

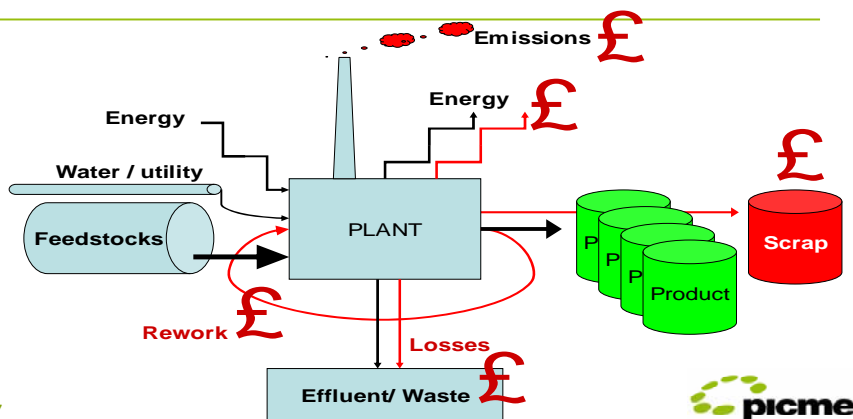


To the House of Lords Science & Technology Committee - Waste Reduction – (In process industries)

The committee requested additional case studies from **picme** which illustrate the potential for waste reduction through the deployment of Lean Manufacturing and Six Sigma methodologies in tandem with cultural change {changes in people's attitudes and behaviours}.



Waste >> Process Ideal



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Simplified waste schematic – presentation to Industrial Environment exhibition, NEC, 11th Mar 08

Product Changeovers in chemical, pharmaceutical and polymer manufacture:

With the major exception of basic bulk chemical / petrochemical manufacture, the majority of processing plants manufacture a range of product types and grades by running production campaigns and then cleaning down their process plant as part of their changeover to the next product. These changeovers can consume both considerable time (and hence lost capacity) and also considerable energy and materials for cleaning. In many instances water is not appropriate for this cleaning and organic solvents must be used (expensive to buy and dispose of).

Example 1.

picme has worked with many process manufacturers to address primarily the duration but also the cost / waste of these cleandowns / changeovers. Typically we have enabled manufacturers to reduce their downtime for changeovers by circa 75 per cent. A secondary effect of this is that much less energy and cleaning medium (solvent or water/detergent) is used. The improvement process involves developing the best cleaning method and the tightest means of controlling this so that it is done

consistently each time. Last year, working with a chemical company in the North East, cleaning solvent usage was reduced by about £100,000 per year.

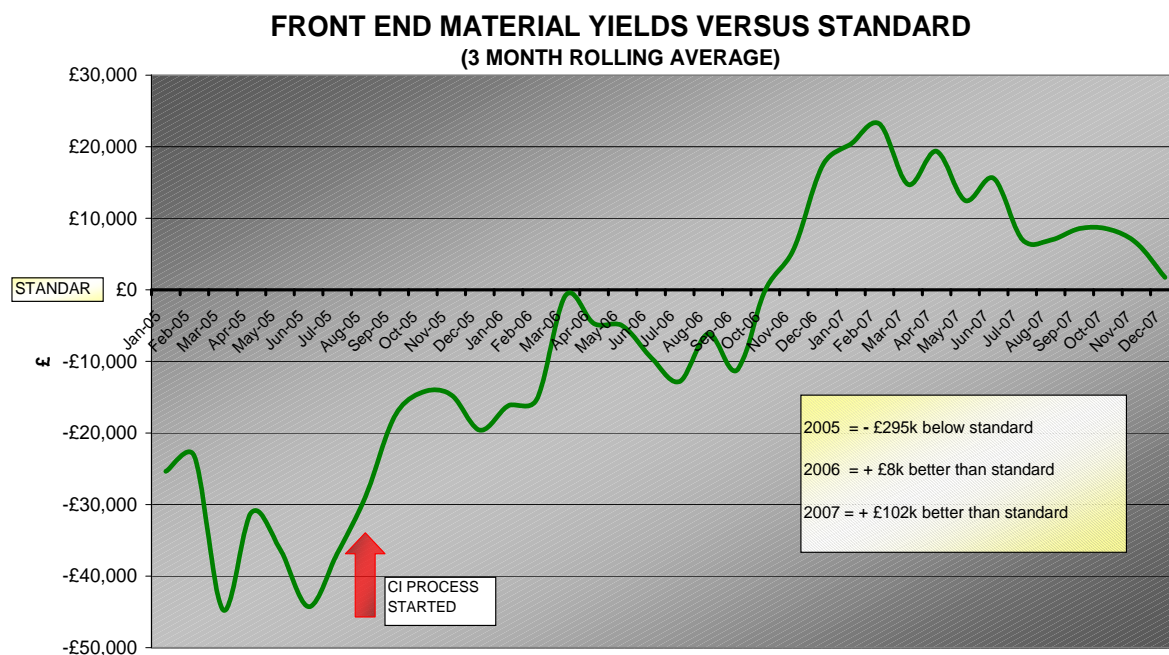
Process Yield improvement

Process yield is the efficiency with which raw materials are converted into saleable product. In chemistry it is not always possible to achieve 100 per cent conversion and there is considerable science underpinning plant and process design to achieve an economic conversion rate without incurring excessive capital cost of additional plant equipment for material recovery and recycle. However, sometimes design yields are not achieved, or can be bettered. Also, over time, plants may have to be adapted to produce new products for which there has been less process development.

picme has helped process manufacturers improve their process yields by helping them combine the practical observations and knowledge of plant operators with the technical knowledge of process engineers and chemists. Often we help them devise and review trials of modified plant operation.

