Overview of case studies: Thailand

Case study: Thailand – PTT Chemicals (High Density Polyethylene (HDPE) plant) (March 2011)
Summary

- Example of application of the ISO methodology: Chemical company producing high-density polyethylene (HDPE) for use in plastics industry, packaging, electrical appliances, construction industry etc.

- Credits
  - TISI Project team: Ms. Chaowalee Ratanamungmeka, Director of Standardization Promotion and Development Bureau, Ms. Nopporn Klum-Em, Ms. Boonsri Hanesopa (project assistants)
  - Consultant: Mr. Prakob Petcharuttana (safety consultant)
  - Mr. Reinhard Weissinger, ISO, Manager, Research, Education, and Strategy
The company – 1

- Chemical company producing high-density polyethylene (HDPE)
- The company serves mainly the plastics industry
- The company produces one type of product and is a production facility. It was therefore decided to limit the case study to one business function:

Production

- The company operates only domestically and has no export sales.
The company – 2

- The company in its current form was established in December 2005 and started its production operations during 2005
- The design of the company and of its technology processes have been bought from Mitsui and are used unchanged
- The company has close to 1,400 employees
- The annual production capacity is around 270,000 tons of HDPE
Industry value chain

SUPPLIERS
- Natural gas, Ethan, Propan etc.
- Petroleum, fuels
- Equipment

CUSTOMERS
- Chemical industry
- Plastics industry
- Others (textiles etc.)

In scope

Case study: PTT Chemicals
Model of a company value chain (M. Porter)

- **A**: Management & Administration
- **B**: R&D
- **C**: Engineering
- **D**: Procurement
- **E**: Inbound Logistics
- **F**: Production/Operations
- **G**: Outbound Logistics
- **H**: Marketing & Sales
- **I**: Service

Case study: PTT Chemicals
Model of a company value chain (M. Porter)

Case study: PTT Chemicals
Preliminary analysis of the Standards Impact

- The company has a library of several hundreds of technical standards, primarily product and test standards. More than 90% of them are external standards (ASTM, SAE, API, ISO and the national standards of Thailand, TIS). ISO 9001, ISO 14001 and OHS standards (18001) are thoroughly applied since the start of the operations of the company in 2005.

- Based on preliminary analysis and as a consequence of the type of company as a production company, the business function most significantly impacted by standards is Production.

- It was therefore decided to limit the assessment to this business function.
Production (1)

- In the production function standards are used extensively
- A distinction is made between
  - Product standards (containing product requirements)
  - Process standards (mainly management system standards for quality, environment, health, occupational health and safety)
  - Engineering standards (testing and standards for the plant operation)

Case study: PTT Chemicals
Production (2)

- Due to a systematic application of the management system standards, it was possible to improve the performance of the plant, reduce the shut-down times and save on inputs such as ethylene and energy.

- The assessment compares the situation in 2005 (first year of operation) with that in 2009 and relates the improvements to the intensified use of the management systems that re-inforce the other standards (engineering and product standards).
Calculation of standards impacts in production (1)

- Standards impact 1: Increase in plant availability and reliability

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2005</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production (Tons/Year)</td>
<td>200,097</td>
<td>270,244</td>
</tr>
<tr>
<td>Plant reliability (%)</td>
<td>94</td>
<td>99,66</td>
</tr>
</tbody>
</table>

The higher plant reliability/availability resulted in a marginal gain of around **USD 4,6 million** due to increase in output.
Calculation of standards impacts in production (2)

- Standards impact 2: Reduction in non-conforming product (“OFF-specification” product)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Production (Tons/Year)</td>
<td>200,097</td>
<td>270,244</td>
</tr>
<tr>
<td>OFF-Spec (%)</td>
<td>1.64</td>
<td>0.26</td>
</tr>
</tbody>
</table>

The reduction in OFF-spec products resulted in savings of around **USD 0.3 million**
Calculation of standards impacts in production (3)

- Standards impact 3: **Reduction in ethylene consumption**

<table>
<thead>
<tr>
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<th>2005</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production (Tons/Year)</td>
<td>200,097</td>
<td>270,244</td>
</tr>
<tr>
<td>Ethylene consumption (Tons)</td>
<td>1.033</td>
<td>1.024</td>
</tr>
<tr>
<td>Ethylene price (USD/Ton)</td>
<td>700</td>
<td>700</td>
</tr>
</tbody>
</table>

The reduction in ethylene consumption resulted in savings of around **USD 1,7 million**
Calculation of standards impacts in production (4)

- Standards impact 4: **Reduction in energy consumption**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Production (Tons/Year)</td>
<td>200,097</td>
<td>270,244</td>
</tr>
<tr>
<td>Energy index (Kcal/kg PE)</td>
<td>604</td>
<td>487</td>
</tr>
<tr>
<td>[PE = polyethylene]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy index (kWh/Ton)</td>
<td>702.32</td>
<td>566.27</td>
</tr>
</tbody>
</table>

The reduction in energy consumption resulted in savings of around **USD 2.8 million**
Calculation of the total EBIT impact of standards for the selected operational indicators - Production

<table>
<thead>
<tr>
<th>Business Function: Production</th>
<th>EBIT impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased plant reliability (savings)</td>
<td>4.6 MUSD</td>
</tr>
<tr>
<td>OFF specifications (reduction/savings)</td>
<td>0.3 MUSD</td>
</tr>
<tr>
<td>Ethylene consumption (reduction/savings)</td>
<td>1.7 MUSD</td>
</tr>
<tr>
<td>Energy (reduction/savings)</td>
<td>2.8 MUSD</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9.4 MUSD</strong></td>
</tr>
</tbody>
</table>

- This corresponds to around 3% of the annual sales revenue of the company
Thank you for your attention!

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