HVAC NEW LIFE™

REBUILD

HVAC Air Handling Unit (AHU) Restoration

wti PureAir CONTROL SERVICES

About the speaker

Steven Cavanah, PE

Vice President-Engineering Initiatives | WTI-Pure Air

- Second Generation “Conch” from Marathon, FL
- Mechanical Engineering degree from University of Miami
- 15+ years experience in Design Engineering and Construction
- Licensed Professional Engineer in all 50 States
- Lived in Plant City, FL since 2016
- All things boating and large format darkroom photography
- **Engineer, not a salesman**

The Current Challenge

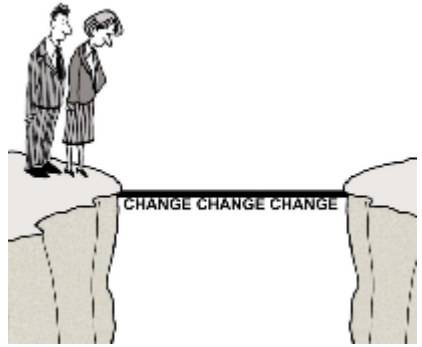
- Air Handling Units nationwide are given minimal maintenance and ultimately run to failure in an industry designed to exploit this.
- Designers are not including access required for major renovation.
- Property owners and managers place insufficient emphasis on lifecycle planning and major emphasis on short-term costs.
- Regulatory compliance is almost non-existent outside of Healthcare. Enforcement is minimal within it.






Why does this happen?

- Lack of awareness.
- Short term cost focus.
- Inadequate lifecycle planning.
- Resistance to change.
- Vendor & Industry influence.



What is the solution?

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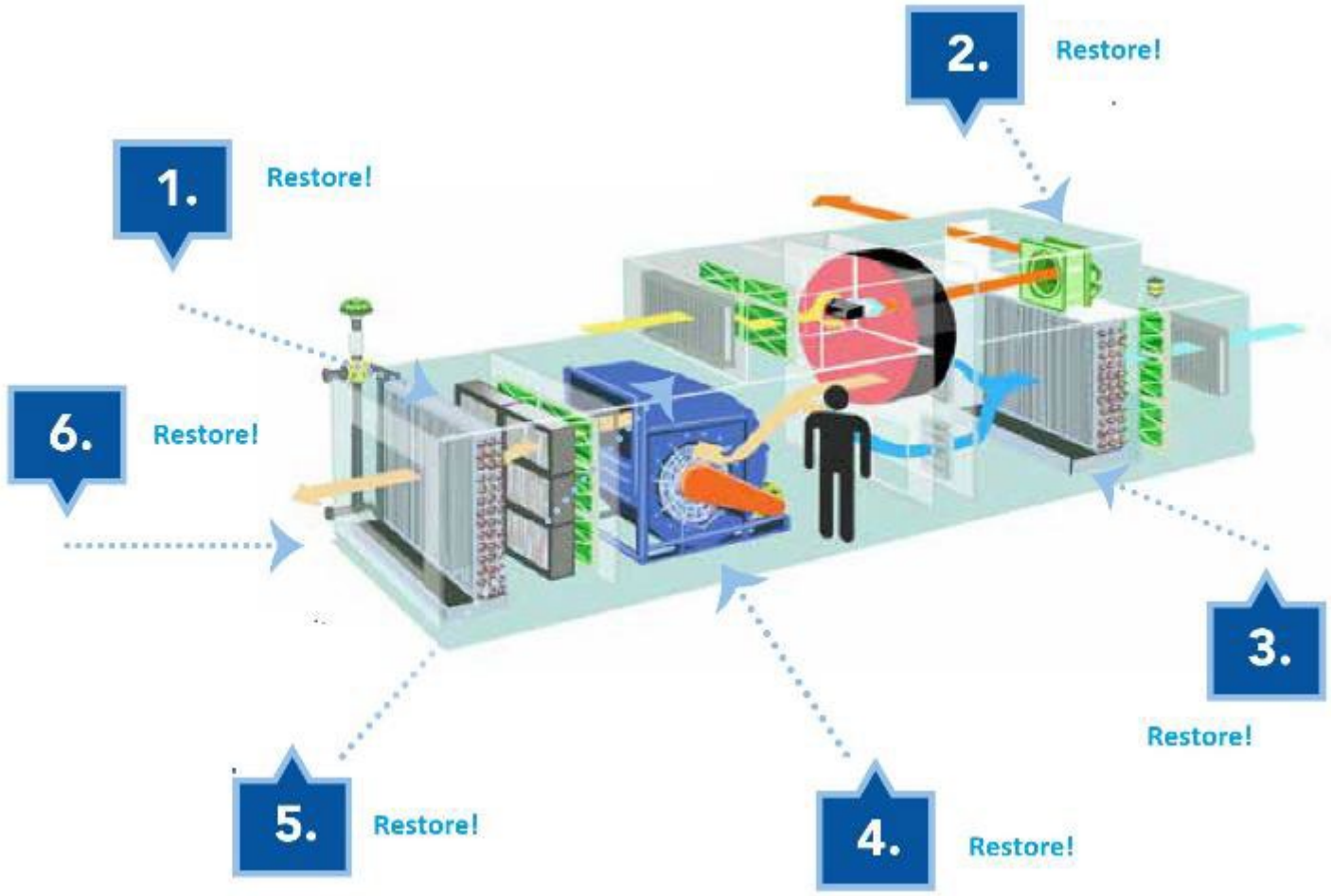
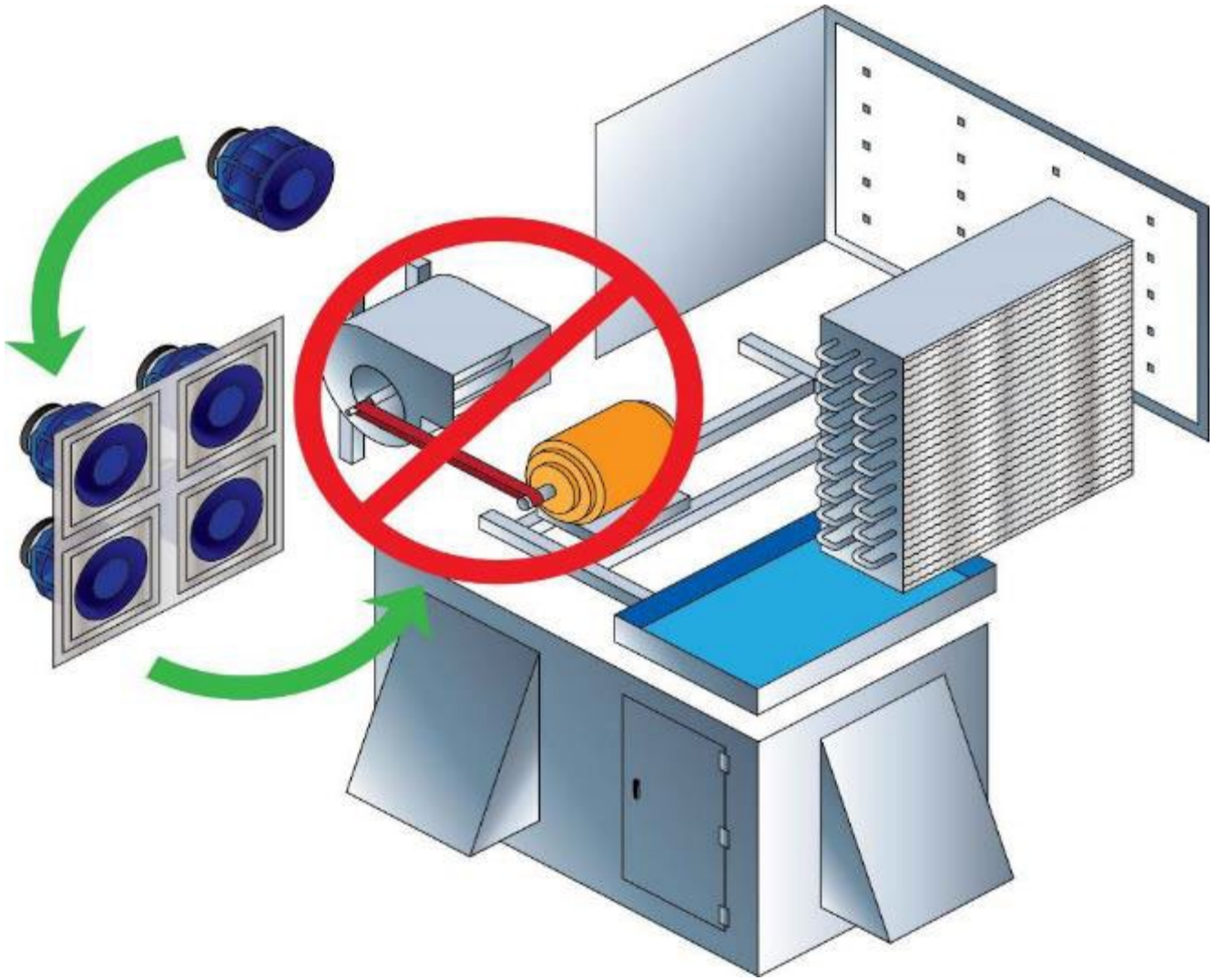
Restoration! An Engineered solution with strategic integration.



Restoration! An Engineered solution with strategic integration.



