Kaizen is a Japanese word that means Improvement, and it comes from a mix of two other words, ‘Kai’ meaning ‘Change’, and ‘Zen’ meaning ‘For the Better’.

Kaizen is an activity which involves benchmarking the process before and after in order to set objectives and targets for the proposed improvement.

In modern business organisations Kaizen goes by a number of different names - Continuous Improvement, World Class Production, Toyota Production System, Lean Manufacturing – but it is not the name that is important, it’s the thinking behind it.

Kaizen is used to identify opportunities for improvement within your own area. These should include identification of all forms of waste, problems or conditions where improvements can be made, and the generally held view is that it should involve Management and Workforce alike. This means that you might be in a position to put forward ideas and organise kaizen events or projects, but you might need permission before you can actually go ahead and implement them.

Every company measures some aspect of its output, and these are part of what ‘Benchmarking’ is about – sometimes also called Key Performance Indicators (KPIs). This might be widgets manufactured, sales per person, length of time to process an order and so on.

Benchmarking is a bit of a buzz word, but it means that you are measuring a process:

1. against itself – how well you did this shift compared with last shift
2. against another machine/process/line/department – how well you are doing in the overall picture compared with everyone else
3. against the other producers in the industry – how well your factory does compared with the competitors factory. See also the section on OEE later on.

Benefits of Benchmarking can be:

- Looking for a better way of doing things – highlighting poor efficiencies
- More power is given to the workforce – they have the ability to make alterations if benchmarking shows a downturn in efficiency
- Effective training is required – new skills may be required
- Quality improvements – poor quality items or processes are highlighted earlier

If you were having a Kaizen event in your area, who would be involved?

Why would you choose these people?

What would be the limits of your responsibilities before you would seek permission to continue?

What Health and Safety issues should you consider?

Why have you chosen these issues?

Some of the Goals, both Internal & External, of completing a Kaizen Activity are:

- 100% Quality
- On Time Delivery
- Correct Quantity
- Reduced Costs
- Increase in Efficiencies
- Reduced Cycle Time
- Value for Money

A key aspect of this is learning what makes a successful team, appreciating each team member's strengths and weaknesses and establishing team meeting formats, organisation and rules.

When any alterations are made in the workplace there is a possibility that the Risk Assessments may need to be updated- bear this in mind throughout the implementation of Kaizen.

Training skills may have to be updated, or even begun from new, depending on the size of the changes. At the very least if you are working on a project people in that area must be made aware that their normal day to day activities might be disrupted – more people, more noise, unusual working practices going on – a whole host of things.

Remember though, where H&S is concerned there are no limits to your responsibilities.

What are some of the benefits of Benchmarking?

Kaizen provides scope for continuous improvement through:

- Improving Visibility
- Providing Long Term Goals
- Providing Reward and Recognition
- Achievement of Goals & Targets
- Giving a Sense of Belonging & Purpose
- Improving Labour Techniques
- Improving Management Relations

The activities undertaken should identify all forms of waste – 'anything other than the minimum resources of material, machines and labour required to add value to the product,' and highlight problems or conditions within the work area or activity where improvements can be made.

What Key Performance Indicators do you measure?

The Government issue guidelines on what they consider to be the 8 main Key Performance Indicators that they expect British companies to monitor, and these are generally taken to be:

1. Right first time (RFT)

RFT can best be described as:

'Completing a process or action without the need for any rework or quality rejects.'

It is used in order to determine if the process is in control.

2. People productivity

The amount of units, parts or processes completed per person in a given time period. For instance, if you process 15 orders a day and someone else is only doing 10, what is the difference. (Why are you getting paid the same?)

3. Stock turns

The number of times per year that you theoretically replace stock. Calculated as:

$$StockTurns = \frac{anual.stock.purchases}{stock.held.in-house}$$

In a lot of manufacturing companies this can be vitally important as it gives a good indicator as to how much money and floorspace is tied up in stock – this can have a major impact on cash flow. It need not be restricted to manufacturing – carpet warehouses, electrical goods retailers, even stationary cupboards.

4. Delivery schedule achievement

The % of orders delivered with correct goods, on time, in full, without any damage

This may vary from company to company, however a lot of warehouses or delivery companies look at:

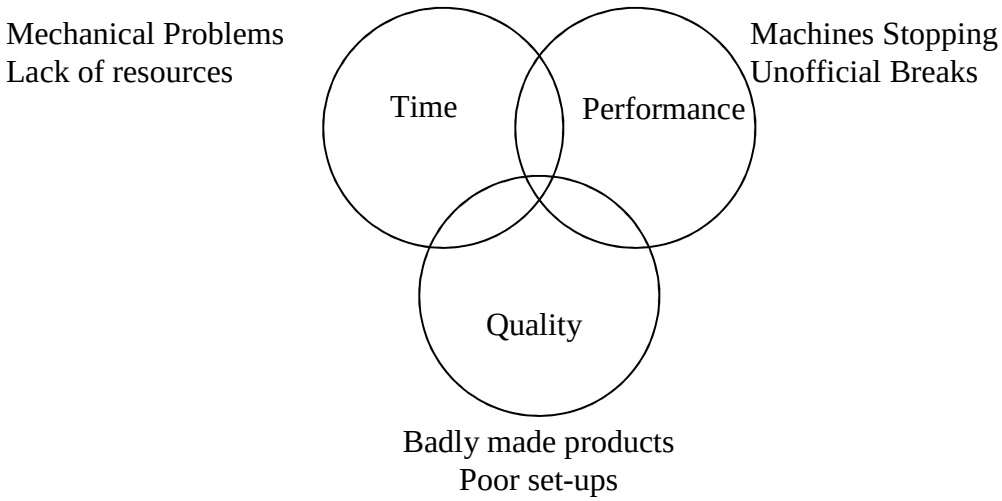
'Correct Items and Correct Amount of items delivered on time with no Quality Defects.'

