Glass Processing Technology
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Lecture - 67
Root Cause Analysis

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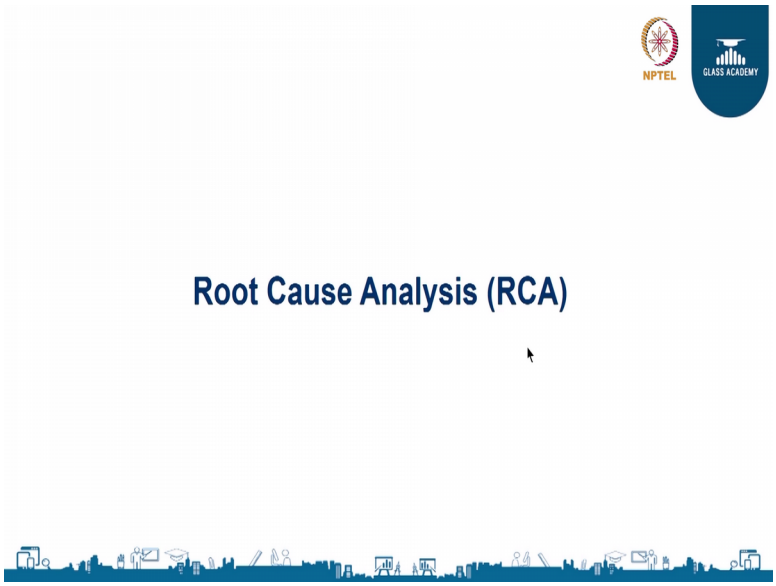

Welcome to all for the presentation of Root Cause Analysis, and there short terminology call it as a RCA. And this root cause analysis is very very important tool for the any problem analysis both in operation as well as any offline activities of any both personal and official these things.

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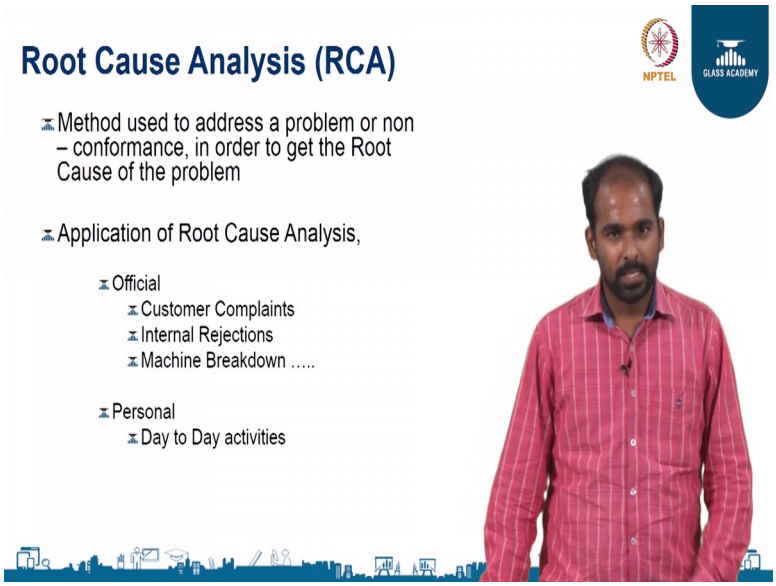

And let us talk about what is RCA, it is a method to address a problem or any non-conformance, in order to get the root cause of the problem, which means that if you find any problem in your both official or personal activities, those can be taken as a task and analyze, which will which you apply this tool method to identify the cause of the problem.

Example, where and all we can apply this RCA are, one is like if you takes any official this thing and under operations, we can apply these are the customer complaint, and any internal rejection, which you face in the during production. And if you come to the break downs under maintenance that also can be use this as a method to find out the root cause of the problem.

And if you take, but it not only for the operation this thing; there were any common field like finance, HR, and everybody can use this method to find out the cause of a any problem, which they are facing on the day-to-day activities. And if you come to the personal, where and all it can be applied are like whatever we are facing any day to day activities. Like example, we got the bus late to go to the office or school, where we can apply this tool to find out the cause of the problem. And like it is not only for the this thing; like other thing, where we can apply these are our monthly expenses, where I where this can be used as a tool for to find the cause of the problem.

