



# Energy Auditing

Sample from a Paper Mill:

Discovery Level to Detail Audits

**Vacuum Pumps and Blowers**

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# Discovery Level

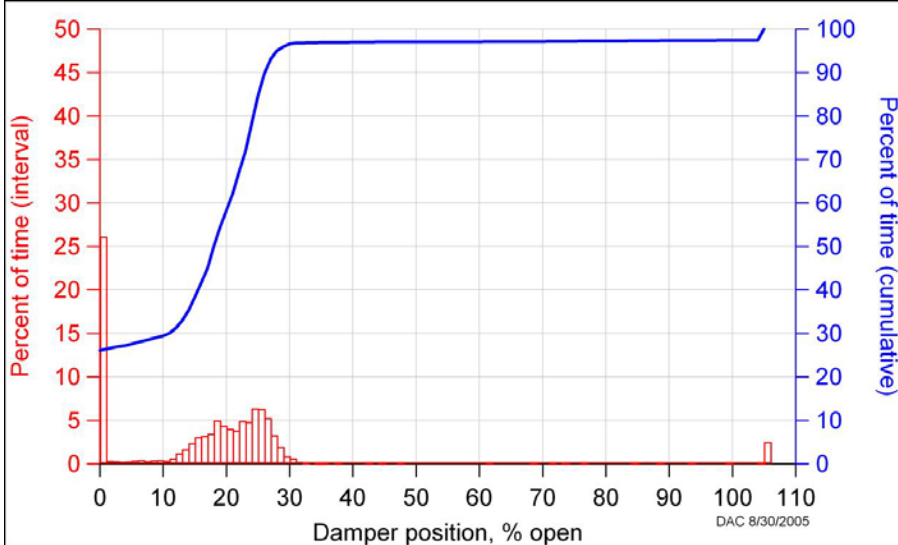
Finding Opportunities for Energy Saving:  
Low hanging fruit can be obvious



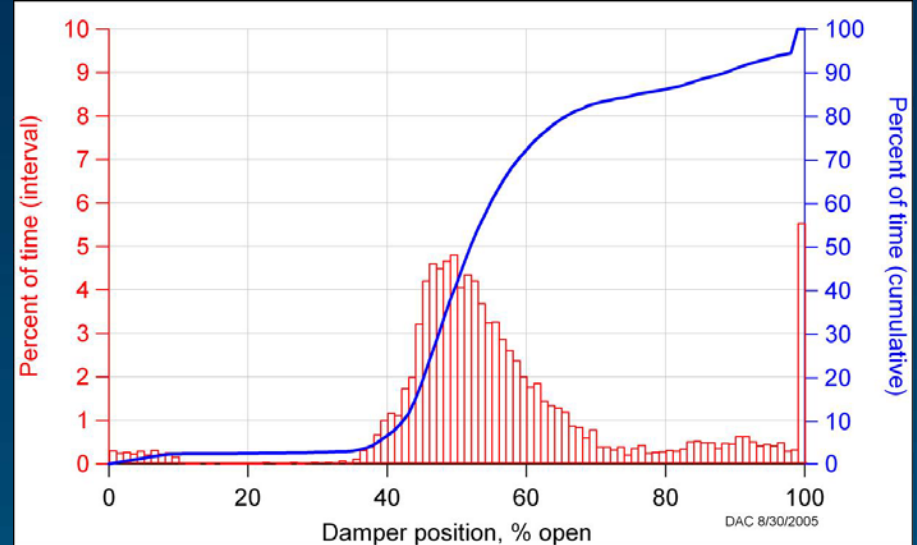
# Discovery Level

But don't count on it - check available data

Vacuum Breaker Valve Position Histogram



Blower Inlet Valve Position Histogram



# Discovery Level

## Reporting at the discovery level

- Provide conservative estimates
  - Use actual data whenever possible
  - If data is not obtainable, use fan/blower curves
  - If curves aren't available, use VERY conservative
- Use photos to demonstrate where/why it appears to be a good opportunity
- Interview operations and maintenance for additional cost savings



# Detailed Audit

- Develop a plan using established and recognized methodology
- Assess the entire system



