easier to understand. Later on some choose to expand into commercial air duct cleaning.

Now if you have a mechanical contracting background you already have knowledge of how an HVAC systems works but there are many trades that are entering into the commercial air duct cleaning business including:

- Mechanical contractors
- Plumbing contractors
- Mold abatement con tractors
- Asbestos abatement contractors
- Fire restoration contractors

Even if you are an individual without these types of backgrounds you can become a successful air duct cleaning contractor.

Your success will be based on your desire to learn what is required, your ability to provide quality work and your ability to provide good customer service.

Are there licensing requirements?

Every state is different. In some states you don't need anything, while in other states you must obtain a mechanical contractors license. You should check with your appropriate state agency.

How is commercial air duct cleaning different from residential?

There are several major difference between residential and commercial air duct cleaning including:

Work Time

- Residential: Typically 8:00 am to 5:00 pm.
- Commercial: Typically second shift, 4:00 pm to 12:00 am when the occupants of the building are gone.
 <u>HVAC Systems</u>

- Residential: Small and simple
- Commercial: Large and complex

Revenue Per Project

- Residential: from \$300.00 to \$700.00
- Commercial: from \$4,000.00 to \$5,000.00
 Payment Terms
- Residential: End of project
- Commercial: You are typically a subcontractor so 30,60 or 90 days
 Specifications
- Residential: None
- Commercial: Detailed
 <u>Marketing</u>
- Residential: To homeowner
- Commercial: To multiple
 audiences

<u>Other</u>

- Commercial: Requires more insurance coverage, bonding ability, safety manuals/training, etc.
- Commercial: Require larger and additional types of equipment

Equipment Issues

The purpose of your air duct cleaning equipment is to maximize your productivity while achieving the required cleanliness standard. This is important because your labor cost is your largest expense of the project. Reducing your labor cost by maximizing your productivity makes you more profitable on each job and makes you more competitive when bidding new projects.

You can use gas powered

vacuum collection systems on low rise commercial buildings (1 or 2 story). On multi story commercial building electric portable vacuum collection systems typically work the best.

You can use your residential equipment on small commercial ductwork but to maximize your productivity you will typically need:

- Larger vacuum collection systems so you can isolate and clean longer duct runs per hook-up
- Larger air compressor might be needed depending on the cleaning tools you are using
- Larger brushing systems for the larger ductwork found on commercial projects.
 - A good 10 or 15 gallon wet/dry HEPA vac for contact vacuuming
 - If coating, you will need that specialized equipment.











What does it cost to get into commercial air duct cleaning?

The cost will vary depending on the equipment you choose but a basic equipment package will start at \$10,000.00 and go up depending on what you select.

In addition you will need a truck/van or trailer to transport the equipment.

- If you already have one there would be no additional cost.
- A new trailer with a top and ramp can cost \$2,750.00 and a new/ used truck or van can cost \$15,000 to \$35,000.

Estimating Commercial Projects

Estimating commercial project is more complicated than residential projects. You'll want to have an system that walks you through the necessary steps and gives you consistent results.

Typical steps include:

- Review and understand cleaning specification
- Review and understand mechanical blueprints
- Do a project walk through
- Do a take-off of the HVAC system
- Determine man hours of labor required
- Determine charge per man-hour
- Determine materials charges
- Create proposal/bid

Our "Introduction to Estimating Commercial Air Duct Cleaning Projects Guide" walks you through an estimating process step by step. Get your free copy at www.vacsysint.com or call 855-Vac-Systems.

Training

Training is very important. You want to learn how to maximize your cleaning productivity (for greater profits and revenues) as well as maximizing your cleaning quality (for greater customer satisfaction and more referrals).

There are three sources for training:

 NADCA: NADCA offers two webinars for commercial contractors: "Basics of Commercial HVAC Cleaning" and "Blueprint Reading, Estimating and Project Man-

agement for Commercial Projects."

- Equipment suppliers: Some equipment suppliers offer videos or hands on training.
- Other air duct cleaning contractors: Some contractors are willing to train you if you are not in there area. They are not going to train a competitor.

Certification

Certification is becoming more important because it is being required as part of the contractors qualification. In many areas you cannot even bid on a project unless you are certified.

The certification that is most often required is the "Air Systems Cleaning Specialist" or ASCS. This certification is available through the National Air Duct Cleaners Association . Go to ww.nadca.com for full details.

Revenue projections

A two person crew will generate anywhere from \$200,000.00 to \$250,000.00 in revenues per year. A lot will depend on the experience and productivity of the crew. A company with 3 to 4 experienced crews can reach \$1,000,000.00 in revenues.

