Glass Processing Technology
Prof. Anil Pant
Department of Civil Engineering
Indian Institute of Technology, Madras

Lecture - 72
Introduction to Quality Management System (QMS)

(Refer Slide Time: 00:21)

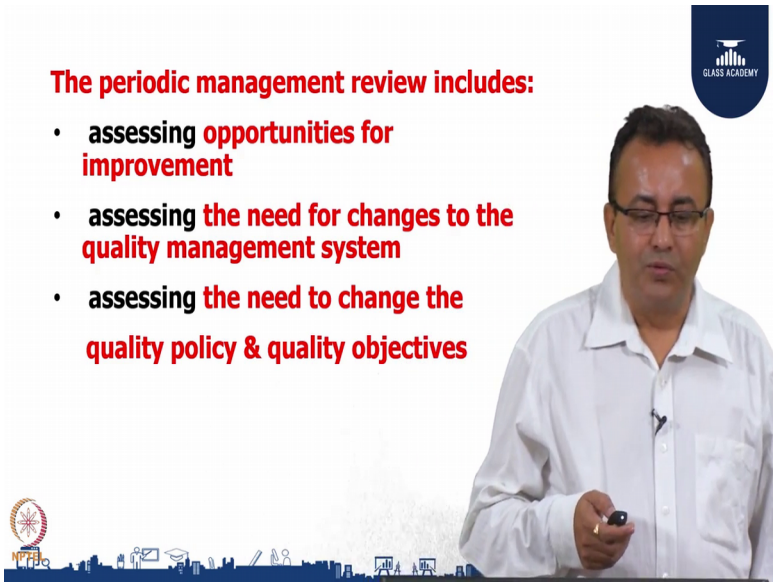
So, what are the main elements of a Quality Management System?

(Refer Slide Time: 00:25)

The main elements are management reviews, internal audits, control of documents, control of records, continual improvements, data analysis, customer satisfaction and corrective and preventive action.

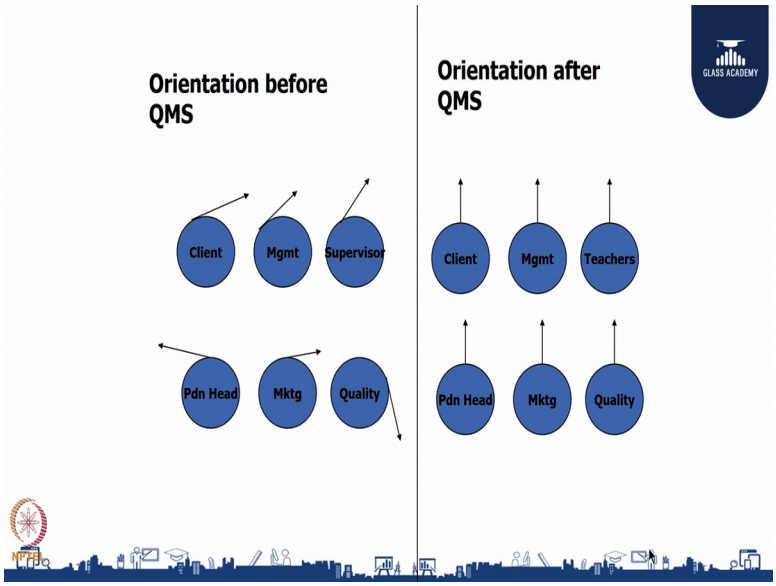
(Refer Slide Time: 00:39)

(Refer Slide Time: 00:43)



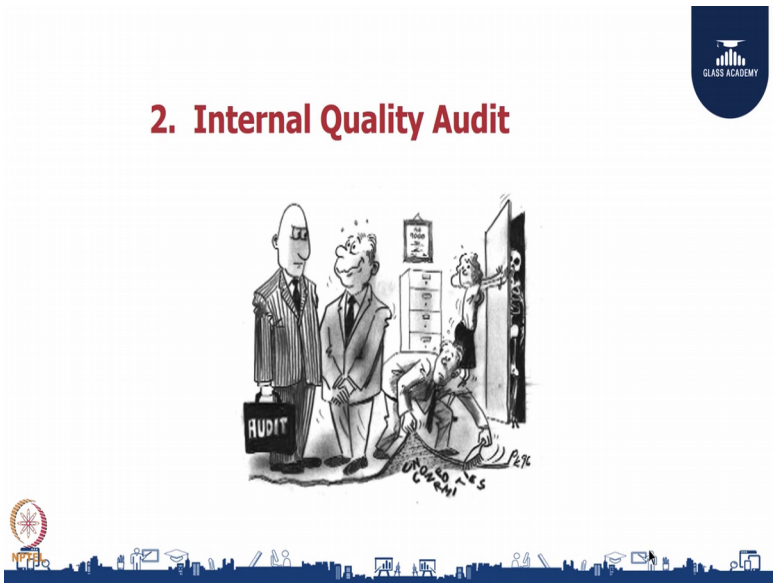
So, when you look at management review it, what does it mean? The periodic management review includes assessing a opportunities for improvement, assessing the need for changes to the quality management system, assessing the need to change the quality policy and quality objectives.

(Refer Slide Time: 00:57)

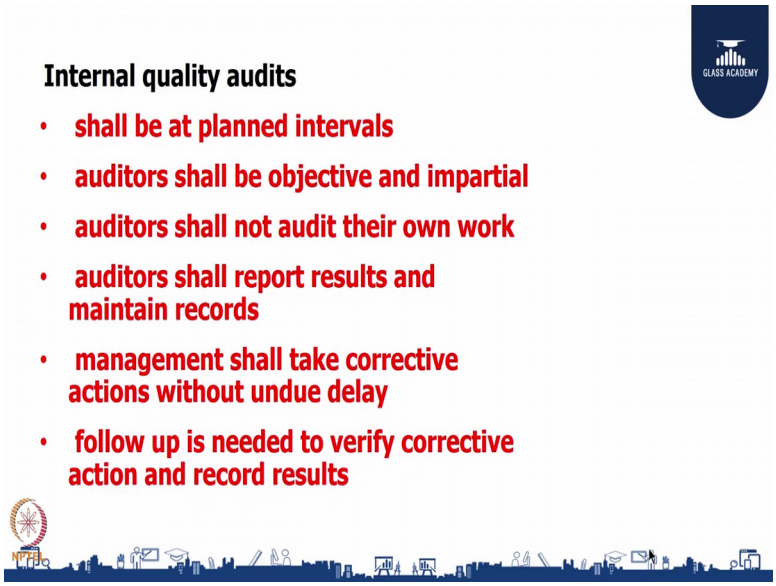


So, you can see the orientation of an organization before QMS and after QMS. Before implementation of a quality management system, everybody is thinking and working in a different direction. After orientation, after implementation QMS, you can see everybody is looking towards satisfaction of the customer and meeting the requirements applicable requirements of the interested parties including customers.

