

Starving The Beast





Presenters

Kevin Rohde – General Manager

Hastings Air Energy Control

800-236-8450

X-516

What is “The Beast” ?

- It is big
- It is hungry
- It is wasteful
- It is hard to control
- It is a constant drain on resources and your pocketbook

It all starts with making a
great product!



What Do You See?



We See ...



- Welding
- Machining
- Grinding
- Polishing
- Vehicle Exhaust

Air Quality in the Industrial Work Environment

- Clean Air Is Not Free
 - Dirty Air Can Be Even More Expensive
- Hazards
- Liability
- Lost Productivity
- Diminished Quality
- Higher Maintenance burdens
- Loss of expensive heated and cooled air



Background

- In the past, and even today, process ventilation and general ventilation are not designed or updated at the same time.
- In some cases people responsible for designing these systems do not even “speak the same language”.

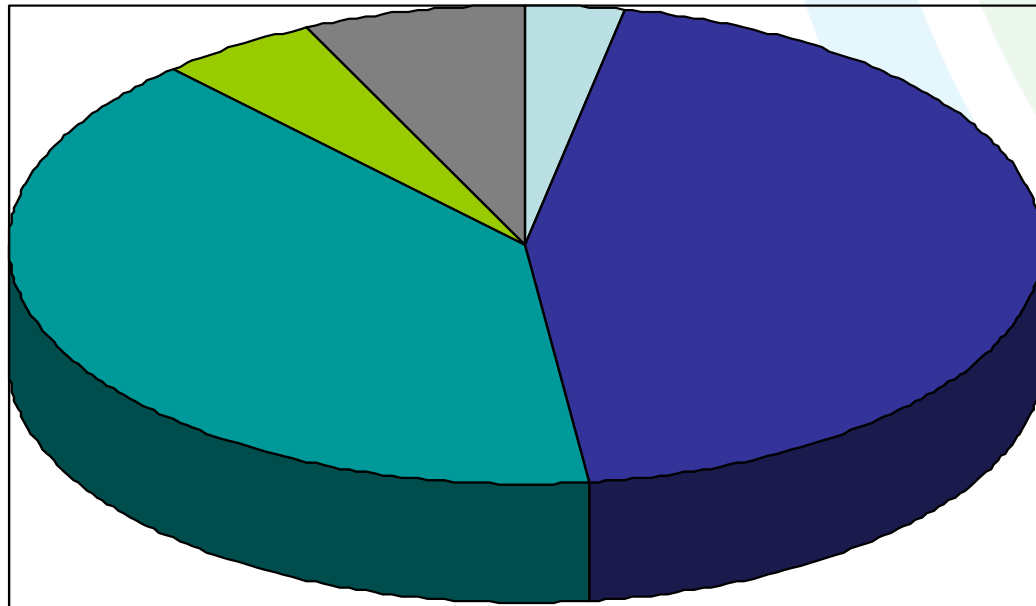


Background

- In the past, and even today, process ventilation and general ventilation are not designed or updated at the same time.
- In some cases people responsible for designing these systems do not even “speak the same language”.

US Manufacturing Costs pre-1960

During the decades of cheap, abundant energy.

