Foundry operations have always been varied and complex. The main production steps include:

1. Preparation of raw materials
2. Metal melting
3. Preparation of molds
4. Casting
5. Finishing (Which includes fettling and tumbling)

Based on American Foundry Society, a 15% reduction in energy costs will increase operating profit by an average of 25%.

There are opportunities for improvement in all areas of foundry such as:

- Process changes - improvements in process equipment and technological changes that result in reduced energy consumption
- Energy efficiency of melting and possibility of fuel substitution - maximizing the efficiency of use and selecting the best source of energy (electrical power or natural gas)
- Electric power management - measures resulting in reduced electricity consumption, including power demand and power factor management, and cogeneration
- Heat recovery - reuse of waste heat streams and their integration and prevention of heat losses in all forms (e.g., heat exchanger, insulation)

Many research and recommendation efforts have been aimed at reducing the thermal losses focusing on burner system insulation, control system.

Implementation of better energy management techniques may lead to energy saving of 10% to 15% as well as cost reduction.

Implementing the renewable energy especially solar panel will save a significant amount of energy usage and cost.

IAC Mission

- Identify most significant Energy Efficiency Opportunities (EEO)
- Assessment recommendations categories
- Standard Industrial Classification (SIC) code
- Determine and benchmark the potential energy and cost savings
- Total energy savings including electricity and gas in kWh/year
- Energy cost savings in USD/year
- Implementation rate
- Provide guidance for plant managers, energy engineers and other personnel involved in the energy assessment process
- Foundry operations have always been varied and complex
- The main production steps include:
  1. Preparation of raw materials
  2. Metal melting
  3. Preparation of molds
  4. Casting
  5. Finishing (Which includes fettling and tumbling)

Profile of Foundry Industry

- Energy Use in Metal Casting Industry
- Energy Use in Metal Casting Industry
- Energy Use in Metal Casting Industry
- Energy Use in Metal Casting Industry
- Energy Use in Metal Casting Industry

IAC Energy Management Opportunities

- HVAC systems - Use of optimum temperatures and setting it back in cooling/heating seasons - Installable heat equipment
- Motors - Use of VFD - Use of sagged V-belts and synthetic lubricants
- Compressed air systems - Insulation of air piping and air receivers - Insulation of air receivers - Compressors intake air intake to the outside
- Lighting - Use of high-efficiency lights (LED) - Use of occupancy sensors and photocells
- Heat recovery systems - Recover heat from boiler's stack temperature - Recover heat from air compressor's exhaust
- Building envelope - Install air seals around loading docks - Install plastic PVC strip curtains on doors
- EDMUB - Skilled electrical demand for all peak hours - Install capacitors back to reduce the power factor penalties
- Water - Recycling water to be use for another process (i.e. cooling) - Automation of control processes

Primary Metal Industries

<table>
<thead>
<tr>
<th>Number of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blast Furnace And Basic Steel Products</td>
</tr>
<tr>
<td>Nonferrous Rolling And Drawing</td>
</tr>
<tr>
<td>Nonferrous Foundries (castings)</td>
</tr>
<tr>
<td>Miscellaneous Primary Metal Products</td>
</tr>
</tbody>
</table>

Case Study Result

- Plant A and Plant B Selected to analysis the opportunity of installing PV to reduce electricity cost
- For system design and simulation, a software called SAM is used
  - Plant A
    - Total Area: 864 m²
    - Annual Electricity cost: $296,029
    - The total Module Area: 510 m²
    - Since 3 kW of solar modules requires an area of around 9.3 m² (100 W), the total area of 864 m² is suitable for nearly 312 modules to operate
  - Plant B
    - Total Area: 670 m²
    - Annual Electricity cost: $257,682
    - The total Module Area: 391 m²
    - Since 1 kW of solar modules requires an area of around 9.3 m² (100 W), the total area of 670 m² is suitable for nearly 240 modules to operate

Annual Cost and Energy Saving

Annual Energy savings (indirect) = Annual Cost Savings

<table>
<thead>
<tr>
<th>Plant</th>
<th>ACS ($/year)</th>
<th>Annual Energy Saving (kWh/year)</th>
<th>Implementation Cost ($)</th>
<th>Incentive ($)</th>
<th>Simple Payback Period (Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant A</td>
<td>27,818</td>
<td>604,719</td>
<td>154,500</td>
<td>100,000</td>
<td>3.4</td>
</tr>
<tr>
<td>Plant B</td>
<td>23,014</td>
<td>333,541</td>
<td>149,615</td>
<td>100,000</td>
<td>2.1</td>
</tr>
</tbody>
</table>

1. Many research and recommendation efforts have been aimed at the reducing the thermal losses focusing on burner system insulation, control system.
2. Implementation of better energy management techniques may lead to energy saving of 10% to 15% as well as cost reduction.
3. Implementing the renewable energy especially solar panel will save a significant amount of energy usage and cost.

CONTACT INFORMATION

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Conclusion