



Metal Fabrication and Machining Best Practices for Compressed Air Systems

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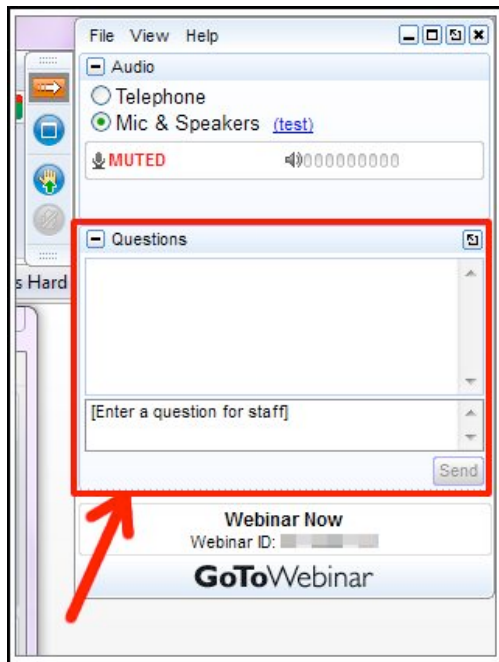


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COMPRESSED AIR BEST PRACTICES

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Q&A Format



- Panelists will answer your questions during the Q&A session at the end of the Webinar.
- Please post your questions in the Questions Window on your GoToWebinar interface.
- Direct all questions to Clinton Shaffer, Associate Editor, Compressed Air Best Practices® Magazine.
- Any questions that go unanswered will be addressed personally with an email after the session.

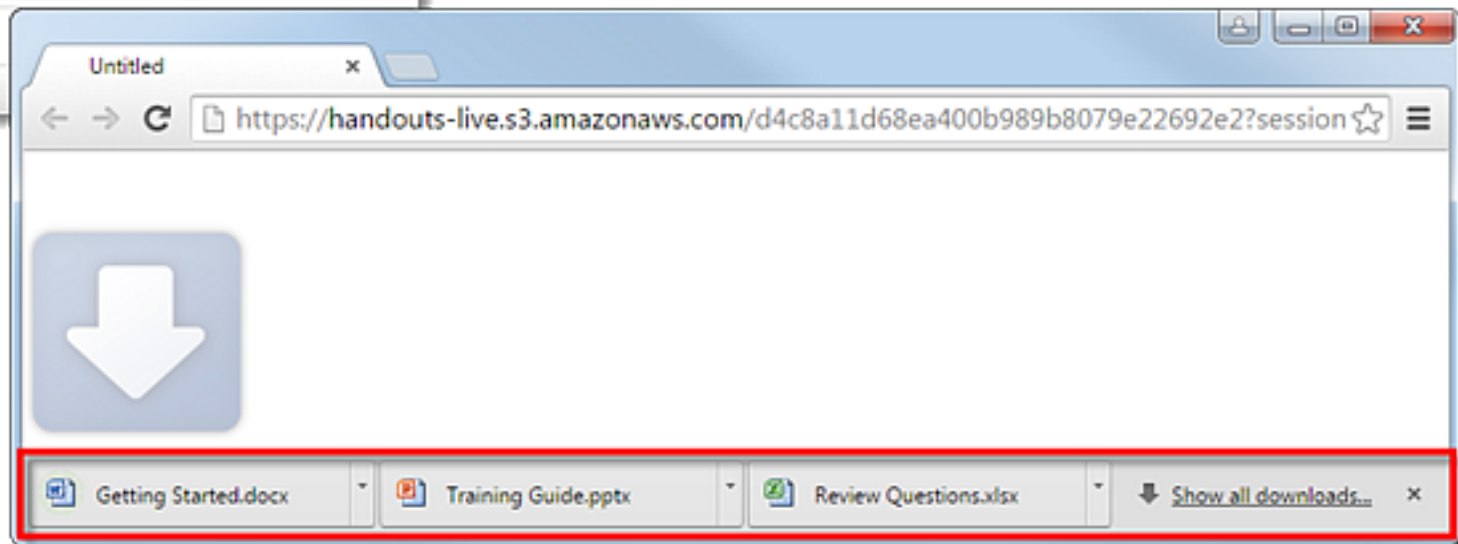
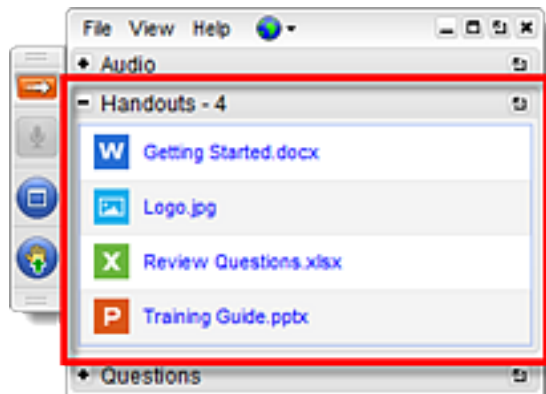
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Handouts





Metal Fabrication and Machining Best Practices for Compressed Air Systems

Introduction by Rod Smith, Publisher,
Compressed Air Best Practices® Magazine

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About the Speaker



Andy Poplin, Corporate Sales Manager,
Atlas Machine and Supply, Inc.