5. Overall Equipment Effectiveness:

This is by far and away the most accurate method of determining how any process is performing. Where OEE gains an advantage over all other methods of determining efficiency is through the fact that it considers all aspects of the process.

There is no point in a machine running at 100% 'efficiency' if 10% of what is produced is of such poor quality that it can not be used or has to be reworked.

Look at the following reasons that cause the three main distinctions in poor plant efficiency :-



When all of these areas are included in the overall picture, it can clearly be seen that the only section where optimum efficiency is being maintained is where the three circles come together. This may seem extreme, but if you consider the alternatives methods of measurement then OEE gives a clear and concise picture with all parameters included.

What do you think the OEE figure should be for a company to call itself 'World Class'?

%

With the results of Time (equipment availability), Performance and Quality, the Overall Equipment Efficiency can be calculated in the following way:

$$\text{Time} = \frac{\text{Available Production Time - Downtime}}{\textit{Available Production Time}} \times 100\%$$

$$\text{Performance} = \frac{\text{Cycle Time} \times \text{Amount Processed}}{\textit{Operating Time}} \times 100\%$$

$$\text{Quality} = \frac{\text{Processed Amount - Defects}}{\textit{Processed Amount}} \times 100\%$$

The secret is to combine them, using the final figure as a measure of efficiency:

$$\text{OEE} = \text{Time} \times \text{Performance} \times \text{Quaity}$$

These simple equations will allow you to easily calculate each of the main issues that you should look at to try and get a feel for how the operation is running.

As an example of performance:

$$\text{Performance} = \frac{\text{Cycle Time} \times \text{Amount Processed}}{\textit{Operating Time}} \times 100\%$$

If you run a machine for one hour, and the cycle time of each component is exactly one second, you would expect to make 3600 components in one hour. This obviously equates to 100% efficiency.

If however in the hour you only produce 3000 components, then efficiency can be calculated as follows :-

$$\text{Performanc e} = \frac{1\,\text{second} \times 3000\ \text{components}}{3600\ \text{sec}\,\textit{onds}} \times 100\%$$

$$= \ 83\%$$

6. Value added per person

The difference between cost and sales price averaged over the number of people involved (either direct or indirect). For instance, if your sales price is £100 and the total cost of producing that item was £90, the profit would be £10. If it took 10 people to work on that component then each person contributed £1 to the profit.

It can get a lot more complicated – do you consider gross or net profit, are you looking at the entire organisation or just a production line, are you comparing different shifts etc. This leads naturally onto….

7. Product cost reduction

% reduction in product costs after improvements activity. This might be the entire goal of the activity.

8. Floor space utilisation

The amount of floor space as a % that is directly involved in value adding activities. This might seem a strange thing to calculate, however if you rent property it might be relevant, you will have to pay rates, heat and light areas. If you can reduce the amount of Non-Value Adding activities then you may be able to use smaller premises or rent out excess space.

How could you apply these 8 KPIs to your work role?

1. (RFT)

2. (PP)

3. (ST)

4. (DSA)

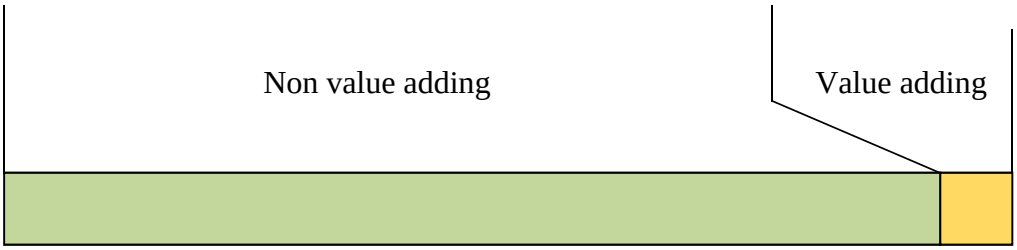
5. (OEE)

6. (VAP)

7. (PCR)

8. (FSU)

Have a look at this little drawing:



What is this showing us?

95% of all effort and actions are Non Value Added.

That is to say only 1 in 20 actions actually add value to a process.

If you find this difficult to grasp, consider the following - a simple, and oft used, scenario is to imagine someone making a cup of tea. Don't skip over the next paragraph, it will show you just how involved this operation is.

