4 Ways to Manage Increased Demand

Paul Edwards, Compressed Air Consultants
Keynote Speaker

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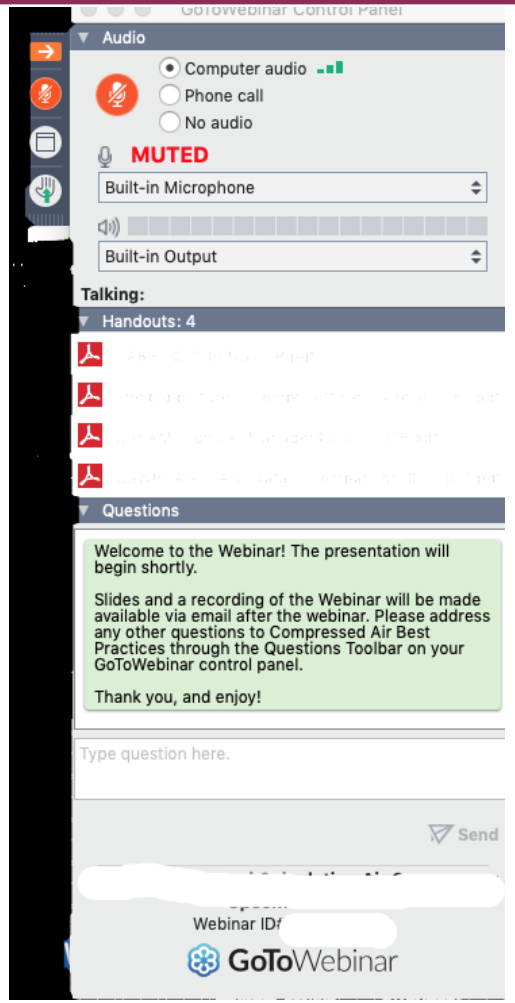

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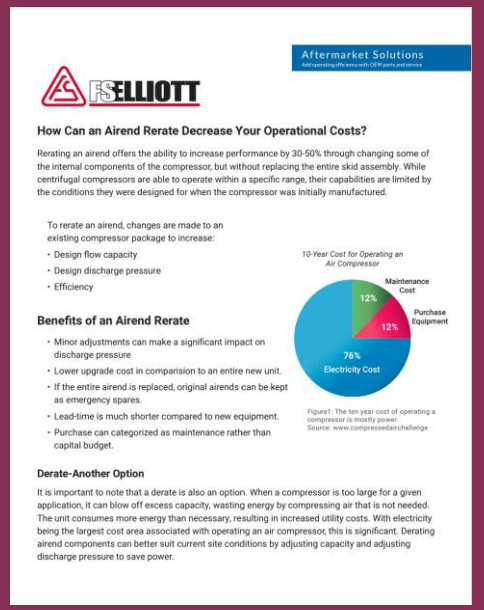
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Aftermarket Solutions
How Can an Airend Rerate Decrease Your Operational Costs?
Benefits of an Airend Rerate
Derate-Another Option
10-Year Cost for Operating an Air Compressor
Maintenance Cost
Purchase Equipment
Electricity Cost
12%
12%
76%


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Sustainable Production
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26 Heat Improves Compressed Air Production Efficiency by 90+%
30 Five Decades of Innovation at Festo USA

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All materials presented are educational. Each system is unique and must be evaluated on its own merits.

4 Ways to Manage Increased Demand

Introduction by

Compressed Air Best Practices® Magazine

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About the Speaker

It's about money, not about air

Paul Edwards
Compressed Air Consultants

- President and Owner, Compressed Air Consultants since 2003
- 39 years of experience in the compressed air industry
- Former Marketing Manager, Product Manager, Ingersoll Rand
- Started up IR's audit business

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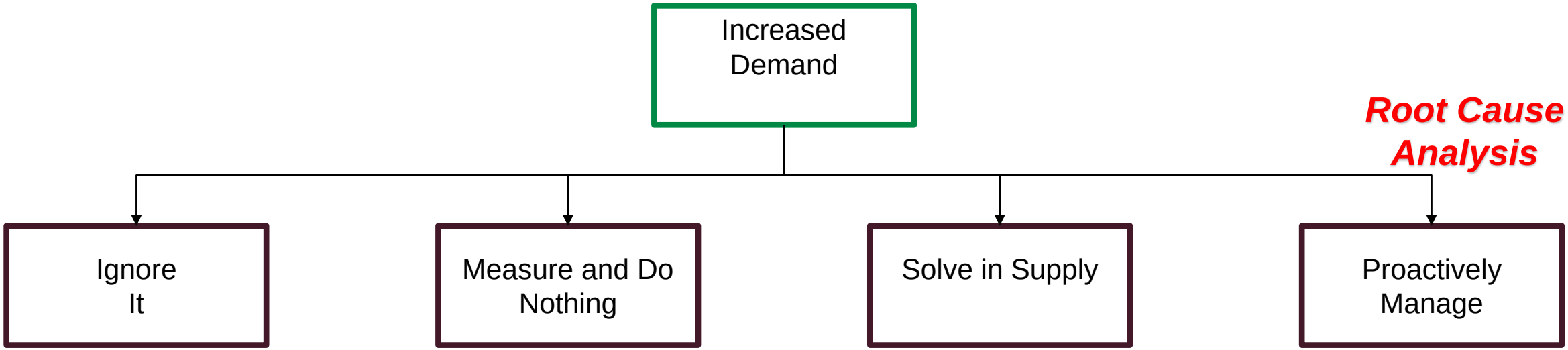
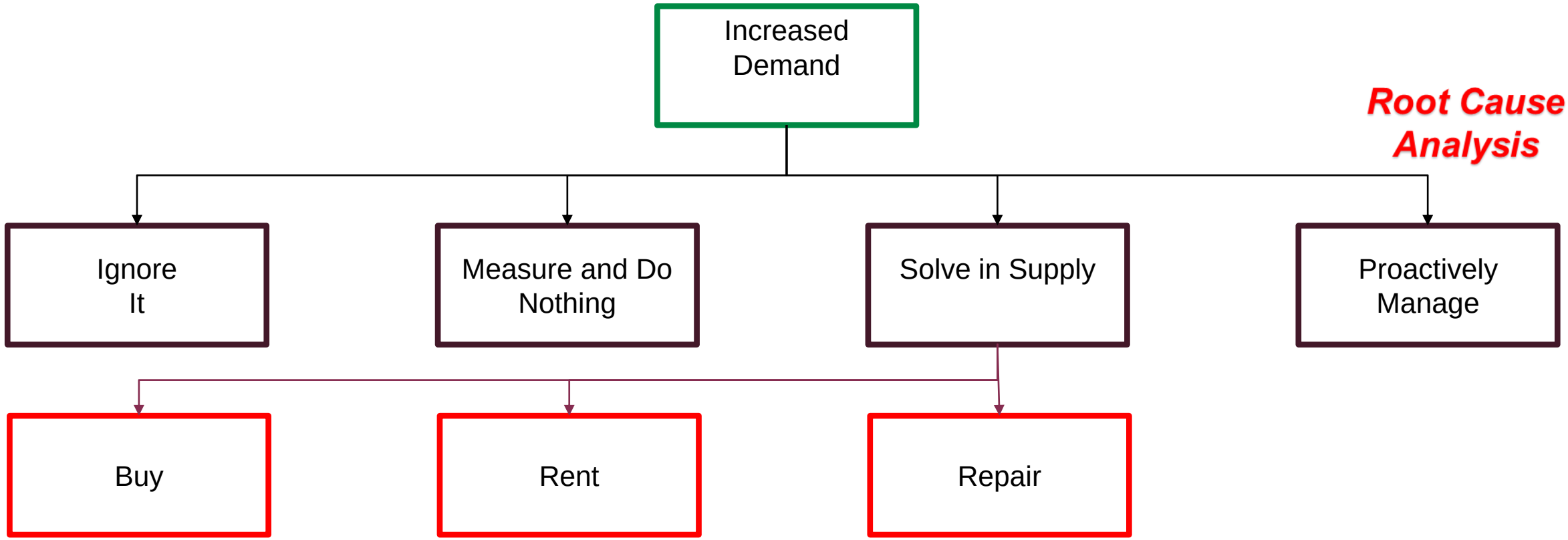
Four Ways to Manage Increased Demand



Four Ways to Manage Increased Demand?



