



***UV Technology & Filtration Solutions
for a Cleaner, Healthier World***



Sparks Technology, Inc

A Division of **UVDI**



Agenda

- Ultraviolet Devices, Inc. company overview
- What is UV and how does it work
- Importance of Indoor Air Quality
- Success stories
- Summary

UVDI brings 50+ years of heritage to UV in air & water purification



Sparks Technology, Inc.
A Division of UVDI

UVDI acquires Sparks Technology



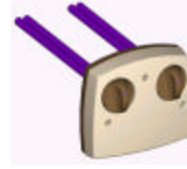
TOM VELOZ

Tom Veloz joins Aquafine founder & Father, Luis Veloz

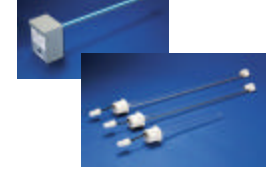
Many products were introduced, patents were applied for and most were awarded



HEPA-FLOW® APS 625
FDA 510k Class II MD



Premium Residential Air Return Model



Altru-V products for HVAC industry



-- Then...

Ongoing participation in over 20 professional and standards organization including: ASHRAE, NSF, ISPE, SME, WQA, IUVA



AQUAFINE Corporation



1987 UV drinking water disinfection system for consumer appliance



1992 Ultraviolet Devices Inc. becomes an independent Corporation



LA Chamber of Commerce awards UVDI for significant growth and contributions to our local community