(Refer Slide Time: 01:27)

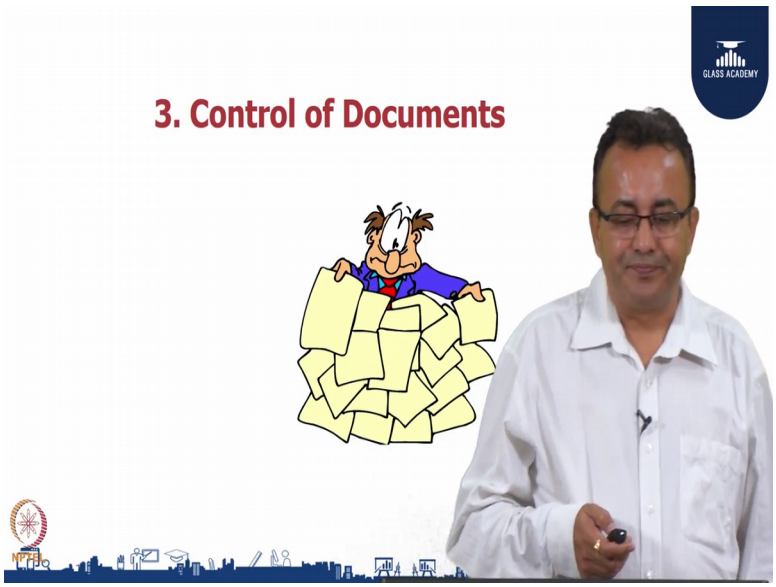


(Refer Slide Time: 01:35)

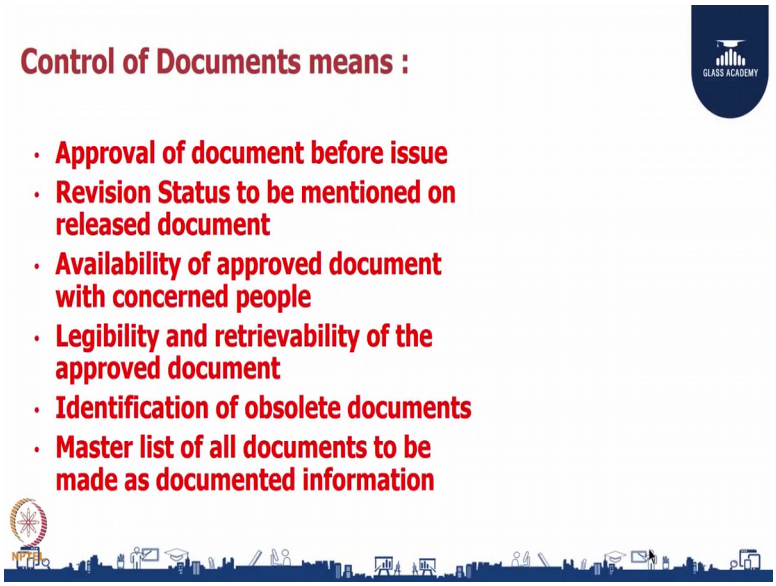


2nd element is internal quality audit; so, the organization arranges for internal quality audit which shall be a planned at definite intervals quarterly, half yearly. So, we will train there a auditors or higher some external auditor. Auditor shall be objective and impartial. An auditor will not audit their own work. Auditor report the results and maintain records and management shall take corrective action without undue delay and follow up of the corrective action is required and results are recorded to close that non conformity or findings of the audit.

(Refer Slide Time: 02:07)



(Refer Slide Time: 02:11)

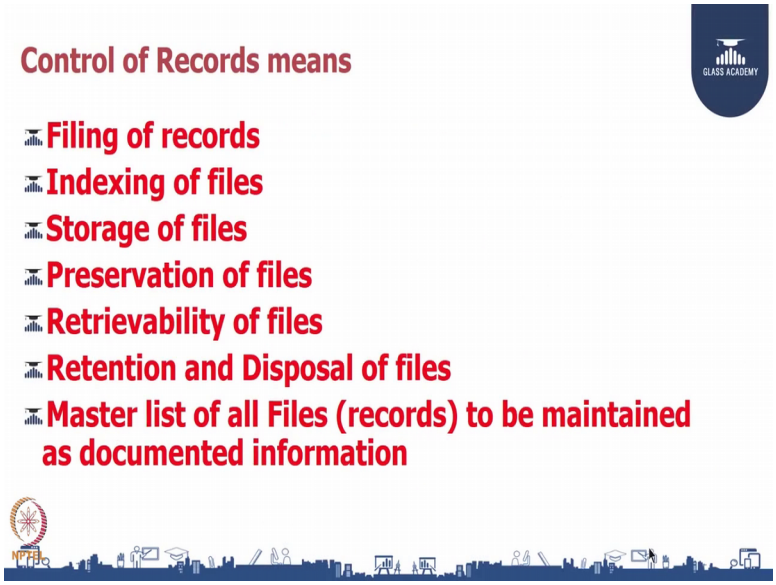


3rd is control of documents; control of document means the any document that organization circulates for his employees where as SOP, manual work instruction; it should have approval of the top management before issue. Identification and revision status of the document is to mention on the released document. This approved document must be available with the concerned people legibility and retrievability of the approved document has to be ensured or silly document has to be removed from that area and has to be stamped obsolete and file separately; master list of all documents to be made as documented information.

(Refer Slide Time: 02:55)

4th one is control of records means all the formats which we are feeling on day to day basis.

