

General Topics – Managing costs: a focus for the future

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Part 1: Introduction

Competition in all manufacturing sectors is constantly increasing and there is continuous pressure to drive costs down and increase cost management (generally by employing another accountant!). Indeed, cost management is still seen as vital to the success of any manufacturing company in any sector. But are we really managing costs or are we just playing at it?

- Why do we think that if we want to reduce costs then we must start with the labour?
- Why do we have Human Relations Departments and Purchasing Departments but ignore any attempt at Overhead Management?
- Why do we get upset if we see a worker standing still and yet turn away without thinking when a £100,000 machine is not working?
- Why do we always justify machinery purchases on the labour we save and yet rarely analyse how much labour we really saved?
- Why can managers tell exactly how many staff they have and how much material they have used yet it is impossible for them to say how much capital equipment they control or how much of the overheads they control?
- Why do we think, 'Overheads are part of the business. They are central, unmanageable and unavoidable' and then ignore them or assume they are somebody else's problem?

Realistic cost management for the future is not about ignoring huge chunks of cost (such as overheads) but is about trying to understand what we are really doing. Unrealistic costing systems can distort the reality of the business so much that good profitable products are killed whilst unprofitable products are produced. The management of costs is critical to survival and if you want to stay alive then you had better start thinking about it soon or you may not be around to regret it!

1. Cost structures and efforts

The cost composition of products and the rise of overheads

A major factor that is changing in manufacturing is how we need to approach the costing of products. This is because of the rapid rise in overhead costs relative to other costs. Most manufacturing industry recovers the overheads – the indirect costs – by increasing the direct cost of the products by some factor. In the simplest form the total overhead cost for the company is divided by the total number of available direct labour hours (or machine hours) to give an 'overhead rate'. This overhead rate is multiplied by the number of direct labour hours (or machine hours) required for the individual product to give an overhead allocation. This overhead allocation, the cost of direct labour and the cost of direct materials involved are all added up to give the 'cost' of the product.

Overheads are rising, labour content is reducing.

These costing methods grew up in the first half of this century when direct labour was a high proportion of the costs and overheads were lower. Increased investment in machinery has reduced direct labour costs and simultaneously increased overhead costs. The need for 'Customer Service', Quality Management, Health and Safety and compliance with other regulatory requirements has also loaded overhead costs. Despite these changes, the costing systems and our efforts have not changed to reflect these facts. The model we have all grown used to is no longer valid.

In fact, the problem is getting worse as time goes by, the direct labour base continues to shrink and overhead costs continue to rise. This is making the older style cost accounting formulas even more inaccurate. They are ripe for both change and management. The approximate change over time in the distribution of the costs is shown below:

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Cost Category	1960	1986	2006	2016
Overheads	15%	30%	35%	38%
Direct Labour	25%	12%	10%	8%
Direct Materials	60%	58%	55%	54%

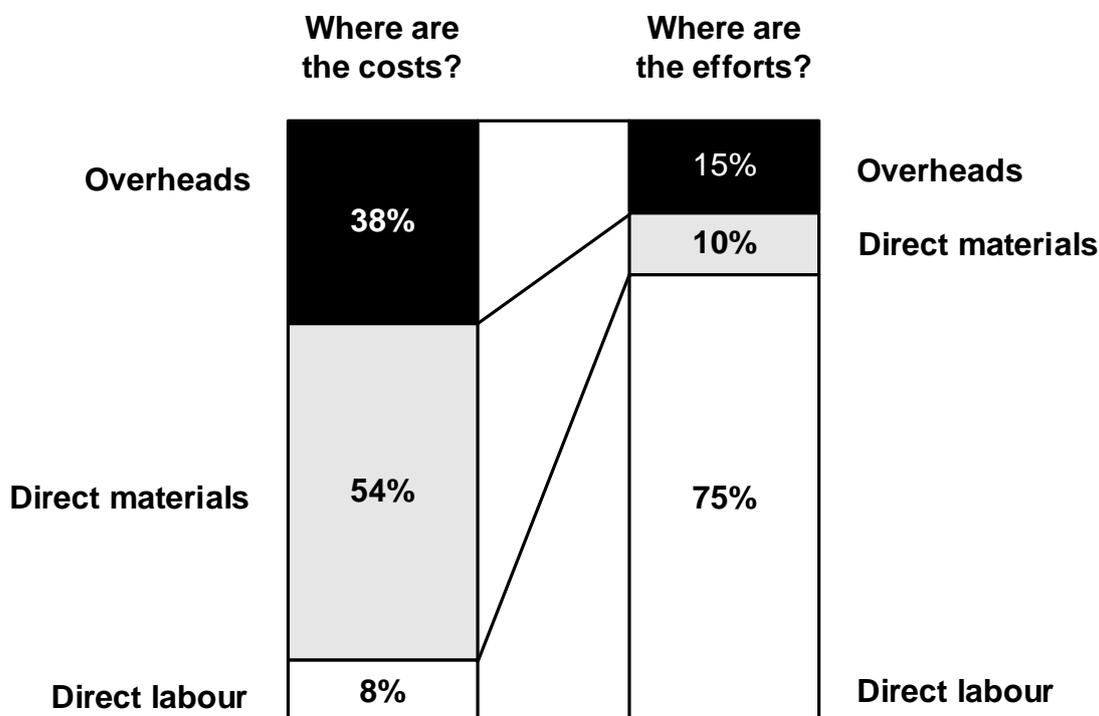
The cost basis of most manufacturing operations has changed over the past 60 years and the process is continuing. The cost of direct labour is now much less than the cost of overheads yet we continue to use direct labour hours as the most common benchmark for cost allocations.