You may have to decide if there is enough water in the kettle, walk to the sink, turn the tap on, remove the lid and fill up the kettle with water, replace the lid, turn the tap off and return the kettle to its original location. Then you have to switch it on. Walk to a cupboard, open it up, collect sugar, remove a box of tea bags, open the box, remove a tea bag, close the box, replace it in the cupboard, close the cupboard and return to the work area. Place both items on the worktop. Walk to another cupboard, open it up and collect a cup. Close the cupboard and return to the working area. Put the cup down. Walk to the fridge, open it, pick the milk out of the fridge, open it up, sniff it, make the decision 'is it fresh, put the lid back on, close the fridge door, return and put the milk down. Walk to the drawer, rummage around in it until you find a spoon, close the drawer and return. Put the spoon down. Wait for the kettle to boil. Pick the tea bag up and place it in the cup. Pick up the kettle and fill the cup. Replace the kettle. Wait for the tea to infuse. Pick up the spoon. Remove the tea bag, walk to a bin, open the bin and throw the tea bag away. Return to the work area. Put the spoon down. Pick up the milk bottle, remove the top from it, add milk to the tea, replace the top and place it back on the worktop. Remove the lid from the sugar bowl, pick up the spoon, take an amount of sugar from the bowl and add it to the tea. (Do you contaminate the sugar this way or do you have a special spoon for the purpose?) Replace the lid on the sugar bowl. Stir the tea, walk to the sink and place the tea spoon in the sink. Return to the cup. Realise that the milk is still sitting out, pick it up, walk back to the fridge, open the door once more, replace the milk, close the door and return to the cup. Then you can drink your tea.

This may all seem rather far fetched at first, but read it again and have a good think about all that has happened in the previous paragraph. It is all relevant, isn't it?

Now ask yourselves, what actually added value to the cup of tea?

1.

2.

3.

4.

5.

6.

The 6 answers above are all there are. All the other actions were all non-value adding - everytime you walked or picked something up, everytime you opened a cupboard, all non-value adding.

1. Value Added Activity – this is something that your customer is willing to pay for, be it a hole drilled in a piece of metal or specific pieces of information. Value added activities are determined by :-
   a. customer specifications, where the finished product must comply with predetermined drawings or agreements
   b. supplier features, such as a kitchen mixer being able to offer a range of speed settings, where the end user is willing to pay a bit extra for the added features and the work that is involved in providing these
2. Non-Value Added Activity – things that no-one would reasonably expect to pick up the costs for, such as Work In Progress sitting idle for hours on end or the costs of parts being moved around the factory. (WIP has had work done on it, therefore this is money sitting in the middle of a production line. It takes up room. There are overheads required to pay for the lighting, heating and housing of it.)

Name two Value Adding operations that you are involved in

Name two Non-Value Adding operations that you are involved in

Here's a tricky one for you to try.

Are Quality Inspections VA or NVA?

Why did you give this answer?

All of the issues that you come across as being Non-Value Adding will fall into one of the following seven categories. The **7 Types of Waste** (or possibly 8 Types?) are generally considered descriptions of all the possible waste that can be present in any process. They are obviously all NVA:

1) **Waste of over production** – Overproduction is making too much, too early or just in case. Whenever parts stop and wait in a process, costs that do not add value begin to build up. Overproduction leads to excessive lead times and storage time.
2) **Waste of waiting** – This occurs whenever time is not being used effectively.
3) **Waste of transporting** – Any movement in a factory is a waste, so movements should be minimised as far as possible.

4) **Waste of inappropriate processing** – This refers to the term of using a hammer to crack a nut. This includes inappropriate machines and poor layout. Equipment that has either a greater or lesser capacity than required or when machines are not operated efficiently, when Standard Operating Procedures (SOPs) are not being followed, SOP's are not known or SOP's are inadequate. Waste due to design, trials & final production is also included, tackled through a study of waste in planning, defects and operations.
5) **Waste of unnecessary inventory** – The goal is to have no inventory. Inventory tends to increase lead times, prevents rapid identification of problems and increase space requirements. Waste in purchasing occurs without an orderly purchasing procedure. Waste in Manufacturing is anything other than the minimum resources of material, machines and labour required.
6) **Waste of unnecessary movements** – Unnecessary movements refers to the importance of ergonomics. If operators have to stretch, bend, pick-up or move in order to see better or move things, the victim is the operator but ultimately quality and productivity suffer.
7) **Waste of defects** – Any defects is a waste and costs money. Zero defects is the goal. When product is out of specification, the waste in material and labour includes not only the making of the defect, but also its rework, disposal etc. Remember 'Defects are not Free – someone gets paid for making them.

…..and possibly an eighth one

8) **Waste of Human Resources** – not using the skills, experience, inventiveness and intelligence of the workforce.

If you can, list one of each of the '7 wastes' in your job role	
Type of Waste	i. Description of Process ii. How would you remove this waste
	i. ii.
	i. ii.
	i. ii.
	i. ii.
	i. ii.

	i. ii.
	i. ii.

These can be eliminated or reduced if processes are:

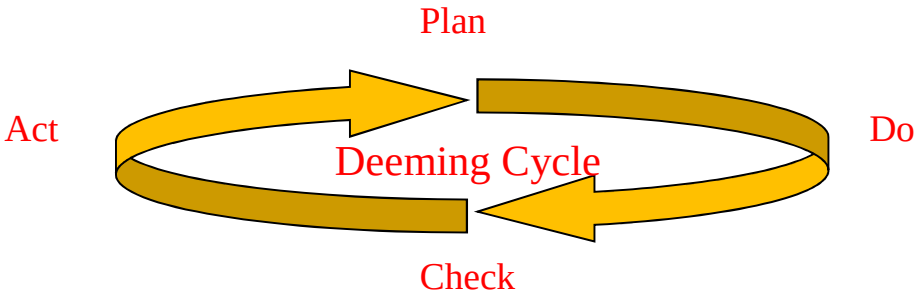
- Streamlined – Problems are solved not just covered up.
- Simplified – Improve methods.
- Analysed for value-adding capability – Continually review
- Customer Concerns (Internal & External) are given top priority

Give a definition of what 'waste' is

"

"

Why is it important to identify and eliminate these forms of waste?