(Refer Slide Time: 03:03)

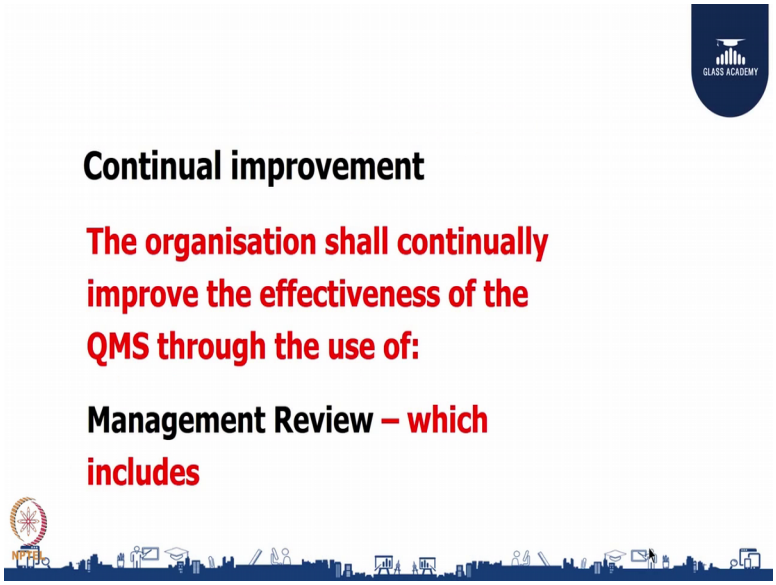


So, control of record means we have to file all the records, we have to index all the files, we have to store all the files properly, we have to preserve the files, we have to ensure that files are retrievable when required and where to define a retention and disposal period of the files. Master list of all files, containing records to be maintained as documented information.

(Refer Slide Time: 03:27)

Now, 5th one is continual improvement which is made up of corrective action and preventive action less understand what are they?

(Refer Slide Time: 03:35)



.

(Refer Slide Time: 03:43)

The organisation shall continually improve the effectiveness the QMS through the use of management review which includes quality policy sates focus of all employees on customer satisfaction meeting interested parties requirements and continual

improvement, quality objectives, process performance, audit results, analysis of data corrective and preventive actions and customer feedback.

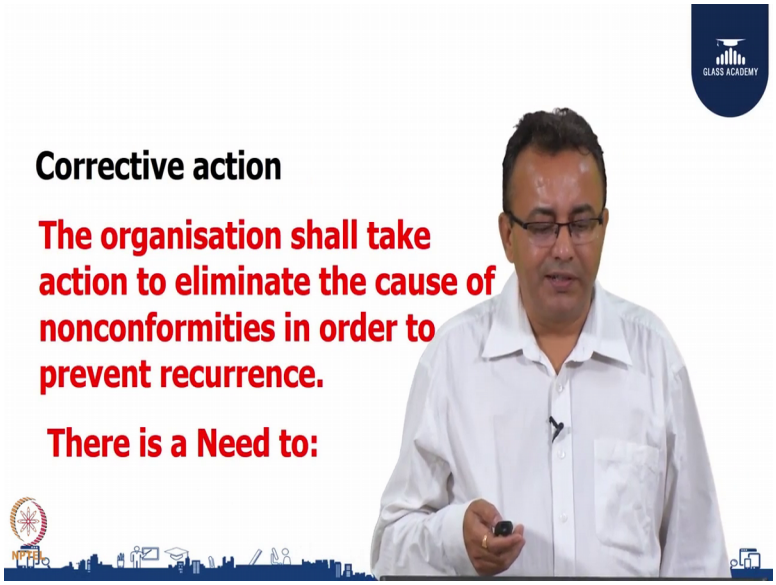
(Refer Slide Time: 04:03)

(Refer Slide Time: 04:07)

Now, let us understand correction corrective and preventive action; correction means the organisation shall take action to rectify the nonconformities that does not ensure that it will not occur again like, in case of any customer complaint in any of the glass

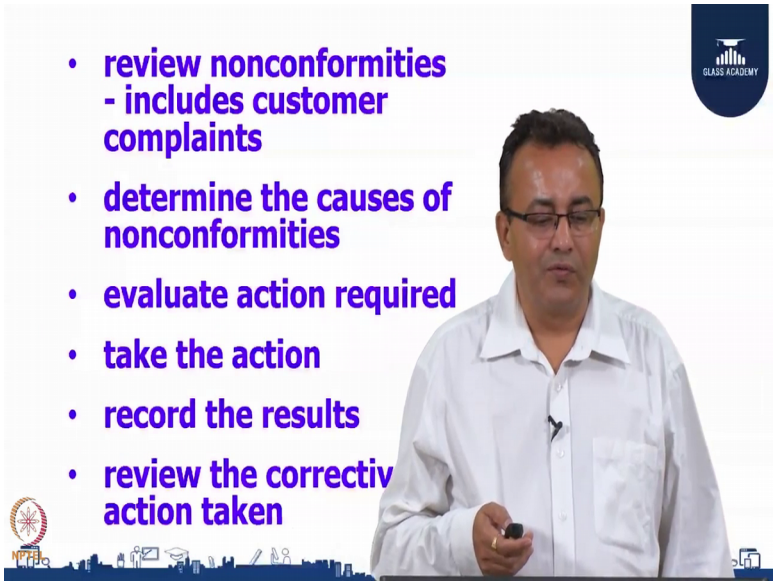
processing unit replacement is a correction. If you realise that mistake has happened at you and you replace that glass part that is called correction.

(Refer Slide Time: 04:31)



Corrective action is the organisation shall take action to eliminate the cause of nonconformities in order to prevent recurrence.

