ACHIEVING BEST PRACTICE IN YOUR BUSINESS

Quality, cost, delivery: measuring business performance
To stay ahead of the market, it’s crucial to monitor your company’s performance, however big or small your business is. Once you’ve gauged how well you are doing, you can start improving the way you do things – and boost your profits.

This brochure is for: Companies that want to take a fresh look at their business processes, with the goal of increasing profitability and delivering exceptional customer service. Companies outside manufacturing can adapt the principles to their industry.

It covers: The key roles of quality, cost and delivery (QCD). This approach puts your whole business under the microscope and aims to raise standards in seven key areas: quality of finished products; on-time delivery; staff productivity; stock levels; efficiency of equipment; added value and floor space utilisation.

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Read the steps that are relevant to your business.

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What is QCD?

The QCD approach has been widely adopted by many sectors in manufacturing, from textiles to chemicals.

It was originally developed for the car industry to help British companies evolve into world-class operations. The organisation that created QCD is the Industry Forum of the Society of Motor Manufacturers and Traders (SMMT).

If you are in the service industries, you can adapt the principles of QCD to your sector to measure how efficiently you work and bring about business improvements.

HOW CAN MY COMPANY BENEFIT FROM QCD?

The benefits of the Quality, Cost, Delivery approach include:

FOCUS
Using QCD can clarify your priorities for improving your production process or service delivery – whichever sector you operate in.

SIMPLICITY
The measures give you the big picture, simplifying even a complex production process and identifying a straightforward route for improvements.

FEEDBACK
You can use the tools to assess the results of any changes you make to your production process or service delivery. QCD provides rapid feedback – it gives you the facts and figures you need to make meaningful decisions.

BENCHMARKING
QCD tells you how well you are currently doing, to help you decide which part of your business or production process to improve. The data gives you a standard to set targets for the future. Once you’ve decided which activities to improve, you will need to review them, to establish why you do things in a certain way.

THE BOTTOM LINE
Using the techniques to monitor your performance and set goals will noticeably improve efficiency. It can bring rapid improvement and increased profits.

The case studies in this booklet show how QCD has helped businesses tighten up their operation and improve their bottom line.
Not Right First Time

Not Right First Time (NRFT) looks at the quality of your products or services – how often do they meet the customer’s specification?

You can put NRFT into figures, by measuring the number of ‘defective parts per million’. Take the number of defective products and divide it by the total quantity of products you supplied. Multiply this by $10^6$ to get the number of parts per million – the standard way that industry looks at the number of defects.

Companies in service industries need to look at factors such as the number of customer complaints, the number of returns or cancelled contracts.

MEASURING NOT RIGHT FIRST TIME

There are two points at which you can measure NRFT – before it reaches the customer (internally) and after it reaches the customer (externally).

If a company produces two defective components in every thousand, this translates into 2,000 parts per million.

"See the working example below."

Once you know this figure, you can set targets for improvement – you should aim for below 100 parts per million, which is the industry best practice.

Regardless of which industry you are in, getting things right first time and every time, leads to a lower defect rate, improving quality and customer satisfaction.

