

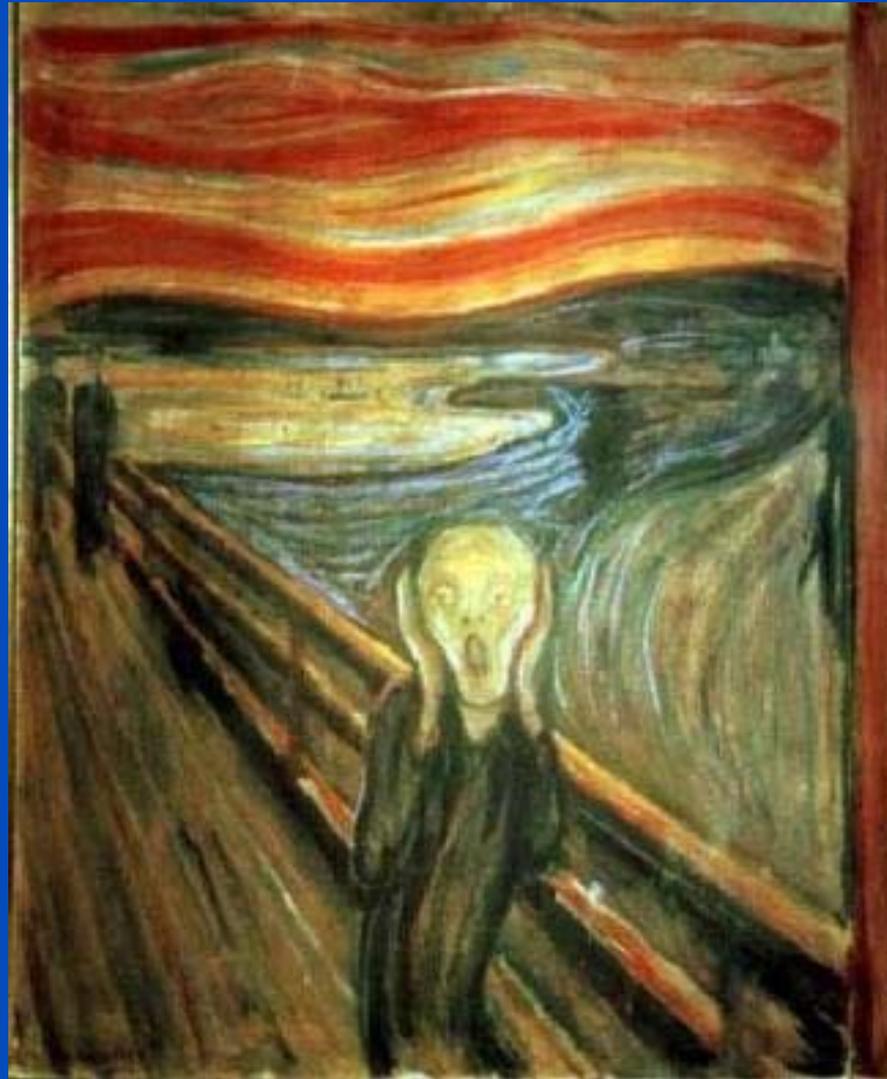
Enhanced Operation, Maintenance & Purchasing

Encouraging a Culture of Change

Don Rainey, CEM

Dover AFB REM

206-618-2750



CHANGE

HOW MUCH CHANGE
DO YOU ENJOY?

What is the relationship
between what you are
doing this year on your job
and what you did last year
on your job?

What do you believe?

- If you change your beliefs
you will change your behavior.
- If you start behaving differently
you will change your beliefs.

20% Rule

If 20% implement change and are rewarded, most of the rest will change

Naysayers

Leave them be – they are the 5% who don't want change under any circumstances.

Bottom Up or Top Down?

Need Both

Expectations

What are your beliefs
about O&M Staff?



Expectations

What are your beliefs about Designers?



SHOW OFF!