UVDI delivers market driven solutions to its partners & customers



Class 100,000 clean room



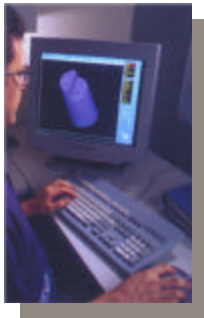
Valencia, California



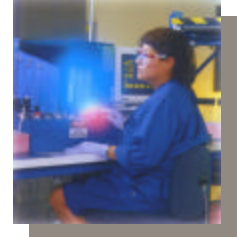
Batavia, Illinois



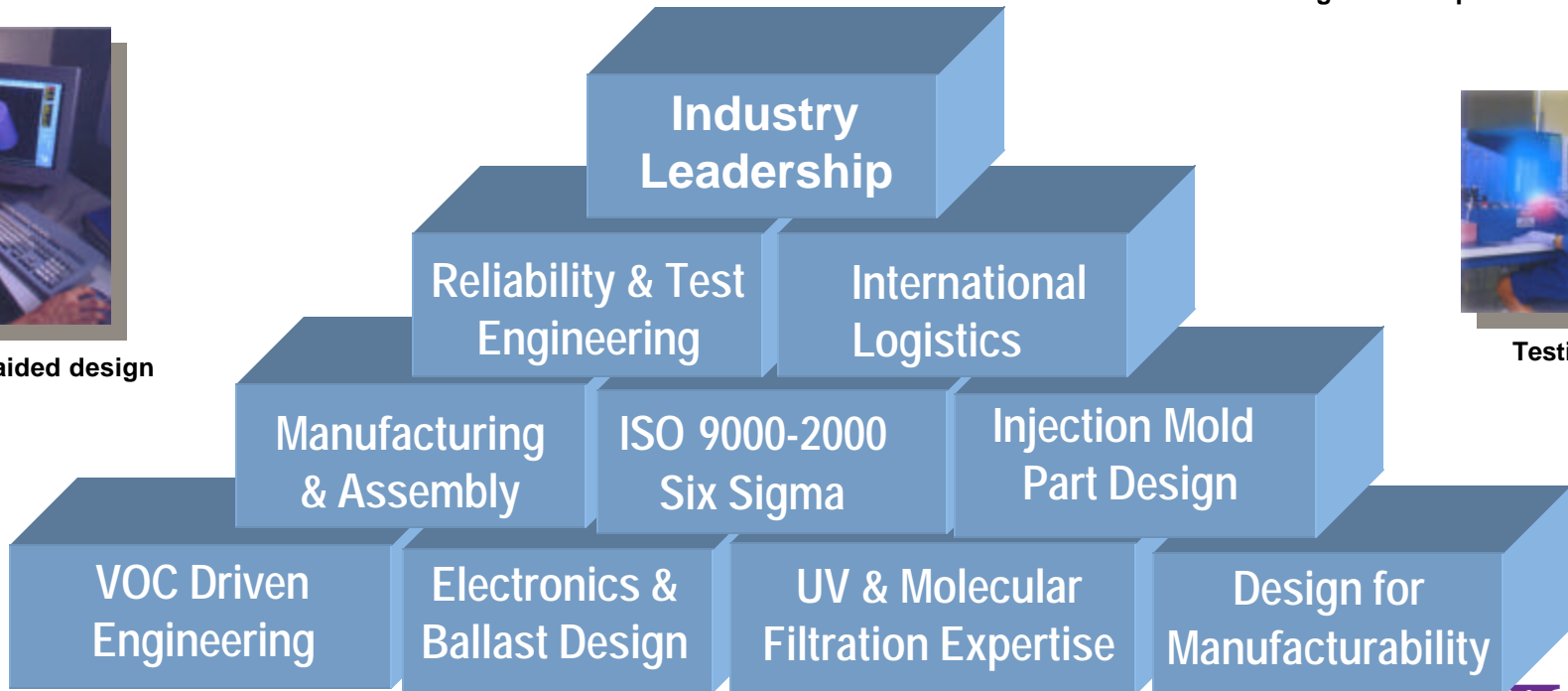
High-volume production



Computer-aided design



Testing



UVDI – Technical Advisory Board

- **William W. Nazaroff, Ph.D.** Faculty Professor,
 - Department of Civil and Environmental Engineering, UC Berkeley
- **Leonidas E. Alevantis, M.S., P.E.**
 - California Department of Health Services
- **William S. Cain, Ph.D.** Professor of Surgery,
 - Department of Surgery, UC San Diego
- **William J. Fisk, M.S., P.E.**
 - Staff Scientist - Group Leader, Indoor Environment Department.
 - Lawrence Berkeley National Lab
- **Hal Levin, Research Architect**
 - ASHRAE Chair, Guideline Project Committee 10P
 - IAQ Building Environmental Expert
- **Francis (Bud) J. Offermann III, M.S., P.E., CIH**
 - President, IEE, Indoor Environmental Engineering
- **Thomas Phillips, M.S., P.E.**
 - California Air Resources Board

UVDI Engineering-Manufacturing

Key Strengths

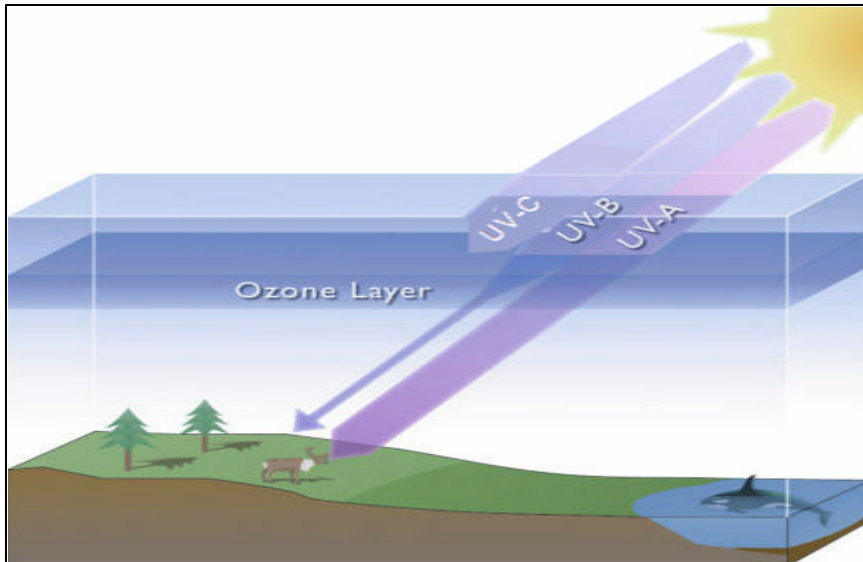
- Speed to market
- Reputation for high quality, innovative products
- Flexible manufacturing lines with variable capacities
- ISO Certification
- Products UL listed
- Adopted principles of lean manufacturing and six sigma productivity enhancements
- Solid model design and rapid prototyping
- Unique software for UV design and dosing



Class 10,000 clean room

What Is Ultraviolet Light?

The Earth's Ozone Layer filters UV-C which occurs naturally in sunlight



UV-A (315nm - 400nm)

