Minnesota Technical Assistance Program

Reducing Energy Use and Oil Mist Generation

Roberts Automatic

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MnTAP Intern 2009

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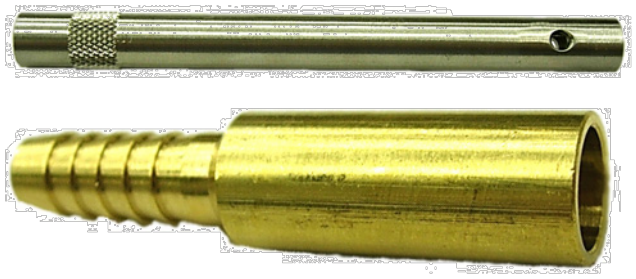
Helping Minnesota businesses maximize resource efficiency, increase energy efficiency, reduce costs, and prevent pollution

Company Overview (Not for Roberts Presentation)

- Metal parts manufacturing job shop
  - -Automotive
  - -Aerospace
  - -Consumer



- Automatic machines
  - -High production
  - -High precision

MnTAP Overview

- Minnesota Technical Assistance Program
  - University of Minnesota outreach program
- Services for Minnesota businesses
  - Minimize waste and pollution
  - Resource efficiency
  - Energy reduction
- Intern program

Motivations for Change

- Production is down – energy overhead costs significant

- Physical evidence of oil misting

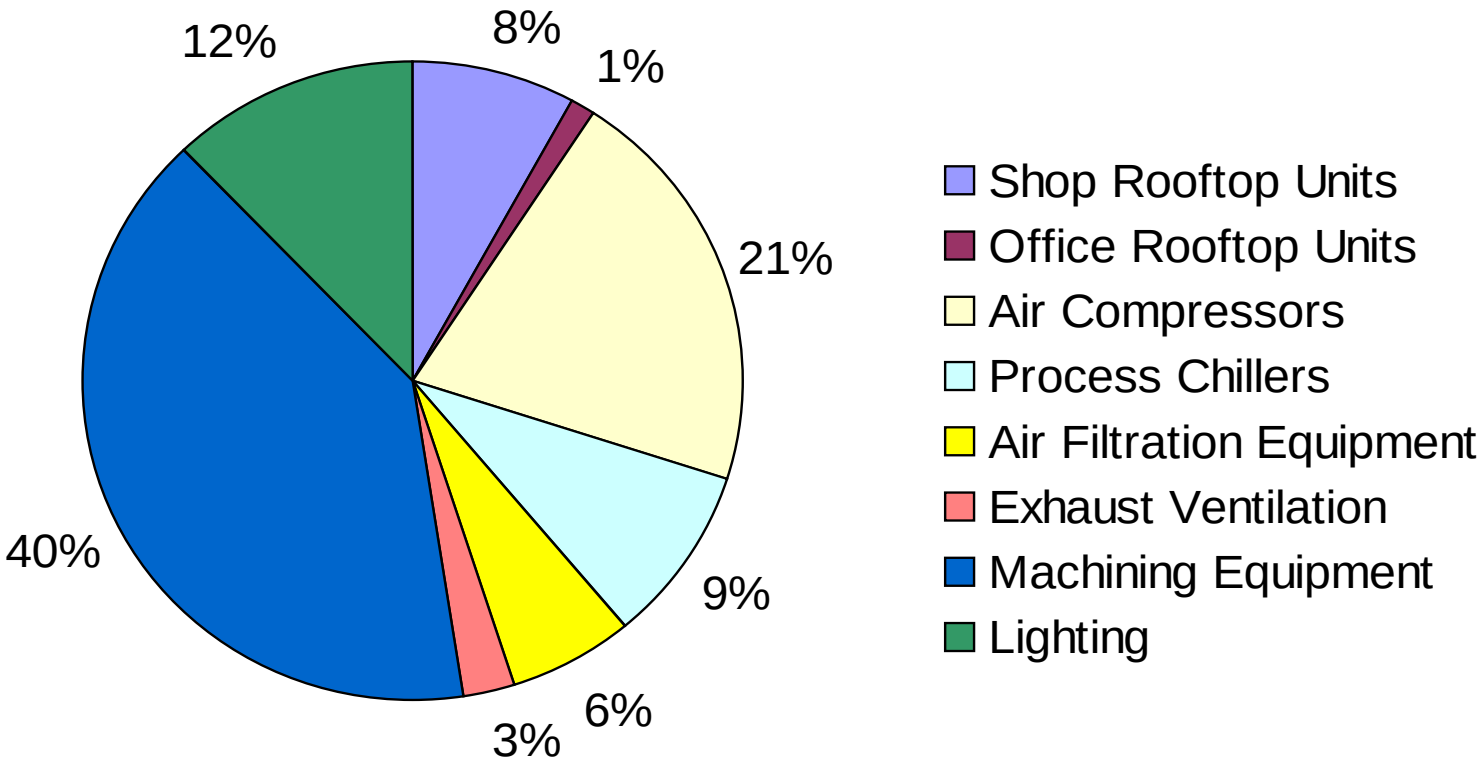
- Facility equipment is aging

Reasons for MnTAP Assistance

- Identify and improve large energy consumers
- Quantify and reduce oil mist levels
- Incentives for replacing equipment
- Better understanding of ventilation