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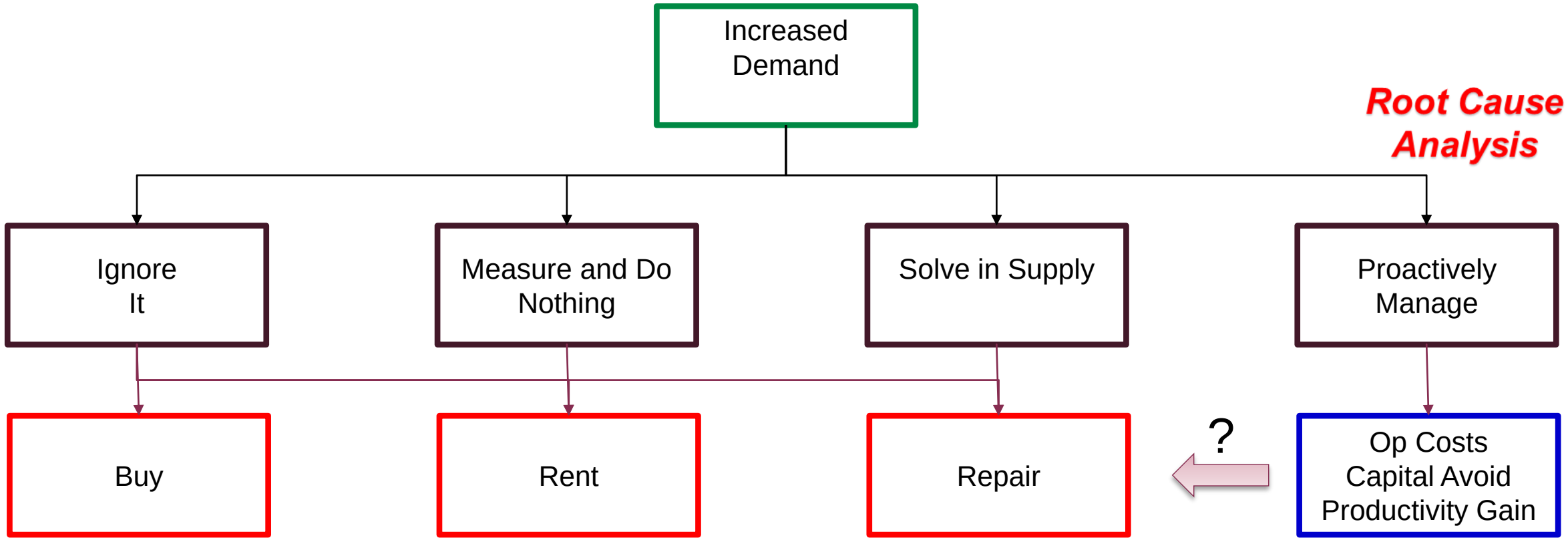
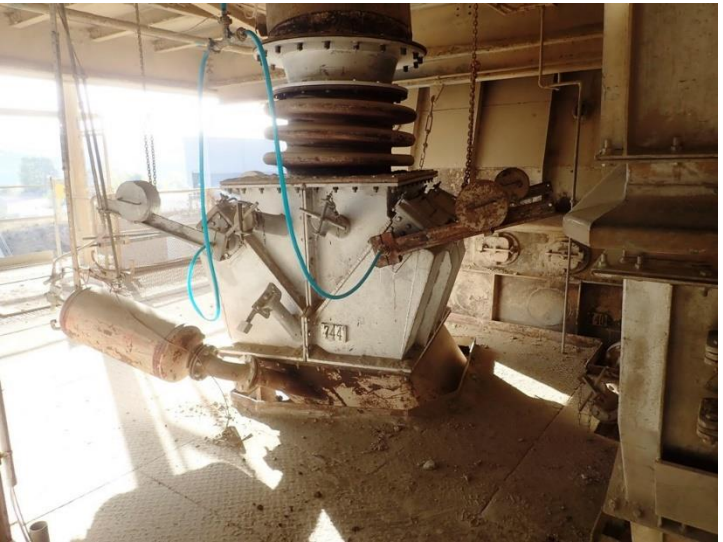


Managing Demand – Compressed Air Challenge

Potentially Inappropriate Uses	Suggested Alternatives/Actions
Clean-up, Drying, Process cooling	Low-pressure blowers, electric fans, brooms, nozzles
Sparging	Low-pressure blowers and mixers
Aspirating, Atomizing	Low-pressure blowers
Padding	Low to medium-pressure blowers
Vacuum generator	Dedicated vacuum pump or central vacuum system
Personnel cooling	Electric fans
Open-tube, compressed air-operated vortex coolers without thermostats	Air-to-air heat exchanger or air conditioner, add thermostats to vortex cooler
Air motor-driven mixer	Electric motor-driven mixer
Air-operated diaphragm pumps	Proper regulator and speed control; electric pump
Idle equipment*	Put an air-stop valve at the compressed air inlet
Abandoned equipment**	Disconnect air supply to equipment

Estimating Reductions

- Measure it -
  - Flowmeter or Pump Down
- Model It
  - Specs + Instrumentation
- Take the Time To Understand/Study It
  - Know What you Don't Know