(Refer Slide Time: 04:39)

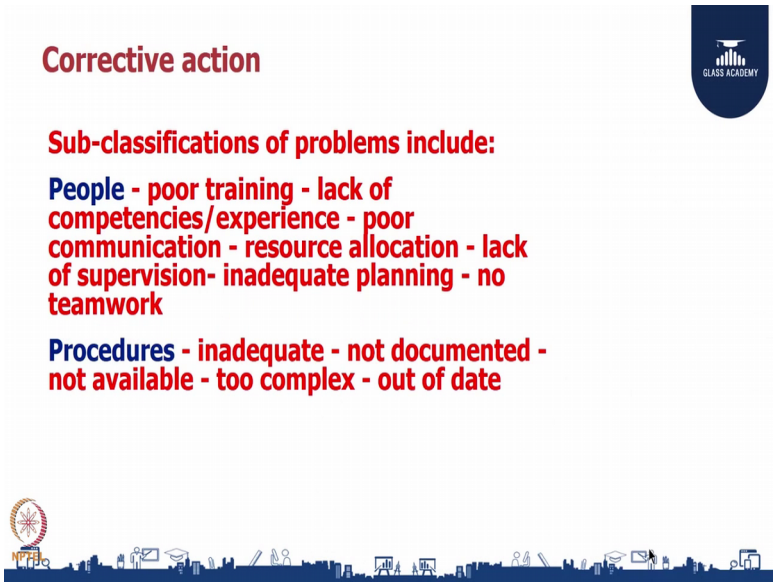


So, this need to review nonconformities including customer complaints, determine the root cause of the non conformities and evaluate action required then take the action

record the action and review the corrective action taken. So, if you can record well and analyse effectively, we can reduce our problems.

(Refer Slide Time: 04:51)

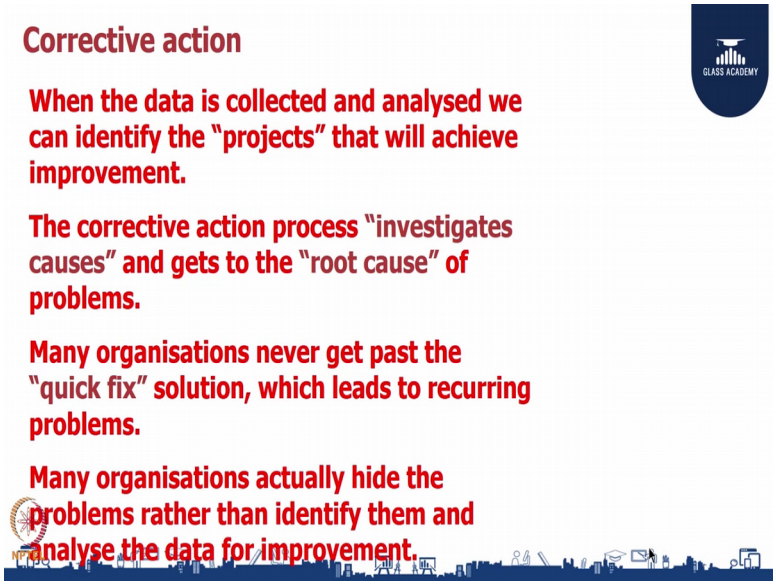
(Refer Slide Time: 04:57)



So, corrective action sub classification of problem include people. So, corrective action may be trace back to poor training or lack of competencies of experience or poor communication or inadequate resource allocation or lack of supervision or inadequate planning or no teamwork. Procedure may have a root cause, they may not be adequately

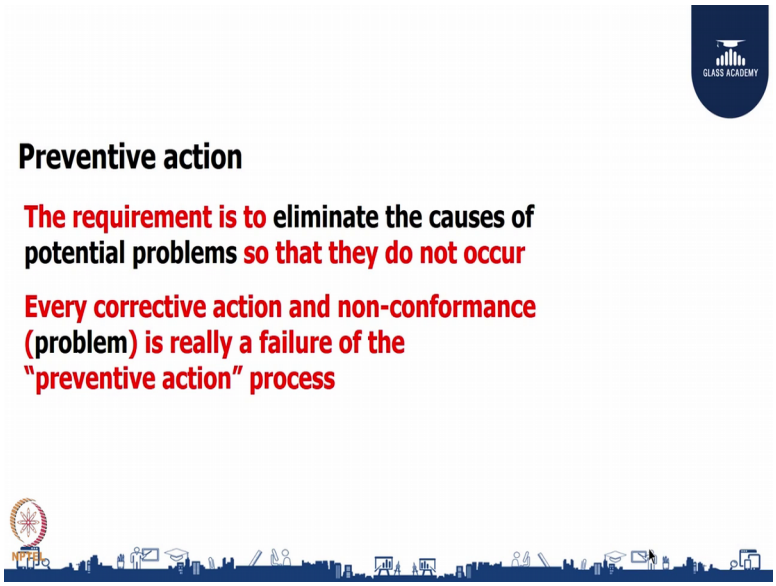
define, they may not be documented, they may not be available at the place of work, they may be too complex or they may be out dated.

(Refer Slide Time: 05:29)



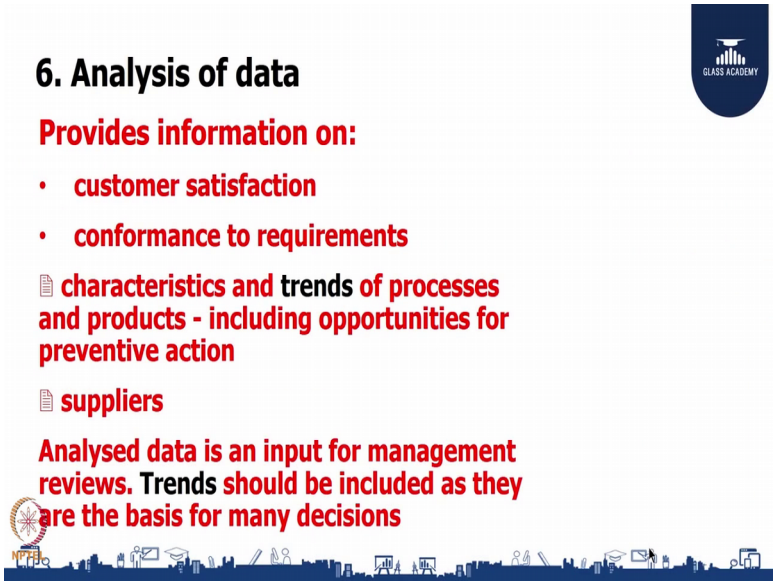
So, for corrective action when a data when this data is collected and analysed, we can identify the project that will achieve improvement. The corrective action process investigates causes and get to the root cause of the problem. So, people use five analysis to find the root cause of the problem.