- Graduated from The University of Kentucky with a BSME degree
- Involved in virtually every aspect of the compressed air industry since 1990
- 5 years as an R&D and project engineer
- 5 years as an Outside Sales Engineer for a distributor
- 10 years as an independent air auditor and developer of compressed air automation solutions

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Objectives

Demonstrate Successful Energy Project

❖ Demand Side

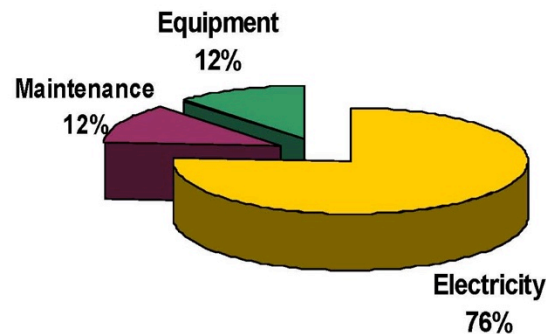
- ❖ Air leaks
- ❖ Inappropriate use of compressed air
- ❖ Excessive pressure

❖ Supply Side

- ❖ Modulation elimination
- ❖ Master system controller

Total Cost of Ownership

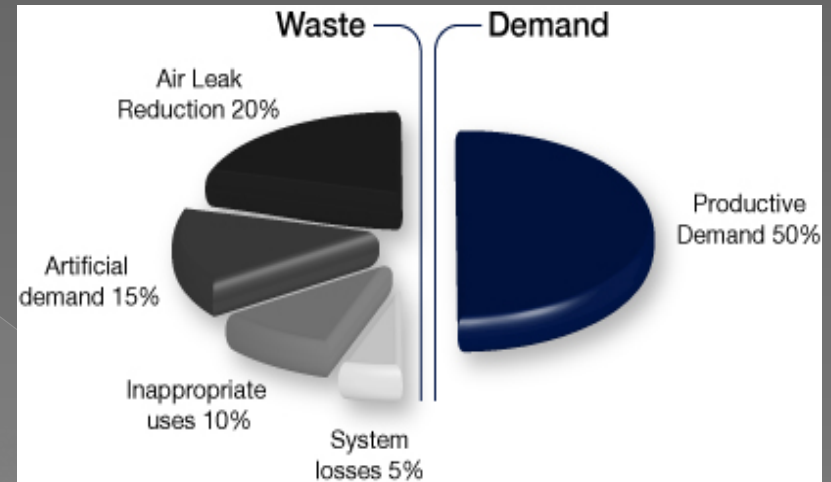
Compressed Air System Operating Costs over 10 Years



Source: U.S.
Department of Energy

Realistic Goals

- Reduce Electrical Costs by 15 to 50%
- Reduce Maintenance Costs by 10 to 60%



Slide taken from US Department of Energy Compressed Air Challenge

Demand Side Opportunities

- ❖ Air leaks
- ❖ Inappropriate use of compressed air
- ❖ Excessive pressure

Demand Side

AIR LEAKS



Where are the energy savings???

AIR LEAKS

Pressure	1/64"	1/32"	1/16"	1/8"	1/4"	3/8"
70 PSIG	\$ 25	\$ 100	\$ 400	\$ 1,574	\$ 6,185	\$ 14,080
80 PSIG	\$ 28	\$ 112	\$ 447	\$ 1,765	\$ 6,990	\$ 15,510
90 PSIG	\$ 31	\$ 124	\$ 495	\$ 1,975	\$ 7,855	\$ 17,477
100 PSIG	\$ 35	\$ 136	\$ 546	\$ 2,165	\$ 8,676	\$ 19,398

NOTE: YEARLY LEAKAGE COSTS BASED ON \$ 0.05 PER KW-HOUR

Did You Know?

A \$ 100 PER YEAR LEAK
CANNOT BE HEARD

A \$ 400 PER YEAR LEAK
CAN BE FELT ONLY

A \$ 700 PER YEAR LEAK
CAN BE FELT AND HEARD

Demand Side

Ahresty Air leaks

Savings Opportunity-

Wasted SCFM:	380
Wasted Energy:	661,200 kW-Hrs/Yr
Wasted Money:	\$ 49,590.00

Actual Savings (50%)-

Conserved SCFM:	190
Conserved Energy:	330,600 kW-Hrs/Yr
Conserved Money:	\$ 24,795.00

Inappropriate Uses of Compressed Air



We will discuss what to look for in your plant when identifying inappropriate uses of compressed air. Below is a list of inappropriate uses of compressed air and a recommended alternative.