Depending on what management consultant you speak to, the steps involved in problem solving will usually range from 4 through to 12 or so, possibly more. A certain Dr. Deeming, the 'Father of Modern Quality Systems' stated that there were four main stages, shown above as:

Plan what you want to achieve

Do the project

Check to see what has happened

Act to make alterations or cement it

This implied a continuous approach, as after each stage you would progress around the circle and start the next stage afresh.

If you are not experienced at problem solving then the smaller each step is the better. If we state that there are 10 clear steps, you will find it much easier.

1. Determine what the problem is
2. Describe the Problem
3. Objective Statement :- Conditions and Date
4. Understand the process
5. Pinpoint external relationships
6. Introduce temporary solutions if desired
7. Determine causes
8. Decide on and implement solutions
9. Monitor effects
10. Standardise procedures

1. Determine What the Problem is

If you are going to commit time, effort and money to solving problems, then there has to be a good reason for doing it in the first place. This might be someone on the shop floor coming up with a suggestion or a complaint about a recurring problem. Occasionally they may be started at the whim of a senior manager, but usually they are designed around a specific problem. The information that you use may come from:

Key Performance Indicators
Pareto analysis - no more than gathering information and plotting it on a bar graph, as described below in more detail.
New product implementation
Customer complaints may initiate it
New processes in the workplace
Suggestions from the shop-floor

The use of statistical information can help to resolve concerns and disagreements due to the information being factual, does not hold opinions and can therefore not be argued with. The information used will be specific to the activity, for instance changeover time, order processing times, quality or specific customer complaints.

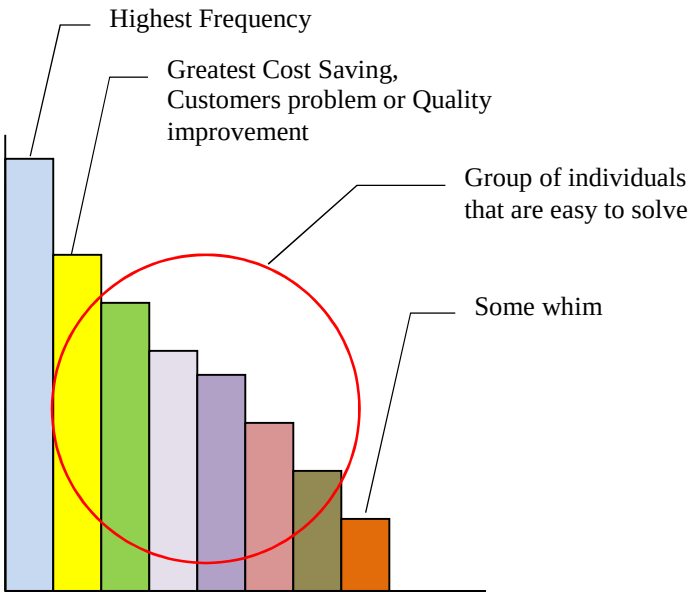
Pareto analysis, sometimes also called the 80:20 rule, is very simple, so simple in fact that they teach it to all of us in Primary school. It is really no more than gathering information and plotting it on a bar graph, giving an indication of areas where problems are occurring and/or what those problems are.

And to be perfectly honest, the graph itself is purely for communication purposes, as all of the information obviously has to be known before a graph can be constructed. That doesn't mean to say that we can do away with it though, as it provides a very good visual aid.

Once the information has been collected you can start to target the problems dependant on one of the following five reasons :-

1. The problem with the greatest frequency
2. The one that will give you the greatest monetary saving or quality improvement.
3. The problem that the customer has highlighted as causing them problems, a very important one this
4. A series of problems that may individually not be too large, but collectively are considered easy to solve and will provide a good quick hit whilst eliminating a large percentage of the overall total
5. The one that someone with a bit of power has noticed as they walked around one day.

For example :-



Number five above may sound irrelevant, but you can be sure that if the boss sees something that causes them concern, it will be a major issue, even if it happens once in a blue moon and there are other priorities.

There are two main aspects to Paretto analysis :- the actual gathering of the information and the graph itself. The gathering may come from your Key Performance Indicators (KPIs). These are the things that are measured in the production/process area that show how well you are working – in effect the efficiencies or outputs that you might mark on shift reports or production runs.

Why must you not blame the people who have identified the potential improvements?

How would you distinguish facts from opinions in order to identify improvement actions?

How do you establish measurable improvements?

2. Describe the Problem

Once the problems have been highlighted, placed in order of importance and one or two have been selected for analysis, the problem should be written down.
The description should be clear, concise and specific.

It should be simple, but have impact.
It should be able to be understood by anyone.

If we take our Problem Description as being:

"The Cutting operation in the Finishing Shop area has a 6.5% reject rate when using the CD-375 electric saw, using the steel ruler and the quality measurement sheet as our base information", then our …

3. Objective Statement

…. Will be:

"Reduce the reject rate on the Cutting operation in the Finishing Shop on the CD-375 from 6.5% to 0.5% by DD/MM/YY, using the steel ruler and the quality measurement sheet as our base information."

Don't be too adventurous and set yourself goals that are beyond your reach. Make small improvements rather than setting unobtainable goals that in the long term will de-motivate the team. If you say 'eliminate defects' that means 'no defects, ever', so don't say 'reduce defects to 0%', but consider reducing them to 0.5%.

