GOOD HOUSEKEEPING – F3

Energy eco-efficiency opportunities in Queensland Foundries

Simple ways to save energy and reduce waste

Housekeeping activities that keep materials flowing smoothly, the workplace tidy, and equipment working are an integral part of how foundries operate. They often represent the simplest way to reduce energy and other valuable resources, often without significant capital expenditure. For foundries housekeeping is often linked with safety and quality programs that also improve the working environment.

ECO-EFFICIENCY INCENTIVE SCHEMES

Tyco Water at Currumbin is a ductile iron foundry, machining, coating and assembly plant for large diameter pipeline components. The site has developed a monitoring and incentive program that measures improvement in a range of areas including safety, quality, housekeeping and meeting production targets. All areas monitored can be improved by staff. The results of the program are totalled for the site and then a pool of money is shared amongst the employees.

Tyco has also introduced an innovations scheme where employees are encouraged to submit any innovative operational, environmental, financial, safety and quality ideas into a national company database. The ideas are then reviewed by senior management and employees are appropriately rewarded for any ideas that are successfully implemented.

Process flow

Poor layout of process equipment results in productivity losses and energy losses. Developing a simple process flow chart can help to identify a natural process flow and highlight any duplication of effort and waste. A time and motion study can also help to identify wastes such as poor timing sequences or excessive transport distance. A steel foundry in the USA, for example, evaluated its foundry's layout and then reduced its transfer stations from nine to six cutting 86 kilometres of wasted travel a year from within the plant.[1]

Workshop tidiness

Keeping foundries free of clutter reduces the risk of accidents, damage to stock or equipment and maintains a smooth flow of work. A die casting foundry in the USA identified that their hydraulic and heater oil leaked creating a considerable hazard to staff and costing US$72,000 per year in associated clean up costs. The company implemented a housekeeping and maintenance plan where managers were responsible for a specific area of the plant. Due to the success of the initiative the site is now investigating incentives for employees to help identify and address oil leaks throughout the plant.[2]

1 R. Eppich and R. Naranjo, 2007, Implementation of Metal Casting Best Practice, US Department of Energy Page 55 **www1.eere.energy.gov/industry/metalcasting/pdfs/implementation_final.pdf**

2 Eppich et al. 2007, Implementation of Metal Casting Best Practice, Page 40

Before and after 5S[4]

5S SETS THE FOUNDRY IN ORDER[3,4]

PAC Foundry (now trading as CQMS Pty Ltd), located in Maryborough supplies the mining industry with equipment such as dragline buckets. The site implemented a 5S program with the assistance of QMI Solutions. The first step involved "Sorting" – getting rid of excess material and equipment by attaching a red-tag to all items not essential to the process to be either discarded or moved off site.

Step two, "Set in Order" ensured all materials, tools and equipment had a designated location and that all such locations are easy to access. The site identified the need for tool shadow boards, additional racks and storage areas, cupboards for protective equipment, and notice boards for staff communication.

Step three, "Shine" involved setting up new maintenance regimes and communications boards with Key Performance Indicators. All these activities were included in the site's action plan.

Step four, "Standardise" involves putting systems into place that ensure that what has been accomplished remains in effect.

Step five, "Sustain" uses Tool Box Talks to embed the culture of 5S within the company. The new 5S action plan was included in the site's existing Health and Safety Management Action Plan so monthly health and safety inspections could include 5S activities.

Handling and storage of materials

Handling procedures should be implemented and well coordinated to avoid the crossover of activities. Handling should be kept to a minimum, for example, the storing of sand in silos rather than handling straight from bags. If possible, handling should be automated, through the use of equipment such as cranes and conveyors, and materials standardised to reduce the variety of handling units and equipment required.

Preventative maintenance

The energy efficiency and life of equipment depends largely on the effectiveness of the maintenance program. Shut down of production because of equipment breakdown wastes energy as lines have to be kept on standby or molten metal held ready for casting waiting for the equipment to be fixed. Preventative maintenance is typically more effective than reactive maintenance. A regular schedule of maintenance with inspection logs to follow up on repairs is a good management option. Systems should also be in place to encourage staff to identify and report maintenance problems such as leaks in compressed air systems. Computer packages that can help schedule maintenance activities are available from many industrial software providers.

Transport and distribution factors

The transport of raw materials and product to and from foundries is not only costly but also impacts on the generation of greenhouse gas emissions. Strategies to minimise transport and distribution costs and emissions include:

- purchasing materials close to foundry site
- implementing just-in-time purchasing to reduce warehouse costs and the disposal of out-of-date inventory
- combining deliveries
- working with other businesses in the area to combine deliveries
- optimising travel routes
- investigating if two way delivery is possible e.g. raw materials in and product out
- investigating rail freight options
- maintaining trucks to reduce fuel consumption and emissions
- ensuring that trucks are stopped with engines turned off when waiting rather than idle

3,4 QMI Solutions, 5S blitz provide immediate benefits for PAC Foundry, **www.qmisolutions.com.au/article.asp?aid=264**

- ensuring trucks are sized appropriately for the job
- onsite recycling undertaken to reduce transport costs.
- reusing packaging to reduce transport costs.

Hensley Industries in Texas for example, were able to reduce their transport cost from US$60,000 per month to an average of US$13,500 by supplying their foundry sand to a nearby rock and aggregate processor who partnered with the foundry to crush, separate, load, and transport the screened sand solids to the road base facility.[5] Similarly, an engine manufacturer in the UK redesigned its packaging system to use returnable and collapsible packing frames. Fewer than half the return journeys were needed to return packaging to the site.[6]

This series of fact sheets provides examples and suggestions to the modern foundry operator on how to achieve both economic and environmental benefits from eco-efficiency. Visit the project website **www.ecoefficiency.com.au** for more ideas and case studies.

5 Diana Lundelius, 2008, Texas Facility Turns Foundry Sand into Pay Dirt, Environmental Protection, **www.eponline.com/articles/67633**

6 The Foundryman (1999b), Lower costs from reduced packaging, The journal of The Institute of British Foundrymen, Vol 92, Number 1, January, p16-17

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