



## World Class Manufacturing Checklist

See how your production processes rate against the best with this World Class Manufacturing checklist or you can use the checklist to identify improvement opportunities and check progress.

### **World Class Manufacturing definition:**

"The recognition of an organisation as a benchmark by its industry sector and, for some aspects, by other industry sectors. World class manufacturing organisations consistently deliver exceptional performance, frequently in excess of expectations."

### **Introduction**

There can be no absolute World Class Manufacturing standard. World class manufacturing opportunities vary enormously from one industry to the next. You should therefore judge your company's performance against other companies in comparable industry to your own. For instance, where discrete but basically similar products are built sequentially, you should be manufacturing using kanban control and generally score above average. If each of your products are engineered to order you should expect to score below average.

There are two overriding criteria when using this checklist to judge whether your company can be regarded as World Class:

How does the company compare with its best competition?

Has the company increased its score since last year?

Please now answer the questions below. The first question on customer service requires a percentage the remainder have a graded answer:

"W" World class

"X" Very good but not quite world class – (country class)

"Y" Better than many – (city class)

"Z" Poor – (village class)

It is recommended that as you work through the checklist you build up a list of short, medium and long term improvement opportunities. You need to be clear from the start and consistent about the division or section of your company that you are referring to when answering the questions.

**Q1 Do you ship to your customers on time in full (OTIF), more than 99% of the time, against their latest schedule or delivery agreement?**

All objectives are subordinate to the requirement to ship what your customer expects, when expected, with all relevant paperwork complete. For make to stock companies the principle customer service measure is the percentage of orders received where stock is available at the time of receipt of the order, an out of stock item is normally only counted once in the time period under consideration. Out of stock items not ordered are not counted. Where you are supplying to a customer kanban, you achieve better than 99% in line with the kanban agreement. For other companies the measure is the percentage on time in full (OTIF) delivered complete to the customer on the agreed promised delivery date. If there are multiple lines or items on an order, one hit means all ordered item lines are delivered on time in full. If one line item is missed, this is a miss for the whole order.

<b>Customer service level (on time in full or availability)</b>	<b>%</b>
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Scoring guideline

Grade	Criteria question1	Tick
W	99% or better customer service level (on time in full or availability).	
X	95% up to 99% customer service.	
Y	90% up to 95% customer service.	
Z	Below 90% customer service.	

**Q2) Does everyone in the company know who the key customers are and what differentiates the company's products and services from the competition?**

Awareness of the strengths and weakness of the company's product or service is a key factor in achieving the involvement of everyone in the company and improving employee satisfaction. It is not possible to achieve this objective without an employee induction process, current customer service challenges discussed at meetings (not just late orders) and information about customers readily available to all employees.

Grade	Criteria question 2	Tick
W	Everyone knows key customers through a new employee induction scheme and regular updates, meetings, notices etc.	
X	Most people know key customers.	
Y	Managers know key customers.	
Z	Customers known mainly on a "need to know" basis.	

### Q3 Do all staff who are in contact with customers have the authority and empowerment to resolve customer problems?

Managing the points of contact with your customers is the single most important company success factor. A company can only consider itself to be a world class manufacturing company if all its customers are confident that any problems they have will be speedily resolved and they will be kept fully informed, preferably by the person they initially contacted. It is very unlikely that any company that uses a remote call centre or layered telephone answering system could ever be considered world class in any business or industry.

Grade	Criteria question 3	Tick
W	A person answers telephone calls within 4 rings and takes responsibility to deal with the call either immediately or by getting back to the caller within 24 hours. Similar standards are used for e-mail and written complaints.	
X	A person answers telephone calls and takes responsibility to deal with the call either immediately or by getting back to the caller. Similar standards are used for e-mail and written complaints.	
Y	Customer problems are dealt with as soon as possible.	
Z	Many customer problems are outstanding or not satisfactorily resolved.	

### Q4 Do kanbans control your supply chain?

Kanban control means that the authority to make or move an item is based on that item's usage unless there has been a properly approved and strictly limited deviation.