How do you set quantifiable targets and objectives?

What targets are you expected to achieve in your current role?

4. Understand the Process – for example by creating a Flow Chart

It is important to understand the process you are looking at, paying particular attention to the differences between what is happening and what should be happening. A problem occurs when what *should* be happening differs from what *is* happening, and a diagramatic flow chart will show at a glance where the main areas of deviation occur. One of the main advantages of the Flow Chart is it lets the team see the process or operation from an overall perspective, with each input and element broken down to its basic parts. From this all external influences on the system can be seen and documented.

Understanding the Process is of great importance for two main reasons:

1. You will be able to identify areas where it is not doing what it is meant to do.
2. You can not improve the process if you do not know what it should be doing in the first place.

By getting to grips with this you will be able to concentrate your efforts and resources on the areas that you know will make a difference rather than having to look at the entire process.

1. This will save time, effort and money.
2. Make the problem solving easier
3. Make everyone feel that they have an idea what they are talking about

5. Pinpoint External Influences
By ‘external influences’ we mean items such as other people or departments, machinery not being used correctly, incorrect materials being used, inappropriate information being used.

Through looking at the external influences the team can decide on whether these have any part to play in the forming of the problem. This is decided through simple detective work, asking a few basic questions.

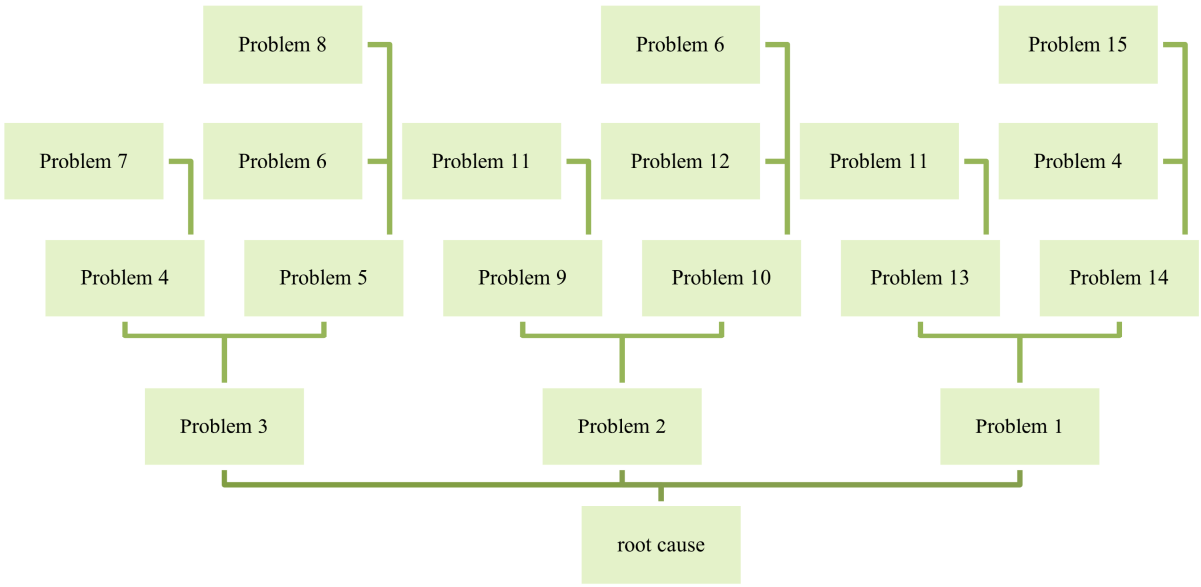
6. Introduce temporary solutions if desired
Remember :- Temporary Solutions

This stage is only really used if the problems are having a major impact on customers. It is considered to be a stop-gap solution and not usually associated with the longer term, planned approach. In most organisations this would be termed ‘fire fighting’. This should only be carried out if the Customer is going to be directly affected, be it from poor quality, failure to meet order requirements and the like.

7. Determine causes
Using data is a good basis for making decisions as it avoids opinions and lets more logical steps to be taken. This data can also be feedback from other teams or successes. On a day to day basis this data will primarily come from:

Analyse through Brainstorming: There are 2 methods of brainstorming which are Freewheeling and Round Robin. Freewheeling is where everybody shares ideas all at once, shouting out ideas as they go along. Round Robin is where everyone takes it in turn offering ideas but can pass on any go. With both methods all ideas are listed as they are shouted out. This continues until no more ideas are offered.

Establishing the Root Cause: This could be best described as the one single problem that leads to many more problems occurring. If you were to draw this it might look like a tree:



The 5 Why’s can help the process of brainstorming. This is where the question ‘why’ is asked 5 times, for example:

1. Why did the problem occur? The item was rejected because the dimensions were out of specification.
2. What caused the product to be out of specification? The equipment was not set up correctly.
3. Why was the equipment not set up correctly? The set up test had not been carried out first.

4. Why was the set up test not carried out? The process control operator was not available to complete the test.
5. Why was the process control operator not available? He was setting up another piece of equipment.

This process of the 5 Why's is asked in order to 'get to the bottom of the problem, and yes, you might only ask the question three times, maybe 7 times, but the technique is still know as the 5 Whys! Other things to consider are:

Key Performance Indicators
Interviews with people outwith the team
Feedback from customers - and this might include information from the customer regarding problems and solutions that other suppliers have had
Specialist help, such as machinery manufacturers or bodies like the HSE.