Black lights and tanning lamps,
harmful to eyes

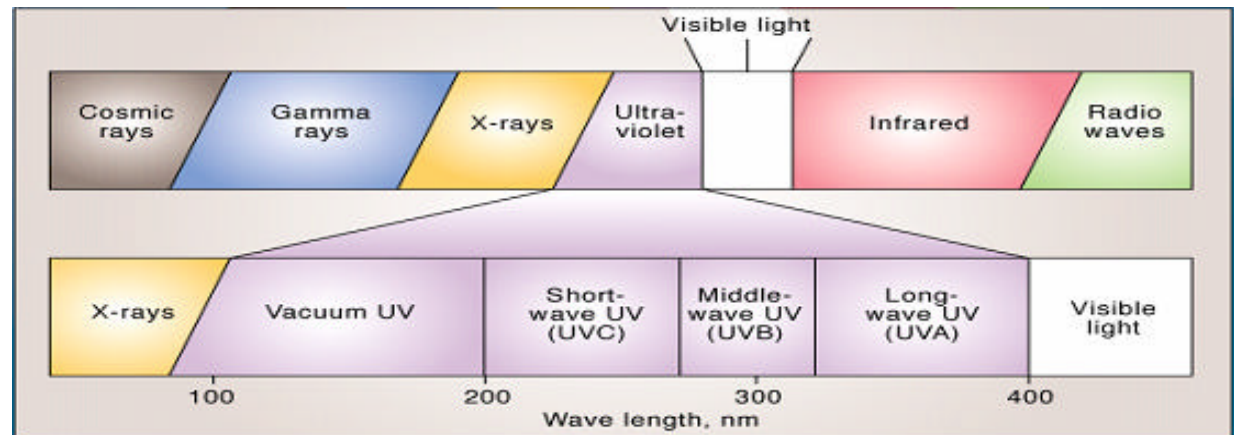
UV-B (280nm - 315nm)

Causes sunburn and skin
cancer

UV-C (200nm - 280nm)

Germicidal - Damages DNA in
cells, optimum at 254 nm

The Light Spectrum

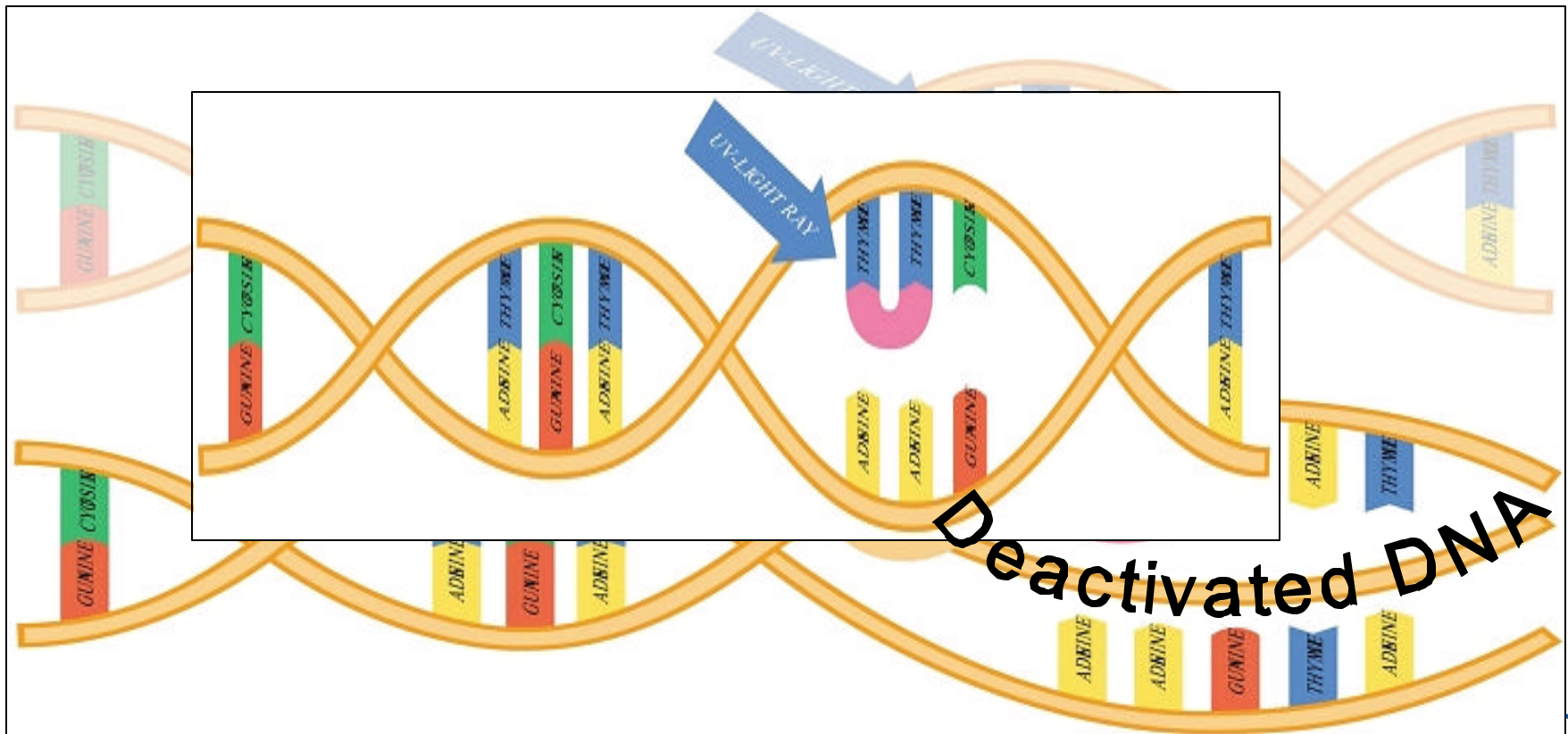


How It Works...

