



WHEN TRUST MATTERS

# Compressed Air

## Demand Savings

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# Demand Savings

- Why it matters
- Inappropriate uses
- Measures
  - Leaks
  - Drains
  - Motors & tools
  - Blow-off – Nozzles and blowers
  - And less common...
    - Desiccant dryer control, vacuum, and piston air motors

# Why it Matters

- Compressed air is an inefficient energy source where 80-85% of the input energy is discarded as heat
- For some sites it is a significant energy user (over 10% of energy use)
- *Generally* – we want to move away from uncontained air flows (e.g., blow-offs) and keep compressed air contained (e.g., cylinders).

# Inappropriate Uses

- Floor sweeping
- Open blowing
- Cleaning off clothes
- Personal cooling
- And other applications with better alternatives



# Leaks

- Lowest hanging fruit
- Can be significant, and can cause problems
- Most use ultrasonic detectors and software
- Other verification measures such as idle plant audible detection and compressor load can be used
- Can lead to turning off excess compressors

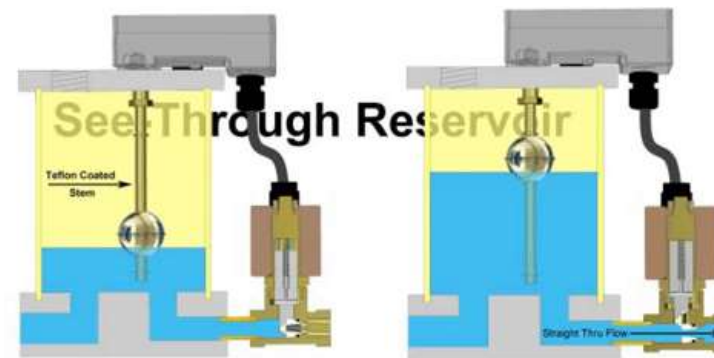
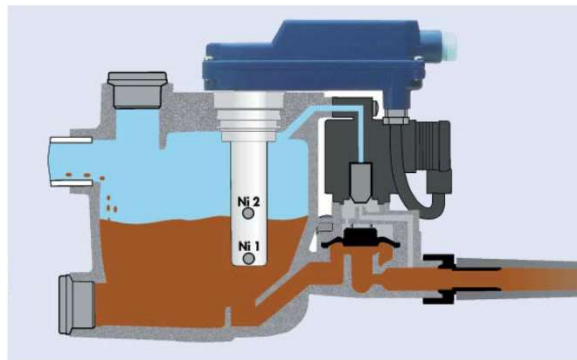


# Utility Incentives

- Consumers Energy
  - Compressed Air audit with leak detection and repair \$15-30/hp (every two years)
  - Leak detection and repair only \$7.50/hp or \$10/hp with VFD (every two years)
- DTE Energy
  - \$27/cfm or \$42/cfm with VFD (every year)

# No-loss Condensate Drains

- The most common is the timed drain
  - User sets the open time and time between cycles
  - Typically compressed air is lost
- No-loss drain opens only when condensate is present and does not release any compressed air



# Utility Incentives

- Consumers Energy - \$300/drain
- DTE Energy - \$147/drain



# Motors and Tools

- Due to the inefficiency in creating compressed air, electric motors are much more efficient.
  - Expect about 1/6<sup>th</sup> the energy use
  - Tools can be corded or battery powered
  - Look for production tools and paint mixers
- Going cordless is often what gets this adopted
  - Users do not have to drag around a hose
  - Removes a trip hazard

# Utility Incentives

- Consumers Energy
  - Motors - \$100/hp
  - Cordless tools - \$70/tool
  - Corded tools - \$100/tool
- DTE Energy
  - Motors - \$80/hp
  - Cordless tools - \$44/tool
  - Corded tools - \$85/tool

# Blow-off – Blowers

- High volume/low pressure applications such as cooling and drying.
  - A dedicated blower can be used instead of nozzles
  - Additional VFD incentive can also apply
- Although there are hurdles, these can deliver more air volume than a nozzle setup would, which can increase productivity

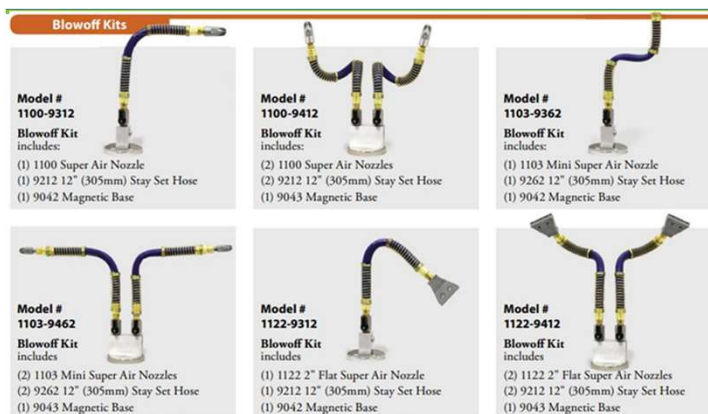


# Utility Incentives

- Consumers Energy
  - \$450/blower hp
  - \$100/hp for process fan VFD / \$75/hp fixed speed
- DTE Energy
  - \$335/blower hp
  - \$67/hp for fixed speed VFD