In House Project



Starting A Conservation Project

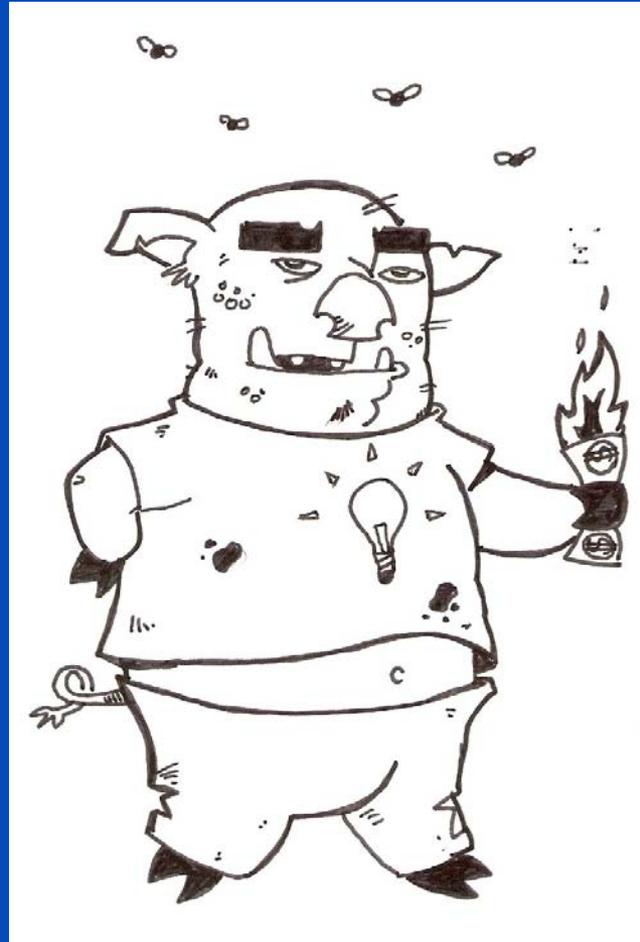
GOALS

- Simple
- Measurable
- Realistic

Advertise

- Verbal
 - talk about what you want to do
- Written
 - newsletters, updates, posters
- Keep Momentum Going

Have a Theme



The Energy Hog

Decide how you will account
for savings

It Pays to Advertise

- In House Newsletter
- Trade Journals
- Newspaper Articles
- Progress Reports
- Giant Thermometer
- Talk about it

Conservation Project Characteristics

BUILT-IN Savings

- Built-In savings come from equipment that does the same job more efficiently.
 - A Prius is more efficient than a Corolla
 - Variable Speed Motors
 - Turbocor Compressors
 - Better Building Envelope
 - Cool Roof or Green Roof
 - Sighting of Building

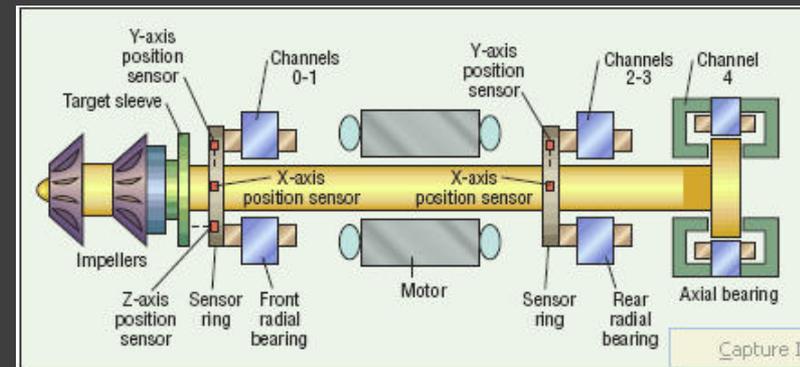


FIGURE 2. A digitally controlled magnetic-bearing system consisting of two radial and one axial bearing levitate the compressor's rotor shaft and impellers during rotation.

DYNAMIC Savings

- Dynamic Savings come from how we use and maintain equipment and resources.
 - Constant Optimization
 - Reset Temperatures and Pressures based on minimum prevailing need
 - Turn it OFF or Down when not needed
 - Key Performance Indicators can immediately tell you when things quit working properly.
 - Composting food waste

Purchasing

- Lighting and Air Filters keep getting better.
- Mechanical Equipment keeps getting better.

Do your purchasing decisions keep getting better?

Combination Savings

Most of our cost saving opportunities have both built-in and dynamic aspects.

- A more efficient chiller
- Variable speed chilled water system
- Variable Volume Temperature and Pressure

Low/No Cost Savings

- Pay for themselves within 1 budget cycle
- Have a substantial dynamic component
- Easy Come – Easy Go

If you don't change your culture, you'll lose dynamic savings after the "big push".

Conventional and Enhanced O&M

- Most O&M organizations use a mixture of both conventional and enhanced O&M practices.
- If you can transition more to the enhanced approach, you may be able to reduce O&M costs by 10%.