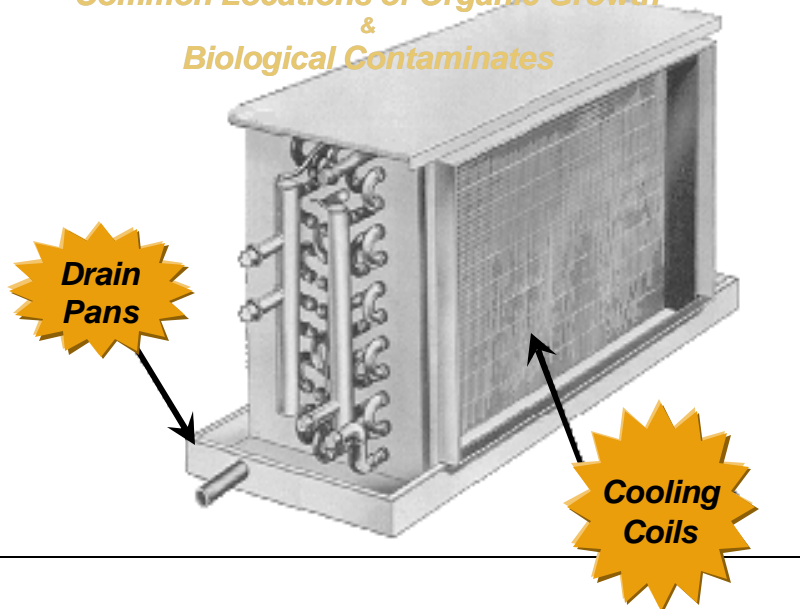
- Any organic based cell exposed to UV-C Absorbs it at the molecular level...

The organism is now destroyed & ineffective.

It is unable to reproduce & unable to infect.



*Common Locations of Organic Growth
&
Biological Contaminates*

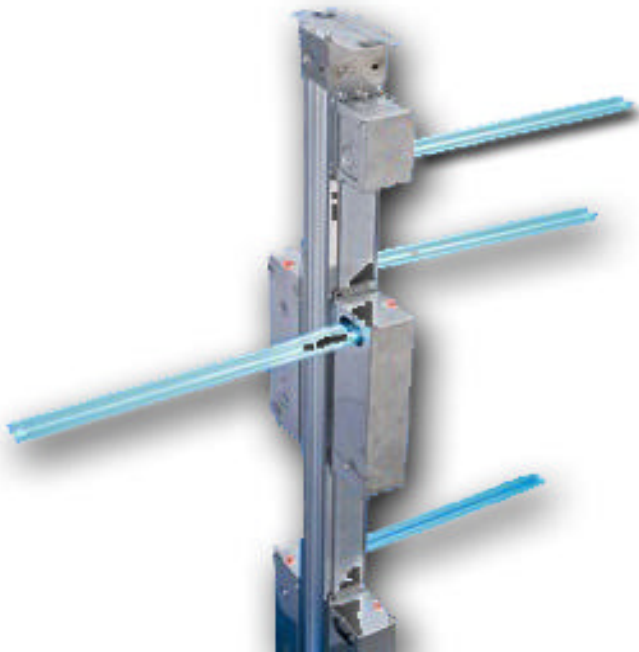


“Capture & Kill” – Source Control

- Typically applied on HVAC coils
- Most cost efficient
- Most versatile and popular
- Uses normal & low output lamps

Moving Air Streams

- “Kills on the Fly”
- Installed in the HVAC duct system – supply or return
- Isolation rooms, Bio-Terror, etc.
- Requires high output lamps