Working example:

```
NOT RIGHT FIRST TIME  = (2/1000) X 10 X 10 X 10 X 10 X 10 X 10 = 2,000 DEFECTIVE PARTS PER MILLION.
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Checklist

**COLLECT DATA**
- Measure the amount you waste – not just waste materials, but wasted time and effort.
- Do you have the right data to identify problems in the production cycle or the general workflow?
- Consider getting external help and advice, for example from Business Link (or its equivalent in Scotland, Wales and Northern Ireland), consultants or industry bodies.

**COMMUNICATE**
- Once you’ve identified where the problem lies, communicate this to all relevant staff – you need everyone to understand the importance of getting it right first time and the effect on the bottom line.

**ANALYSE**
- Brainstorm a solution. Ask yourselves why you carry out activities in a certain way. Is it simply because you’ve always done it that way?
- Consider an alternative way of doing things.

**ACT**
- Put in place improvement activities.
- Set goals – short term and long term.
- Make staff responsible for improvement.

**MONITOR**
- Monitor improvement activities.
- Take measurements to make sure they’re working.
- Set new goals for continuous improvement.

See the case study on NRFT on page 18.
Delivery Schedule Achievement

Delivery Schedule Achievement looks at how well a supplier delivers what the customer needs, when they need it.

The goal is 100% on-time delivery of the correct goods or services. Businesses need to achieve this in a cost-effective way, without resorting to expensive special deliveries or overtime payments. Neither should you incur increased costs for stock, scrap or reworking to meet a deadline. If you do end up with extra costs, it shows you are not in control of your processes.

MEASURING DELIVERY SCHEDULE ACHIEVEMENT
In one week, a company makes 100 deliveries. Of those deliveries, five are late and three are of incorrect quantities. To measure how well you’re delivering what the customer needs, you need to work out the ratio of correct to incorrect deliveries.

See the working example below.

Working example:

\[
\text{DELIVERY SCHEDULE ACHIEVEMENT} = \frac{100-(5+3)}{100} \times 100 = 92\%
\]

Checklist

**MEASURE**
- Collect data to measure the ratio of correct to incorrect deliveries.

**ANALYSE**
- Use brainstorming to identify bottlenecks and inefficiencies that are affecting delivery.
- Ask staff to come up with solutions, not just problems.

**TEST**
- Test new ways of working.
- Refine them with feedback.
- Formalise them in company policy.

**COMMUNICATE**
- Explain to staff the effect on the bottom line of bottlenecks and inefficiencies.
People Productivity

People Productivity (PP) looks at how long it takes (in staff hours) to produce a good quality product or deliver a satisfactory service – a necessary measurement for every business.

To measure it, you need to take the number of good units and divide it by the total number of direct operator hours (direct operators are staff who are vital to the production process). This will give you a measurement of the number of units per employee per hour. Units could be physical products, the number of sales or the number of customers serviced.

Measuring PP helps you focus on a major product cost – staff salaries. Once you know how long it takes to produce each product or carry out a service, you can look at ways of making staff more productive.

See the working example below, where a mobile phone factory has 30 staff making 60 phones an hour.

To improve PP, you have two options. You can either increase the number of good units each member of staff makes (or the number of sales they make, etc) or reduce the amount of time they need to make each unit. This could reduce your overtime bill, making your company more profitable.

You may need to reassess the way people work, making sure that every action counts; reducing wasteful work; avoiding overproduction and standardising the way things are done. If staff have spare time whilst an automated process completes, look at ways of using this time productively.

MEASURING PEOPLE PRODUCTIVITY

There are three kinds of work:

- Work which adds value in line with the customer’s requirement
- Work which does not add value, but is necessary
- Work which is wasteful and counter-productive.

A high value for PP can only be obtained when:

- most of your employees’ work is adding value to the process
- non-value added work is reduced to a minimum
- waste is eliminated.

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MEASUREMENT

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MEASURE

- Get staff to record cycle times to provide a benchmark for improvement.
- Use a camcorder to capture the way staff currently do things.

ANALYSE

- Watch the video to spot wasteful actions.
- Use brainstorming techniques to question the traditional way of doing things and identify new ways of working to reduce waste.

TEST

- Test new ways of working e.g. build a mock-up of a production cell.
- Pilot new practices with one team, and make modifications according to staff feedback.

IMPLEMENT

- Roll out new ways of working across the factory.
- Set targets for speeding up cycle times, and make staff responsible for hitting targets.

MONITOR

- Monitor the financial results of new ways of working and other improvement activities.
- Use questionnaires to get feedback from staff.
- Use the information to constantly improve, and communicate successes to staff.
Stock Turns