(Refer Slide Time: 05:47)



Preventive action: preventive action is action taken today to eliminate the cause of potential problem in the future so, that they do not occur. So, every corrective action and non conformance is really a failure of preventive action. So, if you see you install fire extinguisher in water hydrant in your company, it means you are taking preventive action against future fire ratio.

(Refer Slide Time: 06:15)



6 is 6 element is analysis of data; so, analysis of data on customer satisfaction and whether we are conforming to the requirement or not. Characteristic and trends of process and products including a opportunities for preventive action. Trends of suppliers whether they are supplying in time or whether they are supplying quality product or not.

(Refer Slide Time: 06:41)

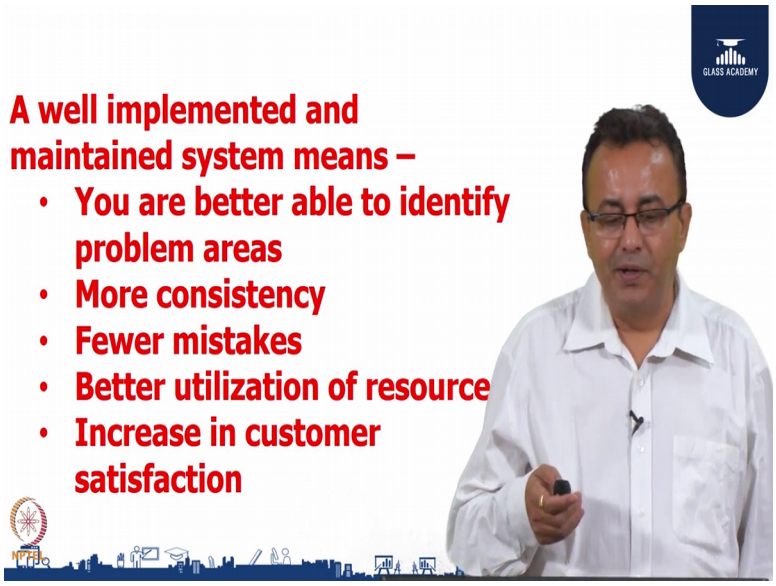
Customer satisfaction; what is our customer perception of the degree to which we are meeting is requirement. So, to capture that we have to take customers feedback because customer is the most important person whose interacting with your processes and people and can provide really invaluable insights.

(Refer Slide Time: 07:03)

So, let us come to the summary and benefits of implementing QMS in organisation. First process gets defined and control mechanism device and implemented.

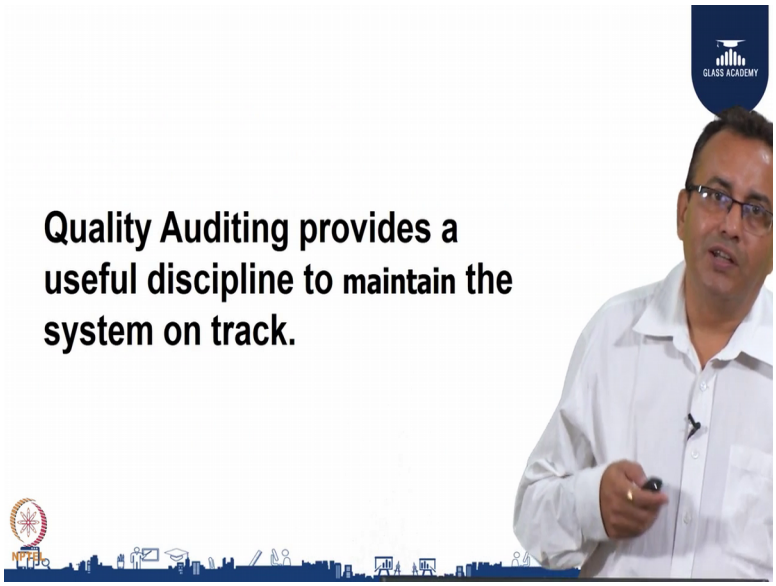
(Refer Slide Time: 07:07)

(Refer Slide Time: 07:13)



So, if you have well implemented and maintained the system, so, you are better able to identify problem area; your more consistent, you make fewer mistakes, resources are better utilise and the customer satisfaction increases.

(Refer Slide Time: 07:27)



If you are regularly auditing your quality systems, so, it gives you a useful discipline to maintain the system on track.

(Refer Slide Time: 07:39)

Regular management reviews lead to continual improvements and data generation analysis provide ground for sound decision making.

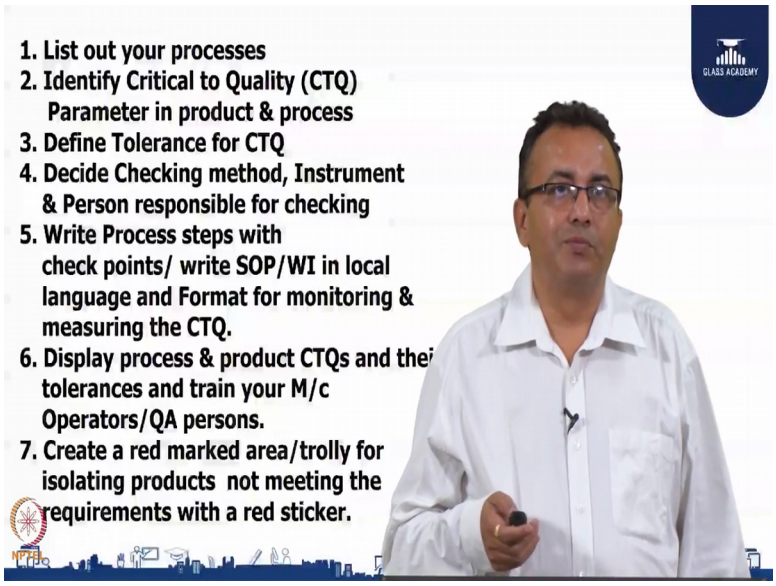
(Refer Slide Time: 07:47)

(Refer Slide Time: 07:49)

It gears you up for higher achievements and if you get ISO 9000 certified that distinguishes your organisation as well among your competition.

(Refer Slide Time: 07:59)

(Refer Slide Time: 08:03)



So, what are the simple steps to implement a simple QMS? Most fundamental basic QMS; first I could be list out your processes, then indentify critical to quality parameters in product and process. Then they find tolerance for the critical to quality parameter decide checking method instrument and person responsible for checking that critical to quality parameter.