Conventional O&M

- Follows the same practices established when the building was first built.
- Failed components replaced in-kind.
- Original control logics and setpoints are still in use
- Maintenance Stores are full of obsolete parts
- “As-Built” documents are not accurate or even available
- O&M staff is consumed with fire fighting and work orders. “Success” is a high % of WO completions.
- O&M Staff NOT involved in improving practices

Enhanced Operation & Maintenance

- Constantly improve maintenance practices with a focus on reliability and minimizing Total Cost of Ownership (TCO).
- Identify more cost effective parts and equipment for replacement maintenance.
- Maintenance stores are filled with modern parts and the obsolete parts are removed.
- Continually improve control logics and setpoints. Then DOCUMENT the changes.
- Drawings and documents are inventoried and kept up to date on a regular basis.

Enhanced Operation & Maintenance

- Work Order Success means minimizing the number of Work Orders.
- O&M staff take time to proactively improve practices whenever an opportunity is identified.
- Monitor & Tracking capabilities in the HVAC control system are used for problem solving and optimization.
- Key performance indicators are developed and displayed so O&M staff are immediately aware of developing efficiency and capacity problems before they result in customer complaints and/or unusually high utility bills.
- **O&M Staff is frontline for identifying and implementing improvement opportunities.**

Best Practices Go Stale

- We have discovered yet another new best practice air filter – dramatically trumping last year's best practice.
- We have convinced ourselves that 25 watt F32T8 lamps can directly replace 32 watt lamps (when using newer ballasts and enclosed fixture).
- We must now improve our recently improved purchasing practices and tell designers to use our latest standards.
- **We must stay on top of new developments and implement improvements now!**