VENTURI VACUUM PUMPS

- ELECTRIC MOTOR DRIVEN PUMPS ARE MORE EFFICIENT

AIR DIAPHRAGM PUMPS

- UNLESS IN HAZARDOUS LOCATION ELECTRIC MOTOR DRIVEN PUMP IS A BETTER CHOICE

PERSONAL COOLING

- FANS OR BLOWERS ARE MUCH MORE EFFICIENT

LARGE ELECTRICAL ENCLOSURE COOLING

- REFRIGERATION TYPE COOLERS ARE FAR MORE ENERGY EFFICIENT

PARTS CLEANING AND COOLING

- ENGINEERED NOZZLES CAN REDUCE AIR CONSUMPTION 3 TO 6 TIMES
- HIGH VELOCITY BLOWERS ARE 10 TIMES MORE EFFICIENT

LOW PRESSURE BLOWING

- TYPICALLY 25 PSIG OR LESS
- RECOMMEND BLOWERS

SPARGING

- AERATING, AGITATING, OXYGENATING OR PERCOLATING FLUIDS CAN BE ACCOMPLISHED MORE EFFICIENTLY USING HIGH PRESSURE BLOWERS

Demand Side

Ahresty Electrical Enclosure Cooling

Savings Opportunity-

Wasted SCFM: 80
Wasted Energy: 139,400 kW-Hrs/Yr
Wasted Money: \$ 10,440.00

Actual Savings (100%)-

Conserved SCFM: 80
Conserved Energy: 139,400 kW-Hrs/Yr
Conserved Money: \$ 10,440.00