Stock Turns (ST) looks at the ratio of raw materials to work-in-progress and finished goods. The more quickly you convert raw materials into finished articles and sell them, the more quickly they bring in valuable sales revenue. It also frees up valuable storage space for the next job.

Your ST ratio will reveal how effectively you are using company funds and how much control you have over your production process. If you have tight control over your manufacturing processes, you only need to keep small quantities of raw materials and work in progress. As your company becomes more efficient, you may find you can respond faster to customer demands and work to tighter schedules.

You may want to look at moving to just-in-time manufacturing, where you keep the minimum amount of raw materials, work in progress and finished products. You rely on suppliers to provide materials as and when needed, and deliver goods to customers only when needed.

MEASURING STOCK TURNS

There are three streams of stock to measure:
- incoming materials from suppliers
- work in progress flowing through the factory
- finished goods that are ready for delivery to the customer.

To work out your ST ratio, you need to know the annual sales turnover of a product line and the amount of stock you hold.

In the working example below, annual product sales are £20,000 and the value of current stock is £5,000. Current stock includes work in progress, finished goods and raw materials.

The higher the number the better. A high stock turn means that you are working your money hard. A low figure means your money is tied up in stock, and you therefore have less funds to invest in other parts of the business. The more stock you keep, the higher the risk of it becoming obsolete or damaged.

In process manufacturing, the industry average for stock turns is 12-15. In retail, where goods are perishable or go out of fashion quickly, the average is higher.

WORKING EXAMPLE:

\[
\text{STOCK TURNS RATIO} = \frac{20,000}{5,000} = 4
\]

For more information on just-in-time and supply chains, visit the Achieving best practice in your business web presence at www.dti.gov.uk/bestpractice/
Overall Equipment Effectiveness

Overall Equipment Effectiveness (OEE) tells you how well your business is using its equipment and staff.

MEASURING OVERALL EQUIPMENT EFFECTIVENESS

There are three key points to look at: availability, performance and quality.

1. To work out availability for a machine, you need to look at the amount of unplanned downtime. If you plan to run a machine for 100 hours a week, but it’s only up and running for 50 hours, availability is 50% (50 hours divided by 100 hours).

2. Performance compares the actual output with the ideal output. If a process is supposed to take five minutes, but instead takes ten minutes, then performance is running at 50% (5 minutes divided by 10 minutes).

3. To work out quality, you need to compare the number of good parts produced with the total. If a company makes 40 components per hour and only 20 are of saleable standard, this means quality is running at 50% (20 saleable components divided by 40 components).

Including these three figures in the equation below will give you the overall equipment effectiveness, expressed as a percentage. The higher the percentage, the better.

\[
\text{OVERALL EQUIPMENT EFFECTIVENESS} = \left(\frac{50}{100}\right) \times \left(\frac{5}{10}\right) \times \left(\frac{20}{40}\right) \times 100
\]

\[
\text{OVERALL EQUIPMENT EFFECTIVENESS} = 12.5\%
\]

ANALYZE

- Assemble staff from across the business and conduct a problem-solving session.
- Ask staff to identify bottlenecks, causes of downtime and factors that influence cycle times.

PRIORITIZE

- Decide which problems are the main cause of downtime, and which solutions will bring the most benefit to the business.

ACT

- Set goals for efficiency improvements and make staff responsible for achieving them.
- Get staff to make regular measurements to check goals are reached.

To find out about tools and techniques for analysing performance and brainstorming problems and solutions, see [www.dti.gov.uk/bestpractice/operations/quality.htm](http://www.dti.gov.uk/bestpractice/operations/quality.htm).
Value Added Per Person

Value Added Per Person (VAPP) shows how well people are used to transform raw materials into the finished product. To calculate VAPP, you need to know the price tag of the finished product and the cost of the raw materials. You also need to know the number of direct employees – those who are vital to the production process.

MEASURING VALUE ADDED PER PERSON

In the working example below, a company makes video recorders that sell at £60, the components cost £10 and 20 staff are needed to assemble the products.

The higher the VAPP, the better. A high VAPP means you are making the most of staff time, minimising waiting time and making every action count. If you analyse the way staff work, you may be able to combine certain tasks, or use time that staff would normally spend waiting for an automatic process to finish.

\[
\text{VALUE ADDED PER PERSON} = \frac{60 - 10}{20} = \£2.50 \text{ per person}
\]

Working example:

MEASURE
- Ask staff to fill in time sheets to show how long they take to complete each cycle.
- Use a camcorder to record how staff carry out their jobs.

ANALYSE
- Analyse product cycles. Look at operator downtime – whilst operators are waiting for a machine to complete a task, can you get them to do another? Analyse the video to spot wasteful activities, for example unnecessary movements.

TEST
- Test new ways of working before you change the shopfloor layout – build a mock-up of a cell and carry out a simulation.
- Make modifications according to staff feedback.

IMPLEMENT
- Make sure all staff are on board.