- a) A world class manufacturer must be able to help their customers reduce the stock of their products by rapidly replenishing their customer's stock on a kanban basis with over 99% reliability. The kanban messages can take the form of an e-mail, fax, card, empty container or require you to visit their plant to replenish their stock of your products (usually referred to as vendor managed inventory).

Grade	Criteria question 4a	Tick
W	Are at least 75% of your shipments to customers controlled by kanban or vendor managed inventory (i.e. shipped / delivered based on customer usage) or you are able and willing to make kanban shipments if requested.	
X	Some but less than 75% of shipments under kanban control or you are probably able to make kanban shipments if requested.	
Y	You may be able to make kanban shipments if requested.	
Z	You would not make shipments under kanban control.	

- b) It follows that the ability to reliably supply to customers under kanban control is crucially dependent on the control of internal manufacturing by kanbans, otherwise the final kanban control is at risk. Your speed of response will be much better when manufacture is controlled by kanban as, in addition to reducing lead times, kanban control can eliminate the scheduling, kitting and issuing processes. There may be some operations which need special controls but there is no problem with operating with a mixture of kanban control and work-to lists. If

all parts produced by a work area can be kanban controlled, however, then there are fewer clashes of priority.

Grade	Criteria question 4b	Tick
W	Are at least 90% of your production processes controlled by kanban.	
X	75% up to 90% of your processes under kanban control.	
Y	Less than 75% of your processes under kanban control.	
Z	No production under kanban control.	

c) The final element of kanban control is the supply of material from your suppliers. Ideally your suppliers should be given responsibility for maintaining a minimum stock level in your designated storage locations, often referred to supplier or vendor managed inventory (VMI). Alternatively your supplier will replenish stock as you have used it based on kanban signals such as an e-mail, fax, card or empty container. The kanban messages should be at least daily although the replenishment could be less frequent. You may have to educate any suppliers who are currently unable or unwilling to supply under kanban control.

Grade	Criteria question 4c	Tick
W	At least 75% of your purchases controlled by kanban or VMI.	
X	At least 50% and up to 75% of your purchases under kanban control or VMI.	
Y	Less than 50% of your purchases under kanban control or VMI.	
Z	No purchases under kanban control or VMI.	

**Q5 Have you eliminated the central storage of direct material and is purchased material supplied to the point of use without routine inspection?**

Moving material from one place to another adds cost but not value, so material should be delivered to the point of use wherever possible. The users of material should be responsible for the storage of that material, including any goods-in checks that cannot be carried out by the supplier. Users should also be able to check that replacement of stock is underway if stocks get too low. Ideally, the vendor should be responsible for delivery to the point of use (i.e. vendor managed inventory) and should be able to decide when to replenish material when this is practical (direct material is any material consumed in the manufacture of the product).

Only "approved" vendors can safely supply to the point of use (see Q11 below) There must be audits of quality and quantity of all supplies.

Grade	Criteria question 5	Tick
W	At least 75% of direct material is delivered to the point of use by approved suppliers and monitored by the users of that material without routine goods-in inspection.	
X	At least 50% of direct material is delivered to the point of use by approved suppliers and monitored by the users of that material; there may be some goods in inspection.	
Y	Less than 50% of direct material is delivered to the point of use.	
Z	No material is delivered directly to the point of use.	

**Q6 Have you laid out the majority of your machines and equipment so as to minimise the distance between sequential operations?**

In the old days a company would lay out equipment according to its function. Thus four milling machines would be put next to each other. Functional layouts must increase the distance parts have to travel because work almost never passes between machines with the same function. You should always arrange machines and equipment in the sequence in which they will normally be used. Such a process based layout will sometimes decrease utilisation of equipment but the work in progress saving alone will more than pay for this in most cases, with additional savings in quality, costs and administration. The people who are responsible for work place layout, ideally the people who work in the area, have to take the trouble to think through the work flows before laying out the work place. The value of line-of-sight communication between sequential operations cannot be over-stressed.