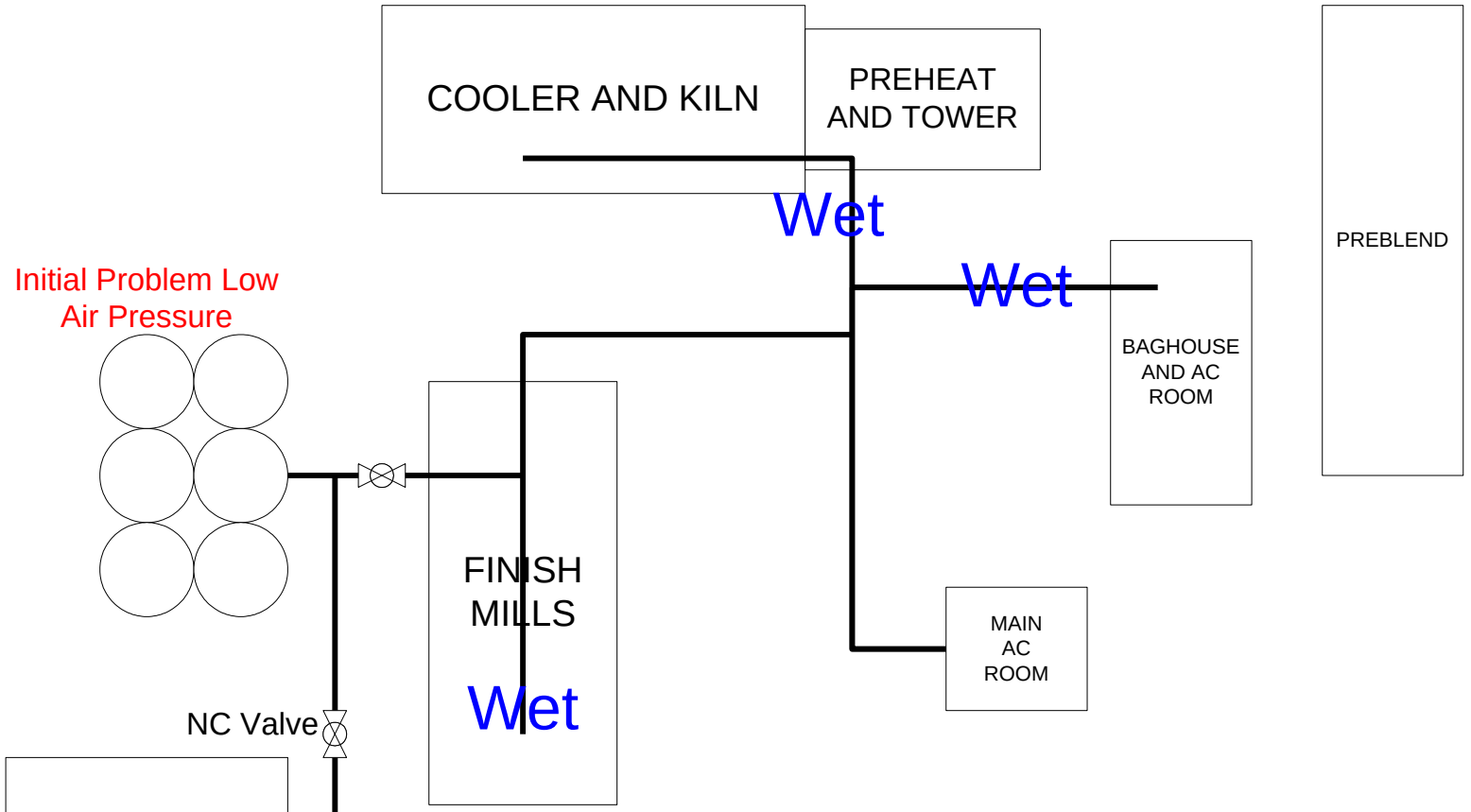
MODEL	REGULATOR SETTING ABOVE PNEUMATIC CONVEYING LINE PRESSURE	
	Class 1 Rotor Clearance	Class 2 Rotor Clearance
MD20, MD40	5 PSIG (14-18 SCFM)	5 PSIG (14-18 SCFM)
MD75, MD139	5 PSIG (14-18 SCFM)	10 PSIG (20-24 SCFM)
MD260, MD400, MD500	5 PSIG (14-18 SCFM)	15 PSIG (25-30 SCFM)

Managing Demand

- Principle 1 – Perform Root Cause Analysis
  - *All Audits ≠*
  - Root Cause Analysis Requires Scope of Work Specific to the System
  - Specific to the System = f(process, plant, people)
- Principle 2 – Reduce Demand
  - Beyond Leaks
- Principle 3 – Spill/Combine Systems when Excess Capacity is Available
- Principle 4 – Familiarity Breeds Blindness
  - A Second Set of Eyes

Principle 1 – Root Cause Analysis (Prescription without Diagnosis…..)