Demand Side

Ahresty Venturi Vacuum Pumps

Savings Opportunity-

Wasted SCFM: 60

Wasted Energy: 104,400 kW-Hrs/Yr

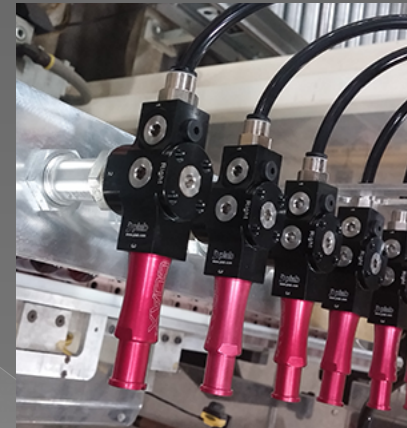
Wasted Money: \$ 7,830.00

Actual Savings (82%)-

Conserved SCFM: 50

Conserved Energy: 85,608 kW-Hrs/Yr

Conserved Money: \$ 6,500.00



Demand Side

Ahresty Parts Drying

Savings Opportunity-

Wasted SCFM: 90

Wasted Energy: 156,600 kW-Hrs/Yr

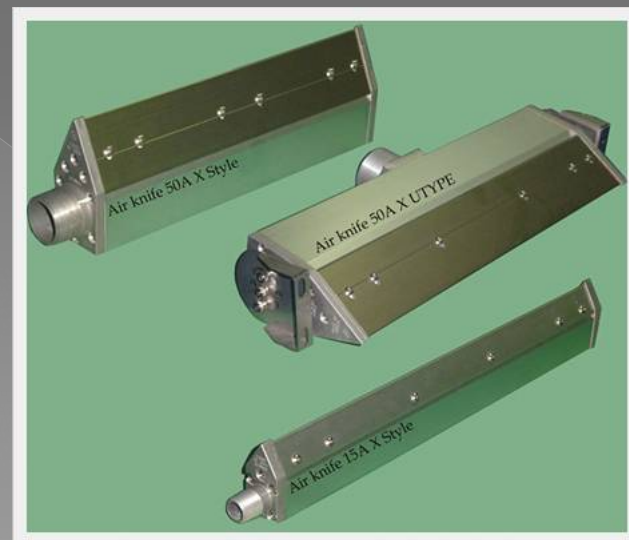
Wasted Money: \$ 11,745.00

Actual Savings (100%)-

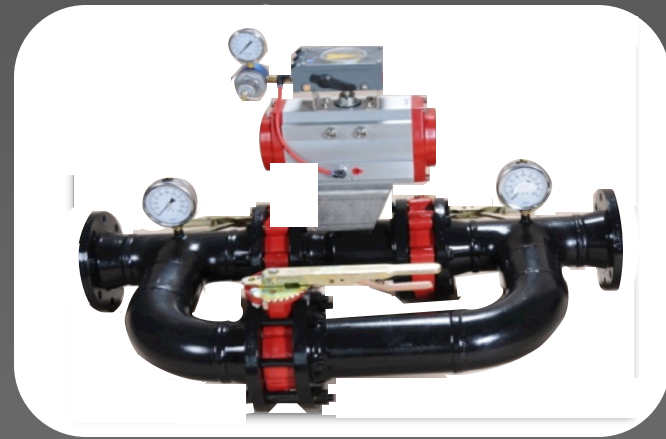
Conserved SCFM: 90

Conserved Energy: 156,600 kW-Hrs/Yr

Conserved Money: \$ 11,745.00



Flow Control Valve



Typically installed downstream of primary dry receiver tank

Originally developed to improve leak management programs

Maintain plant pressure header at +/- 2 psig

Can be used as back pressure controllers

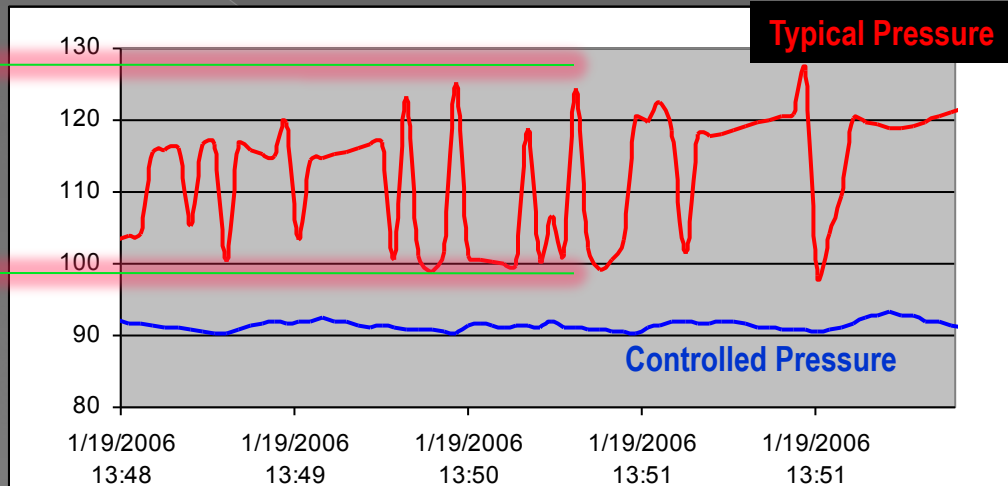
Allows plant to operate at lowest possible pressure

Very effective tool for "load shaping" or "peak shaving"

Diaphragm, butterfly or V-notch valves

EXCESSIVE PRESSURE

ARTIFICIAL
DEMAND



AS PREVIOUSLY MENTIONED 25 PSIG = 12.5% KW

WHEN STABILIZED, PRESSURE CAN USUALLY BE LOWERED BELOW EXISTING MINIMUM

POOR PIPING DESIGN AND PLANT LAYOUT TYPICALLY LEAD TO HIGHER THAN NECESSARY PRESSURES

LOOPED PIPING AND STORAGE USUALLY HELPS TO STABILIZE PRESSURE

POORLY MAINTAINED COMPRESSORS, DRYERS AND FILTERS WILL ALWAYS LEAD TO EXCESSIVELY HIGH DISCHARGE PRESSURES

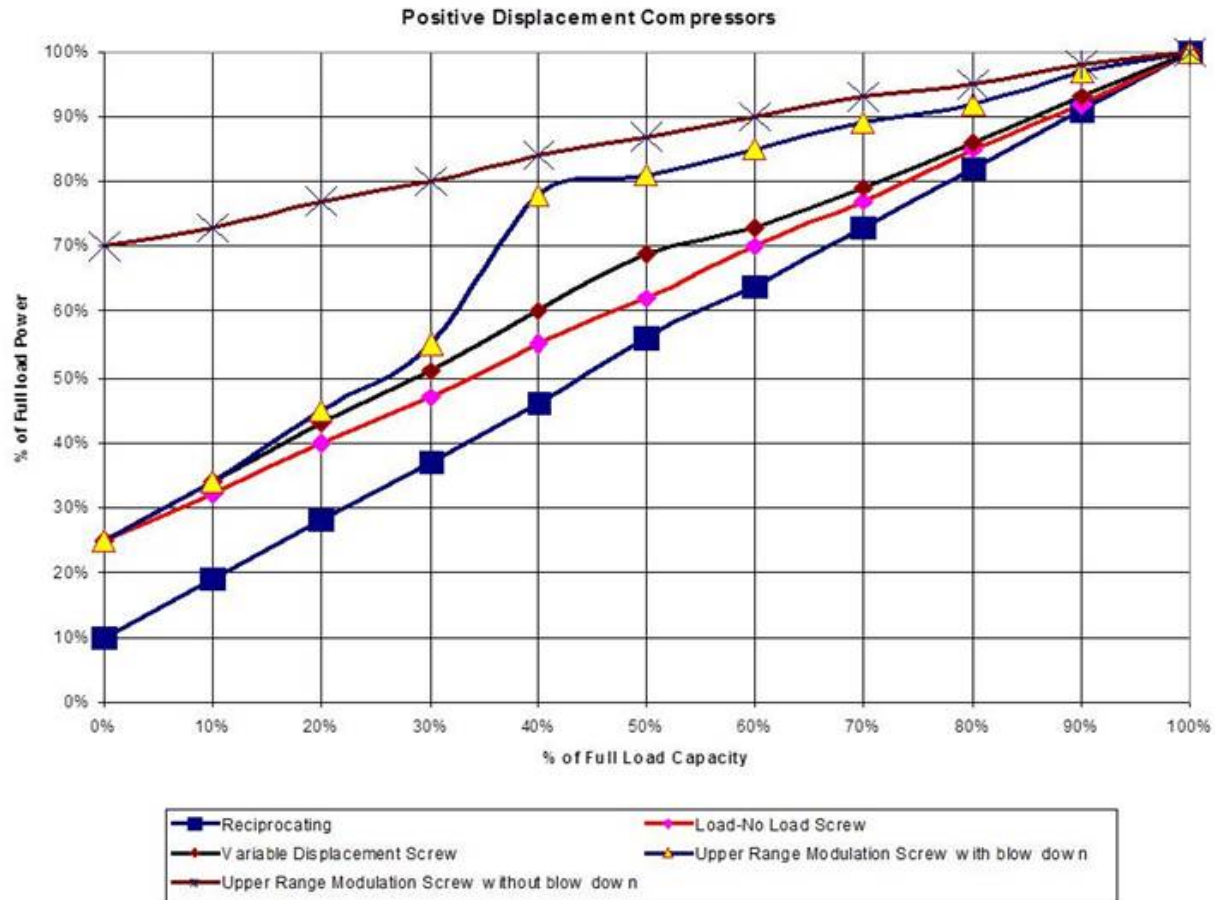
Supply Side Opportunities

❑ Average compressed air consumption:	7,275 cfm
❑ Maximum compressed air capacity:	10,700 cfm
❑ Average power consumption:	1,641 kW
❑ Average system efficiency:	4.4 cfm/kW
❑ Average number of running compressors:	14