UVGI Products for HVAC

HVAC Equipment Used	Altru-V® Product	Notes
“Kill-On-The-Fly” Germicidal Irradiation & Sterilization of Air Stream.		
Any Sized AHU's & RTU's	V-Flex®	Provides unmatched installation flexibility and "kill rates" in HVAC systems of virtually any size, large or small. Perfect for bio-terror or medical applications with high dose UV. Ideal for use in isolation room and clean room applications. Applications are sized for specific microbes using proprietary modeling software.
Duct Mounted Applications		
Plenum Applications		
Coil Cleaning & Maintenance, Surface Disinfection and Microbial Source Control.		
Low initial cost (Less than 1 yr. payback) easy installation, low cost of ownership & lower operating costs.		
Large & Medium Sized AHU's & RTU's.	V-Mod®	Easiest "Turn-key installation". Doubles as a "side access" fixturing system in addition to its traditional "built-up" bank arrangement. Custom software used for sizing, pricing, drawings & modeling UV-C coverage.
RTU's up to 10 tons	V-Strike®	Indoor or Outdoor mounting. Waterproof NEMA 3 design for outdoor locations. Top or side mount single 15", 28" or 32" lamp lengths. Installs easily into "through the wall" and "rooftop" units. 360 degree UV-C irradiation.
Indoor and Outdoor Packaged Units.		
Fan Coil Units (Larger than 18")		
Duct Mounted Applications		
Modular AHU's with limited side or top access.		
Fan Coil Units	V-Strike® IDM	Dual 18" lamps offering higher output 360 degree UV-C irradiation. Indoor or Outdoor mounting. Waterproof NEMA 3 design for outdoor locations . Plugs in to electrical outlet.
Forced Air Systems		
"A" coil irradiation		
Duct Mounted Applications		
Fan Coil Units, duct mounting, forced air systems, "A" coil irradiation.	Model 36	Low cost and popular with residential applications. Plugs in to electrical outlet.
PTAC's	V-Ray®	Low output UV-C fixture and lamp that meets American Conference of Governmental Hygienists (ACGIH) & NIOSH human safe exposure limits. Most flexible installation available of any UV-C fixture. Fits any coil size, vertical or horizontal systems with four lamp sizes (12", 21", 33", 61"). Used in schools, hotels, and any location where UV-C may be visible to occupants. 360 degree UV-C irradiation. Also available in full output and washdown versions.
Unit Ventilators		
Other through the wall HVAC units		

UVGI Products for HVAC



Large Commercial Applications

Low Output UV-C for Capture & Kill / Source Control Germicidal Irradiation

Air Handling Units, Roof Top and Packaged Units

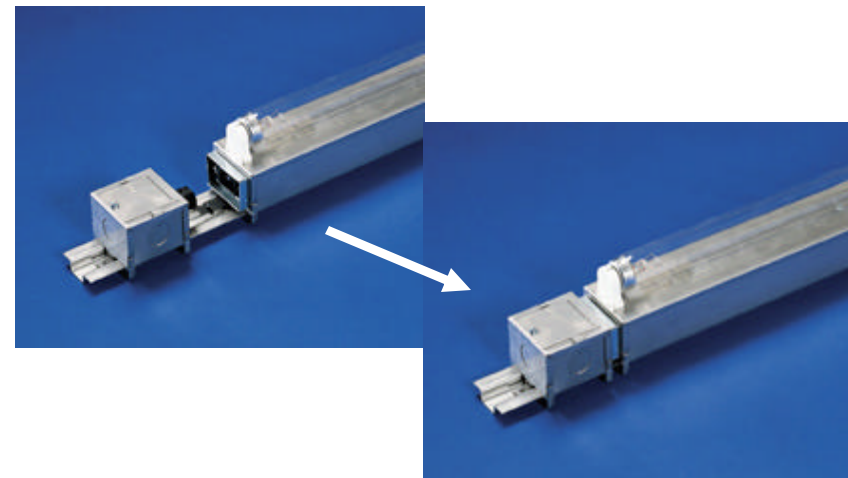
Coil cleaning & maintenance, surface disinfection and microbial control (“Capture & Kill” Applications)

V-Mod® (Modular Coil Irradiator System)

The V-Mod has become known in the HVAC industry as the most installer friendly system on the market. Using the scientific as well as anecdotally proven: “Time & Intensity”, the V-Mod delivers the most cost effective solution for coil irradiation.

Plug & Play:

- Installation Ease with “Plug-n-Play” units
- Track mounting allows ballast to slide on and perform as a "side access" fixturing system
- UL/CUL/CE Listed
- Uses very effective normal output lamps to take advantage of dwell time and save energy
- Proprietary software assures full effectiveness of UV and provides validated return on investment calculations