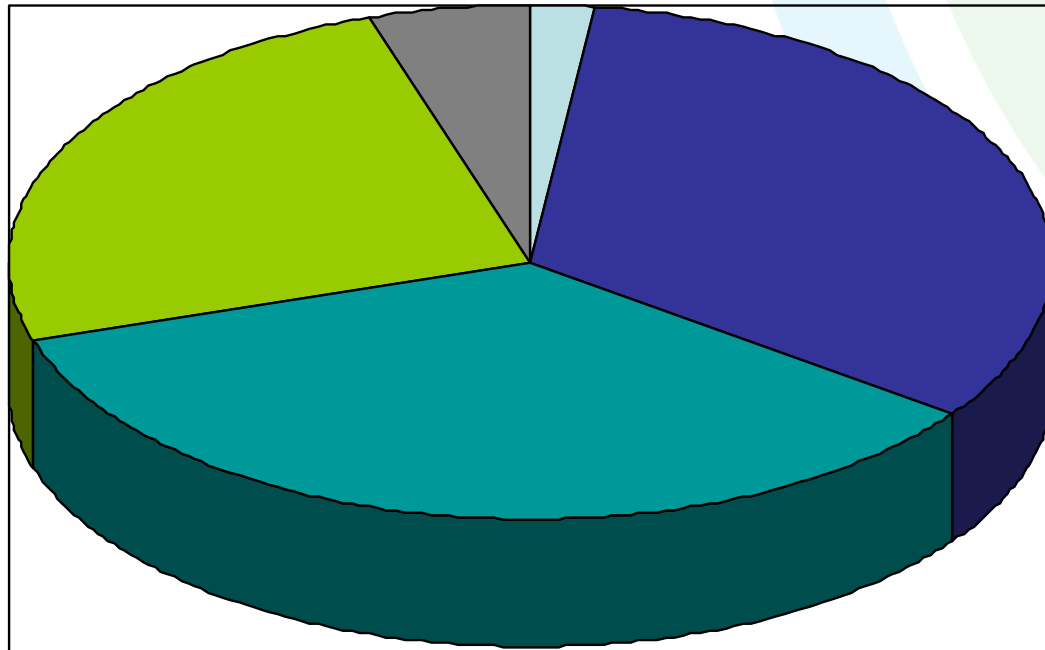


Other	3%
Labor	45%
Raw Materials	40%
Energy	5%
Maintenance	7%

Source: World Energy Council

US Manufacturing Costs Projected for 2025

Energy costs rose sharply in the summer of '08 and will continue to rise as world demand dramatically increases.



- Other 2%
- Labor 33%
- Raw Materials 35%
- Energy 25%
- Maintenance 5%

Source: World Energy Council

How Did We Get Here?

- The Old Way
 - The Solution To Pollution Was Dilution
- Bigger Was Better
 - Large Fans
 - Large Collectors
 - Little Concern For Energy/Resource Management
 - Little Concern For Employee Exposure



This creates some problems...

- High energy consumption
- Poor balance in the general ventilation when process ventilation is installed.
- Negative pressure in buildings.
- Low return on investments for process ventilation systems.
- Poor efficiency in the process ventilation system.
- High costs for maintenance of the ventilation system.
- High makeup air costs

Considerations Today

- Maximizing Energy Efficiency
- Minimizing Energy Use
- Operation Only When Needed
- Prioritize “Source-Point” Containment
- Clean and Re-circulate Air to Reduce Need for Make-Up Air
- Reduce waste of exhausting heated and cooled air



Additional Considerations Today

- Scope Of The Application
- Liability Considerations
- Save Energy if an ROI
- Save Energy as a corporate responsibility
- Lowest cost of production wins!
- Save money.
- Meeting Benchmark Standards

(OSHA,NIOSH,NFPA,EPA)



Safety

Health

Labor

Air Quality

Profitability
(Staying In Business)

Air Quality

Facility

Equipment



Control Systems TODAY

- Save Energy
- Monitor System Functionality & Filters
- Report Status On Demand
- Derived From Years Of In-The-Field Experience
- Usually a combination of experts in electricity, engineering, fans, industrial air ventilation and filtration expertise



Intelligent Energy Control Systems

- Fully Automatic
- Fume/Dust Extraction “On Demand”
- Pay Only For Effective Work Time
- Reduce Size Of The System, Fan & Filter
- Improve the Environment
 - Reduced Noise Levels
 - More Effective Extraction



How Does It Work?

- A Sensor Reacts When A Start Up Occurs (arc, machine, engine)
- A Damper Opens / A Fan Starts
- A Sensor Indicates The Need For More Or Less "Pressure" (Based On A Predetermined Benchmark from a consultant experienced in multiple particulates.)
- The Fan RPM Goes Up Or Down Accordingly – Along With HP Needs

So . . . How Fast??

Fast Enough

... and not one bit more!

***This is why you need expertise in the collection
of particulate, filtration and fan speed***



Affinity Fan Law

Reduce CFM by 10% = 27% Savings

Reduce CFM by 25% = 68% Savings

Reduce CFM by 50% = 87.5% Savings



System Components

- PLC - the “brains” of the system
- VFD - the “heart” of the system
- Sensors or switches for start/stop
- Dampers - motorized or manual



Why put it in a Box?