A few major benefits of Restoration vs Replacement:

- Cost (~50% less than the cost of a new unit)
- Construction Cost Avoidance - cranes, temporary cooling units, steel, concrete, drywall, stucco, fire protection, etc.
- Appropriate for Difficult Locations - tight mechanical rooms, isolated roof areas
- Minimal Disruption - Done outside normal hours vs. disruptions (noisy, traffic patterns changed, comfort compromised)
- Sustainability - No freight, no landfill, small carbon footprint
- Warranty – five year vs one year (new equipment)
- Zero Maintenance Costs - fan array vs traditional blower assembly

Capital & Operating Expense Savings

- Cost Avoidance vs. Replacement of HVAC
- Energy Savings tied to greater HVAC Efficiency
  - Air flow velocity improvement
  - Lower heating & cooling expense
  - Improved patient comfort
- Reduces Risks due to Poor IAQ
  - Environmental improvement
  - Better performance, less sick days, higher cognitive function

Enhancing Sustainability

Outdated and Inefficient AHUs have a negative environmental impact:

- Increased Energy consumption
  - *Inefficient units run longer and draw more power*
- Increased Operational Cost
  - *Units prone to breakdown require enhanced attention from facility staff*
- Increased Thermal Pollution
  - *When heat exchange processes are not optimized, in the case of gas fired heat units, more fuel is used to achieve zone setpoint*
- Poor Indoor Air Quality
  - *Higher concentrations of pollutants and allergens*

IRS Section 179D: Commercial Buildings Energy Efficiency Tax Deduction

- Enacted by Congress as part of the Energy Policy Act of 2005
- Promotes energy efficiency in commercial and industrial buildings
- Applies to energy-efficient improvements made to lighting, heating, ventilation, air conditioning (HVAC), and the building envelope.
- Allows up a maximum $1.80/sq ft deduction for HVAC improvements that achieve a 50% energy savings target.
- Allows a partial deduction of $0.60/sq ft






PUREAIR CALCULATIONS FOR ESTIMATED ANNUAL ENERGY SAVINGS RESULTING FROM "Q-PAC" FAN ARRAY RETROFIT

EXISTING

Location Tag	Existing Fan System	Supply Air	Motor (Plate)	Total Static Pressure	Motor @ Est. 70% Operating Capcity	
		CFM	HP	In-W.C.	HP	kW
AHU - 1 West	Shafted Motor & Belts	17,205	15.0	1.8	10.5	7.8
AHU - 2 East	Shafted Motor & Belts	14,990	15.0	1.8	10.5	7.8
C-2B	Shafted Motor & Belts	13,100	10.0	1.7	7.0	5.2
C-2C	Shafted Motor & Belts	15,100	10.0	1.8	7.0	37.3
C-2A	Shafted Motor & Belts	12,100	10.0	1.5	7.0	44.7

*0.746-kW/HP

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NEW FAN ARRAY

Location Tag	Proposed Fan Array System Retrofit	Electrical		# of Fans In Array	Motor (Plate)	Motor @ Est. 70% Operating Capcity		Operating Hours/ Yr	Connected Load Savings (ΔkW)	Annual Electric Savings	Demand Cost Savings ($/yr)	Annual Electric Cost Savings	Total Annual Savings	Estimated Project Price ($)	Estimated Payback (Yrs)
		Volts/Ph	FLA		HP	HP	kW								
AHU - 1 West	Q-PAC Array	460	7.32	3	13.5	9.5	7.1	8,760	0.76	6,671	$80	$725	$805	$0	0.0
AHU - 2 East	Q-PAC Array	460	7.04	3	13.0	9.1	6.8	8,760	1.03	9,040	$109	$982	$1,091	$0	0.0
C-2B	Q-PAC Array	460	7.52	2	9.3	6.5	4.8	0	0.38	0	$40	$0	$40	$0	0.0
C-2C	Q-PAC Array	460	7.04	2	8.7	6.1	4.5	0	32.75	0	$3,459	$0	$3,459	$0	0.0
C-2A	Q-PAC Array	460	7.32	2	9.0	6.3	4.7	0	40.03	0	$4,227	$0	$4,227	$0	0.0
0															

** Estimated energy savings is based on the CFM before and after remaing the same.*
Motor normal operating HP is being assumed 70% of name plate.

Project Combined Totals		
$9,623	$0	0.0

PROJECT FINANCIAL ANALYSIS

PUREAIR (AHU) RESTORATION SOLUTION

Year	Project Cost	Comined	Net Customer	Present	Accumulated	
0	-$968,012	$0	-$968,012	-$968,012	-$968,012	
1	1st Restore & Retrofit	$1,756,090	$1,756,090	$1,672,467	$704,455	
2		$12,430	$12,430	$11,274	$715,729	
3		$9,944	$9,944	$8,590	$724,319	
4		$6,961	$6,961	$5,726	$730,045	
5		$4,176	$4,176	$3,272	$733,317	
6		$2,088	$2,088	$1,558	$734,876	
7		$835	$835	$594	$735,469	
8		$251	$251	$170	$735,639	
9		$50	$50	$32	$735,671	
10		$5	$5	$3	$735,674	
11	-$626,458	$13,811	-$612,648	-$358,202	$377,472	
12	2nd Restoration	$12,430	$12,430	$6,921	$384,393	
13		$9,944	$9,944	$5,273	$389,666	
14		$6,961	$6,961	$3,516	$393,182	
15		$4,176	$4,176	$2,009	$395,191	
16		$2,088	$2,088	$957	$396,148	
17		$835	$835	$364	$396,512	
18		$251	$251	$104	$396,616	
19		$50	$50	$20	$396,636	
20		$5	$5	$2	$396,638	
21	-$1,685,772	$6,737,453	$5,051,681	$1,813,262	**$2,209,900**	
22	3rd Restore & Fan Replacement	$12,430	$12,430	$4,249	$2,214,149	
23		$9,944	$9,944	$3,237	$2,217,387	
24		$6,961	$6,961	$2,158	$2,219,545	
25		$4,176	$4,176	$1,233	$2,220,778	NPV
Totals	-$3,280,242	$8,614,343				

TOTAL COST OF OWNERSHIP (years 1-25)	**-$3,280,242**
TOTAL PROJECT SAVINGS (years 1-25)	$8,614,343
NET PRESENT VALUE (at Year 25)	**$2,220,778**
Estimated Project Payback Between (years 21-25) is:	**<1**

TRADITIONAL HVAC (AHU) REPLACEMENT SOLUTION

Year	Project Cost	Comined	Net Customer	Present	Accumulated	
0	-$3,336,750	$0	$0	-$3,336,750	-$3,336,750	
1	1st Replacement	$13,811	$13,811	$13,153	-$3,323,597	
2		$12,430	$12,430	$11,274	-$3,312,323	
3		$9,944	$9,944	$8,590	-$3,303,733	
4		$6,961	$6,961	$5,726	-$3,298,007	
5		$4,176	$4,176	$3,272	-$3,294,735	
6		$2,088	$2,088	$1,558	-$3,293,176	
7		$835	$835	$594	-$3,292,583	
8		$251	$251	$170	-$3,292,413	
9		$50	$50	$32	-$3,292,381	
10		$5	$5	$3	-$3,292,378	
11		$0	$0	$0	-$3,292,378	
12		$0	$0	$0	-$3,292,378	
13		$0	$0	$0	-$3,292,378	
14		$0	$0	$0	-$3,292,378	
15		$0	$0	$0	-$3,292,378	
16		$0	$0	$0	-$3,292,378	
17		$0	$0	$0	-$3,292,378	
18		$0	$0	$0	-$3,292,378	
19		$0	$0	$0	-$3,292,378	
20		$0	$0	$0	-$3,292,378	
21	-$8,409,415	$13,811	-$8,395,604	-$3,013,538	**-$6,305,916**	
22	2nd Replacement	$12,430	$12,430	$4,249	-$6,301,667	
23		$9,944	$9,944	$3,237	-$6,298,429	
24		$6,961	$6,961	$2,158	-$6,296,271	
25		$4,176	$4,176	$1,233	-$6,295,038	NPV
Totals	-$11,746,165	$97,871				

TOTAL COST OF OWNERSHIP (years 1-25)	**-$11,746,165**
TOTAL PROJECT SAVINGS (years 1-25)	$97,871
NET PRESENT VALUE (at Year 25)	**-$6,295,038**
Estimated Project Payback (years 21-25)	**None**

Steam Cleaning & Restoration ROI

CABA White Paper

1 AHU

CFM Improved 36%
FPM Improved 37%
BIO Improved 99.98%

USF Case Study

500 AHU

CFM Improved 38.7%

Resort Case Study

1,200 FCU

CFM Improved 84%
PM Reduced 76.1%

GA Tech Case Study

1 AHU

CFM Improved 42.6%
△P Improved 22%
△T Improved 46%

Harvard Case Study

100 AHU

△P Improved 30%

Resort Case Study

650 FCU

CFM Improved 36.9%
△T Improved 56.5%

AHU: Air Handling Unit, **CFM:** Cubic Feet per Minute, **FPM:** Linear Feet per Minute, **BIO:** Biological Contaminants, **FCU:** Fan Coil Unit, **PM:** Particulate Matter, **△P:** Pressure Differential, **△T:** Temp. Differential

What is involved?

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Robust HVAC/Mechanical Restoration offering includes the following:

Assessments

Existing Infrastructure needs to be assessed accurately and intelligently to determine a true “current state”

Engineering

Typically an engineering team capable of issuing drawings for permit, designs and specifies HVAC restoration solutions.