Grade	Criteria question 6	Tick
W	All equipment laid out to minimize the distance parts have to travel.	
X	At least 75% of production processes laid out in the flow sequence.	
Y	Some production cells laid out in flow sequence.	
Z	Equipment mostly laid out by functional groups rather than process flow.	

**Q7) Have you reduced or are you reducing the set-up time between products to the point when it is economical to make your product in the quantities required for customer shipments?**

If at any stage of manufacture you produce in batch quantities that are larger than the shipment quantities required by your customers due to set-up time, there should be an active set-up time reduction group. Wherever possible, equipment should be dedicated to one product to eliminate the time and cost of changing from one part to the next. Where this is not possible or economic, set-up time must be kept as short as necessary to avoid the need to increasing lot sizes to gain "economies of scale". The old "economic lot size" calculation should be turned on its head to work out the "economic set-up time" for the lot sizes required by your customers. You should never impose, or need to impose, minimum batch sizes for your customers.

Wherever possible batch sizes should be the same throughout the process.

Grade	Criteria question 7	Tick
W	All batches of production throughout the factory are in the same, uniform quantity required by the customer.	
X	Final stages of production in customer required quantities and active setup time reduction projects where larger batch sizes exist.	
Y	There are active setup time reduction projects.	
Z	Batch sizes determined by historical setup times and in excess of shipment quantities.	

**Q8) Have you an ongoing education and communication programme to inform existing employees and educate every new employee, whatever function he or she performs, in the world class manufacturing techniques you are using?**

World class manufacturing is a programme of continuous change and change has to be carefully managed. It is important to take everyone along with the changes and so avoid the pockets of resistance that result from a lack of understanding of the changes and the reasons for them. It is also easy to forget new recruits who may have come from a traditional environment and so find some of the world class manufacturing ways of working difficult to understand.

Knowledge of the benefits of world class manufacturing are important for sales staff. The value of the ability to offer kanban delivery will be lost if your customers are not told about it.

There is no better way for people to become more aware of quality issues than for everyone to understand where their tasks fit into the business. Whilst it is desirable for the same person to routinely carry out the whole process it is not always practical but it is the appreciation of the whole process that is required. Cross-training (or multi-skilling) is also very important to meet the rapid changes that will often result from being more responsive to customers' needs. Multi-skilling can be expensive unless spread over a period, so you should concentrate on your longer service personnel.

As many people as possible should have an awareness of the basic 7 tools of quality (process charts, Pareto (80/20) analysis, Ishikawa (cause and effect) diagrams, histograms, run diagrams, statistical process control and check sheets). When problems occur in a world class manufacturing environment they tend to affect everyone quickly. If everyone can help to solve them you turn this enforced problem solving to your

advantage. The training must be backed up with the necessary support and authority, given appropriate safeguards, so that as soon as the solution to a problem is found it can be implemented without delay.

Grade	Criteria question 8	Tick
W	All employees have been educated in world class manufacturing, world class manufacturing is included in the induction of new employees. Education includes multi-skilling and problem solving skills.	
X	All employees have been educated.	
Y	Selected managers have been educated.	
Z	No world class manufacturing education.	

### Q9) Do employees take the initiative to move to the point of need?

Employees taking the initiative is a recognition of the "thinking worker" and helps reduce the level of direct supervision required by a team. Employees should never be "kept busy" doing work that is not needed.

Grade	Criteria question 9	Tick
W	Employees have the authority to move to the point of need based on, for instance, kanban signals.	
X	Direct operators in some cells or groups will move to the point of need within that cell.	
Y	A designated team leaders will set priorities.	
Z	All direct manufacturing tasks organised by managers.	