- “Best Practice” in today’s industrial environment
 - Safety and Protection
 - drive and plant personnel
- In accordance with NFPA 70e
 - The National Electric Code (NEC) as it pertains to industrial equipment



Ivec™ solutions

IPS

IPS-plus

Advanced

Steward

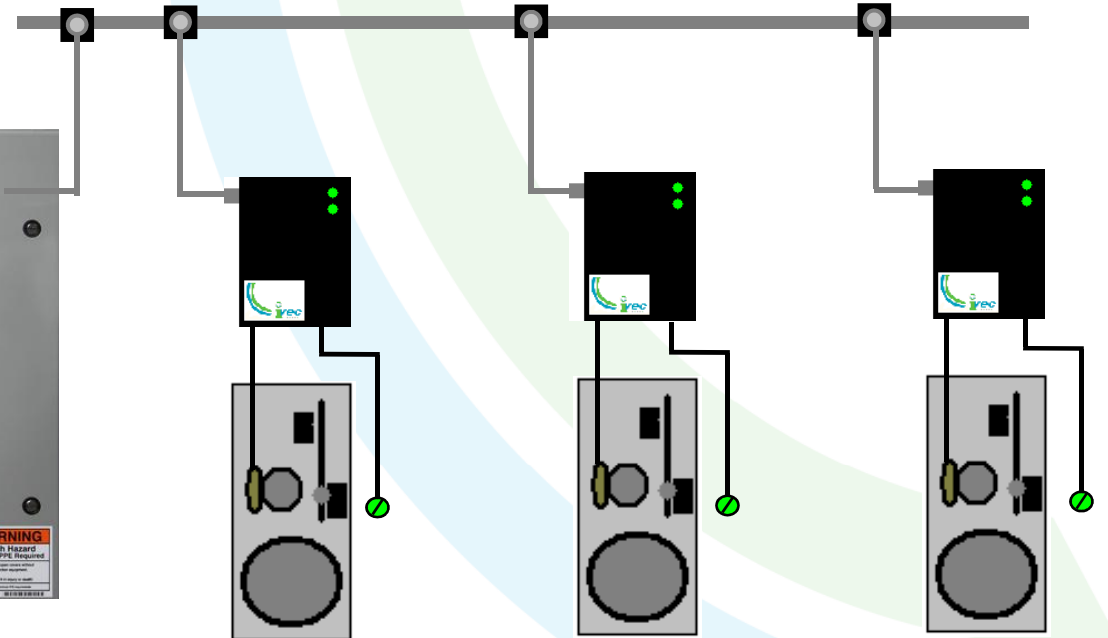
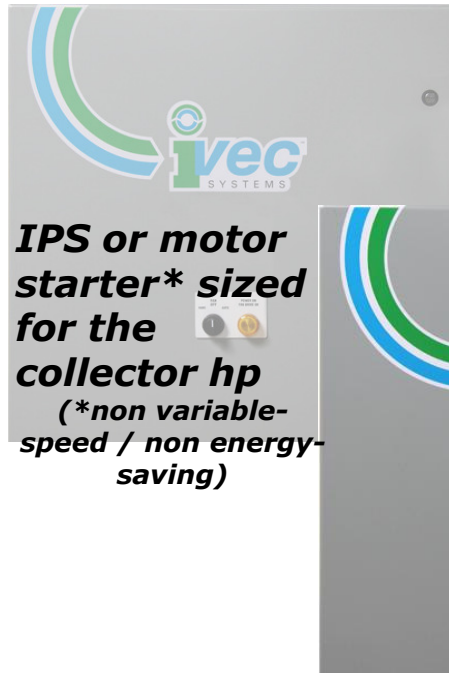


An Intelligent Panel System must have:

- UL 508A NEMA12 Control Panel
 - Intelligent Variable Speed Control package
- Input Fusing
 - UL Compliant for SCCR, eases integration into facility arc-flash compliance program
- 0-Speed Output (with Delay)
 - Can be used for Sequential Timer Interlock; off-line cleaning
- Termination Diagram
 - Simple, Error-free commissioning
- Remote Run Input
 - Start/Stop collector from remote locations at breaks, shift-changes, etc.
- ModbusRTU Comms (slave/client) or other Industrial Protocol
- Scalability to upgrade to Advanced Systems