Construction

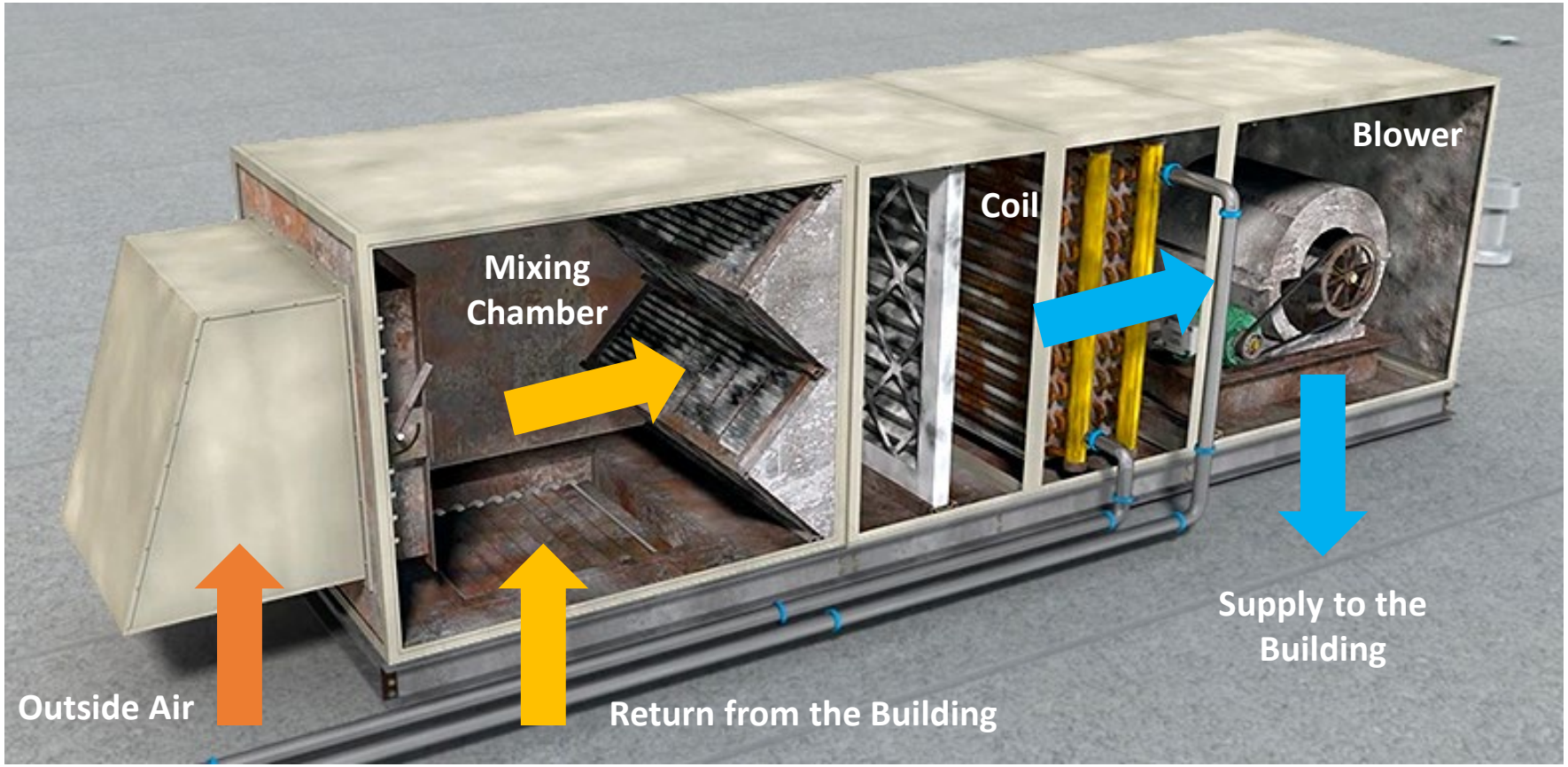
Construction Managers build these solutions using self-perform crews and n-market subcontractor network to execute work in your facility

Warranty

Restoration provides equal if not better warranty protection then typical replacement projects.

Anatomy of a CHW/HHW Air Handler Unit (AHU)

Fresh Air and Return Side



Supply Side

HVAC Restoration Process

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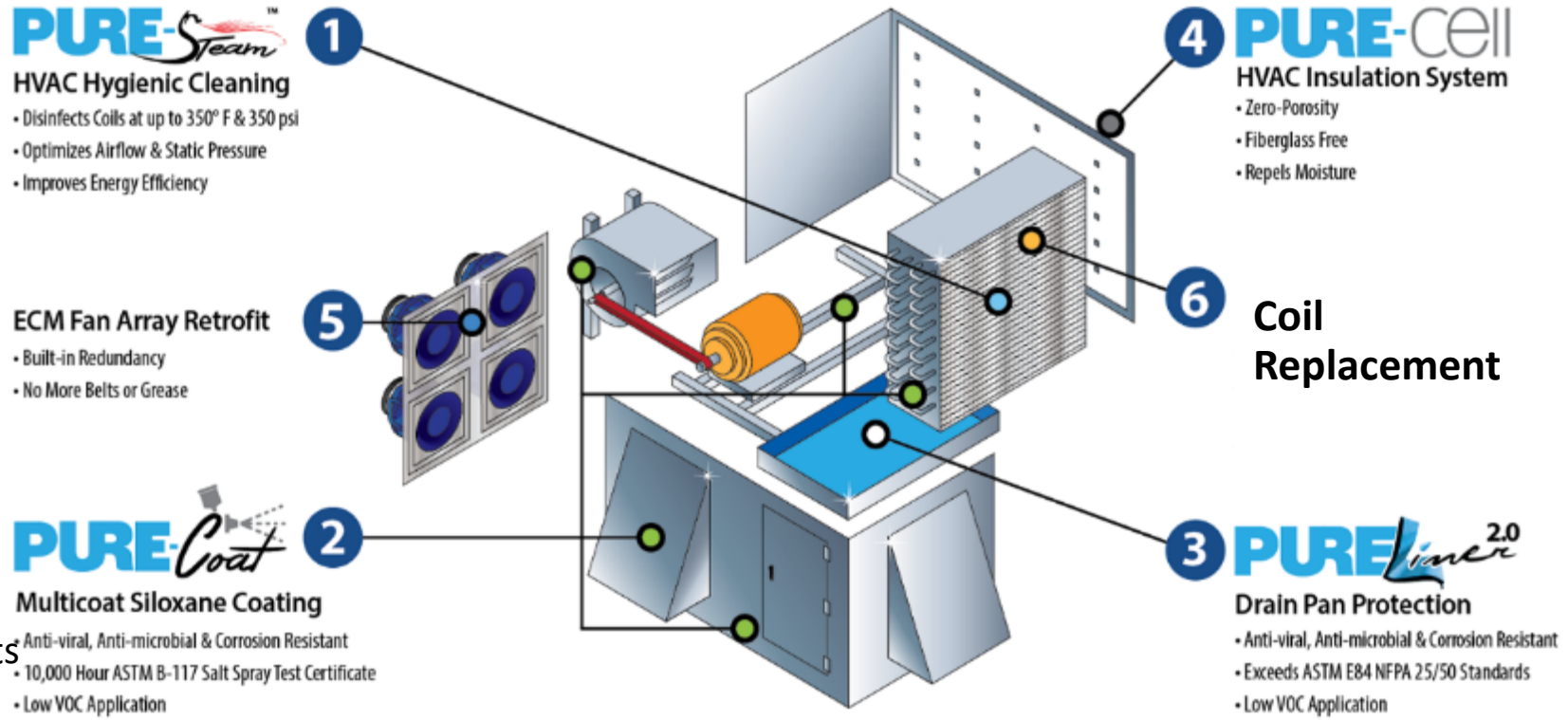
“Simple” Restoration (1 - 4)
Cleaning, coating and insulation

“Designed” Restoration (5 or 6)
Includes Fan Array or Coil Replacement that requires an engineered design

“Technical” Restoration
Issues such as leaks, controls, temporary cooling that require an Engineers visit before budgeting

Reporting
Visual Assessment
Photos from visit
Performance Assessment Field Engineer collects performance data



Assessments

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HVAC Restoration Program Overview

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STEP 1

HVAC Assessments

- Visual Conditions of Equipment
- Environmental Sampling & Analysis
- Performance reporting
- Supply & Return Ductwork Inspection
- Detailed Mechanical Inventory
- Maintenance Prioritization

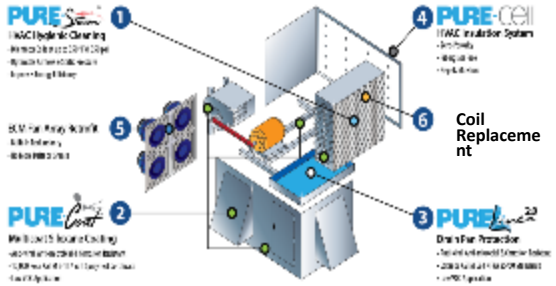
STEP 2

HVAC Condition Reporting

- Red
- Amber
- Green

STEP 3

HVAC Restoration



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HVAC Assessments

HVAC Assessments SOW:

Tier 1: Visual Conditions of Equipment

- Supply & Return Ductwork Inspection
- Detailed Mechanical Inventory
- Maintenance Prioritization
- Remaining useful life estimates
- Prioritization and Recommendations
- Red, Amber and Green Conditional Scale

Tier 2: Performance & Engineering

- Performance (Static Pressure, CFM, etc.)
- Environmental Sampling & Analysis

Brand:	Carrier air handler	Model:	39EJ030B29444	Serial:		Size (L-W-H)	80-58-100 inches	Dx or CW= CW
Module 1		Model:		Serial:		Size (L-W-H)	Date in Service	1/1/1990
Module 2		Model:		Serial:		Size (L-W-H)	Life Expectancy year	25
Module 3		Model:		Serial:		Size (L-W-H)	Remaining Life*	13.19