Low Air Pressure is often Misdiagnosed as Insufficient Capacity

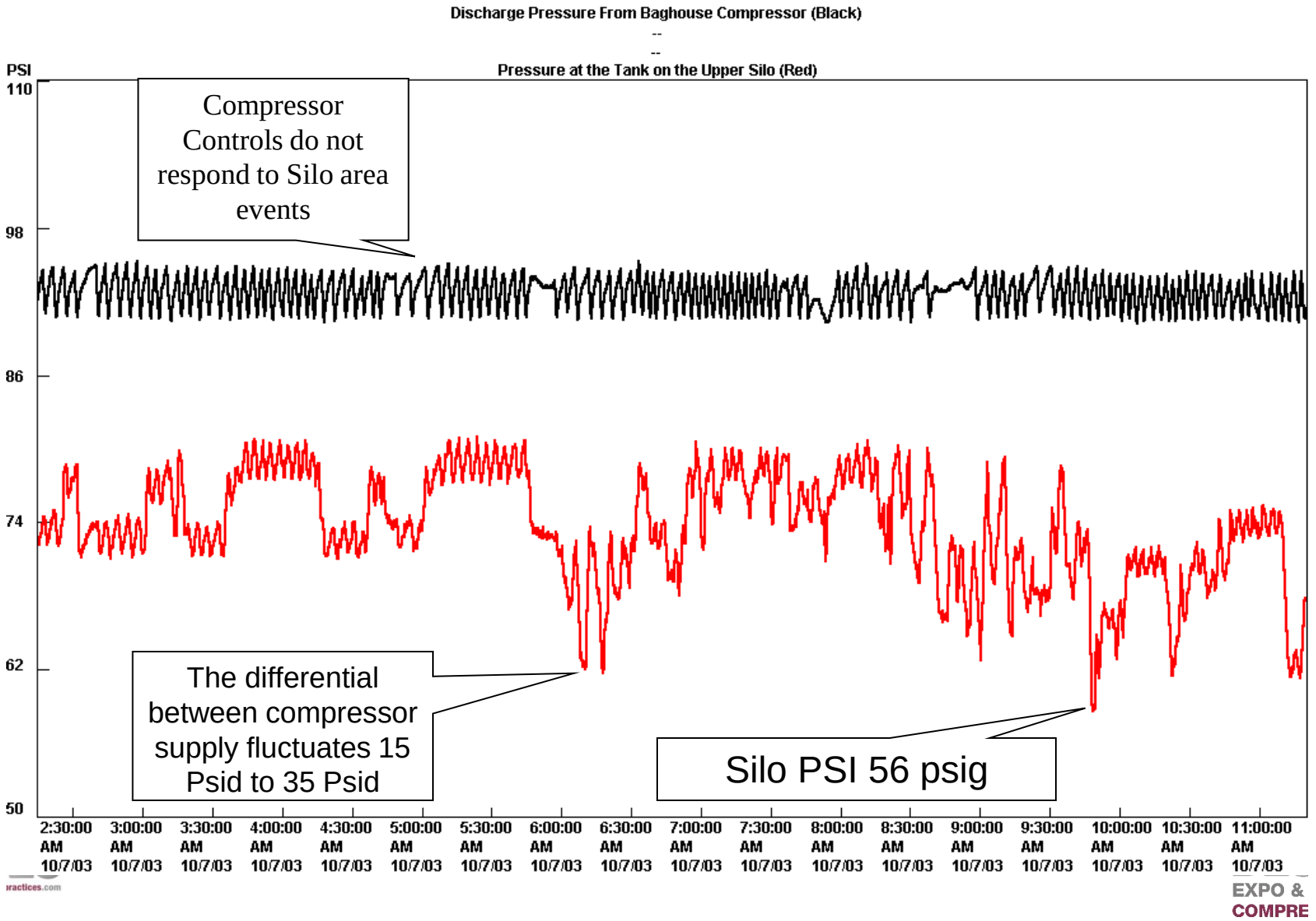


Wet Air Despite Desiccant Dryers

125 psig compressors	88-90 psig Mill Air
:Load Out Silo PSI	78 psig

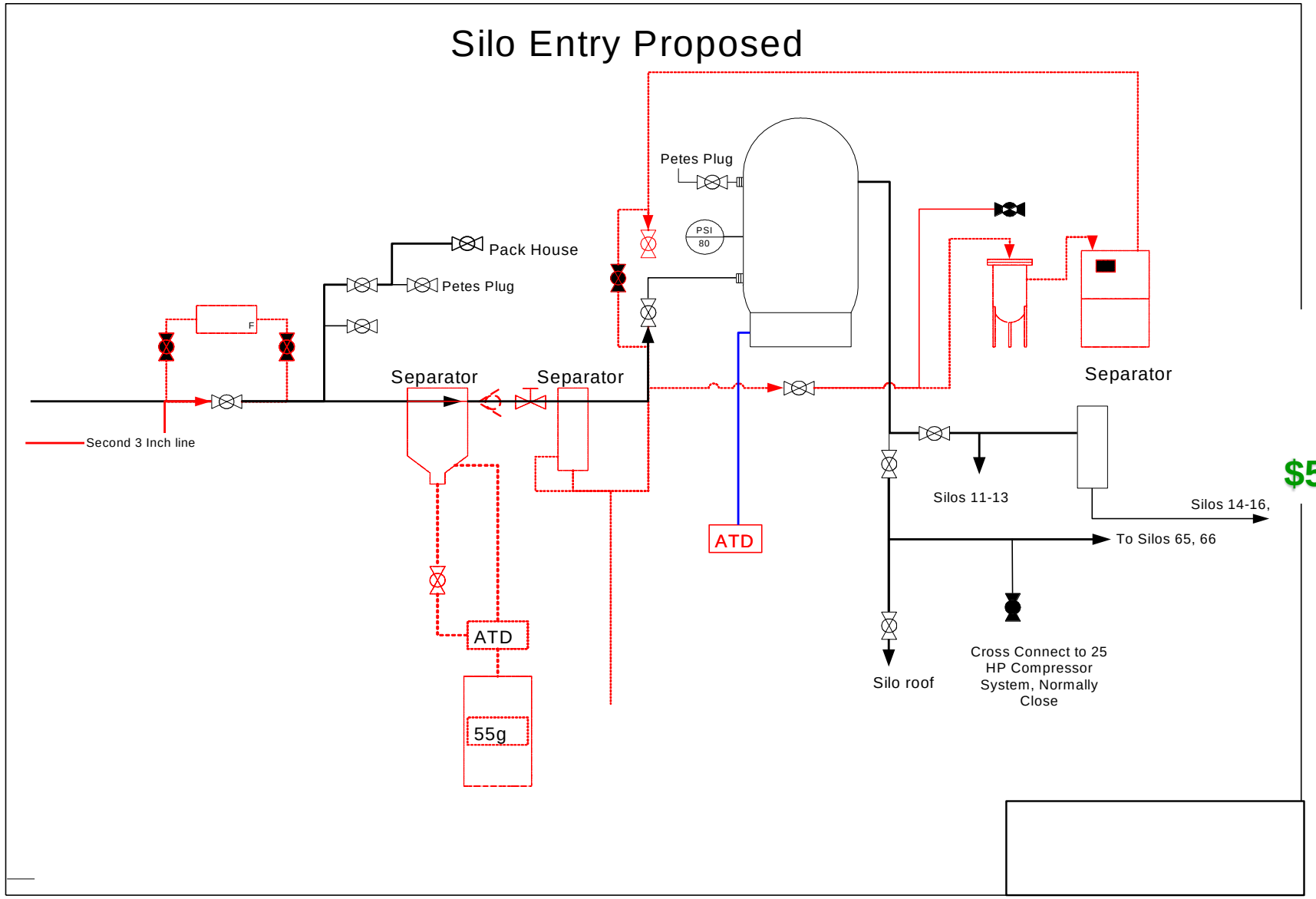
No Back Up for Pack House Air System

Root Cause Analysis – Be Involved in the Scope of Work



The Cost of a Misdiagnosis can be substantial

Capital Costs
$150,000 vs. $3,000



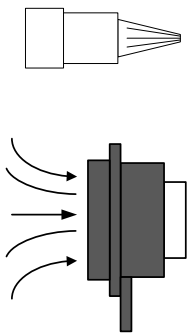
Annual Operating Costs
$50,000 vs. $0

Principle 2 – Reduce Demand, Beyond Leaks

- Leaks are great “Quick Hits” but often not the largest opportunity
- Case History 2 – “Out of Air”
- Did they really need more capacity?

Application	Current	Proposed	Savings
Application 1	1078	0	1078
Application 2	1745	618	1127
Application 3	150	25	125
Application 4	291	50	241
Application 5	249	175	74
Application 6	135	140	-5
Application 7	44	44	0
Application 8	50	50	0
Application 9	50	50	0
Application 10	486	486	0
Application 11	5	0	5
Application 12	963	963	0
Application 13	213	167	46
Application 14	40	20	20
Application 15	127	0	127
Application 16	0	500	-500
Leaks	98	48	50
Total	5723	3336	2388

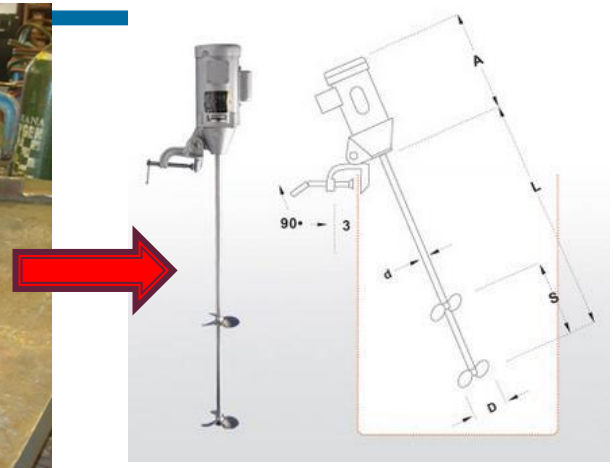
Principle 2 – Demand Reduction, The Usual Suspects



