Effective Energy Management

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PROFIT

How can you increase your total operating profit?

✓ Increased sales
✓ Reduced costs

*Both have the same effect.*

*THE CHOICE IS YOURS*
What are we facing?

• Greater competition
• Unpredictable energy markets
• Potential climate change legislation and controls on greenhouse gas emissions
Energy management is:

A cost reduction strategy that can have an immediate impact on profitability.

A risk protection strategy to protect against future energy rate increases and regulatory effects.
US Manufacturing Costs - 2007

- Energy cost percentages have been as high as 12-15% during the blackouts of the 1990’s.
- Currently about 7% during the recent easing of energy prices.

![Pie chart showing cost distribution](chart.png)

Source: DOE/EIA
Energy costs will rise and decline in response to world energy market conditions but will continue on a steady upward trend.

Effect of potential eventual GHG Cap and Trade legislation will be substantial.

Source: World Energy Council
Energy Cost as a Percent of Operating Cost

- Typically about 5-7% for Metalcasters
- What will it be in a few years?
- Do you know the percentage for each energy source you are consuming?
- Do you know where it is being used in the foundry?
- How do you measure?
  - By pounds or tons shipped?
  - By the month?

In 2008, metalcasters spent nearly $1.5 billion on electricity and fuels.

A 5% reduction across the industry would have amounted to a $75 million savings.
2007 AFS Survey:
Average Operating Profit for the foundries responding was 5.7%
Finding $40,000

Based on an average of 4.0% operating profit...

it would take $1,000,000 in new sales to generate $40,000 of operating profit

Much easier to save $40,000 in energy cost than find $1M in new and profitable sales
Energy Savings: What is it Worth?

• A 15% Reduction in Energy Costs will Increase Operating Profit by an Average of 25%
Energy Use in the Metalcasting Industry

<table>
<thead>
<tr>
<th>Foundry Process</th>
<th>% energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting</td>
<td>55</td>
</tr>
<tr>
<td>Heat Treat</td>
<td>6</td>
</tr>
<tr>
<td>Post Casting</td>
<td>7</td>
</tr>
<tr>
<td>Core making</td>
<td>8</td>
</tr>
<tr>
<td>Molding</td>
<td>12</td>
</tr>
<tr>
<td>Balance/Other</td>
<td>12</td>
</tr>
</tbody>
</table>
There are a few ‘low-hanging fruit’ projects…
but single simple answer. No Magic Pill.
Successful Energy Management

More than just turning off the lights!

- Takes a Champion
- Takes a Commitment
- Takes a holistic, comprehensive program
Successful Energy Management

NOT an quick fix…but a long term commitment

NOT a project…but a program

NOT necessarily capital investment…
but a change in company culture
Management’s Vital Role

More than 50 foundry assessments came to the same conclusion

- Without top CEO / President level support, energy-saving efforts will fail
- Lack of metrics when projects are implemented hampers the next implementation
Successful Energy Management

Common Misconceptions

✓ “Only big companies can do it.”
✓ “Only plants with new equipment can be energy efficient.”
✓ “Large capital budgets are required.”
✓ “We don’t have enough staff.”
✓ “It’s so difficult we would need to hire outside experts.”
✓ “We are already doing everything we can.”
✓ “Everybody manages energy.”
Successful Energy Management

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These are common myths!
Successful Energy Management

Basic Principles (first, easy steps)

- Establish energy accountability and leadership
- Determine energy spending (baseline)
- Measure and track energy usage
- Set goals and look for savings opportunities
- Celebrate and publicize successes (build culture)
ENERGY STAR Guidelines for Energy Management

**STEP 1: Make a Commitment**
- Appoint an energy champion and an energy team

**STEP 2: Assess Your Performance**
- Determine your energy spend
- Measure and track your usage

**STEP 3: Set Goals**
- Such as the ENERGY STAR or Save Energy NOW Challenge
ENERGY STAR Guidelines for Energy Management

STEP 4: Create an Action Plan
- Look for opportunities

STEP 5: Implement Plan

STEP 6: Evaluate Progress

STEP 7: Recognize Achievements
Step 1: Commitment

1.1 Assign Accountability for Energy

- Senior Management support is critical for successful energy management
- A Champion—Appoint an energy manager who will “own” energy for your plant
  - Serves as the go-to person for all energy issues
  - Builds company awareness among employees
  - Sets goals, coordinates energy efforts
  - Establishes metrics and tracks progress
  - Reports progress and successes to both shop floor personnel and management
- The “energy manager” function may be more than just one person
Step 1: Commitment

1.2 Build an Energy Team

- Energy manager is leader of the team
- Establish team sponsor – senior manager
- All areas of the foundry should be represented
  - Operations
  - Maintenance
  - Engineering
  - Environmental
  - Purchasing / administration

- Help: ENERGY STAR Teaming Up to Save Energy Guide
Where to go for help

Energy Resources

✓ AFS Energy Solutions
✓ AFS Energy Webinars and workshops
✓ EPA Energy Star
✓ DoE Save Energy NOW
✓ Recovery Act funding
AFS Energy Solutions

✓ Program for AFS Corporate members
✓ Utility bill auditing, analysis and overcharge recovery
  • Natural gas, electricity, telecommunications, water/sewer, GHG reporting
✓ Competitive bid management & procurement assistance
✓ Energy efficiency audits & solutions
✓ Consultation: Qualified experts to help reduce risk factors in the volatile commodities marketplace.
AFS Energy Solutions