Component	Finish / Type		Fouling Level	Hygienic Recommendation	Aging Level	Refurbish/Upgrade	Additional Notes
Return Air Mix Plenum	Mechanical Room		4	Cleaning is highly recommended	5	Upgrade is recommended	Breaches on mechanical room wall need to be repaired
Filters Type/ MERV	2" Pleated	MERV 5 - 8	3	Replacement is recommended	3	Refurbish is recommended	
1st Cooling Coil	Aluminum	Fins	4	Cleaning is highly recommended	4	Refurbish is highly recommended	
1st Drain Pan	Sheetmetal		3	Cleaning is recommended	3	Refurbish is recommended	
Coil Cabinet	Sheetmetal /Closed Cell		3	Cleaning is recommended	2	None	
Blower Cabinet	Sheetmetal /Closed Cell		3	Cleaning is recommended	2	None	Heavy Moldiness
Blower Housing	Coated metal		3	Cleaning is recommended	2	None	
Blower Wheel	Metal		4	Cleaning is highly recommended	4	Upgrade is recommended	
Supply Air Plenum	Sheetmetal/ liner		6	Cleaning is highly recommended	4	Refurbish is highly recommended	Heavy Moldiness
Totals			33		29		
	Overall Score		61.1%		63.7%		

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HVAC Condition Reporting

Build HVAC Restoration Program With *Prioritization!*

Good Condition – Score of 0-49

- Very little evidence of fouling/aging
- Maintenance + Repair Program

Restoration Condition – Score of 50-84

- Marginal fouling/aging
- Restoration Program

Replacement Condition – Score of 85-100

- Advance fouling/aging
- Replace Program before unit failure

#	AHU/ERU ID	Overall Score	#	AHU/ERU ID	Overall Score
1	AHU 201	28	17	ERU 602	53
2	AHU 1-5	31	18	AHU 3-1	54
3	ERU 601	35	19	AHU 4-4	56
4	AHU 605	37	20	AHU 1-7	58
5	ERU 604	38	21	AHU 2-3	58
6	ERU 603	40	22	AHU 4-3	63
7	AHU 4-1	42	23	AHU 602	67
8	AHU 607	45	24	AHU 2-2	69
9	AHU 601	46	25	ERU 4-2	69
10	AHU 4-2	46	26	AHU 1-1	73
11	AHU 1-3	46	27	AHU 1-2	81
12	AHU 606	47	28	ERU 1	86
13	AHU 2-1	48	29	AHU 3-3	87
14	AHU 1-6	48	30	ERU 2	88
15	AHU 604	50	31	AHU 1-4	92
16	AHU 603	52	32	AHU 3-2	96

Engineering

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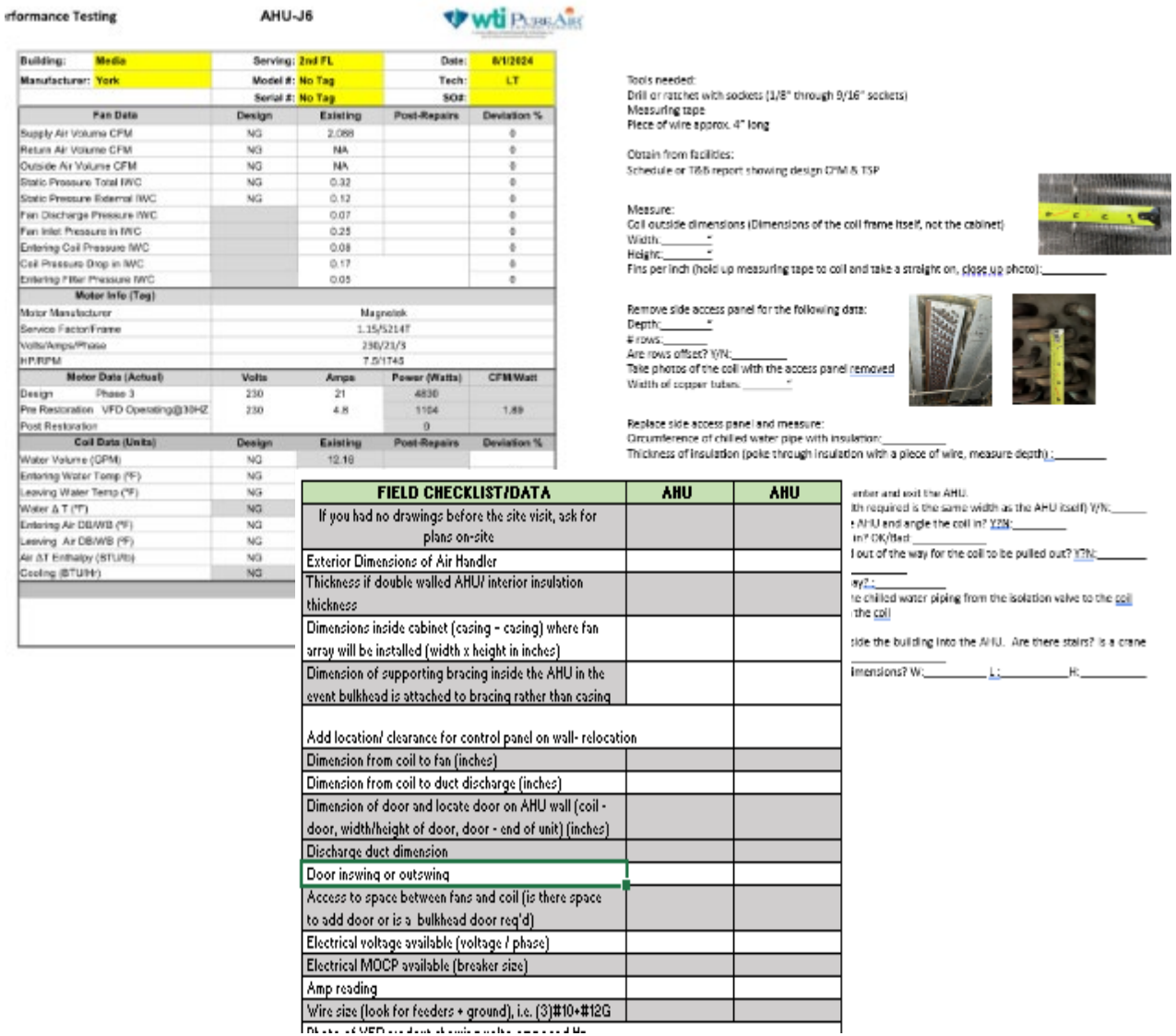
Reporting Estimating & Budgeting

- Project estimating and budgeting
- Build the guardrails for sales and operations
- Engineers collect AHU performance data - CFM, static pressure, temperatures
- Look into technical issues with equipment

Engineered Designs

- Fan Array - Confirm electrical breakers, feeders, motor size, access to each AHU section, coil clearances, controls
- Coil Replacement - Confirm coil dimensions, rows, fins per inch, pipe inlet sizes, insulation materials, isolation valve locations, controls, access route for coil
- Temporary Cooling - Sometimes required in healthcare, data centers, and aerospace applications, ***where uninterrupted operation is non-negotiable.***



rformance Testing AHU-J6

Building:	Media	Serving:	2nd FL	Date:	8/1/2024
Manufacturer:	York	Model #:	No Tag	Tech:	LT
		Serial #:	No Tag	SO#:	

Fan Data	Design	Existing	Post-Repairs	Deviation %
Supply Air Volume CFM	NG	2,088		0
Return Air Volume CFM	NG	NA		0
Outside Air Volume CFM	NG	NA		0
Static Pressure Total IWC	NG	0.32		0
Static Pressure External IWC	NG	0.12		0
Fan Discharge Pressure IWC		0.07		0
Fan Inlet Pressure In IWC		0.25		0
Entering Coil Pressure IWC		0.08		0
Coil Pressure Drop in IWC		0.17		0
Entering Filter Pressure IWC		0.05		0
Motor Info (Tag)				
Motor Manufacturer		Magnetek		
Service Factor/Frame		1.15/5214T		
Volts/Amps/Phase		230/21/3		
HP/RPM		7.5/1745		

Motor Data (Actual)	Volts	Amps	Power (Watts)	CFM/Watt
Design Phase 3	230	21	4830	
Pre Restoration VFD Operating@30HZ	230	4.8	1104	1.89
Post Restoration			0	

Coil Data (Units)	Design	Existing	Post-Repairs	Deviation %
Water Volume (GPM)	NG	12.16		
Entering Water Temp (°F)	NG			
Leaving Water Temp (°F)	NG			
Water Δ T (°F)	NG			
Entering Air DB/WB (°F)	NG			
Leaving Air DB/WB (°F)	NG			
Air Δ T Enthalpy (BTU/lb)	NG			
Cooling (BTU/H)	NG			

Tools needed:
Drill or ratchet with sockets (1/8" through 9/16" sockets)
Measuring tape
Piece of wire approx. 4" long

Obtain from facilities:
Schedule or TAB report showing design CFM & TSP

Measure:
Coil outside dimensions (Dimensions of the coil frame itself, not the cabinet)
Width:_____"
Height:_____"
Fins per inch (hold up measuring tape to coil and take a straight on, close up photo):_____

Remove side access panel for the following data:
Depth:_____"
rows:_____
Are rows offset? Y/N:_____
Take photos of the coil with the access panel removed
Width of copper tubes:_____"