How can identifying the root cause of a problem help solve many more problems?

From here you could identify the most likely solutions to 'kill the cause'.

8. Decide on and Implement solutions

From your brainstorming and team discussions you might have a list of dozens of ideas – but which ones do you select first to try out?

Initially you should take the same approach as you took with Stage 6. Don't go overboard with investment of time, money and effort. Use lots of string and Sellotape, use the suck-it-and-see approach. If the solution works, good. Then you follow it through and implement whatever is necessary to provide a permanent fix. If it doesn't work, don't worry. You haven't spent major resources on it, but at least you tried to do something.

- The ones that are definitely going to work – they might have been tried out elsewhere to great success. Does it actually work?
- The ones that are cheap to implement – Sellotape and string rather than sheet steel and fabrication
- The ones that are easy to implement – can you try them out in a matter of minutes rather than having to wait a fortnight for the results? Is it easy and quick to implement?
- You might have a cost/benefits analysis – how much will it cost against what the likely improvements are going to be? Is the solution cost effective?
- The one that the boss insists you try out?
- Side Effects – Does the solution provide any side effects or disruption within the workplace?
- Understanding – Is it complicated that people have difficulty in grasping the new idea or system?

You might want to grade these ideas against a list of requirements, for instance you could score 1 to 5 on cost, ease of implementation, H&S concerns and potential disruption – this could be described as a risk assessment for the project.

How would you select improvement ideas that are to be implemented?

1.

2.

3.

4.

How would you evaluate these improvement ideas?

Keeping a track of Solutions, whether they work or not, is very important.

9. Monitor effects

Keep an eye on things to see if the problem re-occurs – this may involve using the same indicators mentioned in Step 1 and through the Objective Statement in Step 3. In the fullness of time this monitoring will pass from project team to the people responsible for the process.

Although we said in 'Step 3 – Objective Statement' that we would continue to use the same measurement method to monitor the progress of the team it may be beneficial to introduce a couple of additional tools. For instance, rather than waiting until the end of a shift to measure how many bad parts you have (Chart 1) it might be more useful to measure every 15 minutes or so (Chart 2), as shown:

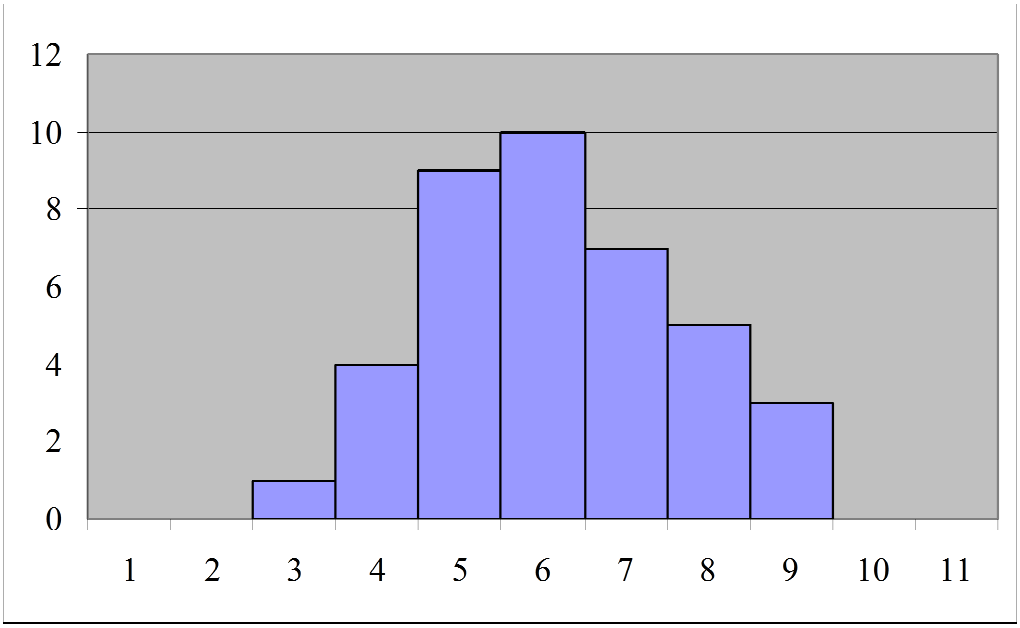
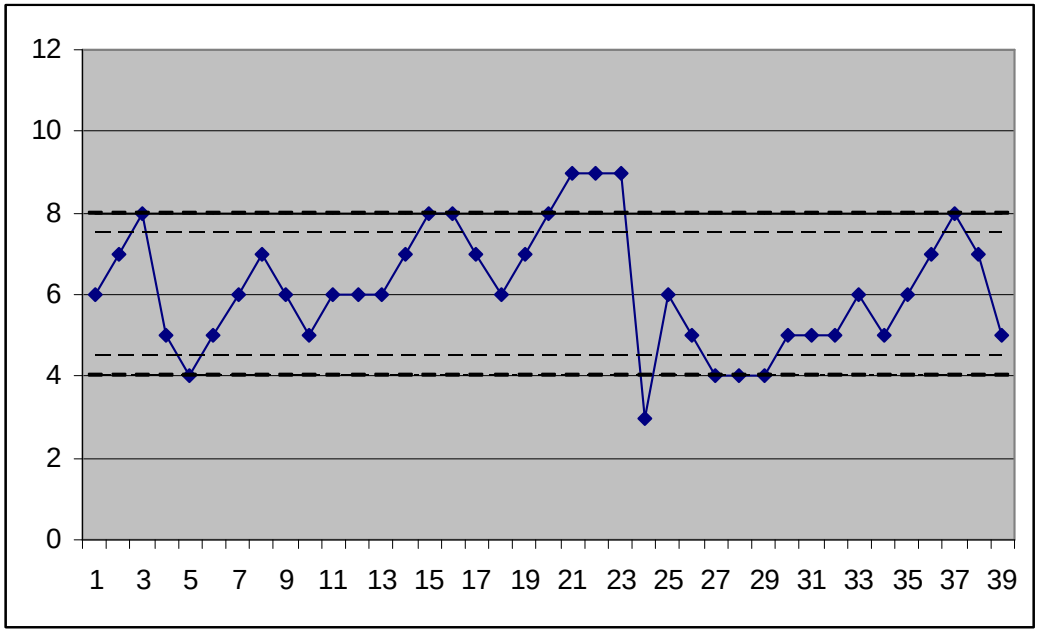