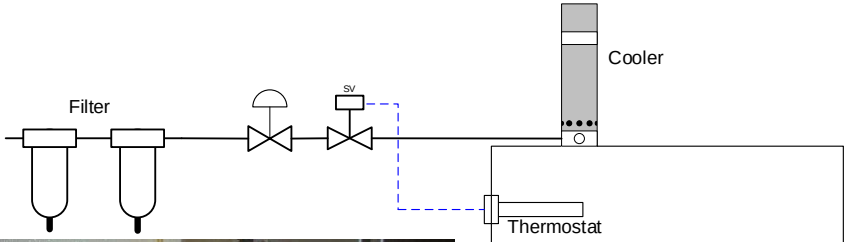
3 HP Ring Type Blower

Blower Type Air Knife

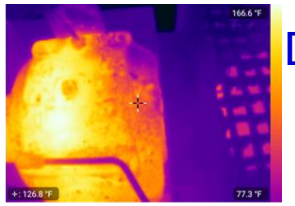
Open Blowing

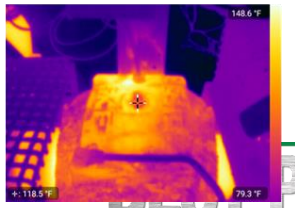


Air Motor Mixers, Corrugated Paper Chile



Panel Coolers

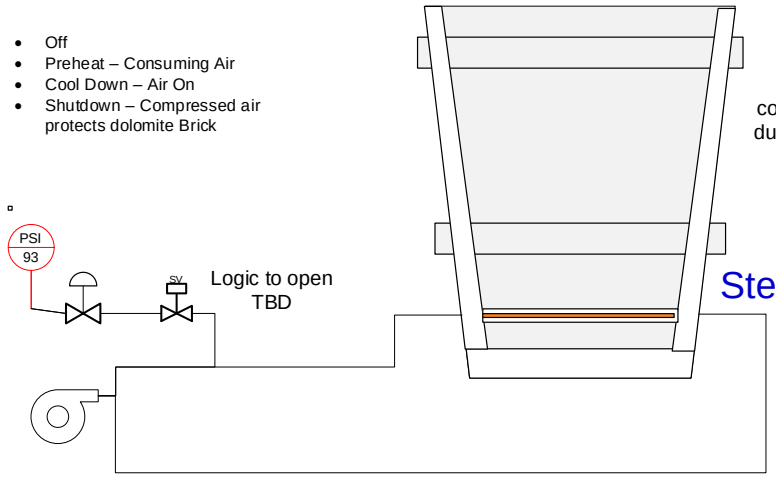




Direct Cooling Cement, Finland

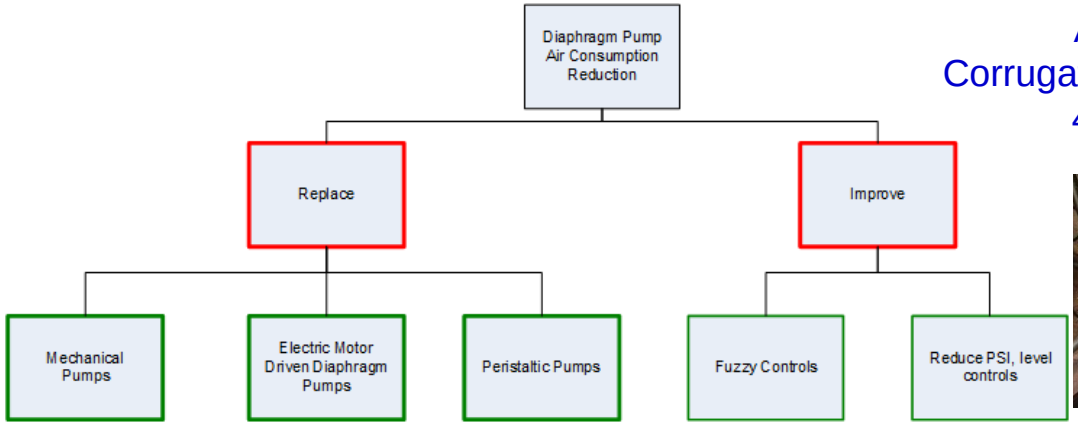
Principle 2 – Demand Reductions, Industry and Site Specific

- Off
- Preheat – Consuming Air
- Cool Down – Air On
- Shutdown – Compressed air protects dolomite Brick

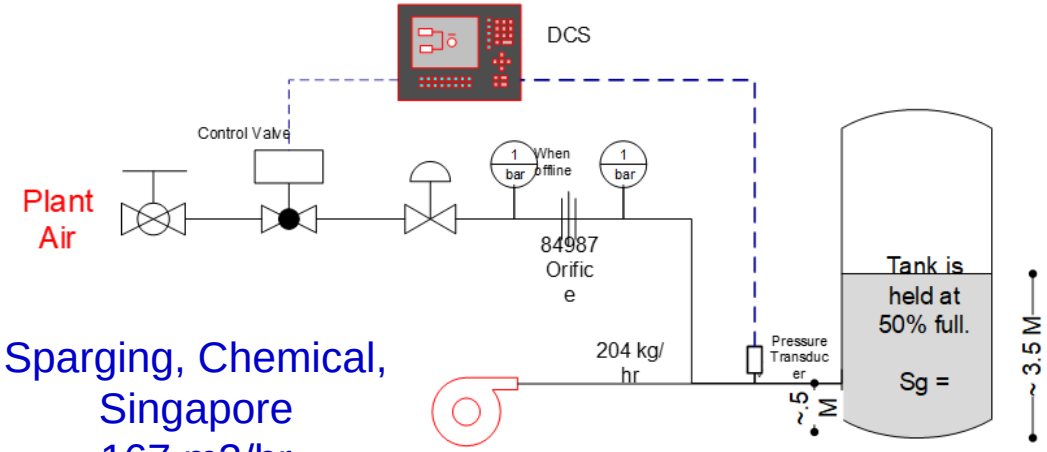


Air used to keep inner tube from collapsing. Compressed air preferred due to dryness. Blower air acceptable

Cooling
Steel, Pennsylvania
161 CFM

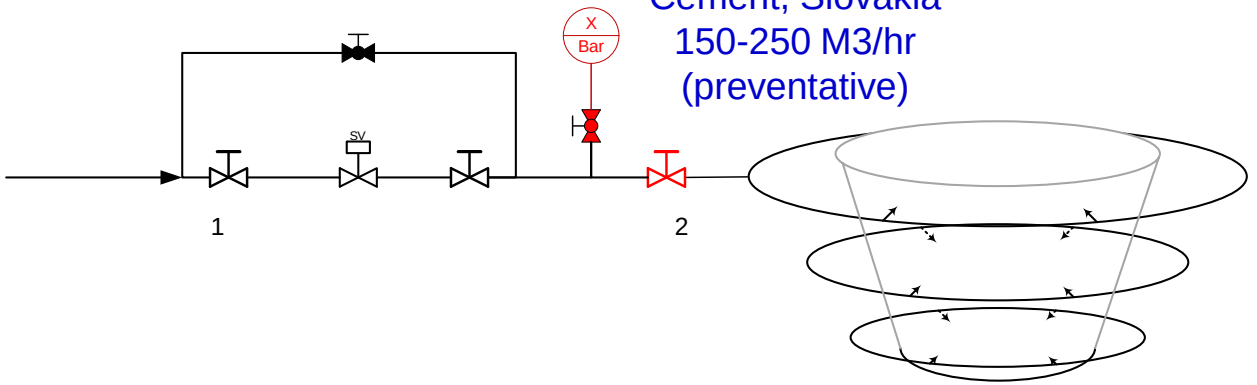


AODD
Corrugated Paper, Cal
45 cfm

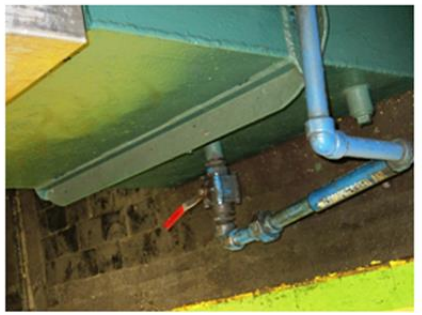


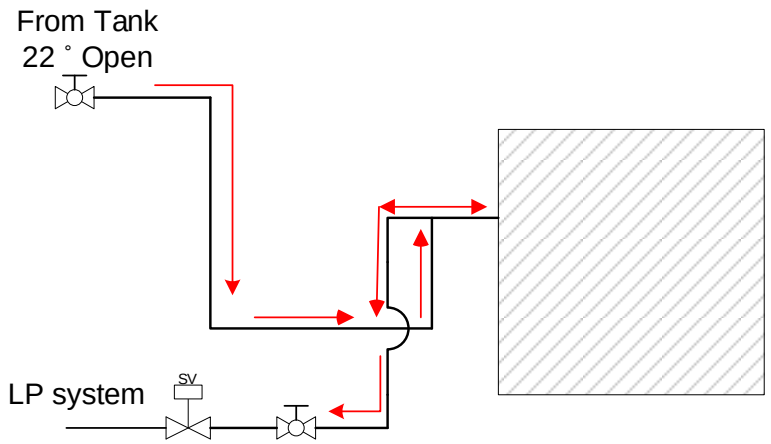
Sparging, Chemical,
Singapore
167 m3/hr

Internal Leaks
Cement, Slovakia
150-250 M3/hr
(preventative)