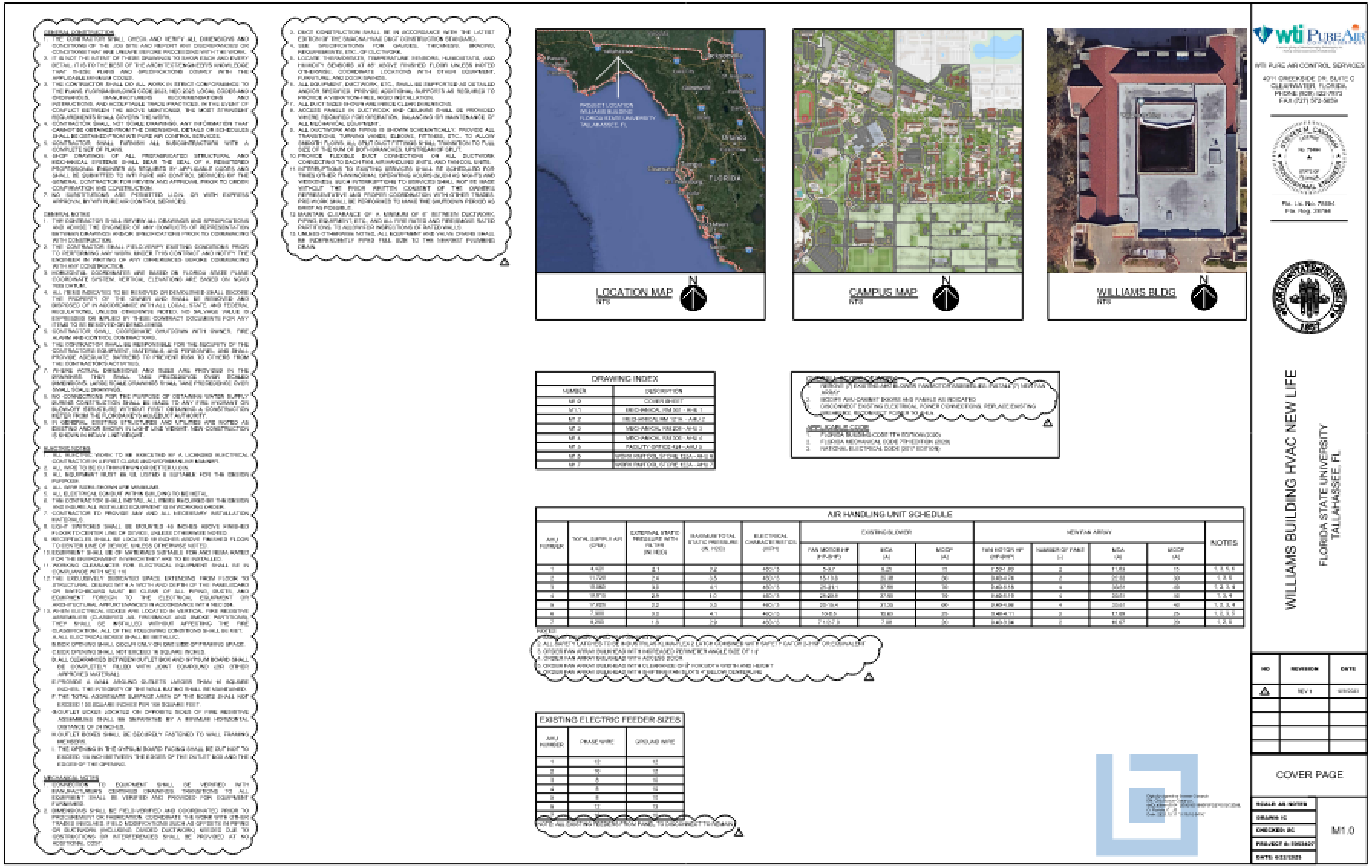
Replace side access panel and measure:
Circumference of chilled water pipe with insulation:_____
Thickness of insulation (poke through insulation with a piece of wire, measure depth):_____

FIELD CHECKLIST/DATA	AHU	AHU
If you had no drawings before the site visit, ask for plans on-site		
Exterior Dimensions of Air Handler		
Thickness if double walled AHU/ interior insulation thickness		
Dimensions inside cabinet (casing - casing) where fan array will be installed (width x height in inches)		
Dimension of supporting bracing inside the AHU in the event bulkhead is attached to bracing rather than casing		
Add location/ clearance for control panel on wall- relocation		
Dimension from coil to fan (inches)		
Dimension from coil to duct discharge (inches)		
Dimension of door and locate door on AHU wall (coil - door, width/height of door, door - end of unit) (inches)		
Discharge duct dimension		
Door inswing or outswing		
Access to space between fans and coil (is there space to add door or is a bulkhead door req'd)		
Electrical voltage available (voltage / phase)		
Electrical MOCP available (breaker size)		
Amp reading		
Wire size (look for feeders + ground), i.e. (3)#10+#12G		

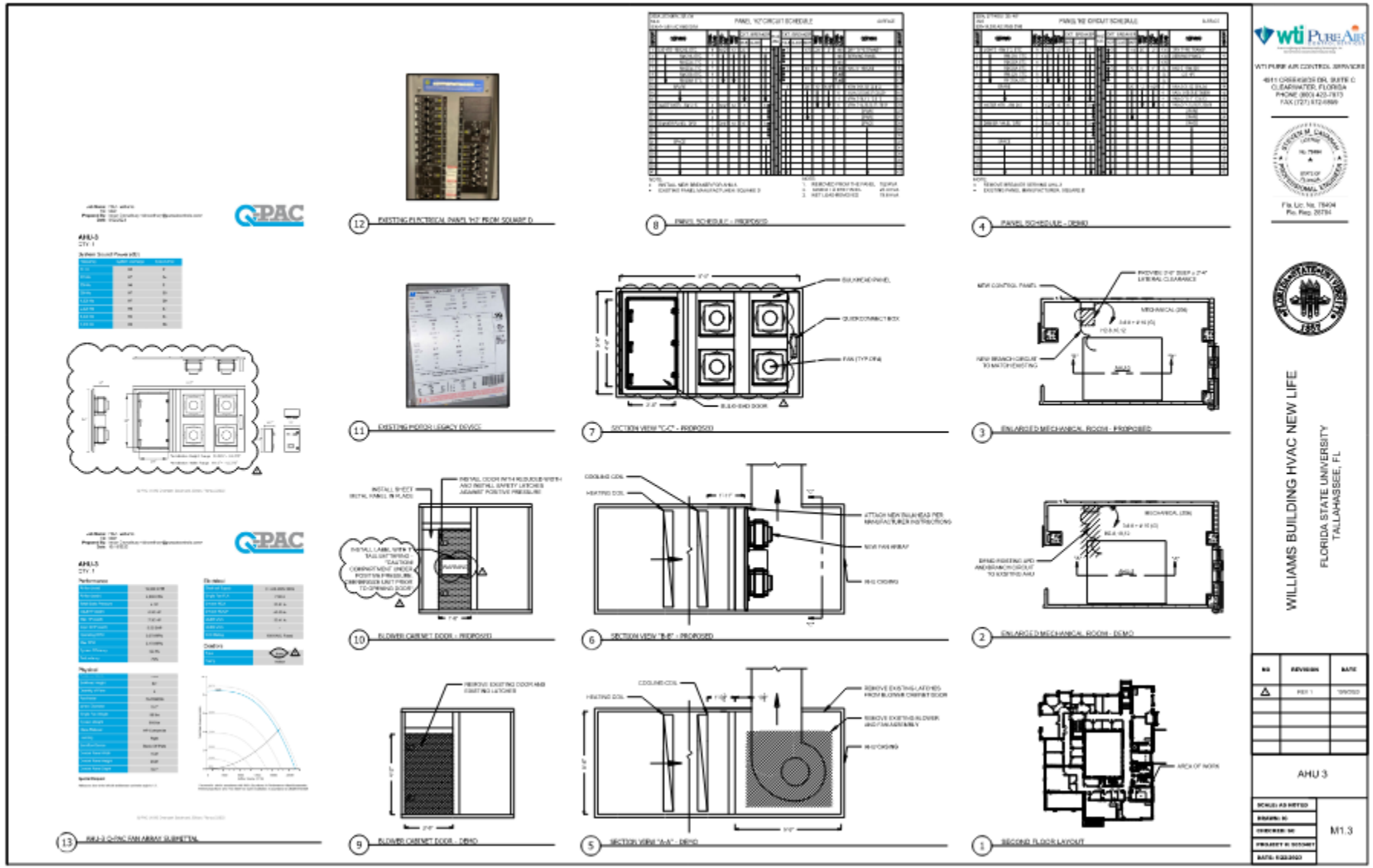
enter and exit the AHU.
ith required is the same width as the AHU itself) Y/N:_____
r AHU and angle the coil in? Y/N:_____
in? OK/tight _____
l out of the way for the coil to be pulled out? Y/N:_____
_____
ay?:_____
he chilled water piping from the isolation valve to the coil
the coil

side the building into the AHU. Are there stairs? Is a crane
_____
imensions? W:_____ L:_____ H:_____

Engineering



Engineering



Restoration

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HVAC Restoration Graphic (again)

HVAC NEW LIFE™

PURE-Steam™

1

HVAC Hygienic Cleaning

- Disinfects Coils at up to 350° F & 350 psi
- Optimizes Airflow & Static Pressure
- Improves Energy Efficiency