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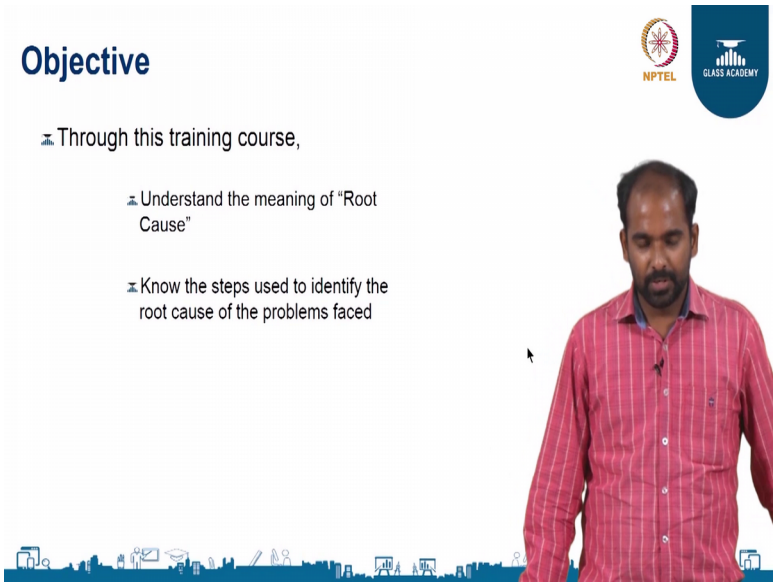

And coming to the objective of this today's training course are we will be the main objective are one is to understand the meaning of root cause. And the second one is the what are all the steps involved in this root cause analysis to find out the root cause of the problem. The next is on the what is root cause, it is a factor like is a effect of is any problem there will be a factor and effect. To find out what are all the factor which contributes that effects that will be identifying with this method.

Thus, definition says root cause is a factor that, when you fix it the problem goes away, and does not come back, which means does not recurrence. This is the root cause definition. And the other definition, what it says is the most basic reason of the problem occurs that is the root cause of any problem. And it is a systematic approach to get the true root cause of the problem, which means that if you take any problem, there will be n number of possible causes, in the sense some people say this could be the cause, some people say this could be the cause. And there will be a one systematic approach to find out, what is the actual cause of the problem, we can find out in this.

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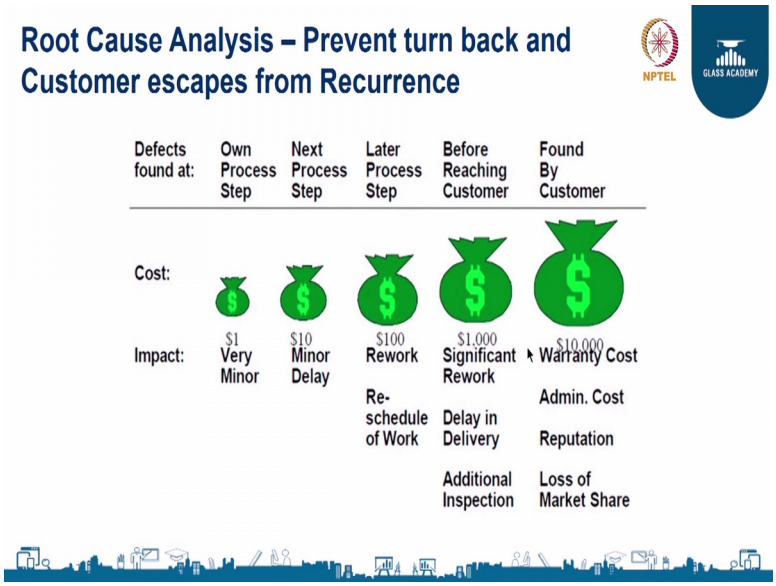

And if coming to the operation, if you see if any defects if you find out at n different stages; for example, what and all will be the cost impact with respect to the defect detection step. If you see say for example, if you find the defect at in your own process the occur the losses, but incurred to the companies very very less, because we identify the defects at our in ours itself in the sense during process, or if the defects find out the subsequent process, whatever we add the value added activities.