### Q10 Is there is a programme in place to progressively reduce non value-adding costs?

A non value-adding cost is anything which adds cost but not value to the saleable product or services provided by the company to customers. Non value-adding costs are characterised by the 7 wastes of early or overproduction, waiting, transporting, inappropriate or unnecessary processing, unnecessary inventory, unnecessary motions and defects. All the wastes should be investigated from time to time and at least one under active investigation now by a team or task force. Every new product and process should be evaluated against the need to reduce waste. The decision to purchase or replace equipment must include all the factors that could increase waste, set-up time and reliability in particular, if world class manufacturing standard are to be achieved and maintained.

Grade	Criteria question 10	Tick
W	Waste has been minimized by successful waste reduction projects in the past and there is at least one active waste reduction projects looking at the 7 wastes.	
X	There have been successful waste reduction projects in the past and one or more current waste reduction projects.	
Y	Occasional waste reduction projects.	
Z	No waste reduction activities have taken place based on the 7 wastes.	

**Q11) Is there a programme in place to reduce your supplier base to a small number of qualified suppliers integrated into your business?**

The world class purchasing objective is a small supplier base of reliable companies working in partnership from the design stage, delivering frequently, in the quantities you need, directly to the point of use.

As it is not possible for one person to maintain a good relationship and understanding with more than about 50 supply companies, single source supply is necessary. With single sources you can get the genuine, invaluable involvement and commitment of your suppliers to your business.

Long term commitment to suppliers and single sourcing makes you as important as possible to your suppliers and allows suppliers to engage in a continuous reduction of costs using, for instance, value analysis techniques. Delivery to the point of use is not possible without single source supply.

There should be a systematic way to approve potential qualified suppliers based on their quality, costs, management, product development resources and financial health. Performance measures in purchasing should be based on total acquisition costs not simply purchase price variance.

To score on this point there have to be significantly fewer direct material suppliers than last year and you should be working more closely with them. You should also have a higher proportion of approved suppliers.

Grade	Criteria question 11	Tick
W	The number of suppliers has been reduced to a small number of qualified suppliers delivering what is required, when required to the point of need.	
X	There is an active project to reduce the supplier base to a small number of qualified suppliers delivering what is required, when required to the point of need and is supported by management policy.	
Y	Some supplier reduction activity has taken place.	
Z	The number of suppliers is not considered important.	

**Q12) Is there a culture of Total Quality?**

There must be a culture of total quality throughout the business. Getting one person to do a job and then someone else to check it is not only wasteful but also de-motivating. Every person or team that has a job to do should be able to check that the job has been done correctly and should be given the training, equipment and responsibility for doing so. The role of quality control is to audit quality and feedback long term process control information. Only if very expensive equipment, a special environment and/or very specialist training is needed should a quality control department be involved with routine testing.

The principles of total quality should permeate all activities. Commercial departments are concerned about the quality of their forecasting process and monitor the accuracy of their forecasts in order to improve them. Stores monitor the accuracy of stock records, engineers the accuracy of the bills of material and so on.



There should not be an independent rework or rectification process which just legitimises faulty work. It should not be regarded as a punishment for people to put right their own defective work but part of the principle that people are expected to produce work that is correct first time.

Identifying and eliminating the cause of the faulty work must also be seen as part of the rectification process. The people in the best position to rectify the causes of faults are the people doing the work. Every fault found must be seen as an opportunity to improve the quality of the product, the basis of blame free quality control.

Grade	Criteria question 12	Tick
W	Everyone is trained to check the quality of the jobs they perform except where this is not possible and to rectify any faults found.	
X	Everyone is trained in the quality standards required and there is some self inspection and self rectification.	
Y	Some self inspection and / or self rectification.	
Z	Most inspection carried out by specialist inspection staff.	

**Q13) Do you audit the product and process quality inside the test limits?**

You cannot get to parts per million quality levels if your quality checks only sort the good from the bad, the passes from the failures. Everyone involved with a task that can vary must check where the process is within the tolerance band and be able to take corrective action before defects occur. By this means, operators have an early warning of possible failures so enabling the processes to be fine tuned. The technique generally used is statistical process control.