ECM Fan Array Retrofit

5

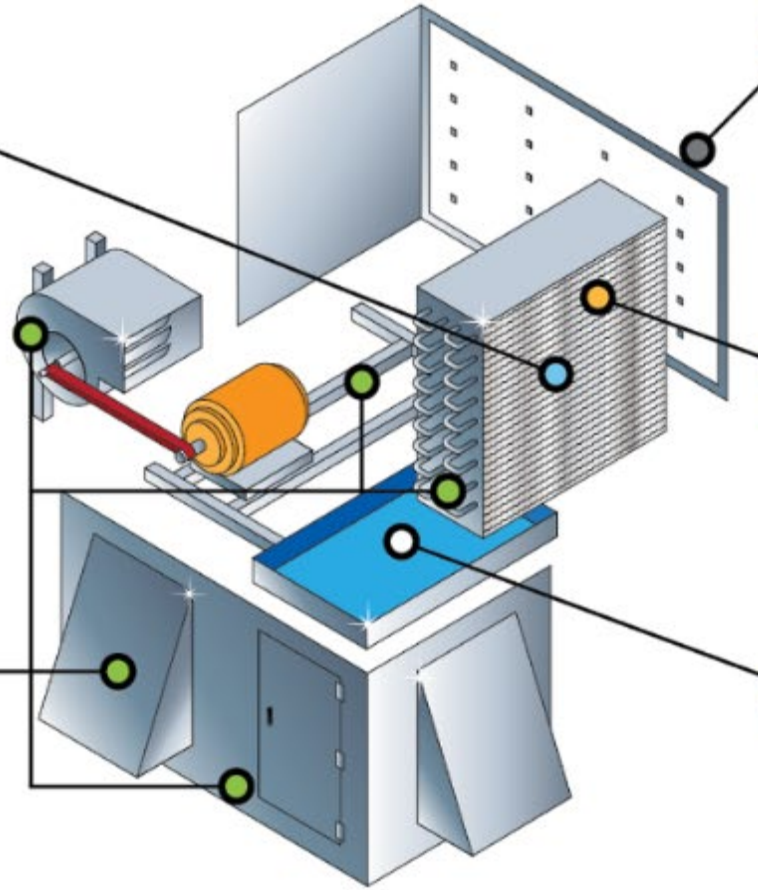
- Built-in Redundancy
- No More Belts or Grease

PURE-Coat

2

Multicoat Siloxane Coating

- Anti-viral, Anti-microbial & Corrosion Resistant
- 10,000 Hour ASTM B-117 Salt Spray Test Certificate
- Low VOC Application



PURE-cell

4

HVAC Insulation System

- Zero-Porosity
- Fiberglass Free
- Repels Moisture

6

Coil Replacement

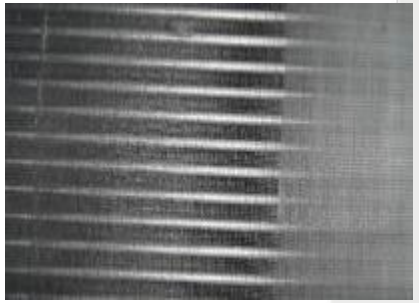
PURE-Liner 2.0

3

Drain Pan Protection

- Anti-viral, Anti-microbial & Corrosion Resistant
- Exceeds ASTM E84 NFPA 25/50 Standards
- Low VOC Application

PURE-Steam AHU Cleaning Program



Thorough, deep sanitization utilizing high temperature and low-pressure steam along with bio-enzyme coil treatments.

- Static Pressure Verification
  - Before & After
- Containment & Masking
- HEPA vacuum interior of AHU
- 350-degree F / 350 psi
- Water Extraction & Final Flush
- Improves IAQ & Performance
- Increases Energy Efficiency
- Reduces Work Orders
- Extends Equipment Life

HVAC Restoration Coatings and Pan Liner

- Prep by steaming, sandblasting and/or hand sanding.
- 2-part, multi-siloxane coating
  - Polyurethane
- Water-based for interior
- Solvent-based for exterior
- Low odor/VOC
- Tested for:
  - pH/Acid
  - Sea Salt
  - UV
- Designed and certified for use INSIDE the air conveyance system

HVAC Fan Array

- Simple, Complete Retrofit
- ECM Fans
- No VFD’s, Grease or Belts
- Single Point Power
- Bulkhead/Array Assembly
- Built-In Redundancy
- N+1 redundancy available if required
- Access doors and dampers engineered as needed

Fan Array Retrofit Construction Process: Remove blower, install in place.

Pre-Fabricated Bulkhead wall – *typical 1 night installation*

- Existing blower and motor are removed
- Cabinet is cleaned and prepped
- Bulkhead wall installed
- Fans mounted in wall slots

Electrical & Controls Integration

- Typically connects to existing blower fan circuit (MCA/MOCP typically improved based on engineered selection)
- Controls: Run in hand to get air moving immediately.
- Controls: Coordinate with BAS provider (Trane, JCI, Honeywell, Siemens, Automated Logic etc…) for graphics and total visibility.

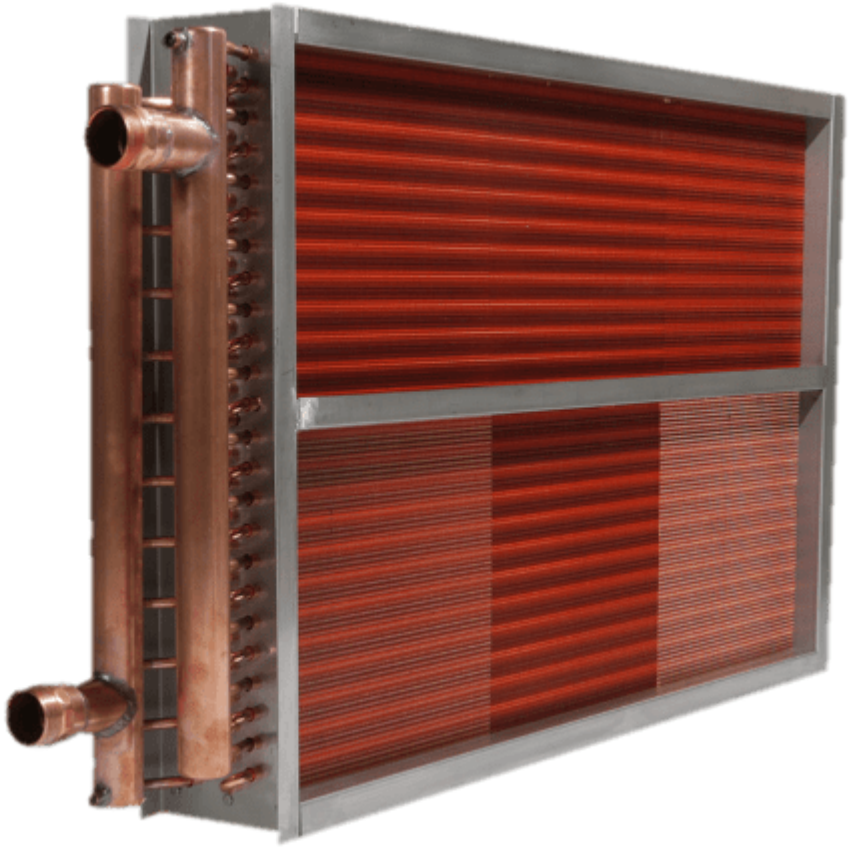
Coil Replacement Construction Process

Reduce Downtime

- Coil ordered in advance and shipped to site
- Isolation valves tested in advance
- Mechanical Contractor vetted and coordinated in advance.

Day of:

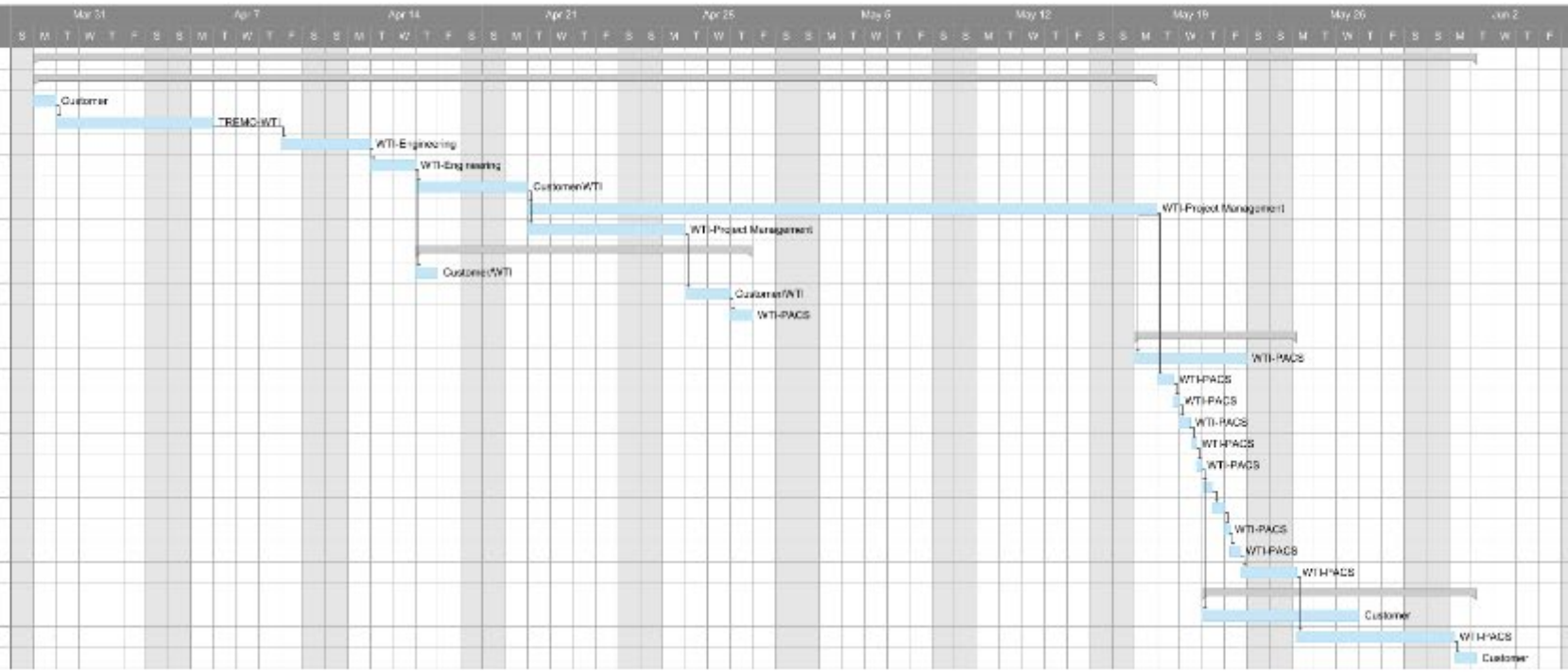
- Disassemble pipe tree
- Remove exterior wall of AHU
- Demo existing coil in pieces
- Hoist / rig new coil into place
- Perform connections
- Re-install AHU wall
- Re-install pipe tree
- Install strainer / bag filter if necessary