Approach

- Energy consumption audit, 2,300,300 kWh annually



Approach

- Measured oil mist levels

- Identified air treatment equipment

  -Mist collectors

  -Air cleaners

  -HVAC

Determining Inefficient Processes

- Leak test
- Datalogging
- Effectiveness of air treatment equipment
- Compressed air requirements
- Air balance
- Spoke to service technicians

Compressed Air Controls

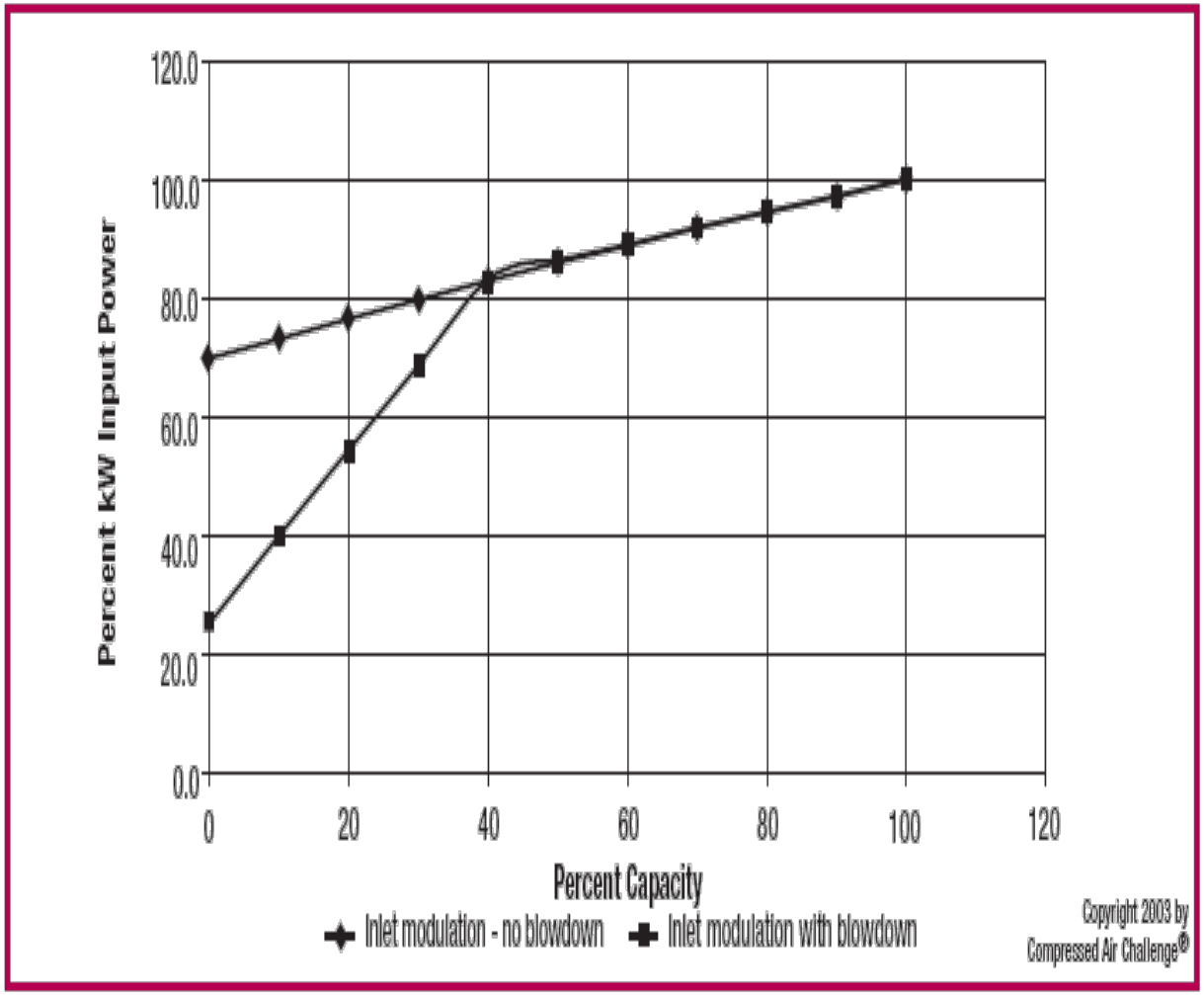
- Background

  - Adjusts volume of air produced

  - Two compressors

- Problem

  - Modulation inefficient

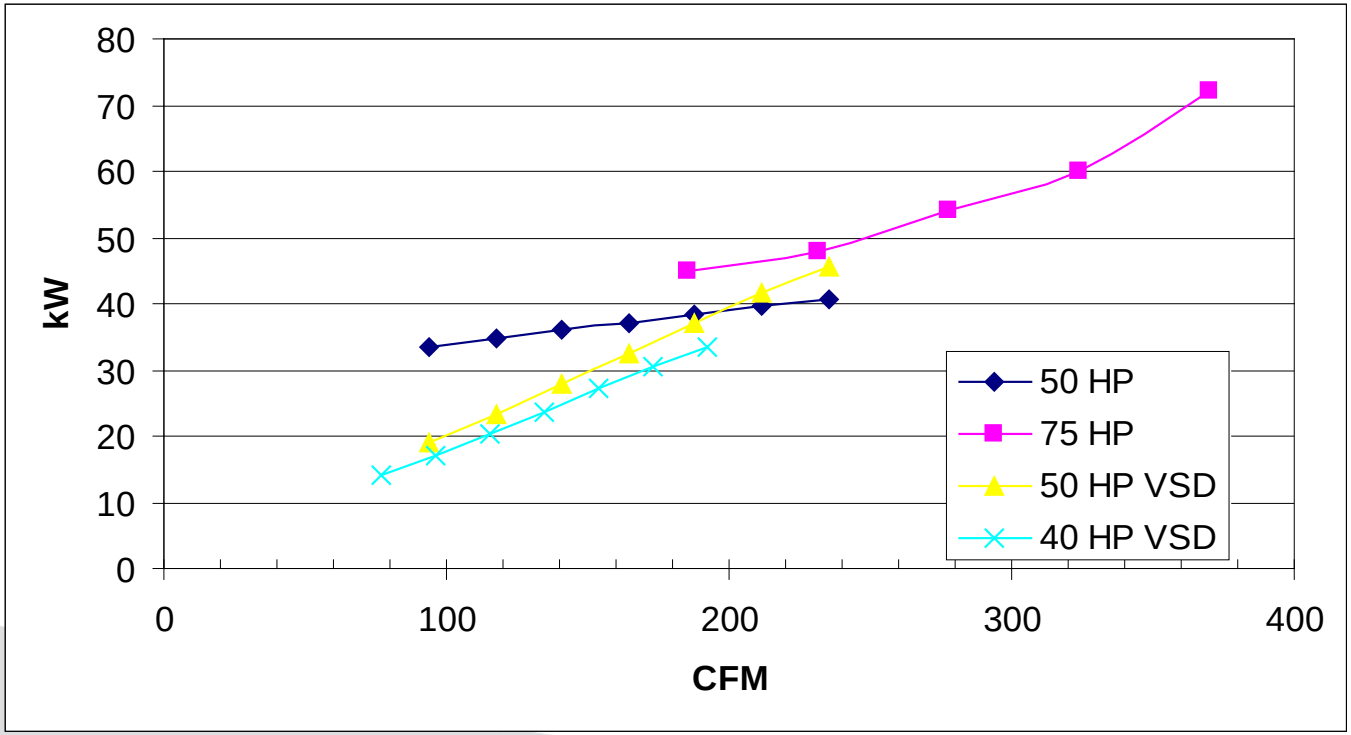


Compressed Air Controls

- Solution

  -Tested load/unload operation on larger unit

  -Equipment improvement



Oil Mist Generation

- Problem

  -40 CFM, 17 % capacity

  - No repair routine

- Solution

  -Leak tag system

- Realizing repairs