ENHANCED PROBLEM SOLVING

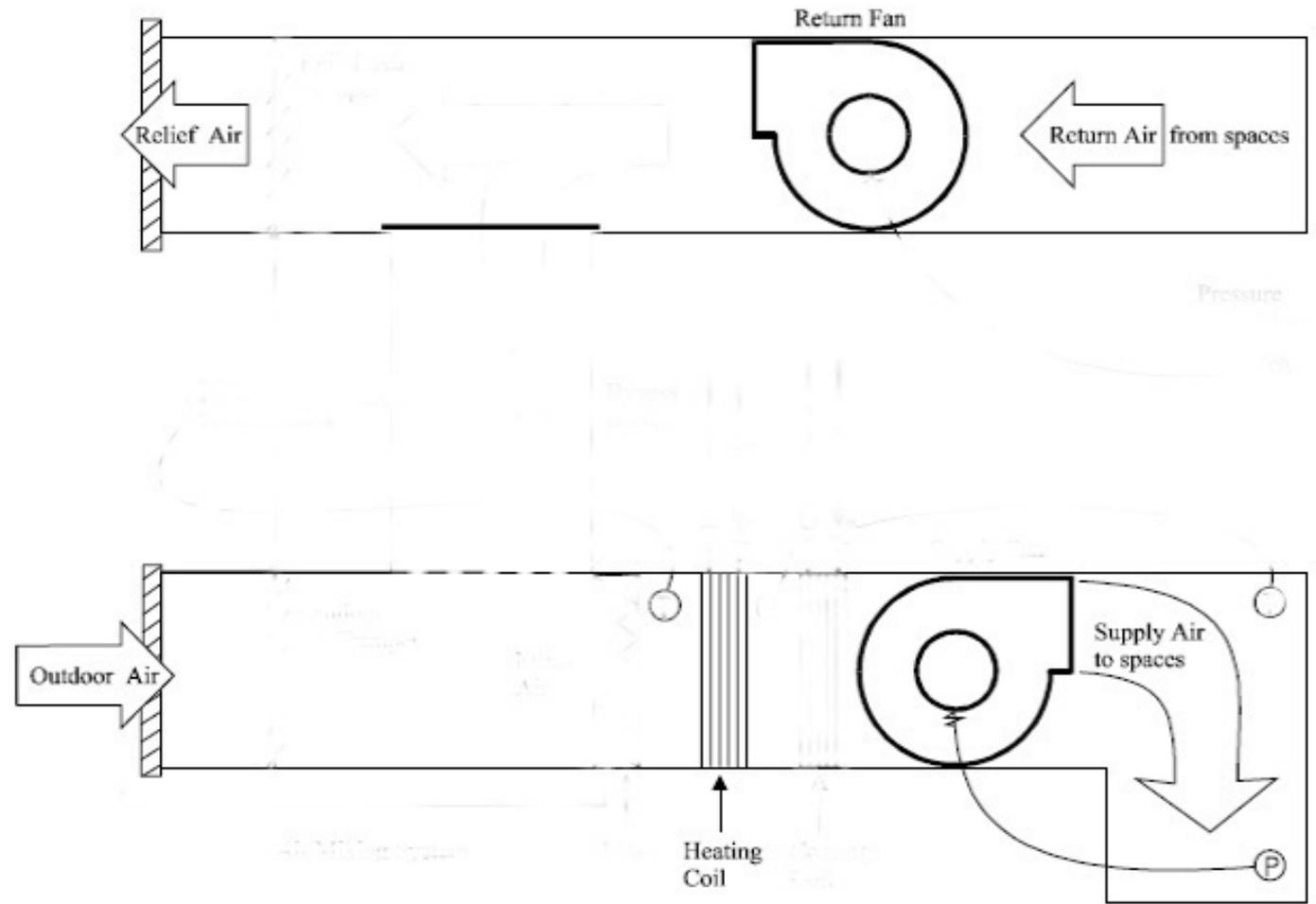
Dead Axial Fan @ 40 HP



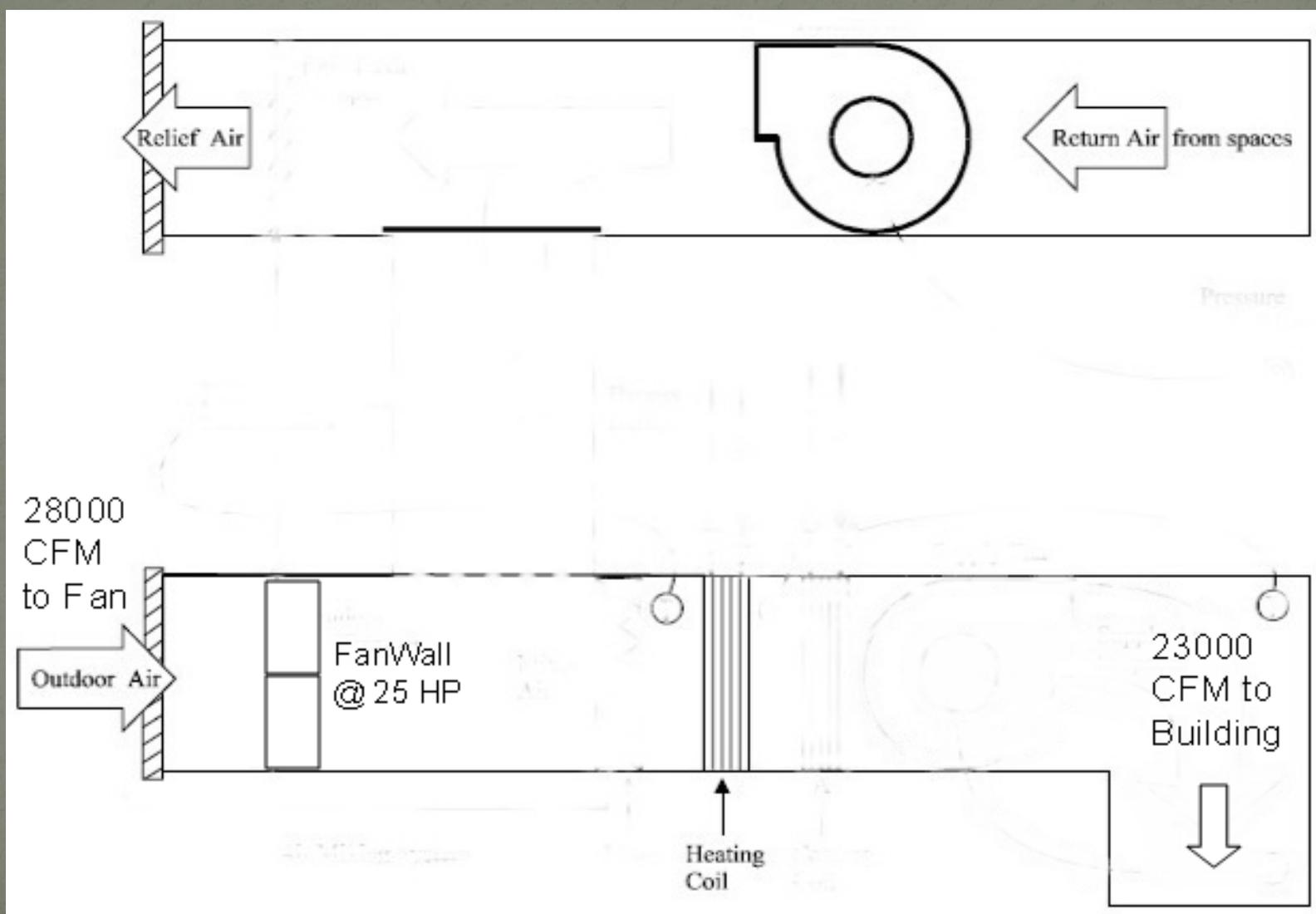
FanWall @ 25 HP



NE Fan with Removed Heat Wheel



FanWall Doesn't Work!?



Why Won't the FanWall Work?

- A heat wheel had been removed years ago and the old patch could not contain supply air pressure.
- When we installed the new fan wall in a new location, it pressurized the old patch which progressively failed over the next few days. We could not provide desired airflow.
- Staff felt that the problem was with the fan wall and kept speeding up the fans but could not increase airflow for very long because the leaky patch simply leaked more.
- We finally made measurements proving that the fan wall was pushing 28,000 CFM while the building was receiving 23,000 CFM. The patch was leaking 5,000 CFM.

We Must Change Our Thinking

- Physics Prevail, not Emotion or Inertia
- Fix the real problem instead of pushing harder
- We can provide existing capacity more efficiently
- We can often provide more capacity without increasing energy consumption
- Clarify the choices between more capacity and more energy consumption – Tell Administration if increased need for capacity is going to increase utility bills.

Provide Clear Direction!

- Don't assume that the service provider understands what you want them to do.
- What is the final goal? Written scope of work?
- How will they know when your goal has been met and what should they do about it...
- What have you already learned about your problem?
- What are the restrictions to access and activity?
- What should service providers do when important things happen?

Work Orders & PM

- Focus on minimizing number of Work Orders
- Incorporate a means of effective prioritization so really important work gets done when it needs to be done.
- Include energy efficiency in PM work plans
 - Keep Economizers Working Properly
 - Calibrate Primary Sensors on a regular basis
 - Try to improve performance over last PM



OPPORTUNITY

Too Valuable to Delay

- Select the best air filters and install them now
- Put improved lamps and ballasts on the maintenance shelf with simple instructions
- Turn it OFF or Down