Scheduling

Draft AHU Restoration

	Task Name	Duration	Predecessors	Assigned To
1	**Total Project (PO to Final Invoice Payment)**	46.25d		
2	**Pre Construction**	35d		
3	PO issued	1d		Customer
4	Project Setup	1w	3	TREMCO-WTI
5	PACS Engineering Site Visit to Site Coil and Fan Array	2d	4FS +3d	WTI-Engineering
6	PACS Engineered Drawings - Fan Array	2d	5	WTI-Engineering
7	Customer & PACS Submittal Approvals	3d	6	Customer/WTI
8	Equipment Lead Time	4w	7	WTI-Project Management
9	Mechanical/Electrical Contractor Signup	1w	7	WTI-Project Management
10	**Mobilization**	11d		
11	Owner/Contractor Expectation Meeting	1d	6	Customer/WTI
12	Coordination Meeting (Facility & Subcontractors)	2d	9	Customer/WTI
13	Pre-T&B	1d	12	WTI-PACS
14	**AHU-4**	5.25d		
15	Temp Cooling - ADD ALTERNATE NOT TAKEN	1w	6FS -1d	WTI-PACS
16	PURE-STEAM INTERIOR	0.75d	8	WTI-PACS
17	LOTO/Prep for Demo	0.25d	16	WTI-PACS
18	Demo existing Fan	0.5d	17	WTI-PACS
19	Install Bulkhead wall	0.25d	18	WTI-PACS
20	Install Fans in bulkhead wall	0.25d	19	WTI-PACS
21	Isolate CHW Coil then demo	0.5d	20	
22	Install new CHW Coil	0.5d	21	
23	Prep for Primer	0.25d	22	WTI-PACS
24	Pure Coat - Interior Only	0.5d	23	WTI-PACS
25	Pure Liner	0.5d	24	WTI-PACS
26	**Closeout**	8.25d		
27	Controls Integration - Owner Coordination Required	1w	20	Customer
28	Punchlist	1w	25	WTI-PACS
29	Final Invoice	1d	28	Customer



HVAC NEW LIFE™

Before and After

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HVAC Restoration: Fan Array Retrofit

BEFORE

AFTER

HVAC Restoration: Fan Array Retrofit

HVAC NEW LIFE™

BEFORE

AFTER

HVAC Restoration: High Performance Coatings

BEFORE

AFTER

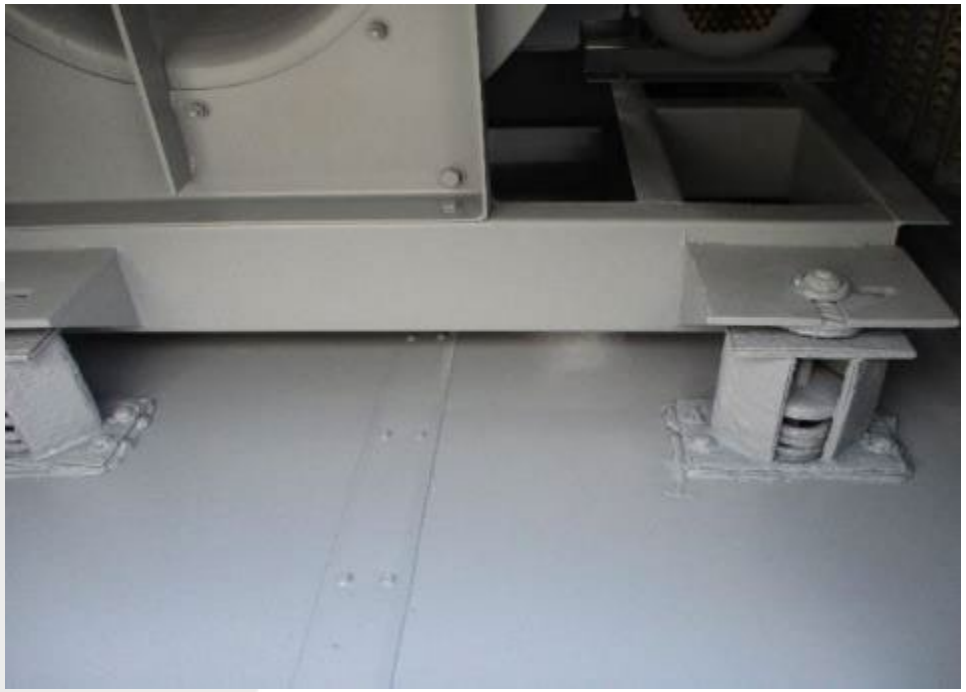
HVAC Restoration High Performance Coatings

BEFORE

AFTER

HVAC Restoration: High Performance Coatings

BEFORE



AFTER

HVAC Restoration: High Performance Coatings

BEFORE

AFTER

HVAC Restoration High Performance Coatings

BEFORE

AFTER

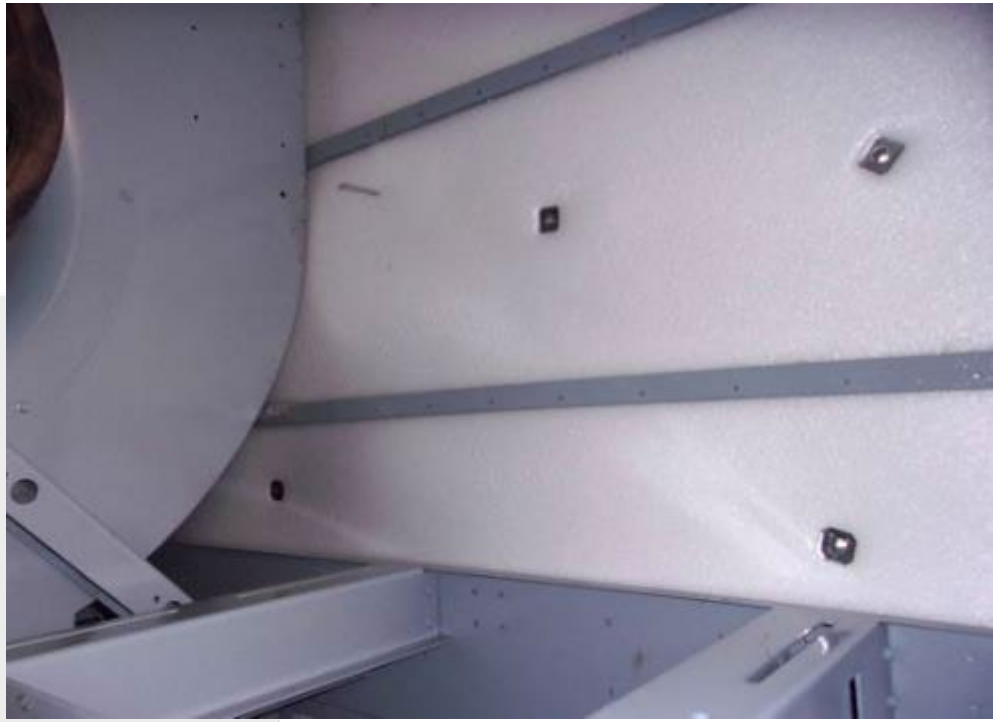
HVAC Restoration: Coating and Insulation

BEFORE

AFTER

HVAC Restoration: Coating and Insulation

BEFORE



AFTER

HVAC Restoration: Coating and Insulation

BEFORE

AFTER

HVAC Restoration: Damper Retrofit

BEFORE

AFTER

HVAC Restoration: Component Fabrication

BEFORE

AFTER

Duct Cleaning

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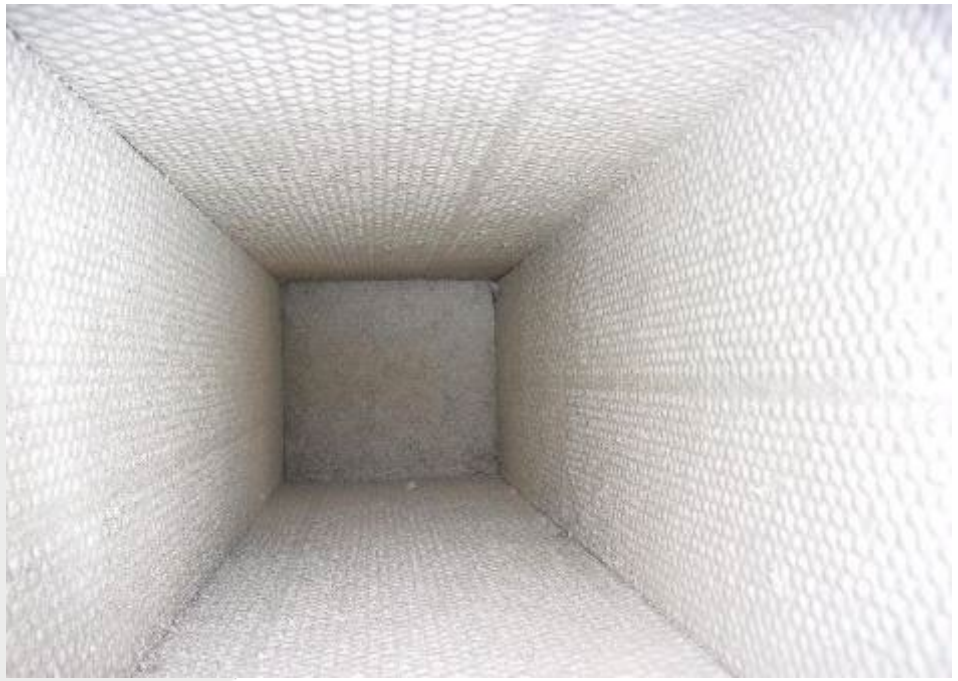
HVAC Restoration: Environmental Duct Cleaning & Encapsulation