Chart 1



This would highlight problems almost immediately, with a corresponding reduction in rejects.

10. Standardise procedures - Creating Standard Operating Procedures

And finally, once you have carried out all of this good work, you want it to stay in place. Stage 9 will highlight if the problem re-occurs, but some form of standardisation must be implemented for the new system used – Standard Operating Procedure, Policies and Procedures, Training and so on.

These are created by detailing every aspect of the job through careful analysis of the Kaizen results, quality requirements, the customers expectations, the machinery or material instructions and so on.

The involvement of a lot of people is preferable to one person thinking that they know it all themselves, so it may be necessary to speak to people outwith the team - speak to QC, the operators, the Health and Safety rep.

A good SOP will detail references to other documents, for instance Health and Safety Risk Assessments or Quality Checks. Information typically included in these are:

- Health & Safety information to be adhered to - General area & job specific)
- Tools & Equipment required to carryout the job.
- Operating instructions.
- Quality Checks for inspection and release of product to next process.
- Machine or Equipment Checks: Daily, weekly, monthly etc.
- Housekeeping standards - colour coding, labelling etc
- Documentation required to be completed.

Communicating within the Team and with other Departments

It is important that teams do not operate in seclusion from other teams or members of the workforce. Good communication across all areas keeps other people interested, lets them feel involved, can generate ideas from external sources and allows people to give their own input.

Visual Management System tools include:

- Team Boards – Display agreed information such as performance targets, key area information, news briefs, area working practices etc.
- Team Meetings and Presentations – a lot of companies like to have presentations by the team at the end of the project, even if it hasn't been too successful. If the project is very large and goes on for a few months, there might be the need to give monthly updates, to clearly show progress.
- Noticeboards – for general communication.
- Kanban Systems – An area that has been set aside to holds product (WIP) awaiting further work and where visually it can be seen what quantities are available for re-stocking purposes. This may entail Card Systems which can be used to display parts available for the process along with minimum stock levels. Theses cards can be colour coded to show stages, ie red – reject, yellow – re-order. Other Card Systems may simply be 'travel card' which follows the product and gives full identification of the product and the stage it is at.
- Colour Coding – Colour coding can be used to highlight various differences of a piece of equipment/components ie component size, calibration period, air lines etc.
- Floor Footprints – Used to mark out areas for equipment, storage, quarantine etc.
- Graphs (Target v Actual, % RFT, Pareto Analysis, Bar Chart and Action Plans).
- Shadow Boards – to indicate if tools are missing.

What are the techniques that could be used to visually communicate the work of the Kaizen team?

A few further Manufacturing terms

An explanation of Cycle Times:

Cycle time is usually taken to be '*the amount of time required for one full cycle of a process to be completed*', for instance a part moving through a production cell or area.

It might also be one specific action within that process such as the time taken to fit a component to a lathe, turn it, remove it and be ready to fit the next component.

Takt Time:

'Takt' is a German word referring to musical timing, the beat if you like.

Therefore Takt Time is the beat that production must follow if it wants to keep up. In effect, the amount of time that you have to fulfil your customer demands. For instance, if the customer wants a part every second, then the Takt time is one second.

It can be used in the construction of cells or production lines where a simple calculation between Cycle Time and Takt Time will let you know at a glance if you have the capacity.

How is Takt Time calculated?

$$TaktTime = \left[\frac{Seconds/TimePeriod}{Demand/TimePeriod} \right]$$

For instance, if you wanted to run only one product in a cell continuously, the takt time for one week would be calculated like this :-

A 37 hour week would produce a figure of 133200 seconds, or the '*Seconds/Time Period*'.

'*Demand/Time Period*' is actually your customers demands, for instance they require 37 pallets delivered per week. This obviously means that they require one pallet per hour, or '60 minutes per pallet'.

If each pallet contains 60 boxes they require one box per minute, or '60 seconds per box'.

And if each box contains 60 widgets, the time that you have to produce is '1 second per widget'. This is the Takt Time.

Therefore,

If your customers require 133200 components per week then the Takt Time = 1 second.

If your customers require 266400 components per week then the Takt Time = 0.5 seconds.

If your customers require 66600 components per week then the Takt Time = 2 seconds.

So what does this tell us? If TT = *Takt Time* and CT = *Cycle Time*

As TT and CT are both measured in the same units, namely seconds per component, then direct comparisons can be made.