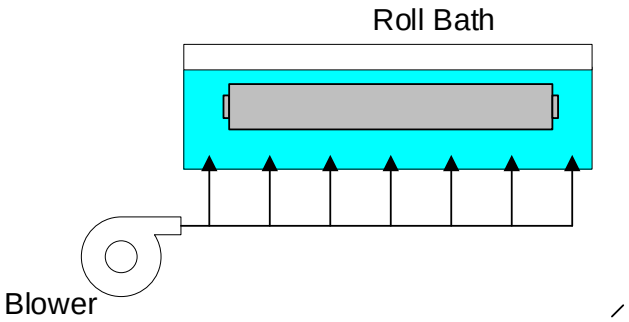
Principle 2 – Demand Reductions, Industry and Site Specific

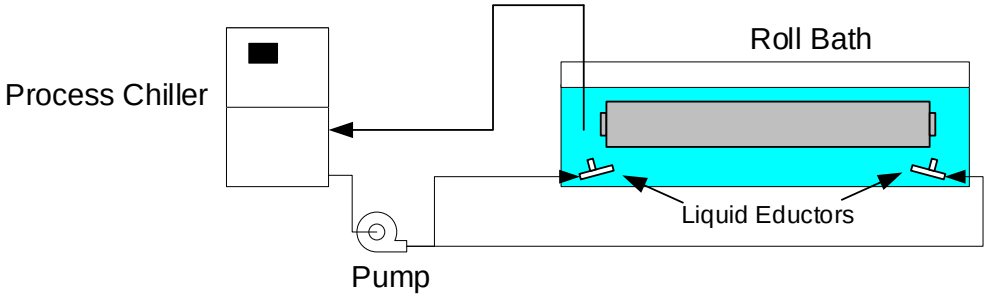




Aeration, Greece
200 M3/hr

Sparging/Cooling
Aluminum
New York
300 CFM Average





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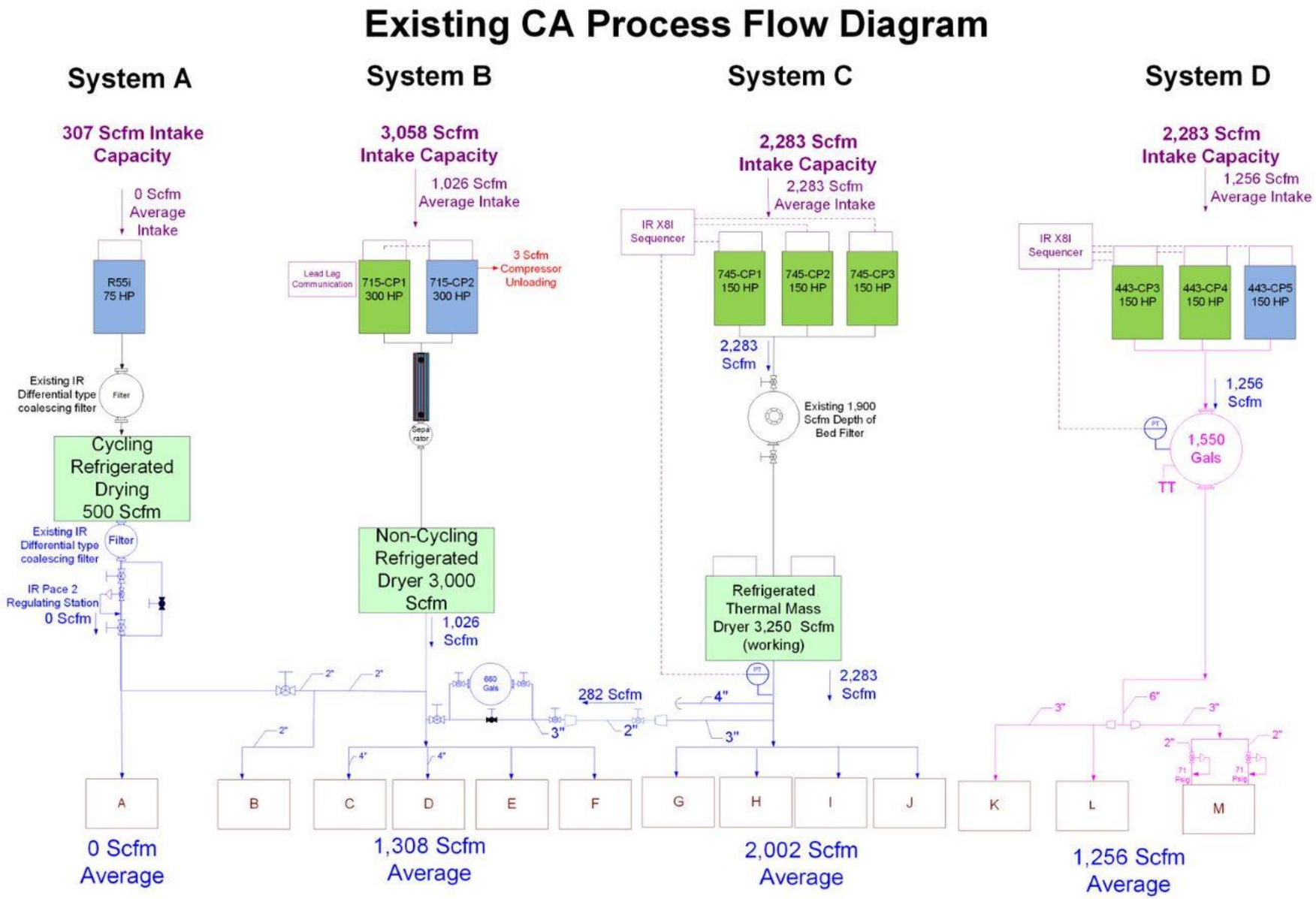
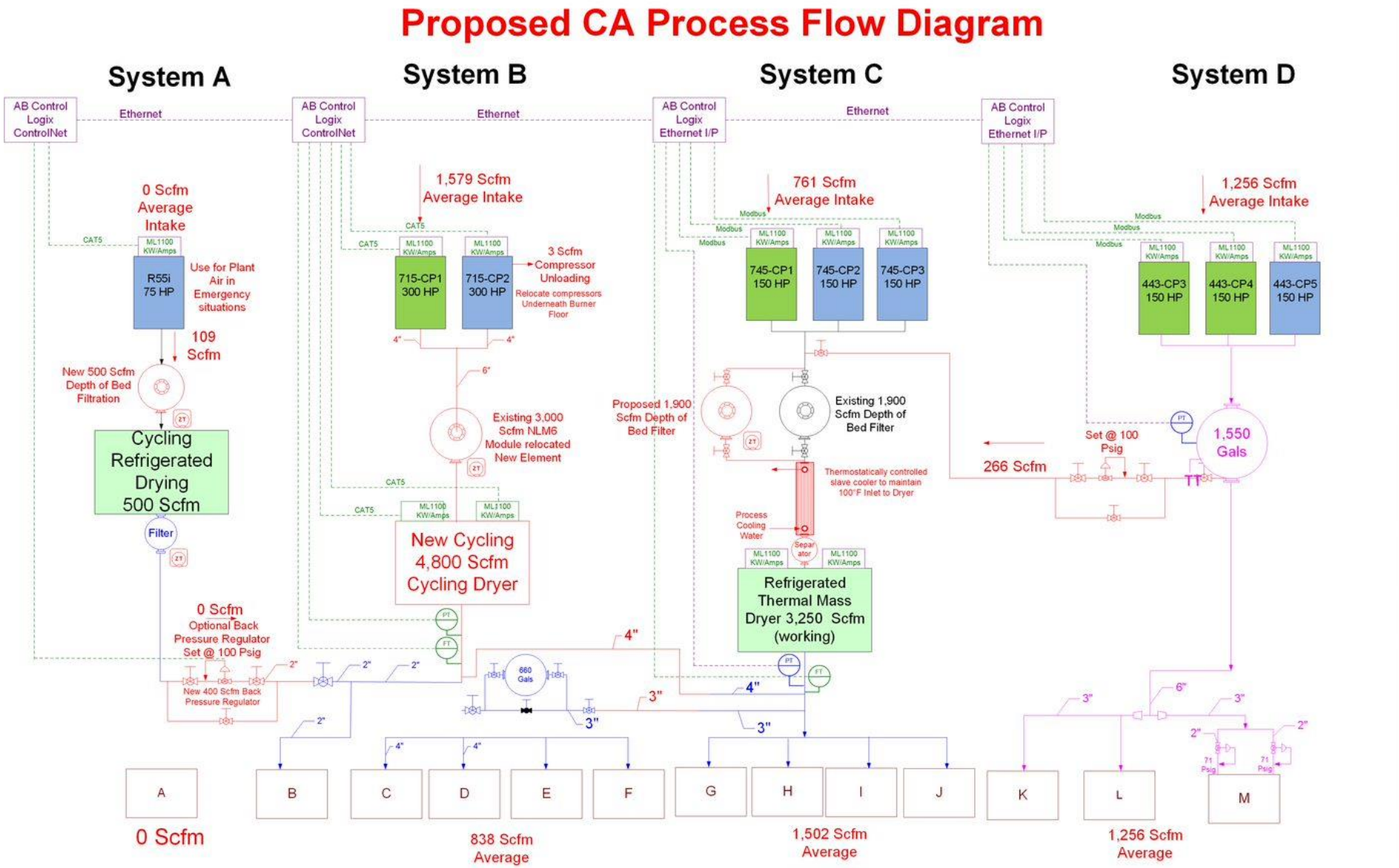
Principle 3 – Source Excess Capacity from Other Systems