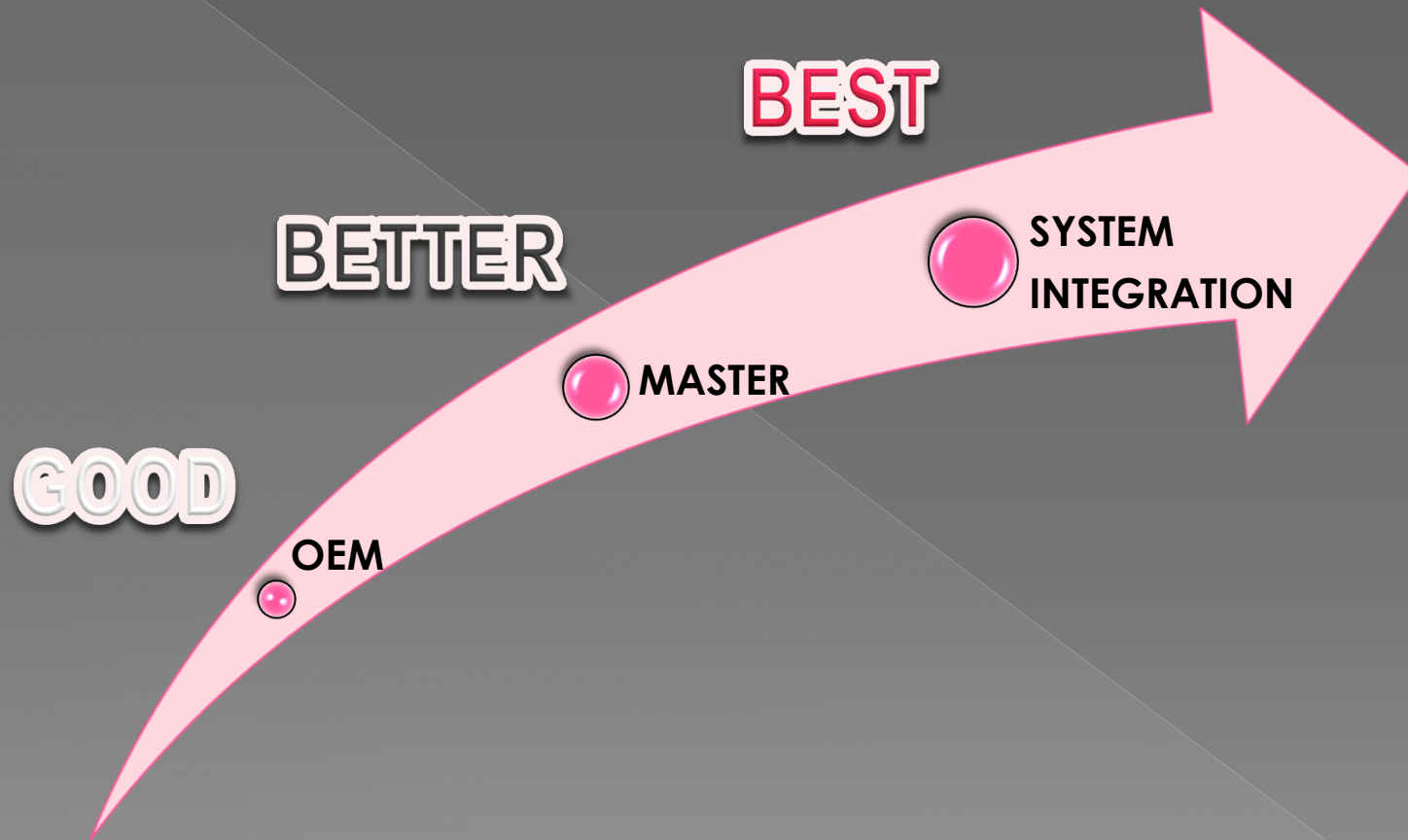
Corrective Action

- ✓ Eliminated all inlet modulation
- ✓ Installed air management system
- ✓ Installed flow controller for “peak shaving” and pressure control
- ✓ Implemented Base/Trim control strategy
- ✓ Installed 6,000 gallons of additional receiver capacity