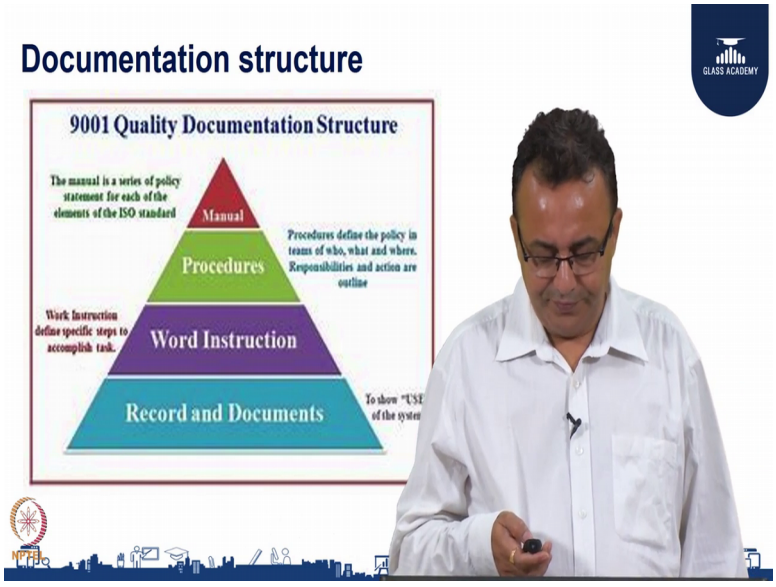
Write process steps with checkpoints you can also write sop or (Refer Time: 08:29) local language and can devise a format for recording those data about the critical to quality

parameter. Display this process steps and process and product critical to quality parameters at the respective place and train your machine operators and quality assurance people about them. Create a red marked area or trolley for isolating production not meeting the requirements with a red sticker to isolate is products from the good ones.

(Refer Slide Time: 09:01)

Now, let us come to the documentation required for a well defined QMS.

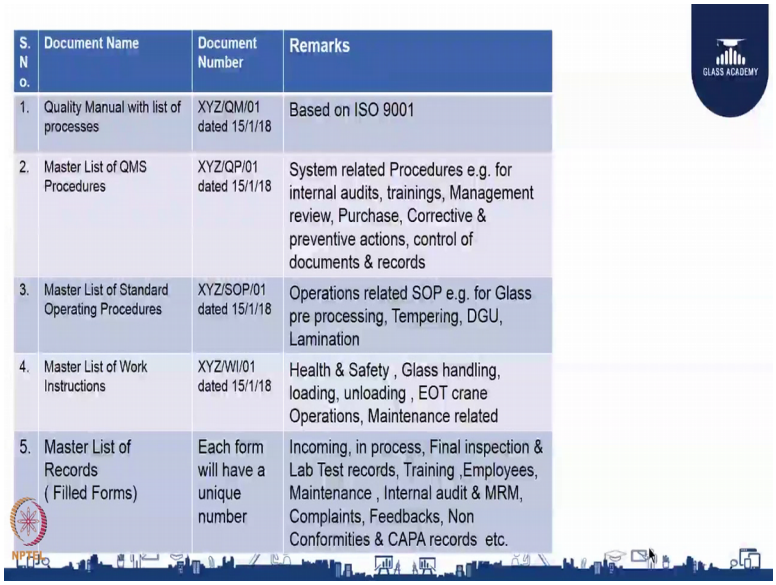
(Refer Slide Time: 09:05)



The structure of documentation is in the shape of a pyramid. The quality management system manual being at the top which gives links to the system procedures which gives

links to the work instruction related to the actual work and then at the bottom the pyramid you have records and related documents.

(Refer Slide Time: 09:33)



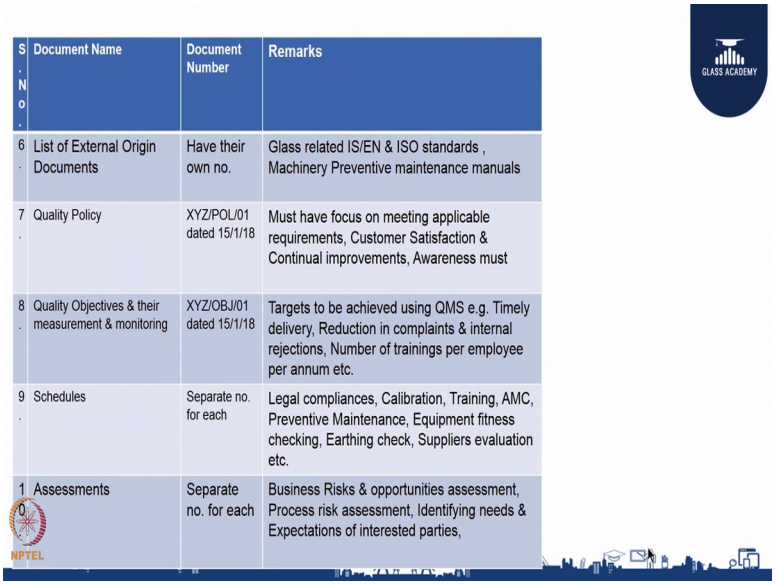
So, is a summary of the documents required; first one is quality manual with list of processes all documents and number with the issue date or revision date. So, quality manual is based on ISO 9001 quality management system standard. Then you have to define master list of your quality management system procedures. So, system related procedures like procedure for internal audits, trainings, management reviews, purchase corrective and preventive action, control of document and records are covered here.

Then you can make a master list of standard operating procedures like corporations; they are operation related sops like for glass pre processing tampering, DGU, lamination etcetera. Then you can also list out your, you can prepare a master list of work instruction related to health and safety glass handling, loading, unloading, EOT crane operation and maintenance related. Then you can make master list of records; records mean the filled form which you have already makes earlier.

So, you can this records will including incoming inspection in processes, inspection final inspection and lab test records training records like training attendance, training evaluation and training feedback. Employees related to record like Aadhar card, pan card, resume, interview evaluation. Maintenance related preventive maintenance plan

internal audit and MRM related complaints, feedbacks, non conformities and CAPA records.