Principle 3 – Source Excess Capacity from Other Systems



Principle 4 – Familiarity Breeds Blindness.

- “Familiarity may breed contempt; but perhaps it would be more truthful to say that familiarity breeds blindness”

Managing Increased Demand – Organizational Considerations

- Why has demand increased?
- Whose sphere of control is that in?
- Should they be involved the improvement process?
  - (Access ROI Money vs Discretionary Money)

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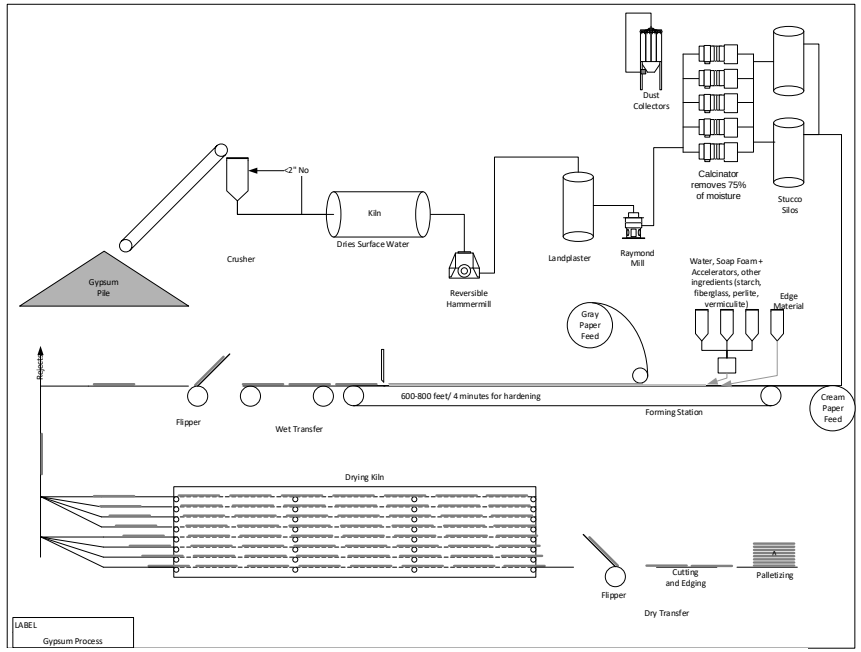

Process

People

Summary

- Managing Increased Demand
  - Ignore
  - Measure and Do Nothing
  - Solve in Supply
  - Proactively Manage = Root Cause Analysis
    - Audit Specific to your Process
    - Reduce Demand
    - Spill/combine with Other Systems
    - Familiarity Breeds Blindness
    - Make Sure the Root Cause of the Increased Demand is Involved (Production/Process)

About the Speaker

JD Schroeder
FS-Elliott

- Applications Engineering Manager, FS-Elliott

- 8 years in both Aftermarket and New Equipment Applications Engineering

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HOW TO ADDRESS WHEN YOUR AIR SYSTEM HAS INCREASED DEMAND

December 1st, 2022

JD Schroeder, FS-Elliott Co. LLC

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Summary

- Managing Increased Demand:
  - Decaying existing capacity or new process?
  - Where is the demand coming from?
    - Temporary
    - Permanent
  - Temporary Measures
    - Rental Air
  - Permanent Measures
    - “Rerate”
    - Replacement Units
    - Additional Units

How to Address When Your Air System Has Increased Demand

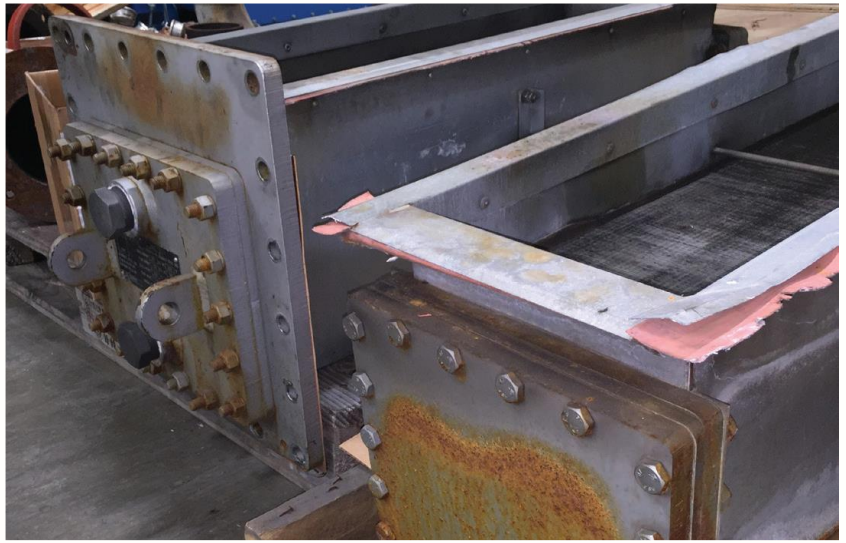
- Where is your need for air coming from?
- Decaying capacity – “I’m not getting as much as I used to”
  - Leaks
  - Aging equipment
  - Climate Change
- New Process or Increased Demand
  - Temporary: short term process or demand increase
  - Permanent: New process, increased demand

How to Address When Your Air System Has Increased Demand

	Decaying Capacity	Additional Demand
Temporary Demand Increase	Maintenance Overhaul Rental	Rental
Permanent Demand Increase	Replacement Additional	Rerate Replacement Additional

Decaying Capacity

- Air Audit and System Review
- Decaying equipment
  - Short term: maintenance programs, overhauls, rentals
  - Long term: rerate, replacement, additional