Compressor Performance Curves



CONTROL SOLUTION TYPES



MASTER SEQUENCER

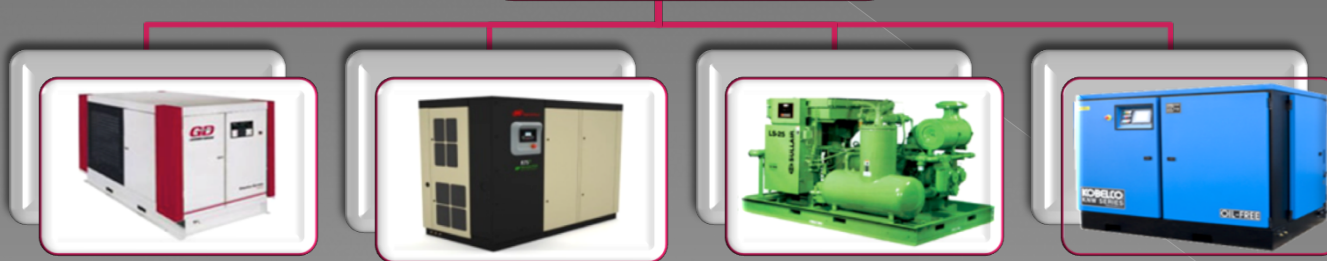
PROS

- NOT BRAND SPECIFIC
- BETTER PRODUCT SUPPORT
- CAN QUOTE TO PLANT PLC STANDARD
- UNLIMITED COMMUNICATION OPTIONS
- QUICKER ROI