- Communicate the reasons for new ways of working – the effect on the bottom line.

MONITOR
- Be open to feedback.
- Take measurements to assess how effective new ways of working are, and continuously improve performance.
Floor Space Utilisation

Floor Space Utilisation (FSU) measures the sales revenue generated per square metre of factory or office floor. Factory or office floor space is an expensive fixed cost. In manufacturing, it’s reflected as a proportion of the price of each finished product.

You can use FSU to look at the revenue for an individual area or for the whole factory or office floor space. In order to increase the revenue per square metre, you need to reduce the amount of floor space you use. This means rethinking layout and, for example, eliminating inventory to reduce storage areas. If you reduce the amount of space you use, you may be able to expand without the expense of acquiring or leasing new buildings.

In manufacturing, one way of reducing floor space is to implement lean manufacturing, where you keep stocks of raw materials to a minimum, and rely on suppliers to deliver materials as and when needed.

MEASURING FLOOR SPACE UTILISATION
In the working example below, a company owns 2,000m² factory space. The sales turnover is £10,000 a month. Divide the turnover by the amount of space to work out floor space utilisation.

Working example:

FLOOR SPACE UTILISATION = $\frac{10,000}{2,000}$ = £5 per m²

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Checklist

ANALYSE
• Look at the layout and the way people work. Can you bring two processes closer, to link or merge them and save space?
• Look at what’s vital to the production process and what you can get rid of or move elsewhere.
• Use external expertise to help you see the big picture.

DISCUSS
• Get staff together from the different business areas to generate ideas for improvement.
• Can you introduce just-in-time manufacturing to reduce the need for stocks, work in progress and finished product?

TEST
• If practical, test a new layout beforehand – mock up a production cell and check the new layout works.

MONITOR
• Take measurements to monitor the effect of improvements on the business – and keep on improving.

To read more about just-in-time manufacturing, visit http://www.dti.gov.uk/bestpractice/assets/jit.pdf. For more information on FSU, see case study on page 22.
OBJECTIVES
Innovia’s factory in Cumbria makes plastic film for packaging and labels – it produces brands such as Cellophane and Propafilm™. The raw material is wood pulp, which comes out at the other end as finished reels of cellophane film.

Production methods haven’t changed since the 1930s, and the company was concerned that a certain level of waste had become an accepted part of the process.

The first step was to find out where the waste was occurring and the reasons for it. The manufacturing team realised they didn’t have enough detail to pinpoint this and needed outside help.

Innovia contacted PICME, a government-funded organisation dedicated to improving process manufacturing. The organisation’s engineers worked with Innovia staff to gather data and analyse it according to the NRFT method of measuring.

SOLUTION
The team identified where the biggest gains could be made and where they should target their efforts. Two relatively simple changes significantly reduced waste. Deciding on standard settings for machines made it easier to plan customer orders, and minimise the amount of finished product that got thrown away. And getting two departments to liaise more closely meant customer orders were fed through promptly and the sheet of film was cut to the right size, so less of the finished product got thrown away.

Innovia’s team used problem-solving techniques to get this result. “Staff have to learn how to measure and analyse data. They learn tools and techniques, such as brainstorming and cause and effect diagrams,” says Richard Story, Works Manager, “We put most staff through the master class and they get an NCVQ in business improvement techniques.”

Video has proved an ideal tool for analysing the way things are done. “We can go through it second by second looking at every action, and look at what could be done differently,” says Richard.

RESULTS
Shop floor staff now understand the effect of waste on the bottom line, as they have carried out teamwork exercises where they talk to the company accountants and work out what the figures are themselves, rather than just being told by management.

The exercises have led to a change in attitude. Staff are now proactive, spotting problems before they arise. “We did team exercises to build staff confidence so they feel they can make suggestions for improvement. It’s about making shopfloor staff see that they can make a difference. Nine times out of ten, they think it’s up to the management to make a suggestion on improvement. Our teamwork exercises encourage good ideas,” says Richard. An added benefit is increased job satisfaction – staff feel empowered.

THE LAST WORD
The business’s waste reduction programme has delivered continuous improvement over the last two years, and has been introduced to a second plant in Bridgewater, Somerset. The company has reduced the amount of material being thrown away by 2% a month, saving several hundred thousand pounds.

“Innovia Films used Not Right First Time (NRFT) measurement to dramatically cut waste in its production process."

“Getting outside advice helped us challenge and re-examine our accepted performance norms,” he says. “Having implemented the necessary changes, we’ve lifted our capability.”

RICHARD STORY – MANAGER
Marley Plumbing and Drainage