UVGI Products for HVAC

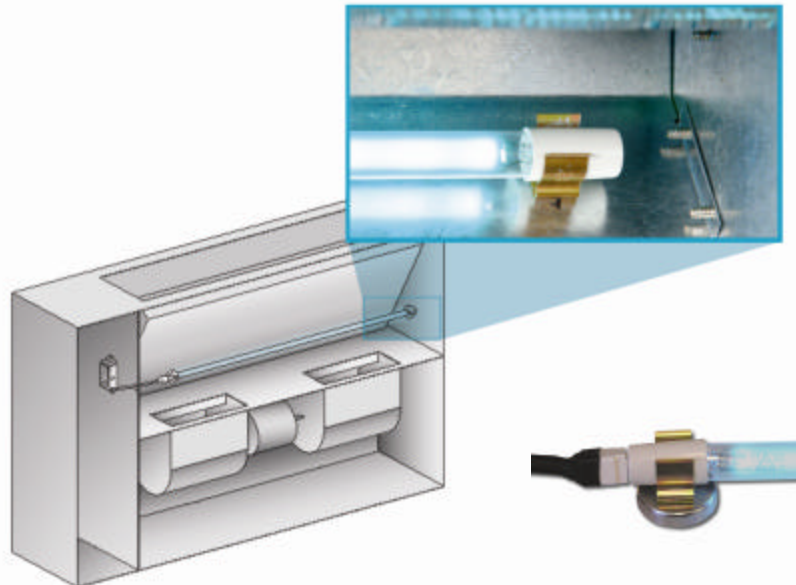
Light Commercial Applications

Medium & Low Output UV-C for Source Control & Surface Irradiation

Roof Top Units (3 - 50 Tons), Indoor Package Air Conditioners (PTACs), Fan Coil Modules, Modular Air Handling Units, Duct Mounted Applications

V-Ray®

Lower Output UV-C meets NIOSH & ACGIH exposure limits. Flexible installation for hard to get to locations. ("Capture & Kill" Applications)



- Most flexible installation available of any UV-C fixture
- Fits any coil size, vertical or horizontal systems with four lamp sizes (12", 21", 33", 61")
- Used in schools, hotels, and any location where UV-C may be visible to occupants
- 360 degree UV-C irradiation
- Also available with full output UV-C lamps for space constrained applications
- Optional "washdown" configuration available for clean-room, food processing and other clean-room type applications

UVGI Products for HVAC

Any Size Commercial Applications

High Output UV-C for “On-The-Fly” Germicidal Irradiation & Disinfection of Air Stream

Also includes the benefits of coil cleaning & maintenance, surface disinfection and microbial control as in “Capture & Kill” Applications

Air Handling Units, Roof Top, Packaged Units, Fan Coils

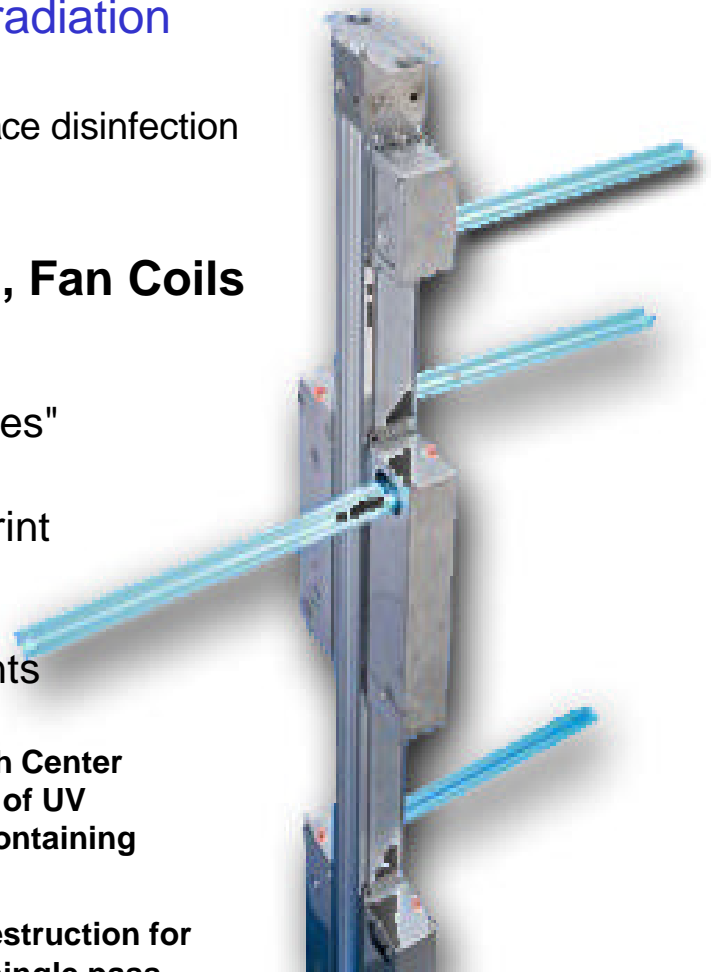
V-Flex®

- Provides unmatched installation flexibility and "kill rates" in HVAC systems of virtually any size, large or small
- Optimized ‘contact time’ design allows minimal footprint with maximum effectiveness
- Precise sizing software allows design for specific applications and targeted microbiological contaminants