No reason or excuse is good enough for failing to allocate the resources necessary to achieve customer returns measured in parts per million. The cost of your rejects to the customer is far more than just the cost of replacing faulty parts. The damage to your reputation of poor quality can never be repaired. This quality target applies also to mistakes in the shipping and packing departments, invoicing and even such things as order confirmation.

Grade	Criteria question 13	Tick
W	To be World Class your product shipment quality must be “best in class” you must measure quality within the tolerance band, take action before failures occur and measure quality in parts per million.	
X	Product quality is in the upper quartile for your industry or product and product quality is monitored not just failures.	
Y	Your quality is better than average.	
Z	Quality is below average and only tested for pass / fail.	

#### Q14) Does everyone have authority to "stop the line"?

If quality is crucial to your success, there is no better way to drive up the quality than to give all employees the authority to halt the job or process if they are unhappy about quality levels. An employee must always choose to stop a process rather than possibly create or even pass on a known or suspected defect. Anyone who finds a defect must always pass it back to the person who made it, if possible, without the need to refer to management.

Grade	Criteria question 14	Tick
W	Employees are empowered to stop working if they are unsure about quality and refer the product back to the previous stage if practical.	
X	Employees will stop working on faulty product and advise their supervision.	
Y	All employees are aware of quality standards and encouraged to raise quality concerns with their supervision.	
Z	Quality is primarily the responsibility of managers or a quality control department.	

#### Q15) Have you 'foolproofed' critical jobs?

To reach parts per million quality standards, jobs have to be made foolproof. Foolproofing (called poka-yoke by the Japanese) means that either mistakes cannot be made or, if this is not possible, the equipment will automatically identify and/or stop when a reject part is produced. Foolproofing requires imagination and commitment to quality. There is no easy way to measure your degree of foolproofing except to ask yourself if the operations that could cause faulty products rely on human judgment.

Grade	Criteria question 15	Tick
W	All critical operations have been foolproofed	
X	Key operations have been foolproofed with an ongoing programme to foolproof the rest	
Y	Some operations foolproofed.	
Z	No significant foolproofing.	

#### Q16) Are the majority of people responsible for the maintenance of the equipment they use?

You cannot afford delivery schedules to be dependent on unreliable equipment. If it is not possible or practical to have duplicate equipment then you have to do as much as you can to avoid equipment failures. The users of equipment are the best people to carry out preventative maintenance because they are the first to know when their equipment is not performing properly and should also be the best people to know when it is fixed. It follows that if they can be trained in preventative as well as corrective maintenance, this will be the most cost effective way of reducing down time. Users of equipment should have a real sense of ownership. Some people will not be willing or suitable for such training but there should be a sufficient number of people in each group or team that are sufficiently experienced and committed. In a world class manufacturing environment the role of equipment maintenance should increasingly be to help and advise on equipment maintenance as well as auditing equipment reliability.

Unreliable equipment is one of the most popular reasons for "safety stock" or "safety time" which increases costs and lengthens lead times. You cannot solve maintenance problems and keep them solved unless you know where the problem areas are and then monitor the effects of any changes. There should be a routine report of downtime widely circulated as well as a downtime reduction teams set up if required.

Grade	Criteria question 16	Tick
W	Routine preventative maintenance is planned and carried out by the people using the equipment.	
X	Some maintenance carried out locally and there is a routine maintenance programme.	
Y	Time and cost is allowed for a routing maintenance programme run by a centralized maintenance department.	
Z	Centralised "fix it when broke" maintenance.	

**Q17) Do you have an active policy to help keep work areas clean, tidy and uncluttered?**

It has been shown time and again that tidy work areas reduce the frequency of errors and delays. Most world class manufacturing companies have regular inspections of their work areas and continually look for ways to tidy up their processes. Housekeeping must be the responsibility of the people who work in the area. A clean and tidy workplace will also give people working in it a sense of pride. You could not imagine a world class company being a mess now could you?

The importance of a tidy workplace applies to administration as well as manufacturing areas.