Best practice in: QCD
Sector: Manufacturing
Size of firm: 550 employees
Location: Lenham in Kent, Bedford and Uddingston near Glasgow
Website: www.marley.co.uk

OBJECTIVES
Marley Plumbing and Drainage manufactures plastics components for the building trade. Unlike many other companies in its sector, Marley produces and sells its product on the open market, rather than acting as a subcontractor for a client order. The company’s approach brings with it risks – if the company holds too much stock and inventory, it means cash is tied up and is unavailable for investment in other areas. Marley’s goal was to change to a ‘pull system’, where customer demand drives production. It stops overproduction as the company only makes what the customer needs. This approach is known as lean manufacturing – where everyone in the supply chain delivers just in time. It reduces uncertainty in the supply chain and reduces the need for expensive buffer stocks.

In addition, the company was aiming for more effective use of machinery. The goal was to speed up changeovers on the injection moulding production line, improving Overall Equipment Effectiveness.

SOLUTION
Marley got outside help from manufacturing industry body PICME. An external team worked with staff from across the business to analyse current practice and brainstorm solutions.

Using historical and current data, Marley predicted the likely demand for its products, so that shop floor staff could start manufacturing products in line with customer demand and introduce lean manufacturing.

RESULTS
The pull system has helped increase stock turns, increase value added activity and eliminate waste from the production cycle. Tool changeover time is now 46% quicker, a far more efficient use of equipment.

Cashflow has improved. Managing director Chris Nunn feels lean manufacturing is of great benefit to the company as it releases cash for investment. He says: “Most people typically think of investment only in capital terms – plant and machinery. But the truth is that a pound invested in stock is the same pound that could be invested in machinery or plant. Investment in machinery and plant can generally provide a return. Money tied up in stock cannot.”

Chris believes the move to lean manufacturing will help the company compete in the marketplace. He says: “As the market changes, with a smaller number of ever bigger buyers, it becomes ever more competitive for suppliers and increasingly difficult to pass costs on.”

When profits are under pressure, the first reaction can be to look for technical solutions – to try to produce better products or achieve faster cycle times. Chris, however, believes it’s key to step back and see where you can achieve the most gains. He says: “The truth is that the pure injection moulding element is only a very small part of what lean manufacturing is about. The tougher solutions of organisational and cultural change are those that provide the biggest benefits.”

THE LAST WORD
The improvement activities have led to a positive change in company culture. “Most of this work is about relationships between people, departments and job functions. A number of pleasing side benefits have arisen from this recent work: departments are much more aware of each other’s role now, and a questioning attitude in our people is now present, together with a desire for change,” says Chris.

He adds: “These early achievements are about starting the business off in a new direction, and we plan to provide a system of training and mentoring that will spread the practice throughout the business. I am hoping that within a couple of years we shall have captured most of the quick wins immediately available to us.”

“...The truth is that the pure injection moulding element is only a very small part of what lean manufacturing is about. The tougher solutions of organisational and cultural change are those that provide the biggest benefits.”

CHRIS NUNN – MANAGING DIRECTOR

Marley Plumbing and Drainage used Stock Turns and Overall Equipment Effectiveness to cut costs and strengthen its market position.
Daniels Healthcare used Floor Space Utilisation (FSU) to reorganise its factory layout and avoid a costly move.

Daniels Healthcare makes specialist containers for waste disposal in hospitals and clinics. The company has two sites, a manufacturing plant in Kidlington, Oxfordshire and a head office in Tring, Hertfordshire.

OBJECTIVES
Due to increasing customer demand, the company needed to expand but had run out of space on its existing manufacturing site. The company was keen to make more of its existing space to avoid a costly expansion.

Operations Director Shaun Hazlett says: "We had very pressing issues of space management, workflow and work organisation to resolve. These concerns were people intensive, affecting nearly all on the shop floor."

SOLUTION
The company set up a manufacturing improvement team to look at the flow of materials on the shop floor. The team found it was key to take time out from day-to-day issues and get outside help. A workshop with manufacturing industry body PICME helped them see the big picture. Quality Director, Salvatore Picillo explains: "The master class gave our team the time and space to look at our concerns head-on and chart the full scale of activity around our 15 moulding machines."

First, the team went back to basics – they cleared the shop floor and cleaned, to get a better idea of where the problems were. After decluttering, the team put back only items vital to production. The goal was to organise the space more effectively.