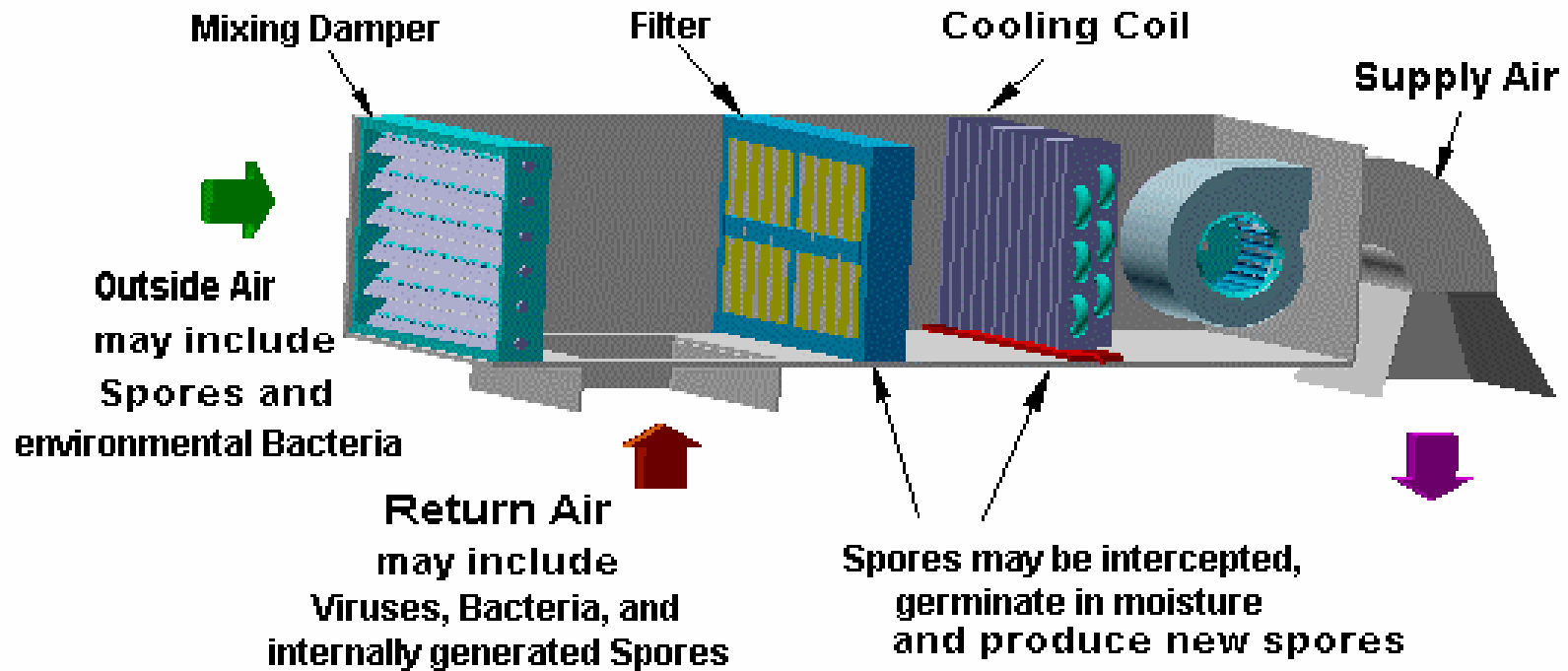


The US EPA's National Homeland Security Research Center recently completed performance testing on the use of UV germicidal technology to treat moving airstreams containing biological warfare agents.

The V-Flex system delivered greater than 99.98% destruction for *S. Marcesans* and 98.00% for MS-2 Coliphage on a single pass.



Where To Install UV-C



Market Drivers

- Increasing attention on Indoor Air/Environmental Quality (IAQ/IEQ)
- Increasing recognition of UV as viable technology for energy savings, cost avoidance and improving IAQ/IEQ
 - Many UV installations have a ROI of less than 1 year
 - Health and Safety concerns with coil cleaning
- HVACR Market – Greatest Opportunity
 - Existing Building Market
 - New HVACR Equipment Sales
- Current induct UVC Market \$45 to \$50M growing at 18.3% CAGR*

* Note: Per 12/04 Frost & Sullivan study “North American Air Purification Equipment Market”

Importance of Indoor Air Quality

“Indoor air quality is one of the five most urgent environmental risks to public health today.”

- *US Environmental Protection Agency*



“Indoor pollutant levels are 2-5 times higher than outdoor levels.”

- *US Environmental Protection Agency*

“Dirty evaporator and condenser coils will reduce cooling capacity and degrade [HVAC] equipment energy efficiency.”

- *US Department of Energy*

“Biological pollutants can be a major cause of sick days at work and school.”