✓ Act as your advocate and consultant
✓ No upfront cost to AFS member (metalcasting or supplier)
✓ Review utility rates and tariffs
✓ Identify billing errors and refund opportunities
✓ Review contracts to ensure best rates and proper billing
AFS Energy Awareness & Education

✓ AFS Workshop on Energy Savings in the Foundry
  • Scheduled for Summer 2011
✓ Internet Seminars
  • available on demand
  • module 1 free on line (http://www.afsinc.org/content/view/385)
✓ AFS Energy Committee
✓ AFS Energy Library
**Energy Star** (US EPA)

- AFS / Energy Star partnership
- Monthly training seminars. New training beginning Fall 2010
- Become Energy Star ‘certified’
- Great community relations tool
- Metalcasting Industry Challenge (10% reduction in 5 yrs)
- Recognition
Save Energy Now (US Dept of Energy)

- Goal: save 25% reduction in energy over ten years.
- AFS is an “ally” helping distribute information and connect SEN to foundries
- Currently signing up “leaders”
Metalcasting / Government Partnerships

Recovery and Reinvestment Act funding

- Co-funding for energy saving projects
- Funds disbursed through individual states
- Watch AFS website for notice of regional conferences
- Main site: [http://www.energy.gov/recovery/funding.htm](http://www.energy.gov/recovery/funding.htm)
Energy saving case studies and ideas
Opportunities

There are opportunities for improvement in all areas of the foundry.

- Molding
- Ventilation
- Compressed air
- Lighting
- HVAC

Melting is biggest source
Demand Control

- Control high demand spikes
- Demand charges are based on the single highest point of use in an entire month
- May be just a portion of the 15-minute period by which utilities measure demand.
- Demand charges can represent as much as 40 percent of a utility bill.
- It is possible to cut costs by 10 – 20 percent
- Typical ROI 12-15 months
Demand Control

Efficiently manage loads through

- real-time information,
- sophisticated algorithms
- user-defined rules
- automation

Participating in utility provider’s demand response program.

- Demand response is a usually voluntary option
- Participants agree to reduce their future demand
- typically when the provider is short on power
Case Study: Iron Foundry

- 10% reduction in energy 1st year
- Individually metered each furnace, compressor, bag house etc
- Computerized monitoring electrical consumption (real-time) for each piece of equipment
- Precise history-KwH each minute
- Identified superheat spike on furnace, compressor waste
- $80,000 initial investment
Sub-Metering

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Case Study: Uncovered Furnaces

- An uncovered 75 kW holding furnace uses 15 kWh more electricity than the same furnace with a cover.
- That’s $10,500/year per furnace!
- One small aluminum foundry found a 25% improvement in melt time.

Exhaust and Ventilation Systems

As much as 40% of energy in manufacturing is related to ventilation, pumps and exhaust.

Typical 20,000 CFM bag-house requires about 60HP.

Poor duct design adds static pressure = more HP.

Improved hood design can reduce 1000CFM and save about $4000/yr.

Poor hood design can add 50-75% to required airflow = 50-75% more HP.
Lighting Case Study

350,000 square feet Plant and Office / Electric Rate = 7 cents per KWH

- 1,110 Metal Halide fixtures replaced
- Cash price $439,200

- 1,110 New high efficiency fluorescent fixtures installed
- Fluorescent lamps last 3 times longer
- Same light output - 50% of the energy
- Can use motion sensors to reduce usage
## Lighting Case Study

<table>
<thead>
<tr>
<th>1,110 Old Fixtures</th>
<th>1,110 New Fixtures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000 watt Metal Halide</td>
<td>8-lamp T5HO Fluorescent</td>
</tr>
<tr>
<td>400 watt Metal Halide</td>
<td>6-lamp T5HO Fluorescent</td>
</tr>
<tr>
<td>2x4 4-lamp T12</td>
<td>3-lamp T8 HBF Fluorescent</td>
</tr>
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<tr>
<td>$348,200 annual energy cost</td>
<td>$153,200 new energy cost</td>
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</tbody>
</table>
Lighting Case Study

**Savings:**

- $195,000  Energy savings from new lights
- $ 15,300  Energy savings from motion sensors
- $ 42,000  Maintenance cost avoidance
- **$252,300**  Total Annual Savings

- $ 73,500  EPACT Federal tax savings
- **$325,800**  Total 1st Year Savings

**Cash price $439,200**
Compressed air

- A typical 100HP air compressor costs $61,600 per year to operate - in energy alone
- up to 50% of it is wasted!
- 25% wasted through air leaks (Leaks are 24/7)
- 1/32 inch diameter hole can cost $210/year

Artificial Demand
15% ($9,240)

Poor Practices
10% ($6,160)

Air Leaks
25% ($15,400)

Production
50% ($30,800)
Compressed air

Keys to efficiency

- Define demand need
- Measure: How much compressed air are you using?
- Does use vary throughout your production schedule?
- What pressure do you really need?
- What quality of air do you really need?
- Regularly check and repair all leaks
- After hour walk-through
- Stop – Listen – Tag – Fix

Foundry Case Study- 600 HP compressor taken off line = $276,000/yr savings
Misuse of Compressed Air

• It costs approximately 5 times as much to deliver air to a stirrer as it does to power the same stirrer with electricity

• Payback to replace a 1/4 HP compressed air driven mixer is two years

• Payback to replace 3/4 HP compressed air driven mixer is one year.
Every foundry can become energy efficient...

- You can do it yourself – the resources are already available
- It saves money that can be used for other areas of the business or to enhance profitability
- Reduces long term risk
- Start TODAY!