(Refer Slide Time: 11:11)

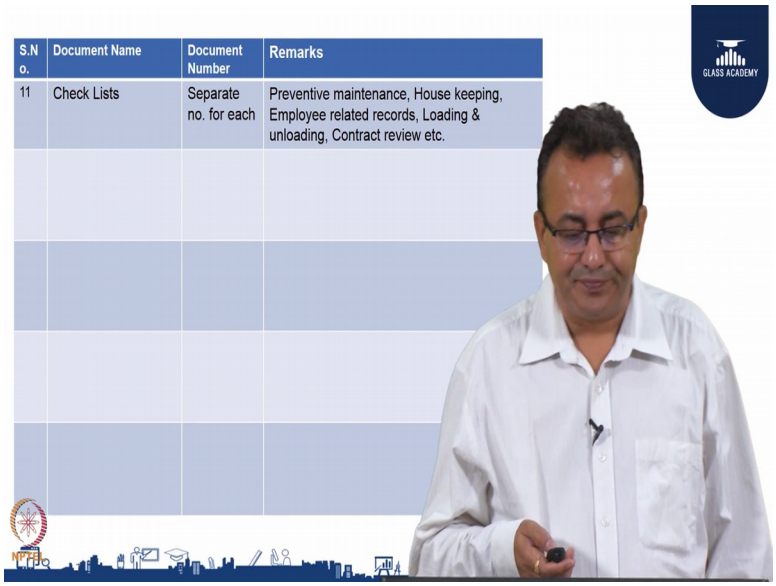


S. No.	Document Name	Document Number	Remarks
6.	List of External Origin Documents	Have their own no.	Glass related IS/EN & ISO standards , Machinery Preventive maintenance manuals
7.	Quality Policy	XYZ/POL/01 dated 15/1/18	Must have focus on meeting applicable requirements, Customer Satisfaction & Continual improvements, Awareness must
8.	Quality Objectives & their measurement & monitoring	XYZ/OBJ/01 dated 15/1/18	Targets to be achieved using QMS e.g. Timely delivery, Reduction in complaints & internal rejections, Number of trainings per employee per annum etc.
9.	Schedules	Separate no. for each	Legal compliances, Calibration, Training, AMC, Preventive Maintenance, Equipment fitness checking, Earthing check, Suppliers evaluation etc.
10.	Assessments	Separate no. for each	Business Risks & opportunities assessment, Process risk assessment, Identifying needs & Expectations of interested parties,

Then you can also list out your external origin documents like glass related Indian and European standards, ISO 9000 14000 45000 standard at any standard that you are using in your company like machinery, preventive maintenance manuals, machine manuals. Then you have to define a quality policy which should have focus on meeting applicable requirements, customer satisfaction and continual improvements. The awareness of quality policy is must for all employees and you can also list out your quality objectives and their measurement and monitoring.

So, it means after implementing QMS, what objective you are planning to achieve like timely delivery your products reduction in number of complaints, reduction in internal rejections or number of trainings per employee per annum etcetera. Then you can prepare your schedules schedule for legal compliances, calibration, training, annual maintenance, contracts, preventive maintenance, equipment fitness checking, earthing check, suppliers evolution etcetera. Then you can also make some assessments about a company like, business what are the business risk and opportunities process risk assessments identifying needs and expectation of interested parties.

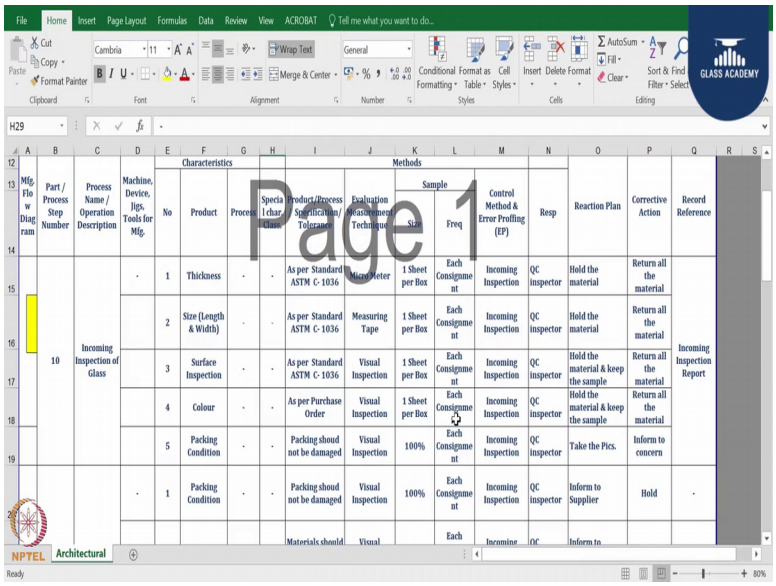
(Refer Slide Time: 12:39)



Then checklist: checklist for preventive maintenance, housekeeping, employee related records loading and unloading, contract review etcetera. This is these are preventive checklist which ensure that person who is checking that process has I will show the certain things which you have already listed out in the checklist.

(Refer Slide Time: 12:59)

(Refer Slide Time: 13:05)



Mfg. Flow Diagram	Part / Process Step Number	Process Name / Operation Description	Machine, Device, Jigs, Tools for Mfg.	No	Product	Process Special Char. Class	Product/Process Specification/ Tolerance	Evaluation Measurement Technique	Sample Size	Sample Freq	Control Method & Error Proofing (EP)	Resp	Reaction Plan	Corrective Action	Record Reference
				Characteristics				Methods							
	10	Incoming Inspection of Glass	-	1	Thickness	- -	As per Standard ASTM C- 1036	Micro Meter	1 Sheet per Box	Each Consignment	Incoming Inspection	QC inspector	Hold the material	Return all the material	Incoming Inspection Report
				2	Size (Length & Width)	- -	As per Standard ASTM C- 1036	Measuring Tape	1 Sheet per Box	Each Consignment	Incoming Inspection	QC inspector	Hold the material	Return all the material	
				3	Surface Inspection	- -	As per Standard ASTM C- 1036	Visual Inspection	1 Sheet per Box	Each Consignment	Incoming Inspection	QC inspector	Hold the material & keep the sample	Return all the material	
				4	Colour	- -	As per Purchase Order	Visual Inspection	1 Sheet per Box	Each Consignment	Incoming Inspection	QC inspector	Hold the material & keep the sample	Return all the material	
				5	Packing Condition	- -	Packing shoud not be damaged	Visual Inspection	100%	Each Consignment	Incoming Inspection	QC inspector	Take the Pics.	Inform to concern	
			-	1	Packing Condition	- -	Packing shoud not be damaged	Visual Inspection	100%	Each Consignment	Incoming Inspection	QC inspector	Inform to Supplier	Hold	-
							Materials should	Visual		Each	Incoming	QC	Inform to		