Note: These figures may not be exactly right for your company but they won't be far out.

Even when we did look at 'overheads' we concentrated on the staff (or labour) element of overheads and delayed, made redundant or RIFed (Reduction in Force) management teams so that there is nobody left to do any of the work that can really save us money. Meanwhile our production people are frantically trying to meet the production targets, to complete the new initiatives started by the management (with too few people to complete them) and the real cost contributors are left unchallenged and out of control.

The management efforts

If we accept that the cost basis has changed then where do we currently allocate our efforts at cost reduction? The traditional Work Study Department measures and controls direct labour, the Purchasing Department attempts to control direct materials purchases after the product has been designed and nobody controls the overhead costs. The efforts of most manufacturing companies are shown in the diagram below.



The biggest costs have the least efforts to reduce them – are we trying to get it wrong?

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The labour costs in the UK are among the lowest in Europe (productivity may be another story) and yet we constantly worry about this aspect when we discuss competitiveness on a European scale. We spend most of our time and effort on the smallest component of the cost and largely ignore the other huge chunks of the costs that we ought to be managing. Reducing the overheads by only 10% translates into a product cost reduction of about 3.5% – the same as a labour cost reduction of 35%. Logic tells us that if we want to make reductions then we should start with the big numbers because that is where we can make some big savings. Yet this is not where we start and we wonder why our cost reduction efforts are not as effective as we would like. Whatever happened to Pareto analysis?

In plastics processing the labour costs represent only about 10% of the cost of the product but the overwhelming amount of effort still goes into reducing labour in the process – 75% of the effort is in reducing labour costs and only 15% in reducing overhead costs. This misdirection of effort continues to cost money and waste resources throughout our industry. Our efforts are badly or incorrectly focused because we still operate instinctively on a model that is wrong and sends us in the wrong direction when trying to manage costs.

2. What are the new rules?

Having spent most of this article discussing cost management and hopefully convincing you of the urgent need to re-examine how you look at costs, it is perhaps fitting to end with a simple statement – Cutting costs is not the same thing as becoming a low-cost producer.

OECD reports on productivity show that American manufacturing workers are 45% more productive per head than Britain's, Germany's are 19%, Japan's are 17% and France's are 7%. The real difference is not in the labour cost but in the productivity – it is perhaps not a coincidence that all of the major competitors invest substantially more capital per worker than does Britain. Cutting investment to reduce costs is a short-term measure.

Managing costs can make you a low-cost producer, simply cutting them will not!

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Part 2: Overhead cost management

1. The traditional division of costs

Traditional costing methods allocate the overheads on the basis of production volumes, direct labour hours or machine hours to produce a 'cost' for the product. The problem is that direct costs, such as direct labour, refuse to be variable and are now a small proportion of the total manufacturing costs (see Section 1). It is totally inaccurate to use them to allocate the indirect costs.