Grade	Criteria question 17	Tick
W	Everyone is responsible for keeping their work areas tidy, there are regular inspections and very high standards are maintained.	
X	High standards of housekeeping and cleanliness are maintained.	
Y	Housekeeping and cleanliness is fairly good.	
Z	Poor standards of housekeeping and cleanliness.	

**Q18) Does the design of products include a consideration of the manufacturability of the product?**

The design of all products and processes should include manufacturing considerations such as current equipment, suppliers, existing parts, subassemblies and ingredients. In many cases manufacturing, marketing and purchasing functions should be involved at the design stage to ensure, as far as possible, designs are manufacturable.

In most businesses it is impossible to optimise designs unless the suppliers of material or components are involved at the design stage of your products. Improvements to materials and components you are currently purchasing should be evaluated also to see if your end product can be improved so that you keep your products competitive.

A key element in design for manufacture is an evaluation of existing designs. Unless designers are aware of problems and changes required to current designs, future designs cannot benefit from the lessons learnt in the past. Self-inspection and rectification of your own mistakes is just as important in design areas as it is anywhere else.

Grade	Criteria question 18	Tick
W	All products are designed for manufacturability as well as function, key material suppliers are involved at the design stage and the design department is responsible for bill of material accuracy and correction.	
X	Two of the above criteria are met.	
Y	One of the above criteria are met	
Z	None of the above criteria met	

**Q19) Is there a culture of continuous improvement in customer service?**

The one universal truth in all manufacturing companies is that customers are demanding higher and higher levels of service which include higher quality, faster response for make to stock companies and shorter lead times for configure to order, make to order or engineer to order companies. It is also true that in most industries suppliers are responding.

No matter how good you think your customer service is, it is vital that you ensure you are addressing the changing needs of your customers and the market place. You can be sure some or all of your competitors will be striving to exceed your current level of customer service. World class manufacturing companies are characterised by continuously improving their customer service. There should be an active customer service improvement group looking at all the tools and techniques available to be more responsive to customers. Significant lead time reductions, for instance, involves most functions in the company working together so will seldom happen spontaneously.

Improving customer service must also include reducing the time it takes to move from the start of a design to the first shipment of reliable product that meets the specification. The time to market must be monitored.

Improvements are rarely achieved unless there are performance measures in place. These customer service improvements must therefore be supported by relevant performance measures which are owned by senior managers, reviewed at least monthly and have realistic targets for improvement which are achieved.

Grade	Criteria question 19	Tick
W	Customer service levels on current and new products are the best in your industry and have key performance measure with targets for continuous improvement.	
X	Customer service levels for current and new products are a key performance measure with targets for continuous improvement	
Y	Customer service levels for current and new products are above average for your industry.	
Z	Customer service levels are poor.	

**Q20) Is there a mechanism to quickly and effectively receive and evaluate suggestions from all employees?**

Everyone must feel that any ideas they have for the improvement of any task they perform or are familiar with will be welcome and resources made available to evaluate their ideas if necessary. A formal suggestion scheme is neither necessary nor sufficient to score on this point neither is a suggestions reward scheme. It is an attitude that encourages innovation and involvement of everyone which is important. A company will score on this point if there is a regular flow of implemented ideas from the majority of employees.

Grade	Criteria question 20	Tick
W	There is a regular flow of suggestions from a wide spectrum of employees which have been evaluated, implemented and the outcome fed back to the employee.	
X	Suggestions are encouraged and some significant suggestions have been implemented within the last year.	
Y	Some significant suggestions have been implemented in the past.	
Z	No suggestions policy or culture.	

**Assessing your status**

You can make a self assessment of your World Class Manufacturing status by comparing the number of top scores (W) against the percentage of companies that had a top score in the table at [www.bpic.co.uk/wcm\\_analysis.htm](http://www.bpic.co.uk/wcm_analysis.htm). The answer to question 1, customer service, is critical, it is a measure of your success on the other 19 questions.

You can assess your progress by scoring each W tick 5, X ticks 3, Y ticks 1, and Z ticks 0. You should re-check your status at least every year.