The Steward System



- **Trunk Line**
 - 4 conductor Flat Cable
- **Taps**
 - Rugged Quick Connect Component and Trunk Line securing method
- **Drops**
 - Industrial Quick Connect Cables
- **Nodes**
 - Intelligent Connections between Gate and Controller



Major Advantages

- Capability
- Control Options
- Flexibility
- Monitoring Capacities
- Data Acquisition
- Scalability
- Adaptable To Existing Systems
- Simple Trouble-Shooting
- Lower Cost Of Ownership
- Exceed Latest Electrical Standards



Major Advantages of Ventilation Energy Control Equipment

***Large volumes extracted but only
when required***

Pay only for effective work time

Savings in:

-heated air

-electrical consumption

Fully automatic system

***Reduce size of the system, fan and
filter***

Better environment

-Reduce sound

-Extraction more effective



Sophisticated systems features

...

- Auto start/stop of fan or filter via a variety of sensors or switches
- Network wiring for improved installation and expansion characteristics
- Real time component status and energy consumption reports
- Remote access operation and diagnostics with visibility into the PLC, the VFD and the network
- Filter monitoring
- Filter cleaning



The best features of all ...

Control systems are

- Appropriate for new equipment
- Adaptable to existing equipment

(Retrofit)



RESULTS!

See additional handouts



Multiple Applications

Woodshops

Welding schools

Mist collection

Machining

Metal working

Vehicle Exhaust

Dust collection



Return On Investment

SAVINGS ANALYSIS – 20 HP

Motor Name Plate HP X 74.7% = KW 20 HP = 14.94 KW

KW X Annual Hours = kWh

14.94 X 4176 hours (Based on (2) 8 hour shifts per day, 5 days/wk = 261 working days/year) = 62,389 kWh

kWh X Cost of Electricity = Energy Cost 62,389 X \$0.10 = \$6,238.90 annual energy cost

50% Reduction of CFM = 87.5% Energy Savings

\$6,238.90 x 87.5% Energy Savings = \$5,459.04

Annual operating cost = \$779.86

ROI = 1 Year

**Emphasizing Total
Cost of Ownership!**





Fan Operation Savings

Fan Motor Horsepower	Annual Cost of Operation (100% load @\$0.10/KWh, 2 shifts per day, 261 days)	Net Annual Cost of Operation At 50% CFM With Ivec System	Savings @ 50% CFM requirement
5 HP	\$1,558.00	\$195.00	\$1,363.00
10 HP	\$3,119.00	\$390.00	\$2,729.00
15 HP	\$4,677.00	\$585.00	\$4,092.00
20 HP	\$6,222.00	\$778.00	\$5,444.00
25 HP	\$7,797.00	\$975.00	\$6,822.00
30 HP	\$9,358.00	\$1,169.00	\$8,189.00
40 HP	\$12,478.00	\$1,560.00	\$10,918.00
50 HP	\$15,597.00	\$1,950.00	\$13,647.00
100 HP	\$31,195.00	\$3,900.00	\$27,295.00
150 HP	\$46,792.00	\$5,849.00	\$40,943.00
200 HP	\$62,389.00	\$7,799.00	\$54,590.00
>200HP			



An Outstanding Feature ... ENERGY INCENTIVES

**YOUR
ENERGY
SAVINGS**

Your Energy Savings Program



DTE Energy

***Variable Frequency Drives
NEMA Premium Motors
Exhaust Heat Recovery***



***Shared Savings Proposal for
Dust Control System with
Intelligent Controls***



Shared Savings Proposal
Estimated Financial, Energy and Environmental Impacts
Dust Control System with VFDS 08/2009
Financial Impacts
Utility Bill Impact and Additional Savings

Contract Amount	\$109,000.00	Annual Energy Saving	\$44,687.94
Contract Term	60 Months	Annual Additional Savings	\$6,703.18
Administration Fee	0.00 %	Annual Savings With Proposal	\$51,391.12
Monthly Payment	\$1,816.66	Annual Payment	\$21,799.92
Monthly Savings	\$4,282.59	Annual Savings Less Annual Payment	\$29,591.20
Anticipated monthly cash flow	\$2,465.93	Annual Savings After Contract Term	\$51,391.12
		Simple Payback	2.1 Yrs