2. The ABC's of accurate costing

Changes in manufacturing, such as increased investment in advanced manufacturing equipment, has meant that the overheads are no longer directly related to production volumes or direct labour hours. Calculated costs are distorted in relation to the resource use of the product and the real costs. Taken to the limit, in a totally automated factory, where direct labour does not exist, the traditional direct labour allocation method falls down entirely. Cost accounting and performance measurement should reflect our activities and the way we make the product. They should be used to manage the result rather than simply inform upper management of what happened months ago.

Activity Based Costing (ABC) has been developed to assign overhead costs (or transactions) in more accurate proportions to the products that require them. ABC says that activities drive the overhead costs and are a sounder basis for allocating costs than any of the current methods. Take supplying the automotive industry: A processor sees such work as a large volume contract and neglects the time and structure necessary to get the work. The work involves getting specifications and quotation documents, completing them and additional complex servicing procedures. This needs extra staff to cope with the work and the extra costs appear as overheads. If costs are allocated according to direct labour hours, then the increased overheads drive up the price of the traditional work whilst simultaneously under-pricing the automotive work (which has directly required the extra costs).

Consider the following example: A Sales Office costs £50,000 per year to run and deals with only two products, both of which have sales of £1,000,000 per year and which take exactly the same number of materials and working hours. The only difference is in the sales ordering pattern: Product A sells in 10 equal orders of £100,000 per year to one customer and Product B sells in 1,000 equal orders per year of £1,000 to 100 different customers. Conventional methods say that the Sales Office costs are distributed equally between the products and both accept an overhead of £25,000 per year. This is not sensible because Product B uses at least 100 times as much transaction effort of the Sales Office as Product A.

Conventional wisdom over-prices Product A and under-prices Product B.

ABC concentrates on the 'cost drivers' for the product and says that you cannot use a global overhead figure from direct labour or machine hours to work out a product cost. You must find the 'cost drivers' of the business and product. The product cost is not just related to the volume of the work but also to the overheads necessary to get and produce the particular job. ABC requires more analysis but gives clearer understanding of what a product really costs. If you are not using ABC then the 'costs' used for pricing decisions probably bear little relation to those that actually incurred.

Despite the increasing relevance of the approach, too few UK processors use ABC to give accurate product costing and most rely on the 'global' approach. ABC gives a clear allocation of overhead costs based on results. We can then start to concentrate on managing and reducing the transactions that drive the overheads and concentrate on results achieved – i.e., on effectiveness rather than efficiency. It is totally useless being efficient at something that you shouldn't be doing!

ABC is a tool to focus on how overheads are generated, their value for money and allows us to reduce or eliminate those that do not generate value. The Pareto Principle tells us that 80% of the results in our business will be created by 20% of the activities. To improve overhead productivity, we must focus on and improve the vital 20% and cut or remove the trivial 80%?

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To manage overheads managers first have to accept that these costs are under their control and that they are not simply there to be allocated away and disappear!

3. What are the overheads that we can manage?

ABC is not a universal panacea to costing and overhead reduction – it is a tool to focus on how overheads are generated and the value we get for money. Instead of a ‘shotgun’ approach to overhead reduction, ABC focuses us on activities that add value and allows us to reduce or eliminate those that do not. The Pareto Principle tells us that 80% of the results in our business will be created by 20% of the activities. To improve overhead productivity, shouldn't we focus on and improve the vital 20% and cut or remove the trivial 80%?

To manage overheads managers first have to accept that these costs are under their control and that they are not simply there to be allocated away and disappear.

You are carrying up to 35% of unnecessary costs through overheads costs!

Manufacturing

- Do you have a full ‘Manufacturing Plan’?
- There are only two activities that add value to the product, the rest add waste and cost. Are you adding waste and not value? Take the acid test – walk around your factory and check where people are being efficient at wasting money. Don't make it efficient – eliminate it!
- Value adding and waste activities:

ACTIVITY	ADDING VALUE	WASTE
Moving		✓
Storing		✓
Machining	✓	
Counting		✓
Inspecting		✓
Scrapping		✓
Re-working		✓
Assembling	✓	
Sorting		✓

Are your manufacturing processes adding to your overheads by building waste and complexity into the process?

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- Have you got absolute physical parts control?

This is where parts have no chance to do anything but follow a controlled path through the manufacturing process, people cannot make a decision where parts go next and the next move for parts is physically controlled and restricted.