The team focused on the company’s two largest moulding machines. New bin collectors were designed and built, and colour coding was introduced for machinery, materials, packaging and ancillary equipment. Colour coding helps staff keep everything in its rightful place – with a knock-on effect of better use of space.

The issue was not just about space. Any reorganisation of shop floor layout would affect the way people worked, so all staff would need to get on board. The company realised it needed to communicate effectively and win staff over.

RESULTS
Staff are now much more aware of how the business works and how they impact upon it on a daily basis. They also accept the importance of clear communication. "The team have learnt a lot about the power of communication, in particular learning that it needs to take place and that people need to be won over. Much as we might want them to, commitment and enthusiasm don’t come automatically," says Shaun.

Running improvement activities has given staff more confidence. Staff feel empowered when they see their suggestions move from brainstorm to reality. Shaun said: "Our improvement team is now its own authority, independent and empowered to change the working environment."

"Many of the initial 25 improvement suggestions surprised me. To be honest I would have personally overlooked some in the course of everyday work. All these initial proposals had to show some kind of material benefit – and all of them were approved on the basis that they did."

SHAUN HAZLETT – OPERATIONS DIRECTOR

One key lesson learned is that staff produce better solutions if management are not involved. Shaun says: "Many of the initial 25 improvement suggestions surprised me. I would have personally overlooked some in the course of everyday work. All these initial proposals had to show some kind of material benefit – and all of them were approved on the basis that they did."

Outside help is key. "The outside facilitators are needed to remind our people about their successes, to recall where they’ve come from and to orientate them with tools and encouragement for the bigger improvement picture ahead," says Shaun.

THE LAST WORD
The improvements to the shop floor layout have encouraged the company to look at the way it organises other parts of the business. Shaun says: "This is not just about manufacturing. It can as much be applied to the flow of orders, invoices, and other information as it can materials and machinery. At the end of the day it means doing a job of work the way you want to do it. The side benefits include saving your time and saving the everyday frustrations that come from an inappropriate system."
Further help and advice

Achieving best practice in your business is a key theme within DTI’s approach to business support, providing ideas and insights into how to improve performance across your business. By showing what works in other businesses, we can help you see which approaches can help you, and then support you in implementation.

ACHIEVING BEST PRACTICE IN YOUR BUSINESS
To access free information and publications on best practice:
• visit our website at www.dti.gov.uk/bestpractice
• call the DTI Publications Orderline on 0845 015 0010 or visit www.dti.gov.uk/publications

SUPPORT TO IMPLEMENT BEST BUSINESS PRACTICE
To get help bringing best practice to your business, contact Business Link – the national business advice service. Backed by the DTI, Business Link is an easy-to-use business support and information service, which can put you in touch with one of its network of experienced business advisers.
• Visit the Business Link website at www.businesslink.gov.uk
• Call Business Link on 0845 600 9 006.

TRAINING IN BUSINESS IMPROVEMENT
Industry specialists often run classes in business improvement, to encourage staff to think proactively on the shopfloor.

Contact your own industry forum and find out what training they offer for business improvement or achieving excellence in business.

Constructing Excellence
Tel: 0845 605 5556
Fax: 01923 664 690
E-mail: helpdesk@constructingexcellence.org.uk
Website: www.constructingexcellence.org.uk

Construction Equipment Association
Tel: 01883 334 499
Fax: 01883 334 490
E-mail: cea@admin.org.uk
Website: www.coneq.org.uk

MICE (Metals Industry Competitiveness Enterprise)
Tel: 0114 244 6833
Fax: 0114 256 2855
E-mail: enquiries@metalsindustry.co.uk
Website: www.metalsindustry.co.uk

PICME (Purpose Industries for Manufacturing Excellence)
Tel: 01642 430021
Fax: 01642 430025
E-mail: enquiries@picme.org
Website: www.picme.org

Shipbuilders & Shiprepairers Association
Tel: 01784 223 770
Fax: 01784 223 775
E-mail: office@ssa.org.uk
Website: www.ssa.org.uk

SMMT Industry Forum
Tel: 0121 717 6660
Fax: 0121 717 6689
E-mail: info@industryforum.co.uk
Web: www.industryforum.co.uk
Industry Forum (Textile and Clothing)
Tel: 020 7636 7788
Fax: 020 7636 4418
E-mail: info@industryforum.net
Website: www.industryforum.net

UK Lean Aerospace Initiative
Tel: 07887 562 833
Fax: 020 7227 1025
E-mail: ksmith@sbac.co.uk
Website: www.sbac.co.uk

Examples of products and companies included in this leaflet do not in any way imply endorsement or recommendation by DTI. Bear in mind that prices quoted are indicative at the time it was published.

GENERAL BUSINESS ADVICE
You can also get a range of general business advice from the following organisations:

England
• Call Business Link on 0845 600 9 006
• Visit the website at www.businesslink.gov.uk

Scotland
• Call Business Gateway on 0845 609 6611
• Visit the website at www.bgateway.com

Wales
• Call Business Eye/Llygad Busnes on 08457 96 97 98
• Visit the website at www.businesseye.org.uk

Northern Ireland
• Call Invest Northern Ireland on 028 9023 9090
• Visit the website at www.investni.com