# Detailed Audit

Have additional testing ports installed

Before



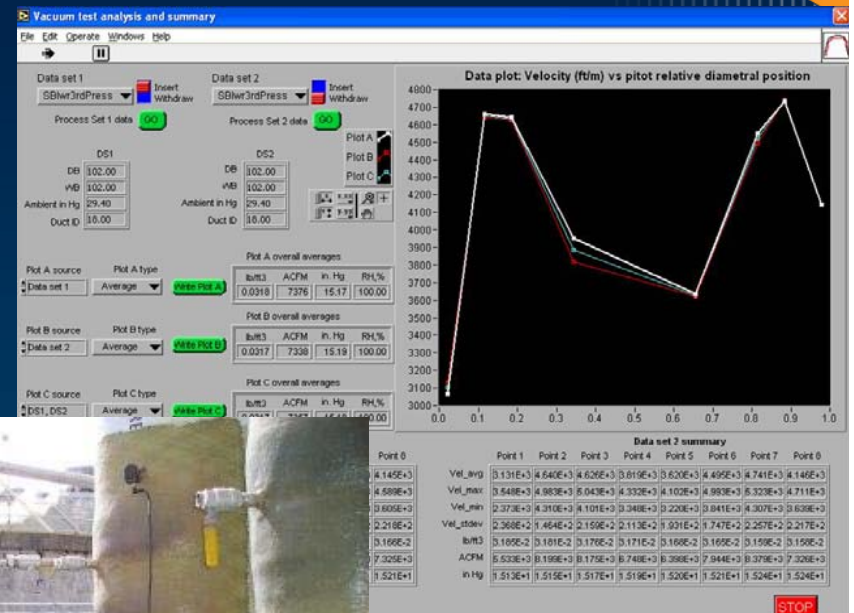
After



# Detailed Audit

Assure that data collected is:

1. Accurate
2. Reliable
3. Repeatable





# Design a plan using accepted methodology

Velocity pressure directly measured



Final System Design



Initial Setup



# Data Collection

Depends on level detail required

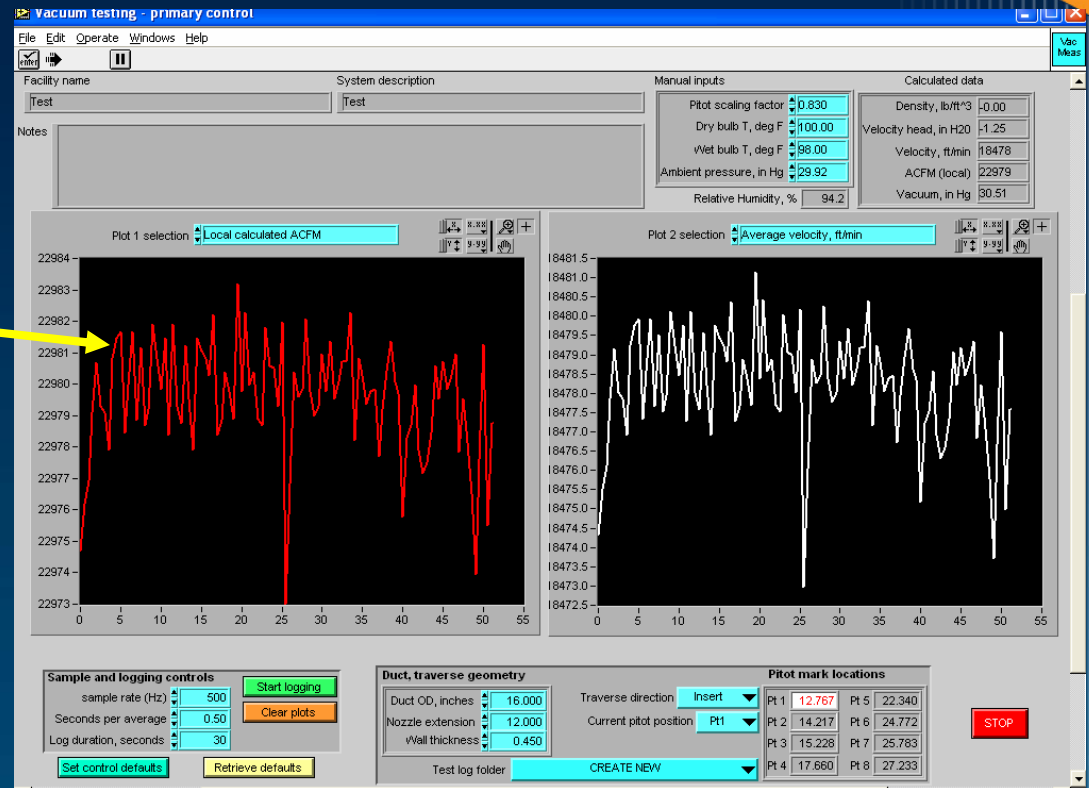


# Data Collection

Sample Rate: 5000 Hz

Test Duration: As long as needed

Repeatability can be easily assured



# Energy Saving Plan

- Review Options
  - New equipment
  - Modifications to existing equipment
  - Process change
- Include Maintenance and Process Advantages to Options
- Make a Clear Recommendation



# Recommendations