- Have you looked at the factory layout to decrease the need for product movements?
- Have you looked at introducing cell-based manufacturing to reduce line management?
- Have you identified your bottlenecks or constraints?
- Do your manufacturing staff have a clear idea of the overheads under their control?
- Have you looked at 'Design for Manufacture' to reduce component numbers and make assembly and disassembly easier?
- Have you used 'Design for Manufacture' to decrease the need for support staff?
- Have you introduced component standardisation and decreased product variability to decrease overheads?
- Have you measured the distance travelled in producing the product and reduced this by grouping product processes to give work cells?
- Have you measured the number of operations and total production time in minutes and reduced this (by combining operations) to give quicker flow and throughput?
- Do you use visual controls for performance measures?
Monitor quickly, display rapidly and improve constantly.

Stocks

Money tied up as stocks and work-in-progress should be included in the 'cost of production' but the accountants tend to treat them as assets.

- Have you identified the hiding places for WIP and removed these to give clarity of work flow?
- Have you reduced supplier order quantities with forward ordering for maximum discount and regular but smaller deliveries?
- Have you improved supplier delivery performance?
Measure, monitor, score and tell them. Establish good relations to improve performance.
- Have you reduced stores holdings to hold only essential stocks in priority order?
- Have you looked at 'Stockless Production'?
- Have you reduced inventory (as stocks or WIP) in all areas? Stock is evil!
- Have you reduced set-up times (which drive Economic Batch Quantities, WIP and stocks) by methods such as Single Minute Exchange of Dies (SMED)?
- Have you reduced paperwork at all stages to give rapid response?

Quality costs

This is the ultimate overhead that should be reduced to reduce costs and improve customer satisfaction:

- Get rid of inspectors.
Make operators responsible for their own work and the quality of that work.
- Do you collect any of the standard Quality Cost information?
- Do you have any plans for reducing the cost of quality?
- Have you removed Quality Control (after the event) and substituted Quality Assurance (before the event) by using SPC or other techniques?

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Staff overheads

These are the support personnel costs of the activities that you carry out

- Have you looked at Business Process Re-engineering (BPR) for the business activities?
- What is the ratio of indirect/support staff to direct production staff?
- Does new equipment reduce direct labour but increase indirect labour to support the machinery?
- Does new equipment really result in labour reductions? This is especially vital if direct labour reduction was used to justify the investment.
- Do you use performance measurement recording for administration processes as well as for production? If not then why not?
- Reduce order process time by simplifying or using computer systems.
- Do you really need all those layers of supervision?
Reduce them to give direct and simple control.

Energy

Energy use is a controllable overhead despite what you think.

- What were the bills last month and what did you do about them?
- Have you thought about and investigated competitive pricing for energy supplies?
- Have you thought about 'peak demand lopping' by internal generation?
- Is there any control over the use of electricity?
- Are machine temperature settings optimised?
You heat plastic up to process it and then it needs to be cooled down – energy can be wasted at both ends of the cycle.
- How does your processing energy use (in kWh/kg) compare with the industry average?
- Have you carried out an energy audit?
- Do you have an energy management plan for the future?

Compressed air

Savings can be high because only about 5% of the energy used at the compressor becomes available to do work at the point of use:

- A 3mm hole in a 7-bar compressed air line costs about £2000 per year.
- Energy consumption varies as the square of pressure so increasing the supply pressure from 2 to 4 Bar requires four times as much energy.
- Compressed air use can often be reduced by 30% by simple management measures.

4. Overhead cost management

There are other overheads that can and need to be managed but we must accept that overheads are part of each manager's responsibility and provide the manager with the incentive and the information to drive down the costs.

A manager should be held responsible for, and evaluated on, the costs that are under his control.

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Without overhead management, any attempt at cost management is bound to be both partial and inevitably ineffective. Effective cost management depends on the measurement and improvement of overhead productivity and will be one of the keys to success in the future. Ignore it at your peril!

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Part 3: Materials and design cost management