1. If TT is greater than CT then production can cope with the demand.
2. If TT = CT then production is breaking even.
3. If TT is less than CT then production will have to catch up.

This is can be used to optimise running times on machinery, plan overtime, indicate the need for more machines, show where improvements need to be made.

Optimising the Process:

There are a number of management tools that can be used once the Takt time has been calculated in order to optimise your resources, such as:

Level Scheduling – where you plan your production as an average over a number of days

Line Balancing – giving everyone an equal share of the work

Area Layout – ensuring there are no wastes through movement of parts or people

Standard Work – what used to be called 'time and motion'.

What 4 methods can be used to reduce some of the 7 Wastes?

1.

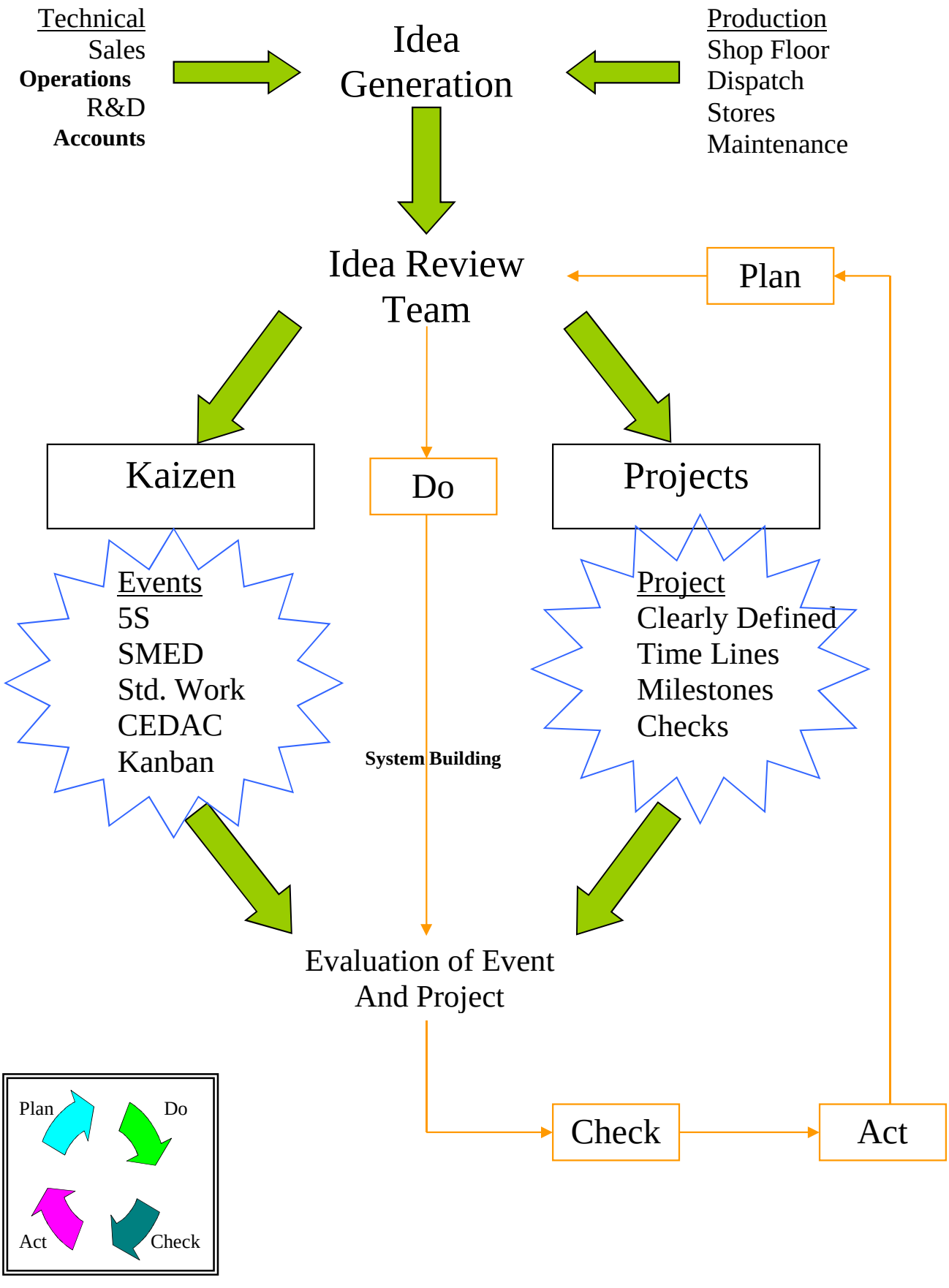
2.

3.

4.

Continuous Improvements System

Overview Presentation



Useful Websites:

www.hse.gov.uk – The Health and Safety Executive, whose website covers almost every aspect of H&S in the UK, with lots of free downloadable documents, guidelines and advice. There are also a lot of documents detailing your specific duties to your workmates.

www.bsigroup.com – British Standards Institution maintain the relevant standards applicable to almost everything in the UK, from traffic lights and caravans to regulations covering Racking and Storage requirements.

www.ciltuk.org.uk – The Chartered Institute of Logistics and Transport. To quote, 'The Chartered Institute of Logistics and Transport in the UK - CILT(UK) - is the pre-eminent independent professional body for individuals associated with logistics, supply chains and all transport throughout their careers.'

Useful Reading:

Ross, W.S. (2003). *Continuous Improvement*, MB2000. ISBN 1-85252-427-8

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