# Blow-off – Engineered Nozzles

- A smaller orifice can deliver the same effect
- Relatively easy to implement



### Air Nozzles and Jets

#### How Air Nozzles Work

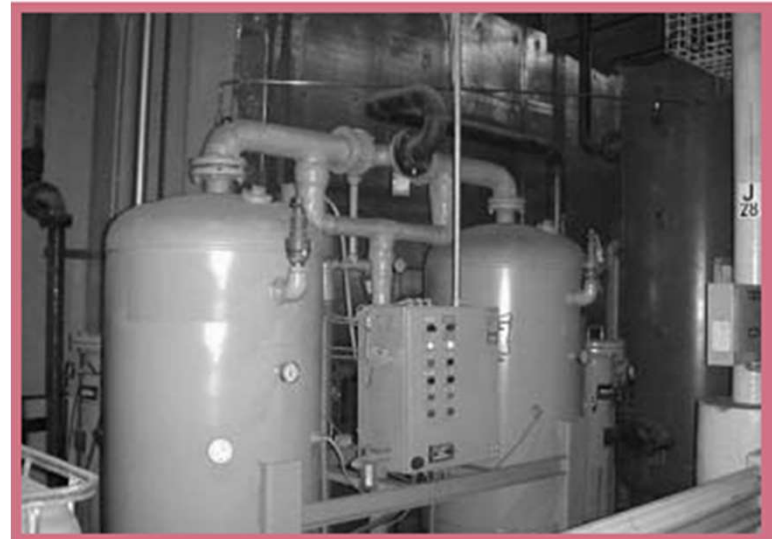
Air Nozzles use the coanda effect or small directed nozzles to amplify compressed airflow 25 times or more. As illustrated above, compressed air (black arrows) is ejected through a series of nozzles on the outer perimeter. As the air travels along the outer wall of the nozzle, surrounding air (blue arrows) is entrained into the stream. The airstream that results is a high volume, high velocity blast of air **at minimal consumption**. The air is always ejected so it can vent safely, **well below OSHA dead ended pressure requirements**, should the nozzle end be blocked.

# Utility Incentives

- Consumers Energy
  - Free nozzles (very popular) or
  - \$150/nozzle up to the nozzle cost
- DTE Energy
  - \$50/nozzle

# Desiccant Compressed Air Dryers

- Basic dryer uses a timer to switch between drying and regenerating columns. These use about 15% of the *rated capacity* of the compressed air for regen.
- Dryers are sized to the compressor capacity, but compressors normally do not run at capacity.
- Dewpoint sensing control measures when columns need to be switched and shuts off the compressed air flow when regeneration is done.



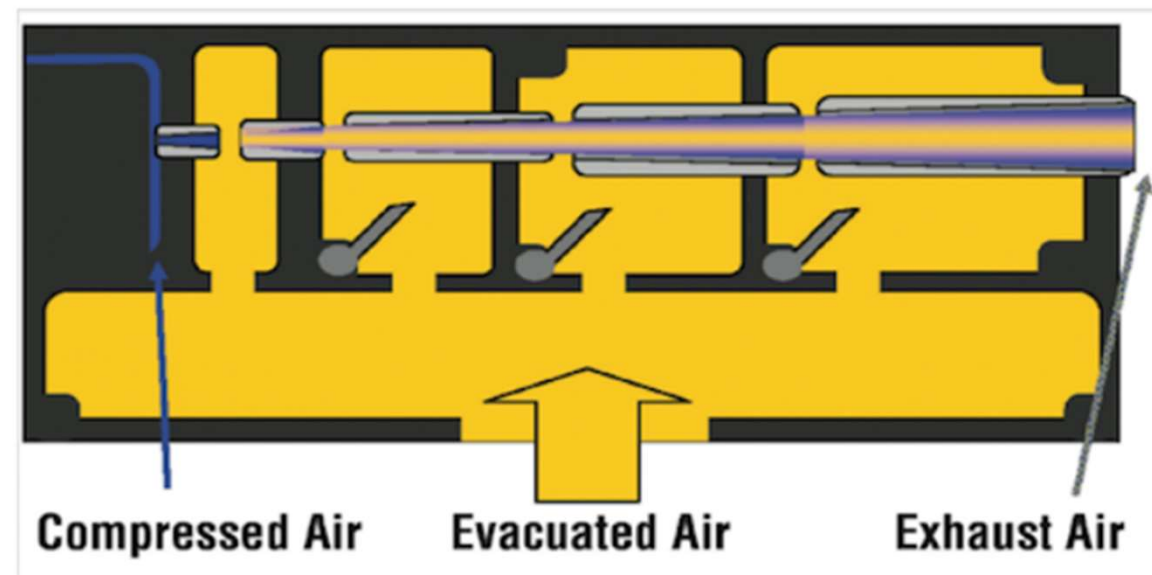
# Utility Incentives

- Consumers Energy
  - \$8/dryer cfm. New or retrofit.
- DTE Energy
  - \$4/dryer cfm. New or retrofit.
  - Part of new heated blower or heated compressed air dryer incentive.
  
- **Refrigerated drying is much more efficient and should be used when possible.**



# Vacuum

- Look for suction cup lifters – typically end of robot arm
- Venturi vacuum generators are common
- Vacuum on when air flows
- Upgrade has pressure sensors and valve to stop air flow
- Similar price



# Utility Incentives

- Consumers Energy
  - \$20/cfm of the vacuum generator
- DTE Energy
  - Calculated as “Custom”

# Piston Air Motors

- Do you have paint mixers? Air motors provide an intrinsically safe motive force, and many are small so each one does not have a large air use. Inexpensive vane motors are common. Often with gear reducers.
- Converting to intrinsically safe electric is great, but also requires electric service which is another cost.
- Piston air motors are more efficient than vanes and excel with direct drive at slow mix speeds (<500 rpm).
- Not cheap, but paybacks are excellent.

# Utility Incentives

- Consumers Energy
  - Custom
- DTE Energy
  - Calculated as “Custom”

WHEN TRUST MATTERS

# Thank You!

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