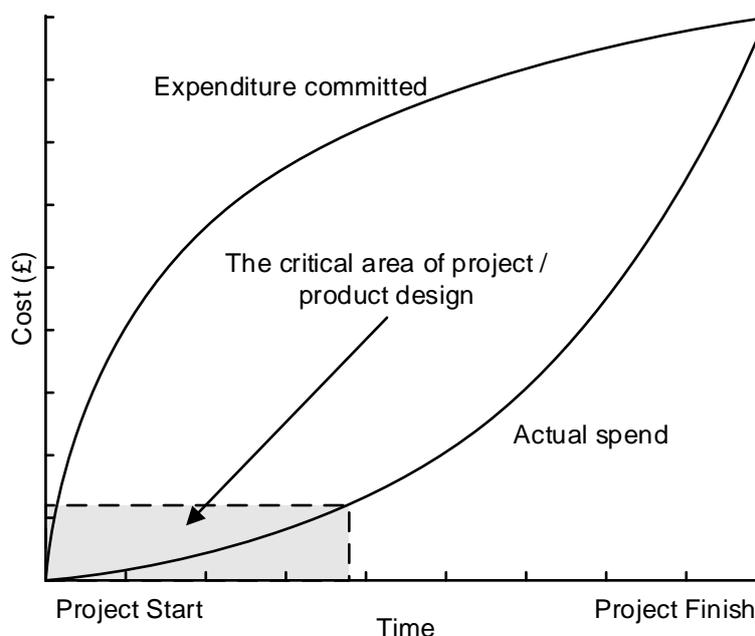
Plastics processing is a conversion industry where we convert raw materials to a finished product, we rarely add much to the product in terms of additional items apart from the forming process. This means that direct materials are inevitably one of the largest cost elements of the finished products and yet it is again one of the least attacked. Depending on the type of product the raw materials cost element will vary from 45% (technical products) to 80% (mass produced products). Concentrate on this large cost element to get rapid and significant payback.

1. Design and materials cost reduction

The first lines on the paper

Product designers and their assumptions influence product cost from the very start of any project. The initial stages are where the very basic decisions on the shape and design of the product are taken. The 'simple and obvious' decisions such as the type of material, the production method, the wall thickness and the rough outline dimensions effectively define the overall cost of the product. Once you have decided the length, width, height, wall thickness and material type at least 80% of the product cost is already bolted into place!

With any design project the first 15 to 20% of the project involves little actual spend but defines and commits 80 to 90% of the final product cost.



Expenditure committed and actual spend for a typical product.

Care and innovation at the start of a project can dramatically reduce product costs but there is almost always an unseemly haste by product designers to get past the critical first stage and on with the more exciting stuff of actual design. There are two simple reasons for this:

- Product designers rarely understand the costing systems used and how their decisions affect the cost (or they are not interested or not told).
- Accountants rarely understand the technical aspects of product design and how they can influence the design at an early stage rather than just calculating the cost after it is all finished (or they are not interested or not told).

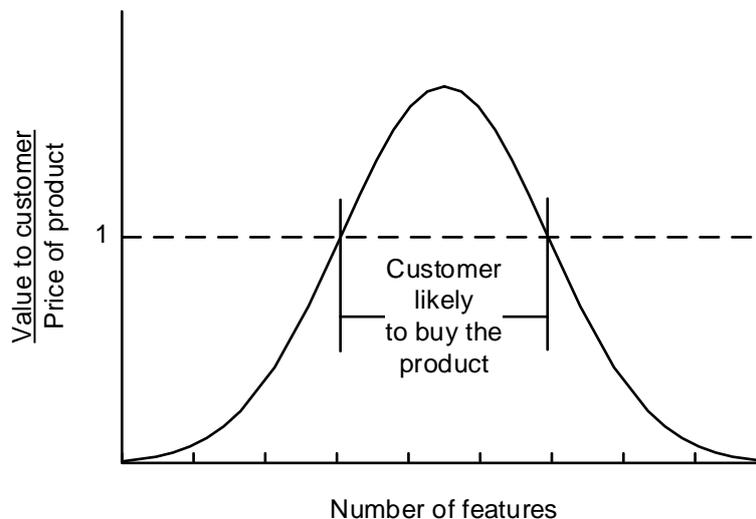
If product designers do not understand the implications of their decisions and accountants do not understand the reasons for the decisions then we have a recipe for disaster and designs which simply use too much material and cost too much are the result.

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2. The product features

Excessive product features are often included by designers because they have been inadequately briefed on what the customer will pay for the features. Cost-effective product design always starts with a very clear brief of what the customer wants (and will pay for) and what would be nice to have but will not achieve any higher price in the market. Extra unwanted features generally increase the design and development cost (and hence both the product cost and price to the customer) but do not increase the price the customer is prepared to pay.