CONS

- MORE EXPENSIVE
- MORE INVOLVED INSTALLATION

Master Sequencer



INTEGRATION PACKAGE

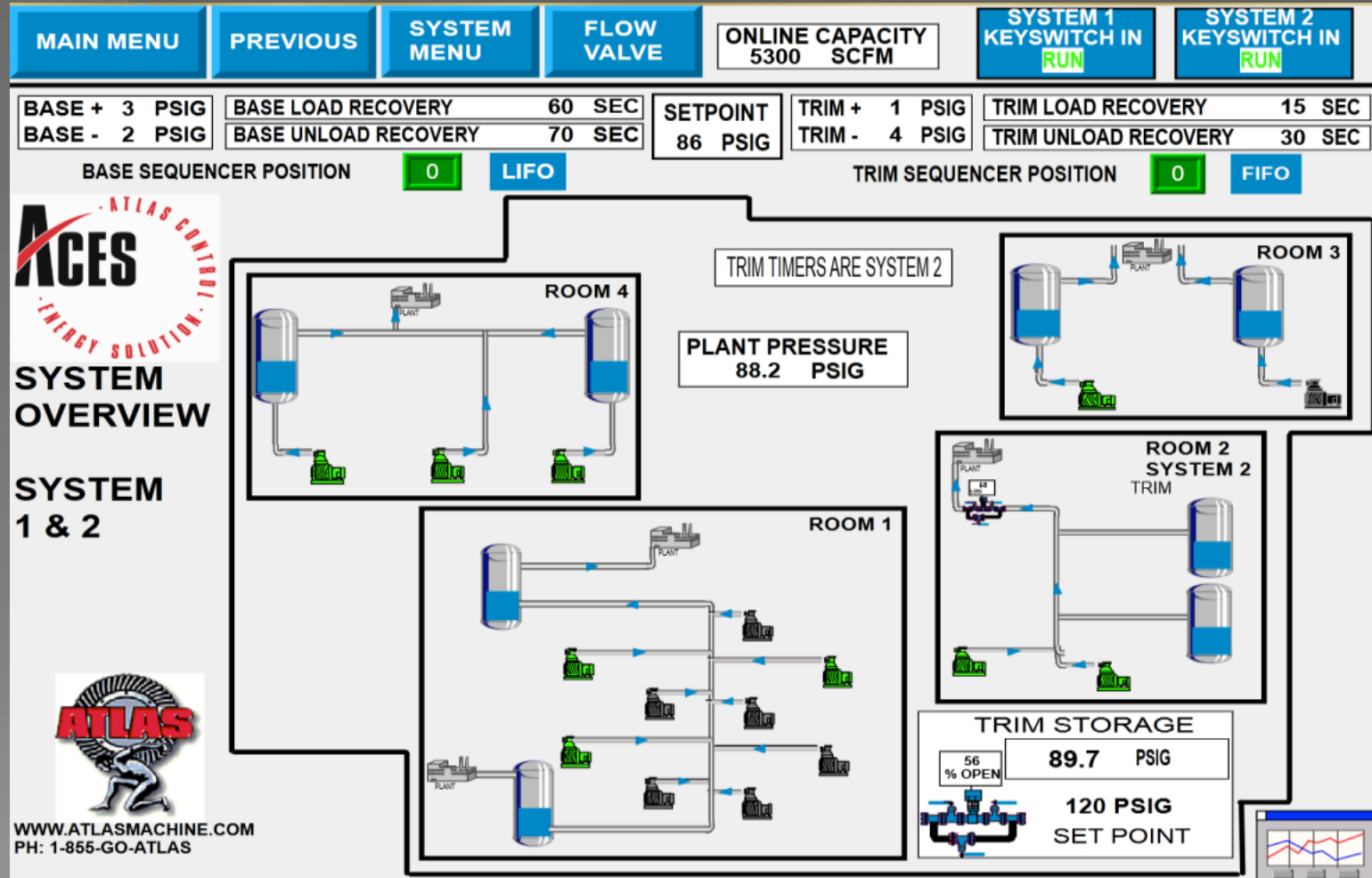
PROS

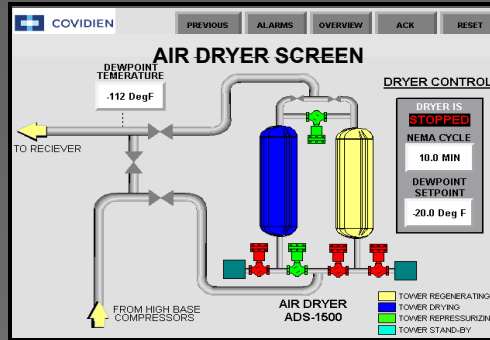
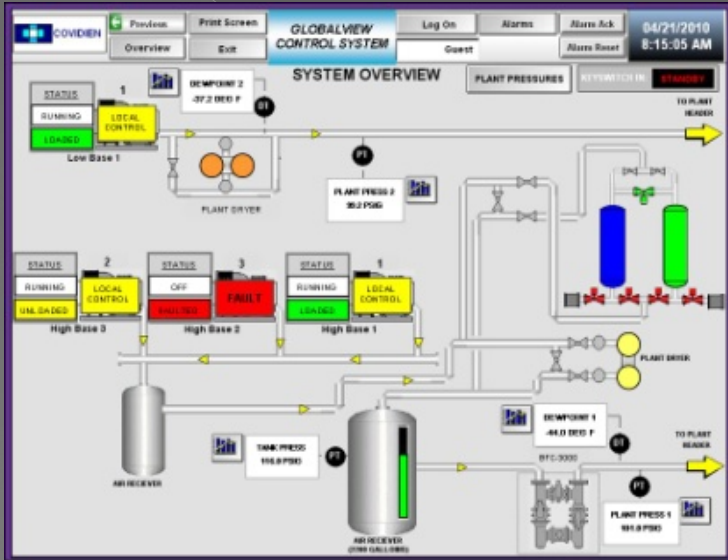
- NOT BRAND SPECIFIC
- BETTER PRODUCT SUPPORT
- HIGHLY SOPHISTICATED SOLUTION
- UNLIMITED COMMUNICATION OPTIONS
- HISTORICAL TRENDING FOR MAINTENANCE AND ENERGY MANAGEMENT

CONS

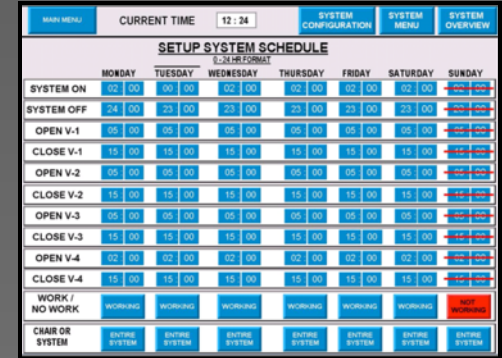
- MORE EXPENSIVE
- FEWER VENDORS TO CHOOSE FROM
- MORE COMPLICATED AND TIME CONSUMING STARTUP

Integration Package

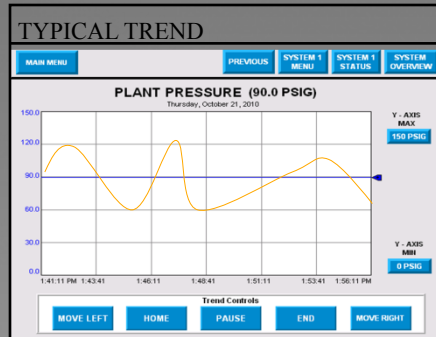




AIR DRYER CONTROL



SYSTEM SCHEDULING



TRENDING

GEMS®		PREVIOUS	ALARMS	OVERVIEW	BACK	RESET
LR M81-2156		Compressor State:		Ready		
Description	Actual	Alarm	Trip	Inputs		
Flow Input	0.0 icfm			Starter Feedback		
System Pressure	95.0 psi			Emergency Stop		
Oil Pressure	23.0 psi	16.0	14.0	Remote Com Air		
Oil Temp (High)	92.0 F	120.0	125.0	Seal Air		
Oil Temp (Low)	92.0 F	85.0	80.0			
Stage1 Temp	71.0 F	120.0	125.0	Outputs		
Stage1 Vib	0.0 Mills	0.0	1.0	Remote		
Stage1 Press	0.0 psi			Trouble		
Stage2 Temp	102.0 F	375.0	380.0	Running Unloaded		
Stage2 Vib	0.0 Mills	0.0	0.0	Prelube		
Stage2 Press	0.0 psi			CRI		
PhaseA Temp	122.0 F	311.0	338.0			
PhaseB Temp	125.0 F	311.0	338.0			
PhaseC Temp	122.0 F	311.0	338.0			
Inboard Temp	111.0 F	194.0	203.0			
Outboard Temp	106.0 F	194.0	203.0			
CT_Input	0.0 A					
Motor Current	0.0 A					
				Outputs		
				Inlet Valve 0.0 %Open		
				Bypass Valve 100.0 %Open		

I-R CENTAC INTEGRATION

Conclusion

Total energy savings:	2,250,000 kW-hrs/year
Supply Side:	1,553,652 kW-hrs/year (69%)
Demand Side:	696,348 kW-hrs/year (31%)
Total cost savings:	\$ 168,750.00/ year
Supply Side:	\$ 116,438.00/ year
Demand Side:	\$ 52,313.00/ year
Energy Rebate:	\$ 75,000.00/year
Number of running compressors:	8

THANK YOU VERY MUCH FOR YOUR TIME !