Marketing commercial air duct cleaning services

The best marketing you can do is to deliver quality work. Satisfied customers (who will refer you) are the least expensive and most effective marketing tool ever created.

It is estimated that 60% or more of your business will come from referrals. <u>Quality</u> work is your first and most important marketing tool. To get the other 40% you need to spend additional dollars and use the traditional advertising and marketing tools.

There are several different customer types that the commercial air duct cleaning contractor needs to communicate to and develop good relationships with. These can include:

- Existing customers
- Mechanical Contractors
 Environmental Consult-
- ants
- Fire/Water Restoration Contractors
- Asbestos Abatement Contractors
- Hospital & Medical Facilities
- Schools & University Facilities
- Large Corporations

Once you are on their list of acceptable HVAC system cleaning contractors they will call you for proposals/bids. This is your chance to develop strong relationships that can help you grow your business.

You will need to create a data base of these various audiences and create a full compliment of marketing materials to promote yourself and your company. Typical items include:

- Something to tell about your capabilities like a website.
- Newsletter and job stories that you can send out.
- You can network by joining local chapters of associations like ASHRAE, BOMA, Hospital Engineers, etc.

Your goal should be to become the recognized expert and preferred contractor offering commercial HVAC system cleaning services in your area. This is not an easy task but it is a worth the work.

Finding Commercial Projects

Project Plan Vendors can be very helpful. They offer, through a subscription, information on commercial renovation projects in your area. You would check Mechanical Section in the bid documents to see if there was any air duct cleaning. You can get blueprints on these projects to use in your estimating. Plus, they have a list of plan holders (like Mechanical Contractors) which you can send your proposal/bid to. Here are two such companies:

 ConstructConnect Co. (includes CMD, iSqFt, Bidclerk, Construction Data) (www.constructconnect.c om)

 Dodge Reports (www.dodgeprojects construction.com)

Summary

Thank you for the time you spent reviewing the "Blueprint For Success – Introduction to Commercial Air Duct Cleaning." We hope it has been helpful in answering many of the initial questions you may have.

Our sole purpose is to



help you succeed.

Please call us with any questions. Peter Haugen President Vac Systems Int. 11950 Riverwood Dr. Burnsville, MN 55337 1-855-Vac-Systems or 952-808-1619 952-808-1617 (fax) phaugen@vacsysint.com

"Blueprint for Success" is a series of articles and publications developed by Vac Systems International to help you succeed as an air duct cleaning contractor. In addition to this publication they include:

- Introduction to Residential Air Duct Cleaning
- Residential Air Duct Cleaning Power Point Training Program
- Going from Residential to Commercial Air Duct Cleaning
- Selecting the Right Tool for the Job Guide.
- How to Select an Electric Portable Vacuum Collection System Guide
- Introduction to Estimating Commercial Air Duct Cleaning Projects Guide
- Introduction to Coating HVAC Systems Guide
- Marketing Commercial Air Duct Cleaning Services Guide

Appendix A - Sample Equipment Packages (110 volt, 60 Hz, 15 amps)



This equipment package is designed around the Super Collector E-Max collector and is for the contractor who wants to clean all types of commercial projects. The E-Max features twin 1.5 hp motors, twin 3,500 "free air" cfm fans, turbo-top, the lowest possible operating and owning cost and good portability. Our recommended (most popular) E-Max package and optional items are listed below.

Super Collector E-Max

Typical Commercial Equipment Package

1-SCEM	Super Collector E-Max vfd Collector
2-SC06	Backpack Dirt Bucket
2-SC01	10" Duct Attachment Collar
2-AC06	Super Air E5 Compressor
2-AC12	Air Compressor Accessory Pkg
2-SW02	Super Whip Deluxe System
1-SCB50	Super Combo Brush System
1-RBS01	Super RBS Brush & Air Wash System
1-DAK-C	Duct Accessory Kit
Special Package Pricing\$11,500.00	

Popular Optional Items

1-HV06	10 gallon HEPA wet/dry vacuum w/tool kit
1-SMT001	Shavings Magnet Tool
1-CDT01	ULV Fogger
1-SU01	Case Oxine sanitizer
1-SW01	Super Whip Basic System
1-SW04	Super Whip Airline System
1-SI01	Super Inspector V Manual Inspection System
1-ST02	Super Trac V Robotic System (Inspection)
1-ST04	Super Trac V Robotic System (Deluxe Pkg)
1-CSS02	Super Cart Deluxe Spray System

Please contact us to add, delete and modify these packages to best suit your needs and to get a formal proposal that will include a detailed list of all the items in the package, their price and shipping cost.