- Reset Temperatures and Pressures
- Reduce condenser water temperature to 68?
- Operate redundant VS equipment in parallel
- Turn computer monitors OFF – nickel a push

Just DO IT!

- Manage Purchasing Practices to minimize utility costs, maintenance costs and the cost of purchase.
- Replace T12 lighting
- Replace HID lighting
- F32T8 lamps – 32 watt to 25 watt
- CFL triple tube 32 to 26 watt in 6" can
- Low flow laminar faucets & showerheads
- Affordable and effective LED lighting is here BUT BUYER BEWARE.



Identify An Opportunity and “Make It So”

Take Enhanced Operation and
Maintenance out for a spin:

- Air filters is usually an excellent place to start
 - You’ll need to talk it up so the administration, purchasing and O&M staff can get on board.
- Use an enhanced approach with your next problem.



Toot Your Own Horn!



Outside Services?

- Most facilities can reduce operating costs around 10% by enhancing O&M practices BUT you may not have the time, motivation or skills so it won't get done.
- Getting some experienced support can be safer, extremely cost effective and more beneficial than you will ever imagine until you DO IT.

Outside Services are VERY Cost Effective

- \$5,000 of outside services brought \$160,000 of rebate to a project and \$31,000 of annual energy savings.
- \$2,000 of outside services showed 260 bed hospital how to save \$27,000 per year by changing air filter practices.
- \$3,000 of outside services showed administration that repairing and using an old chiller would cost \$1,500,000 over 20 years while installing the best new chiller would cost \$1,000,000 over 20 years. Utility rebates covered 70% of the cost.

BetterBricks Tools

<http://betterbricks.com/DetailPage.aspx?ID=943>

- Air Filter Comparison Tool
 - Invest a couple of days with this tool and save tens of thousands of dollars every year.
- Chiller Comparison Tool
 - Use this tool if you are considering a major chiller repair or purchasing a new chiller. It can save hundreds of thousands of dollars over the life of the chiller.
- Energy Efficient Equipment Purchasing Guidelines
- If you won't use the tools, pay someone to use them for you. ROI = 500% to 1000% or more.



NO EXIT