Example 2.

Last year a chemical company in Greater Manchester reported that we had helped them improve their process yields from being £300,000 p.a. below the design efficiency to £100,000 p.a. above the design efficiency. This company had previously believed that achieving design was an inspirational target and not something they could exceed. The graph below illustrates this. Worth noting is that efficiencies peaked in early 2007 and then started to decline. This was partly as a result of the introduction of having to produce new products in shorter campaigns. The plant is now improving its yields again.



This was achieved through revising operating practices, improving operator focus on conversion efficiency, implementing a couple of very minor changes to plant equipment and no capital expenditure. The above example played a big part in reversing the above company's five year slide in profitability (Far East competition).

Example 3.

A large scale continuous flow bulk chemical plant (Europe's second largest facility for producing chlorinated solvents) learnt how to apply Lean Manufacturing and **picme** improvement techniques to the part of its plant designed to recover traces of organics from its effluent stream (any organic effluent that goes beyond this stage is incinerated). The result was to increase organics recovery back into the processing plant by circa £120,000 value p.a.

Energy Improvement

Companies can learn about energy improvement through the deployment of common good energy management processes and energy efficient technology from the Carbon Trust. Many process industry businesses feel that they have now already integrated typical CT recommendations into their processes. However, they still have big energy improvement opportunities associated with the efficiency and productivity of their plant production process. The more quickly materials are produced the less time they spend being heated, moved or cooled. Increasing the output capacity of a plant's current assets will generally involve only marginal additional energy and the energy cost per tonne of saleable output can often be reduced considerably.

picme has worked with many process manufacturers on capacity improvement without involving capital expenditure. A few published examples of achievements are:

- Rohm & Haas, Dewsbury output up 40%
- NPIL Pharma (was Avecia), Huddersfield up 100%
- Johnson Matthey Catalysts, Billingham output up 29%

Some companies who have not required additional capacity, have specifically sought **picme** assistance because of the economic pressure of rising energy costs. The range of outcomes has been wide - £50,000 p.a. to £1million p.a.

Scrap and other Wastes

Six Sigma methodology was originally developed to reduce manufacturing scrap rates, i.e. getting the product right first time more of the time thus eliminating recycle and scrap. Repeat product failures are usually investigated. From benchmarking we can see that half of the chemical industry now has a right first time rate of 98% or better. The other half has, of course, a larger opportunity for improvement. Six sigma or similar and thorough, structured problem solving can virtually eliminate most such waste if pursued relentlessly.

picme had been contracted by Defra to conduct a short study into the causes of waste generated by the chilled foods industry. The study found that certain wastes such as raw material packaging were difficult to avoid as requirements such as hygiene and safe handling must be met. However, the industry produces a considerable quantity of in-process waste and scrapped output. Weaknesses in the industry's skills and deployment of continuous improvement practices were found to be a major contributor. **picme** has worked within this industry and demonstrated that problems blamed on equipment design / technology barriers can be considerably improved through improving operating and management practices coupled with regular structured problem solving.

Why don't companies put more effort into waste elimination?

A question raised by the committee was that it should surely be that manufacturers already have the financial value of waste reduction as a big incentive for waste elimination. This is often true. However, many companies are unable to see the potential scale of their improvement opportunity or their improvement efforts fall short through weaknesses in their approach. The majority of operating sites are also now very resource constrained (few people) and struggle to find time to learn the best ways to improve without external support.

The Manufacturing Advisory Service seeks to help manufacturers of all kinds improve and can often deliver good results but none have the expertise required to bring best practice into some parts of the process industry and many of their people simply do not understand chemical manufacture at all (it is very different from traditional manufacturing). This is the case for having sector specialist "industry forums" like **picme** who were created (with DTI and industry backing) to develop the expertise needed by certain sectors. In some regions MAS will employ **picme** but in others the MAS contract holder views all industry forums as competitors and will not encourage industry to engage. Public sector funding policy should address this issue so that industry is encouraged to use the best support available. **picme** has demonstrated the difference we can make by increasing the process industry engagement with an RDA's (ONE North East) manufacturing improvement support programme ten fold through collaborative working. The RDA commissioned an independent audit of this and the report concluded that the process industry strongly felt the need for sector specialist support and that our credibility with the industry was key.