Now, will come the example of control plan for glass processing. So, in the process flow diagram, you identify the process type as number 10, this is incoming inspection of glass. The characteristic to be checked or thickness size surface inspection colour and packing condition. The specification tolerance are like for thickness is, it is to be checked as per standard a ASTM C 1036 size has to be checked as per ASTM C 1036, colour as per purchase order packing condition, should not be damage packing condition, should not be damaged, expired date material should not have should not be expired.

How to check the thickness used check the thickness in micrometre, what is the sample size one sheet per box and what is the frequency each consignment, what is the control method and error proofing incoming inspection responsibilities of QC inspector, what happens if the material is not able to meet your requirement, hold the material corrective action would be returned all the material.

So, what would you record reference that is incoming inspection report? Like in the case of PVB; what are the requirements impact test as per what are the requirements, what is packing condition we should not be damaged, expiry it should not be expired. We use first expired first out for controlling the material which expire which has expiry date impact as PVB should pass the inspectors to use at impact our un sample each consignment incoming inspection done by qc inspector.

If in case of any problem inform to supplier or reject the material and the evidence is recorded in the incoming inspection report. Incoming inspection of ink again colour and expiry data are the most critical parameter which needs to be checked. Glass cutting you can see the important critical to quality parameters are dimension surface reflection. Dimension should be as per the work order they are to be checked with measuring tape or template.

They have to checked 100 percent each for each work order and after first of inspection and regular in process inspection is required by the operator in case of any problem in the glass inform to the supplier. Similarly, surface before cutting should be free from bubbles stones scratch chips as per applicable ASTM EN or IS standard is visual inspection. So, you must ensure that the eye sight of the people on the machines is ok so, that they can check this visual defects.

Other important parameter critical to quality parameters are cutting pressure which has been defined as 1.5 to 2.5 bar to measure by pressure gauze that to check as set up of the machine for each work order at to be done by operator. And if it is not meeting the pressure requirement, you have to stop the machine and inform to the maintenance. Similarly, for grinding other critical to quality parameters are type of grinding wheel that must be selected as per the work order and as per the glass thickness checked by measuring tape.

It has to be checked during the setup and rest you check for each work order at always product is not coming as per the requirement operators has to hold the machine and to correct. So, type of cutting wheel again is a important critical to quality parameter type of drill type of polishing wheel and type of belt is the most important creativity critical to quality parameters for grinding operation.

So, will again go through the critical to quality parameters for washing; surface inspection colour of is the most important for washing purpose. So, type of DM water properties, DM water properties like pH conductivity and temperature are the most important and the range has been defined the pH should be between 6 to 8 conducted should be less than 20.

And temperature should be between 35 to 40 degree centigrade and the instrument used as conductivity metre and temperature gauge. They are measured before the start of the

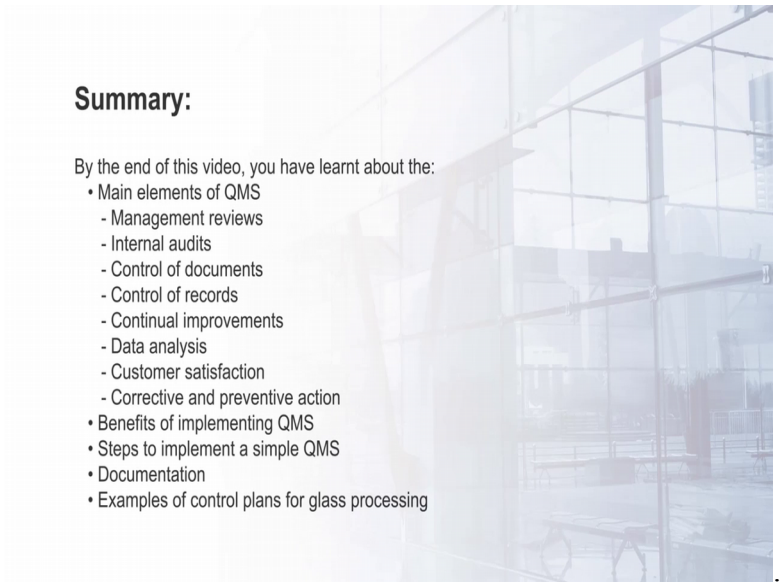
shape and in case of the requirement going beyond the specification; we have to stop the machine and just to be corrected by the maintenance. Same way for heat treatment, you can see the important parameters of flatness, fragment, zebra, short test waviness and bend bow test. So, again their applicable standards are defined and they have the checking frequencies defined and responsibility is assigned.

So, that they are conducted regularly without deviation and any abnormality is reported and machines are stopped and corrected. Washing surface inspection is the most critical to quality parameters, lamination, layup is the most important criteria. Then de airing surface inspection is most important in autoclave service inspection and dimensions are the most critical to quality parameters.

Again finally, in the file inspection visual surface inspection, visual light transmission test, boil test, impact resistance test are the most important critical to quality parameters their respective is standards defined in this presentation. Trimming again surface inspection is the most important critical to quality parameter and washing surface inspection, special cutting, visual checking, desiccant filling, visual checking primary sealant like quality of the primary sealant is very important special fixing manual alignment is very important.

So, in this way we can make a control plan to control different aspects of our processes. And after DGU file inspection, what do you check? Critical to quality parameter the surface inspection, butterfly test, pot life test, tact free test molecular sieve test and butyl test and in dispatch packing and loading are the most critical to quality parameters. So, if you can list out all the processes and their steps and identify the requirements, we can manage all our processes well. So, I hope you will be able to implement a good quality management system based on process approach.

(Refer Slide Time: 21:07)



Thank you so much.