BEFORE



AFTER

HVAC Restoration: Environmental Duct Cleaning

BEFORE

AFTER

HVAC Restoration: Environmental Duct Cleaning

BEFORE

AFTER

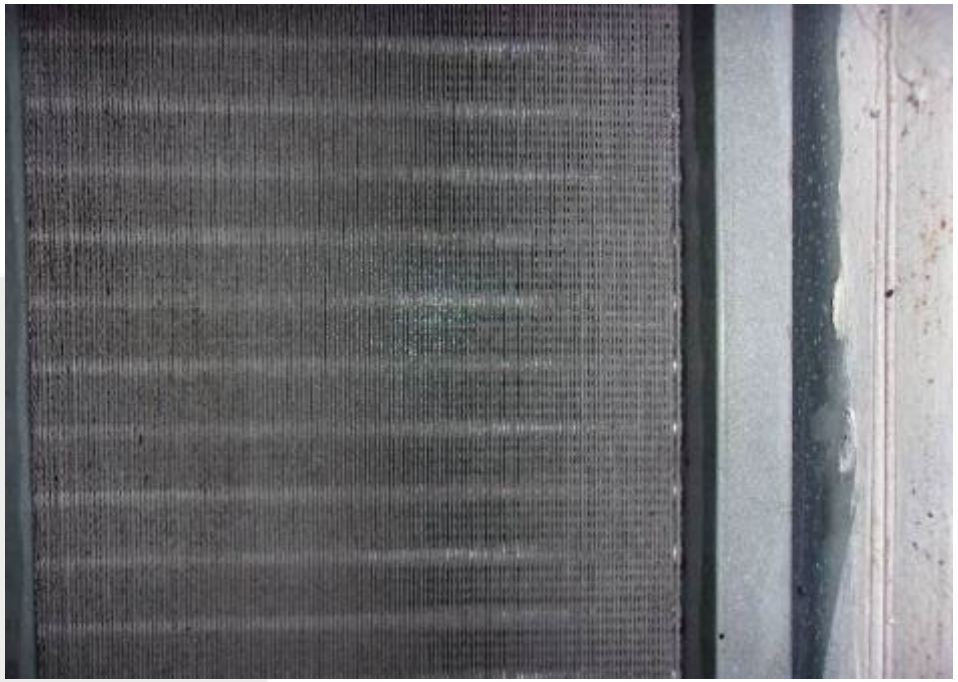
HVAC Restoration: Environmental Duct Cleaning

BEFORE

AFTER

HVAC Restoration: Environmental Duct Cleaning & Encapsulation

BEFORE



AFTER

Case Studies & Success stories

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Success Stories: HVAC New Life

Palm Beach State College - 2016

Roof Top Units

- Projected New: $1,200,000
- Restoration: $120,000
- **Savings = $1,080,000!**

What could your organization do with a million dollars?

HVAC Restoration Program Overview – Documented Value

Perry Township Schools

K-12 Indianapolis, IN

Documented Savings Project

HVAC Cleaning + Restoration: (15) AHU @ (5) schools

$3,263,100 Quoted Cost of (15) New HVAC Unit s

$880,126 Cost of (15) HVAC Restoration
- 27% Cost of New

Documented Savings = $2,383,100, or 73.0%

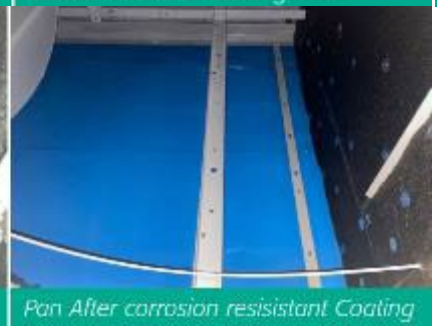

Blower Wheel & Housing Before


Blower Wheel & Housing After


Older Blower Wheel and Housing


Replaced with Fan Array


Drain Pan Before Steam


Pan After corrosion resisistant Coating


Return Side Coil Before


Return Side Coil After

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HVAC Restoration Program Overview – Documented Value

Charleston School District

K-12 Charleston, MO

HVAC Healthy School Assessment

HVAC Cleaning + Ductwork: (67) schools

Indoor Air and Environmental Services

- Hygienic steam cleaning of their HVAC air handling and terminal equipment.
- Hygienic cleaning of the air conveyance system (Duct cleaning).
- HVAC assessment of their system and equipment by a Professional Engineering firm.

HVAC Restoration Program Overview – Documented Value

HCA Healthcare' Methodist Hospital Specialty & Transplant in San Antonio, TX

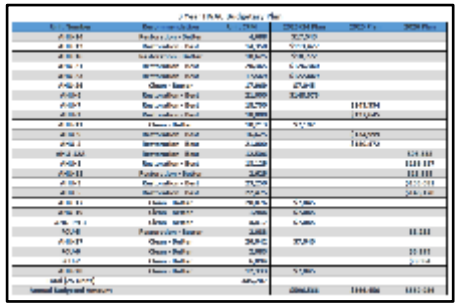
Main POC: Amanda Stephens – Director of Facilities Management

$1,800,000. Capital Cost of (2) New HVAC Units

$399,253. Cost of (2) HVAC Restoration Units
- 22% Cost of New

Documented Savings = $1,400,747, or 77.8%

AHU 1 and AHU 12 Restoration



- Both units serve ORs
- HVAC Restoration:
  - ✓ Steam Cleaning
  - ✓ Interior Coatings and metal work
  - ✓ Exterior Coatings and metal work
  - ✓ PURE-Cell Insulation
  - ✓ Fan Array
  - ✓ Long-range capital plan (25) HVAC units

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HVAC Restoration Program Overview – Documented Value

HCA Healthcare' Memorial Health in Savannah, GA

Main POC: Norman Epps – Regional Manager, Engineering

$300,000. Capital Cost of (1) New HVAC Units

$133,340. Cost of (1) HVAC Restoration Units
- 44% Cost of New

Documented Savings = $166,660. or 55.5%

AHU 1 Restoration

- Unit serves administrative areas - 5,000 CFM RTU
- HVAC Restoration:
  - ✓ Steam Cleaning
  - ✓ Pure-Liner Drain Pan Protection
  - ✓ PURE-Cell Insulation
  - ✓ Interior Coatings
  - ✓ Fan Array
  - ✓ Interior Coatings
  - ✓ Fan Array
  - ✓ New Coil
  - ✓ Replace door gaskets
  - ✓ Replace intake section

HVAC Restoration Program Overview – Documented Value

CommonSpirit: in Henderson, NV

$4,500,000. Capital Cost of (7) New HVAC Units
(261,992 total CFM x $17.18/CFM)

$1,610,817. Cost of (7) HVAC Restoration Units
(261,992 total CFM x $6.15/CFM) - 35% Cost of New

Documented Savings = $2,889,183.00, or 64.2%

HVAC #	Unit Size (CFM)	HVAC Restoration Cost	(CFM) $
AHU-2	43,260	$ 251,195	$ 5.81
AHU-3	38,627	$ 167,842	$ 4.35
AHU-4	36,041	$ 336,216	$ 9.33
AHU-5	42,695	$ 379,023	$ 8.88
AHU-6	25,301	$ 141,846	$ 5.61
AHU-8	38,127	$ 166,844	$ 4.38
AHU-9	37,941	$ 167,851	$ 4.42
Total	261,992	$ 1,610,817	$ 6.15

HVAC Restoration Program Overview – Documented Value

Other Large Healthcare System: around Jacksonville, FL

HVAC Restoration: AHU #131, AHU #141, AHU #151

- ✓ *High Performance Cabinet Coating*
- ✓ *Fan Array Retrofit Installation*
- ✓ *Drain Pan Coating*
- ✓ *Upgraded Filtration System*
- ✓ *New HVAC Model + Serial Number*

$1,139,550 Est. Cost of New HVAC Unit
(75,970 total CFM x $15.00/CFM)

$442,000 Cost of HVAC Restoration
(75,970 total CFM x $5.82/CFM) - 38% Cost of New

Projected Savings = $697,550, or 61.2%

Warranty

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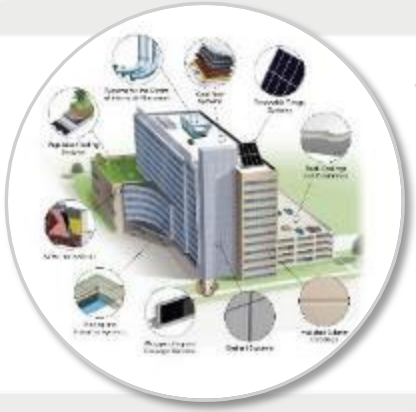
HVAC Warranty Offering



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One Partner – Single Source
Consistent Quality Deliverables

HVAC New Life™

5 Year Warranty

HVAC Restoration

- Restored Equipment
- 5 Year Standard Parts/Labor Warranty
- No New Engineering Requirements
- Work With Existing Healthcare Codes
- Phased Approach, Less Logistical Challenges
- High Performance Coatings - Longer Asset Life
- Fan Array (Redundancy for Backup)
- Less Workflow Disruption

HVAC Replacement

- 1 Year Standard Parts/Labor Warranty
- New Engineering/Design Requirements
- New Healthcare Code Requirements
- More Logistical Challenges/Expenditures
- No Standard High-Performance Coatings
- No Standard Fan Array (Redundancy Setup)
- More Facility Disruption

Q&A

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