Customer Savings	Annual Savings	5 Years of Savings	10 Years of Savings	Savings over Equipment Life (15 years)
Electric	\$44,687.94	\$223,439.70	\$446,879.40	\$670,319.10
Gas	\$0.00	\$0.00	\$0.00	\$0.00
Additional Savings	\$6,703.18	\$33,515.90	\$67,031.80	\$100,547.70
Total Savings	\$51,391.12	\$256,955.60	\$513,911.20	\$770,866.80



Environmental Impacts

Emissions Reduced	Annual Savings:			Equipment Lifetime Savings:			
	Equipment Description	Pounds of CO ₂	Pounds of SO ₂	Pounds of NO _x	Estimated Equipment Life	Pounds of CO ₂	Pounds of SO ₂
Plant 5 100 HP Dust Collection System. These are the final numbers	138,855	397	339	15 Yrs	2,082,829	5,953	5,081
Plant 3 100 HP Dust Collection System THIS IS ONLY AN ESTIMATE AT THIS POINT. PROJECT NEEDS TO BE IMPLEMENTED FOR POST METERING TO .	430,401	1,230	1,050	15 Yrs	6,456,010	18,451	15,750
Plant 3 150 HP Dust Collection System THIS IS ONLY AN ESTIMATE UNTIL POST METERING IS PREFORMED.	661,249	1,890	1,613	15 Yrs	9,918,728	28,348	24,197
Total	1,230,504	3,517	3,002		18,457,567	52,751	45,027



Savings

\$4,679,208 in 2007

\$7,413,737 new in 2008

\$9,975,842 new in 2009

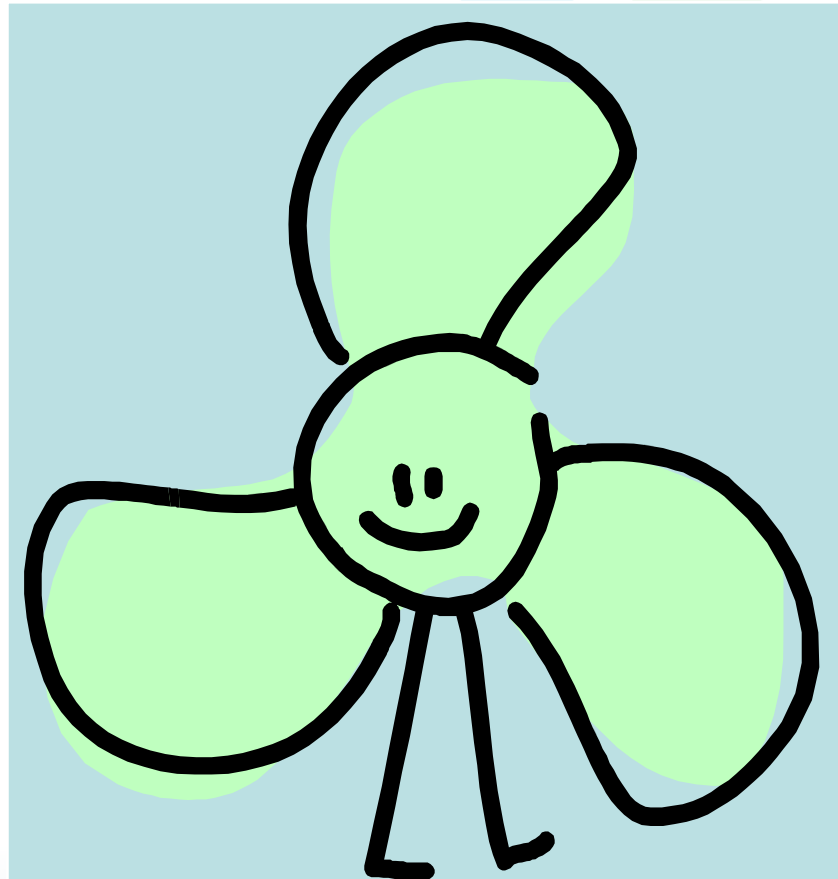
Combined savings to date

\$38,840,940

(Assuming 8 hour shift, 5 days per week, \$0.09/kWH as of January,2010)



ivec™ creates happy fans!



ACTION NOW!

Do you have dust or particulate collection systems in your facility?

Are they running at full speed all the time?

Are they running when not needed?
(breaks,lunch,between shifts, off hours)