This equipment package is designed around the Super Collector E2 vfd collector and is for the contractor who wants to clean all types of commercial projects. The E2 vfd features a 2 hp motor, a 5,000 "free air" cfm fan, variable frequency drive, turbo-top, the lowest possible operating and owning cost and good portability. Our recommended (most popular) E2 vfd package and optional items are listed below.

Super Collector E2 vfd

Typical Commercial Equipment Package

1-SC3	Super Collector E2 vfd Collector Package
2-SC06	Backpack Dirt Bucket
2-SC01	10" Duct Attachment Collar
2-AC06	Super Air 5 hp Electric Compressor
2-AC12	Air Compressor Accessory Pkg
2-SW02	Super Whip Deluxe System
1-SCB50	Super Combo Brush System
1-RBS01	Super RBS Brush & Air Wash System
1-DAK-C	Duct Accessory Kit
Special Package Pricing\$12,100.00	

Popular Optional Items

1-HV06	10 gallon HEPA wet/dry vacuum w/tool kit
1-SMT001	Shavings Magnet Tool
1-CDT01	ULV Fogger
1-SU01	Case Oxine sanitizer
1-SW01	Super Whip Basic System
1-SW04	Super Whip Airline System
1-SI01	Super Inspector V Manual Inspection System
1-ST02	Super Trac V Robotic System (Inspection)
1-ST04	Super Trac V Robotic System (Deluxe Pkg)
1-CSS02	Super Cart Deluxe Spray System

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Appendix A - Sample Equipment Packages (220 volt, 50 Hz)



This equipment package is designed around the Super Collector E1.5 Plus collector and is for the contractor who wants to clean all types of commercial projects. The E1.5 Plus features a 2 hp motor, a 5,000 "free air" cfm fans, turbo-top, the lowest possible operating and owning cost and excellent portability. Our recommended (most popular) E1.5 Plus package and optional items are listed below.

Super Collector Plus E1.5 (220v, 50Hz) Typical Equipment Package

1-SCP15	Super Collector Plus E1.5 Collector Package
2-SC01	10" Duct Attachment Collar
2-SC1505	Extra HEPA filter
2-AC13	Super Air E5 Compressor
2-AC12	Air Compressor Accessory Pkg
2-SW02	Super Whip Deluxe System
1-SCB50	Super Combo Brush System
1-RBS01	Super RBS Brush & Air Wash System
1-HV09	10 gallon HEPA wet/dry vacuum w/tool kit
1-DAK-C	Duct Accessory Kit
Special Package Pricing\$11,670.00	

Popular Optional Items

1-SMT001	Shavings Magnet Tool
1-CDT02	ULV Fogger
1-SU01	Case Oxine sanitizer
1-SW01	Super Whip Basic System
1-SW02	Super Whip Deluxe System
1-SI01	Super Inspector V Manual Inspection System
1-ST02	Super Trac V Robotic System (Inspection)
1-ST04	Super Trac V Robotic System (Deluxe Pkg)
1-CSS02	Super Cart Deluxe Spray System

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This equipment package is designed around the Super Collector E2 vfd collector and is for the contractor who wants to clean all types of commercial projects. The E2 vfd features a 2 hp motor, a 5,000 "free air" cfm fan, variable frequency drive, turbo-top, the lowest possible operating and owning cost and good portability. Our recommended (most popular) E2 vfd package and optional items are listed below.

Super Collector E2 vfd (220v, 50/60Hz) Typical Equipment Package

1-SC3	Super Collector E2 vfd Collector Package
2-SC06	Backpack Dirt Bucket
2-SC01	10" Duct Attachment Collar
20SC12	Extra HEPA filter
2-AC13	Super Air E5 Compressor
2-AC12	Air Compressor Accessory Pkg
2-SW02	Super Whip Deluxe System
1-SCB50	Super Combo Brush System
1-RBS01	Super RBS Brush & Air Wash System
1-HV09	10 gallon HEPA wet/dry vacuum w/tool kit
1-DAK-C	Duct Accessory Kit
Special Packa	age Pricing

Popular Optional Items

1-SMT001	Shavings Magnet Tool
1-CDT02	ULV Fogger
1-SU01	Case Oxine sanitizer
1-SW01	Super Whip Basic System
1-SW02	Super Whip Deluxe System
1-SI01	Super Inspector V Manual Inspection System
1-ST02	Super Trac V Robotic System (Inspection)
1-ST04	Super Trac V Robotic System (Deluxe Pkg)
1-CSS02	Super Cart Deluxe Spray System

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