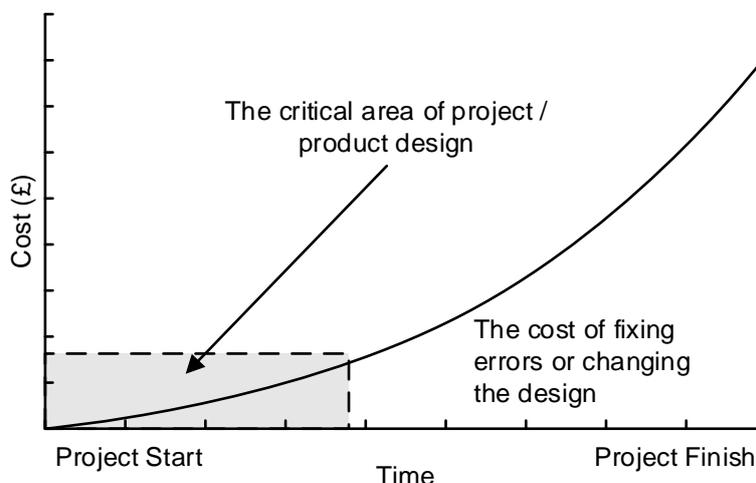
Customers will buy a product provided that the value to them is greater than the price – additional features which add no perceived value to the customer almost inevitably add cost to the product and do not increase the sales of the product. Over-design is rarely free and adds costs which cannot be recovered in the price.



The effect of over development and too many features.

3. The costs of getting it wrong

The cost of fixing any errors or mistakes or making other changes to a design escalates dramatically as a project proceeds. Changes in the initial stages are relatively easy to carry out but the cost of any change rises rapidly as the actual expenditure takes place. Care and innovation at the start of a project reduces the changes necessary and the costs of development. Product development efforts must be concentrated more in the early part of the project to get the basics right.



The costs of getting it wrong during product development.

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Current products and materials cost reduction

Materials cost reduction in current products is difficult to achieve and some general approaches are:

- Value analysis – This provides a formal method for product assessment and cost reduction strategies. Value analysis needs open accounting information to be effective and to provide the focus for the cost reduction efforts.
- Retooling – It is rare to retool simply for materials cost reduction but the calculations sometimes show that even this ‘unthinkable’ option is profitable over a short time scale – do the calculations if in doubt. When retooling is needed for other reasons, it is logical to seek materials cost reductions rather than simply purchasing a replacement tool.
- Scrap reduction – Scrap (with the exception of a small amount of start-up scrap) is generally the result of inadequate production control and presents an opportunity for materials cost reduction. One of my favourite quotes is ‘We don't have any scrap because anything that is not right is reground and the material is used again’. Scrap, even when reused, has consumed time, power, effort and has created unnecessary costs in the business. Machine start-up parameters and running control are key points for scrap reduction. Many scrap problems arise from ‘tweaking’ of the machine by staff on shift changes – establish set-up sheets (using Taguchi analysis to determine the optimum parameters), keep set-up sheets up-to-date, ruthlessly follow the set-up sheets, introduce Statistical Process Control and you will be well on the way to reducing scrap.

4. The materials team and actions

Some key actions in materials cost reduction in either design or production are:

- Set up a ‘Materials Team’ – to include Design, Purchasing, Production and Accounts to ensure that all materials are used cost-effectively. A 1% reduction in purchasing spend has the same effect as a 10% increase in sales volume.
- Provide the Materials Team with accounting information to allow them to do their job.
- Reduce the number of suppliers and involve them in the materials team actions.
- Ensure that a full Product Design Brief, including essential and desirable features, is available to designers and the materials team.
- Ensure that all new product designs are subjected to a full materials design and usage review before the design is signed off.
- Institute Statistical Process Control on every product.
- Use Taguchi methods to find the optimum process parameters and stick to them!

The materials cost is one of the largest costs in plastics processing and yet there are few formal attempts to manage these costs in many processors. The attempts that are made generally involve ‘variances to standard’ without real attempts to reduce the absolute usage. When materials represent between 45 and 80% of the cost there is a lot more to do than simply report the variances!

5. Final words

We hope that you have enjoyed reading this short series and that it has stimulated some ideas about what managing costs really involves. It is not simply concentrating on the labour element and laying off workers. It is about ensuring that your company actually works to minimise costs in the key cost areas such as overheads and direct materials. It is not solely about what direct labour is doing – in fact it has very little to do with them. Not at all what you first thought of?

A final thought from Mario Andretti ‘If things seem under control, you're just not going fast enough’.