  - 50 HP, $500/yr

  -75 HP, $1,000/yr

  - VSD, $1,500/yr

Weekend Air Compressor Use

- Background

  -Stays on for “lights out” shift

- Problem

  -High cost for small air volume

- Solution

  - Use smaller compressor

  - Master switch for shutdown

Oil Mist Generation

- Background

  -OSHA PEL = 5.0 mg/m^3

  -NIOSH REL = 0.5 mg/m^3

- Problem

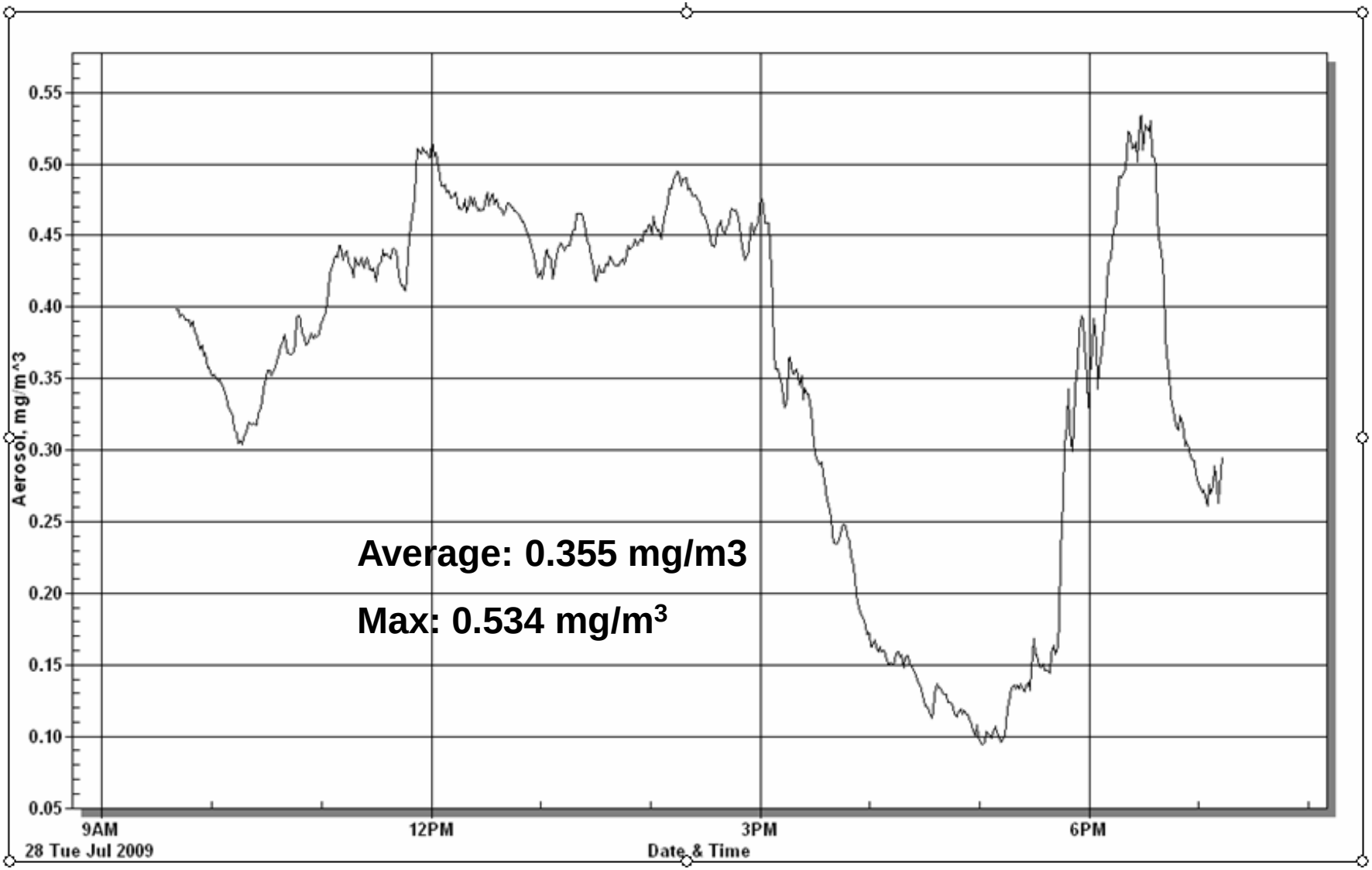
  -Visible haze, odor, slippery floors, exposure

- Solution

  -Evaluate current levels

  -Find and reduce high sources

Oil Mist Generation



Oil Mist Generation

- High sources

  -CNC chip conveyors exits, 15.0 mg/m^3

  -Acme mach. 16, 23.0 mg/m^3

  -Integrex conveyor, 30.0 mg/m^3

- Mist collector good practices

  -Relocate units as jobs change

  -Block unused hoses

  -Davenport door positioning

Oil Mist Generation

Ventilation

- Air-cooled condenser exhaust
  - Continuous 6,000 CFM exhaust
  - 0.4 air changes/hr
  - Cooling costs $400/yr
  - Design intent
- Compressor room manual louver
  - Heat recovery
  - Cooling costs $1,500/yr
  - Rooftop unit alternative

Successful Process Changes (Style 1)

- Small compressor for weekend use

  - $2,000/yr saved

- Recommended leak tag method

  -Potential $500-$1,000 /yr savings

- Identified oil mist contributors

  -Sources as high as 30 mg per cu. meter

Successful Process Changes (Style 2)

- Implemented estimated savings

  - $ _____

- Long-term potential savings

  - $ _____

- Mist reduction

  - _____ mg/hour oil (need to do more work to determine this figure)

Personal Benefits

- Project ownership
- Experience in a new industry setting
- Hands-on data collection, testing

Questions?