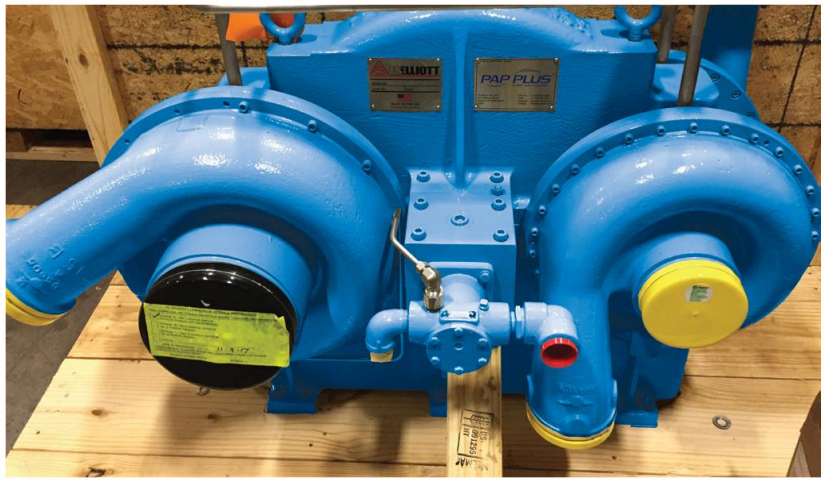


Rental Air Compressors

- Rental air is an option for a temporary addition or replacement of air capacity
- Usually diesel powered
- Can run into issues with environmental regulations
- Very high running costs:
  - EX: 700 HP Diesel compressor can cost in excess of $4,000 per day in diesel alone

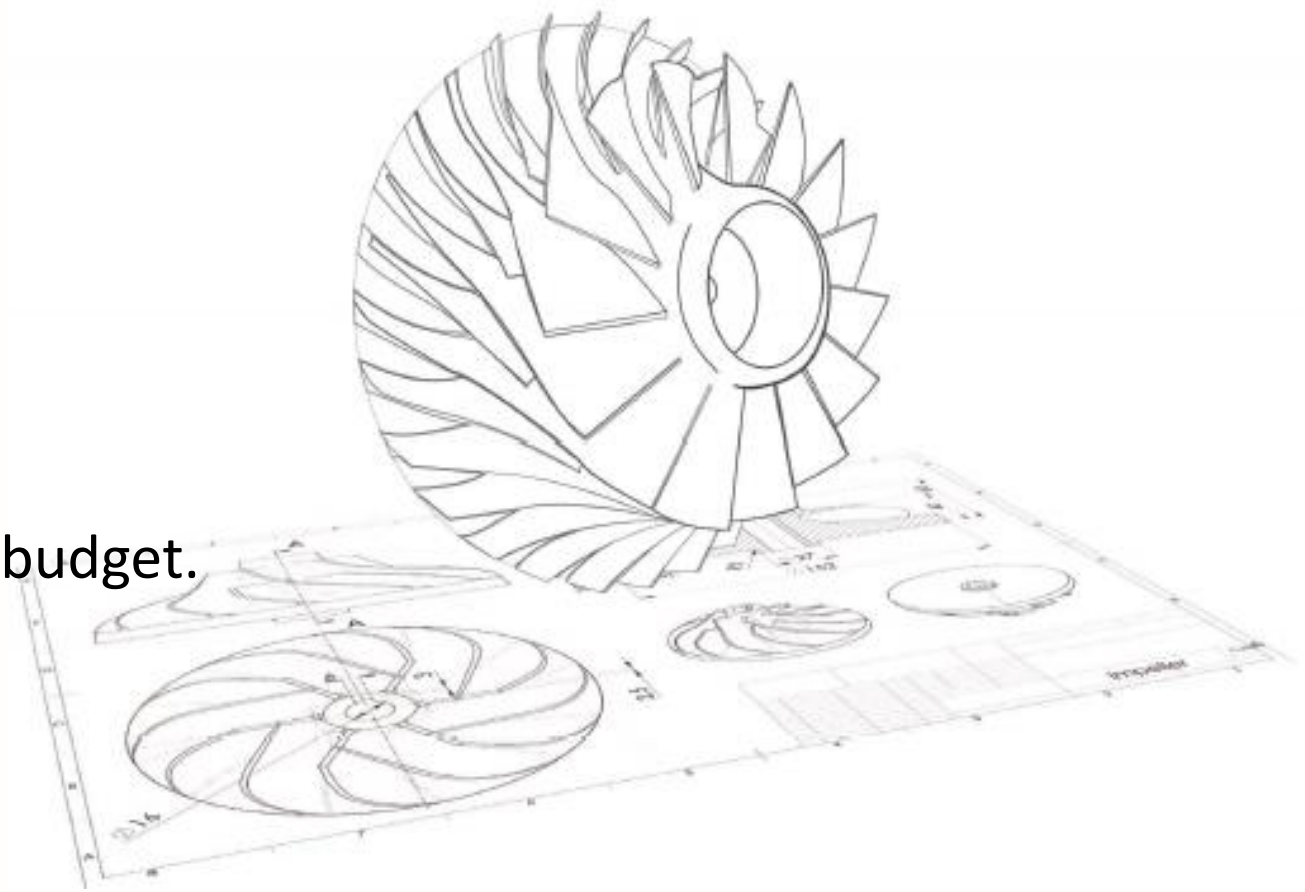
New Process or Increased Demand - Rerate

- Rerates are increasing the capacity of existing compressors by changing the aerodynamic components
- Similar to motors, many installed compressors are not the max the frame can handle
- Can increase design flow capacity, design discharge pressure, and/or increase compressor efficiency



New Process or Increased Demand - Rerate

- Rerates allow for:
  - Lower initial cost than a new compressor
  - Shorter lead times
  - Minimal down time during the upgrade
  - Limited civil/infrastructure change costs
  - Keep existing spares useable
  - Extend the life of an existing asset
  - Can sometimes be used in a maintenance budget.



Rerate – Real World Example

Automotive Manufacturer Rerate

	Original Spec	Proposed Rerate
Inlet Flow Rate	4000 CFM/airend	5600 CFM/airend
Discharge Pressure	150 PSIG	150 PSIG
Airend Power Requirement per Airend	1015 HP	1207 HP
Currently Installed Driver Nameplate Horsepower	1250HP	No change required
Capacity increase (per airend)		1600CFM / 40%
Total Capacity Increase		**8000 CFM / 40%**

Inlet Filters and Unloading Silencers were also upgraded to accommodate the rerate

New Process or Increased Demand - Rerate

Drawbacks:

- Compressor frame may already be at its max capacity, so a rerate may not be possible.
- If compressor components outside of aerodynamic parts are worn out, additional major components may also need to be replaced increasing the capital cost.
- Motor replacement may be needed, which could increase capital costs to a level where replacement may be more feasible

New Process or Increased Demand - Replacement

- If existing compressors are deteriorating significantly or no longer able to effectively meet demand
- Consolidation of units may be best depending on plant demands and efficiency requirements
- Maintenance costs can be reduced significantly with newer equipment.
- Replacement allows for use of improved technology and efficiency
  - Lower mechanical losses
  - Heat of Compression
  - Improved inlet valves (Inlet Butterfly Valve vs Inlet Guide Vane)
  - Improved aerodynamic part designs

New Process or Increased Demand – Additional

- Major expansion or additional heavy air demand applications have been added to your system.
- Existing compressors are suitable condition, but not quite enough air.
- When combined with replacement, allows for optimization of machine sizes and sequencing based on air usage (mixture of unit sizes and configuration).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Q&A

Please submit any questions through the Question Window on your GoToWebinar interface, directing them to Compressed Air Best Practices Magazine. 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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December 2022 Webinar

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Loran Circle
Circle Training and Consulting
Keynote Speaker

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