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About the Speaker



Joe Fecko,
Regional Sales Manager,
BEKO TECHNOLOGIES

- 12 years in the compressed air industry
- Air Master certified with a Mechanical Engineering degree
- Previously worked as technical support, performing compressed air audits and obtaining hundreds of energy rebates
- Currently the Midwest Regional Sales Manager for BEKO TECHNOLOGIES

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Measurement Technology



METPOINT®

precision instruments for compressed air





METPOINT® | Main Menu

General Info

What do you want to
know...





METPOINT® | General Info



The Challenge – Making the invisible visible



METPOINT® | General Info





METPOINT® | General Info



The Challenge – Making the invisible visible in your everyday life



Next up: What do you want to know about your compressed air?



The more complex the systems, the greater the requirements for transparency. Processes become transparent with Instrumentation and monitoring.

What do you want know about your compressed air?

I want to know ...

+

consumption

+

cost of producing compressed air

+

leaks

+

pressure

+

quality

... because

+

costs

+

for planning, calculation and the selection of equipment

+

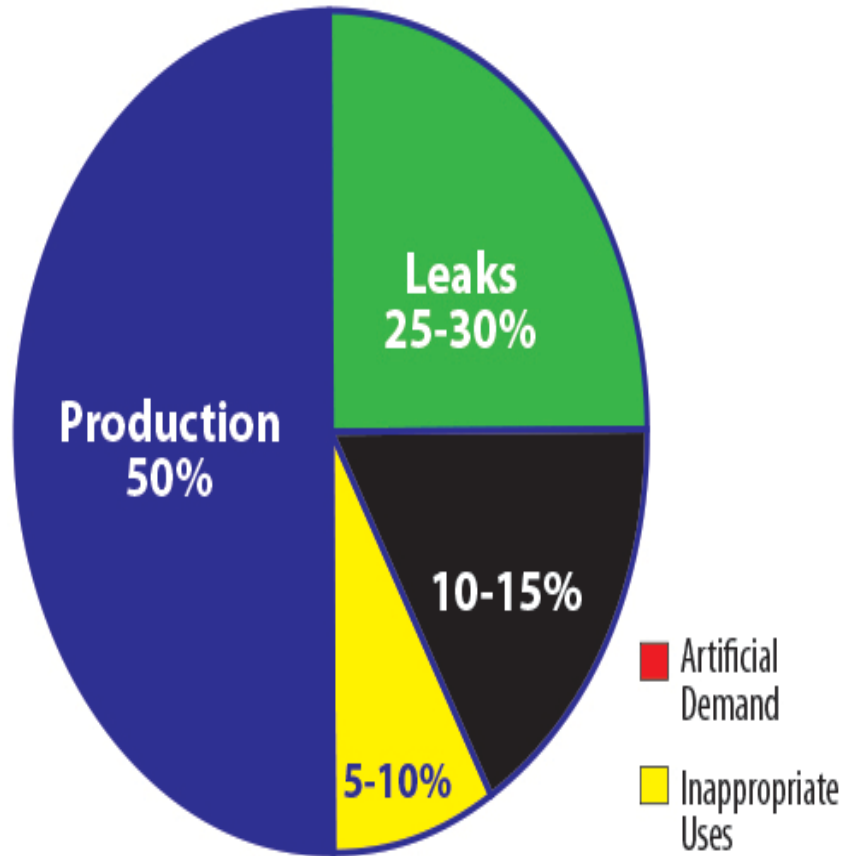
waste of compressed air and money

+

safe and reliable operation of machines

+

product quality, human safety and equipment lifetime



Allows an on-going assessment and measurement of leaks, production increases and inappropriate uses.

What do you want know about your compressed air?

I want to know ...

+

Flow

... because

+

Cost of plant compressed air demand

+

Compressed air leak load & inappropriate uses

+

Future growth potential

+

Compressor controls

+

ACFM vs SCFM

When is the last time you actually checked your tire pressure?



Constant monitoring or periodic check . . . **Which do you prefer?**

What do you want know about your compressed air?

I want to know ...



Pressure

... because



Safe and reliable operation of machines



Pressure drop



Inappropriate operating pressure



Compressor controls



Plant pressure



METPOINT® DPM

Question: **“When do you find out you have a dryer or drain failure?”**

Answer: “When there is water in the pipes...”

...and at that point it's too late.”





METPOINT® OCV

Periodic Check...

Or...

Constant Monitoring!



What do you want know about your compressed air?

I want to know ...



Quality

... because



Pressure dew point/moisture content



Hydrocarbon carry over/oil content



Compressor performance



Production equipment tolerances



Closing





THANK YOU!



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Q&A

Please submit any questions through the Question Window on your GoToWebinar interface, directing them to Clinton Shaffer. Our panelists will do their best to address your questions, and will follow up with you on anything that goes unanswered during this session.

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