- *US Consumer Products Safety Commission*

“There are 15 million Americans with asthma and the additional 35 million with allergies. Between 1982 and 1994, asthma rates rose 61% for adults and 72% for children.”

- *Chelsea Group*

“Asthma accounts for 14 million missed school days each year.”

- *Center for Disease Control*

“More than 95% of the US general population is concerned about indoor air quality at home.”

- *American Lung Association*

JUST THE FACTS



- Health effects from indoor air pollutants may be experienced soon after or, possible, years later.
(Environment Protection Agency)
- The most noticeable increase in operating expenses occurred in utility costs, which had a 9.29% percent increase from 2004.
(BOMA 2006 Experience Exchange Report)
- Heating and cooling systems are the largest single consumers of energy in buildings.
(Energy Star – EPA / DOE)

Success Stories

Medical/Healthcare

- The Queen's Medical Center – Honolulu, HI – Coil Irradiation & On-the-Fly Kill – noticeably improved indoor air quality, return to design HVAC system performance after degradation of over 30%
- St. Michaels Hospital – Texarkana, TX – Coil Irradiation – 8 month payback, eliminated indoor air quality complaints
- Florida Hospital System – Orlando, FL – Coil Irradiation – 6 month payback, improved IAQ (mold completely eliminated from downstream HEPA filtration)
- Children's Hospital SUNY – Buffalo, NY – On-the-Fly Kill – Reduction in microbial counts for infants in the neonatal ward (6 Log reduction)
- Henry Mayo Hospital – Newhall, CA – Coil Irradiation – Returned system to original operating characteristics yielding a payback of less than 5 months, improvement in IAQ despite HEPA filtration already being in place

Commercial/Government

- Public Service Company – Tulsa, OK – Coil Irradiation – Eliminated serious indoor air quality complaints, allowed for shutdown of additional chillers (300 tons of cooling reduction)
- Harris County Municipal Offices – Houston, TX – Coil Irradiation – Eliminated indoor air quality complaints, total maintenance and energy savings in excess of \$20k per year
- Louisiana State University – Baton Rouge, LA – Coil Irradiation – 30 days of UV treatment brought 1.47 in wg. Pressure drop reduction, savings of \$15k due to elimination of need to buy new coil modules

Example of UV Coil Irradiation Application

Before UV Coil Irradiation



53 days after UV Coil Irradiation



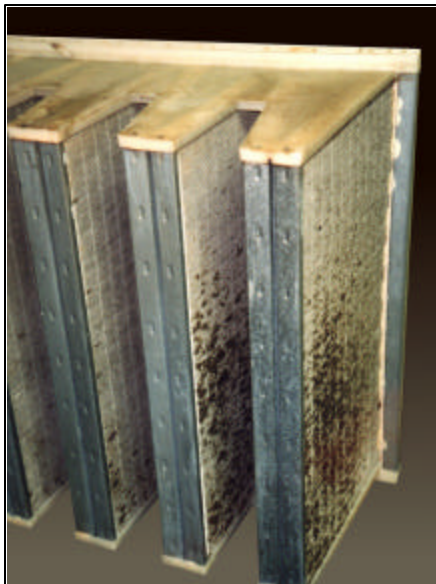
Application was in the HVAC system for the offices of a major telecommunications company located in northern California

Before and After UV installation

Florida Hospital –

Goal Enhance Maintenance & Lower Operating Costs

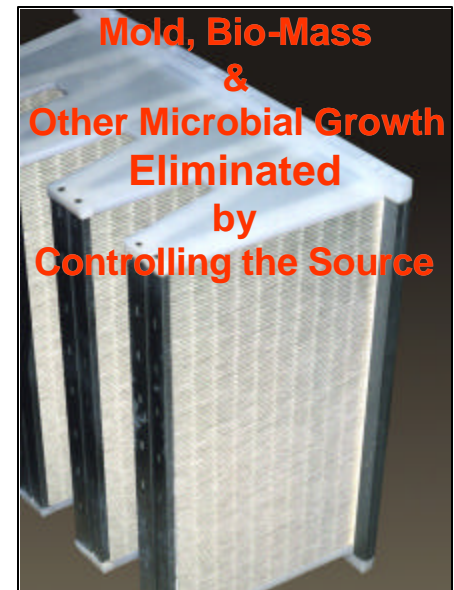
Before...



UVGI is Installed



After...



Additional Benefit:

Traditional coil cleaning is now obsolete.
Cleaner coils means lower operating costs too!

Summary

- **There is an increasing body of evidence showing the indoor air quality benefits for UV Systems**
- **ROI based on energy savings in most cases is less than 1 year**
- **Increasing emphasis on IAQ/IEQ**
- **UVDI is a leader in the field**