In the sense, additional process like the for example, there will be a 10 stage in the process, if you identify the defects at the first process or second process, then there will be a loss will be very very less. Because, we are adding value in the subsequent processes or if you identify the process defects at 5th or 6th step, then already you had a the five steps of values, which is gone away, if you identify the defects, at the 5th stage.

And subsequently if the identify this any defects, at the end of all the process before dispatch to customer end, then whatever they set ten process, whatever you added value at different stages, whatever like man power cost, material, process, power everything will goes off; if you identify the defects at the end stage. The most vulnerable thing is if you identify the defects, if the report the defects are reported from the customer end, then totally loss. Because, if they reports are reported at the customer end, what will happens is see as a customer, he will think on his business perspective. In the sense actually for

example, if you supply, some 1000 number of products to a some customers in a different lots like 10 lot let us take a example.

For example, if he finds some defects at the 5th lot, already what you happen at the customer end, see he would have supplied all this 5 lots material; he assembled in his example if his assembly that is placed, he assembly in his main part, and he would have supplied to customer end, what would happen, he if he finds some defects at this 6th lot or 5th lot. He will suspect all the 5 lots or which are already supplied to his customer place, and whole things will comes under hold, and will have to arrange for any segregation or depends on the severity of the defects reported.

Let us take if any life this thing, like any dimension over says or any this thing that, will affect the warranty of serviceability of the that particular main component of (Refer Time: 06:00) create a issue at the site. So, in the sense if the many defects found by customer that, we will lead to huge cost like warranty cost sometimes, they will lose our reputation in the with the customers. And sometimes it leads to market share also, because what will happens if we lose his business at his customer, what will definitely he will change to from us to some other business.

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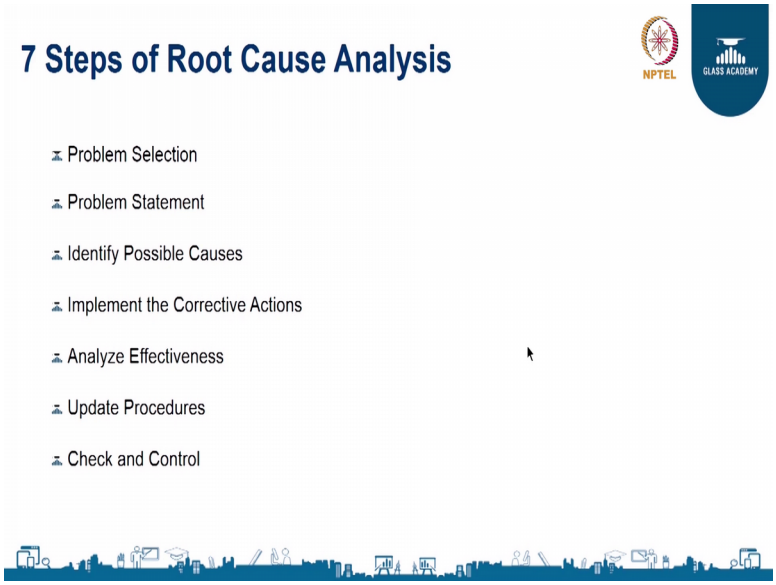

And these are all the some steps, which involved in the root cause analysis. Generally, there are some 7 steps. The step number 1 is problem selection, the step number 2 is problem statement, the third one is identify the possible cause, which are all suspected

for this effect of the problem. And the fourth one is implement the corrective action based on the root cause, what and all the action proposed for this that we call it as a corrective action.

And the fifth one is analyze effectiveness of the action taken for the problem analyze. And the sixth one is update the relevant procedures, where everybody knows these all changes for this reported problem, and this to be followed for upcoming days. And the final one is check and control, where once if actions are implemented, the procedure is needed be updated in the procedure. And the procedure is whether the all the changes whatever we updated in the procedure, those are all followed or not we need to check and evaluate in the further up coming days.

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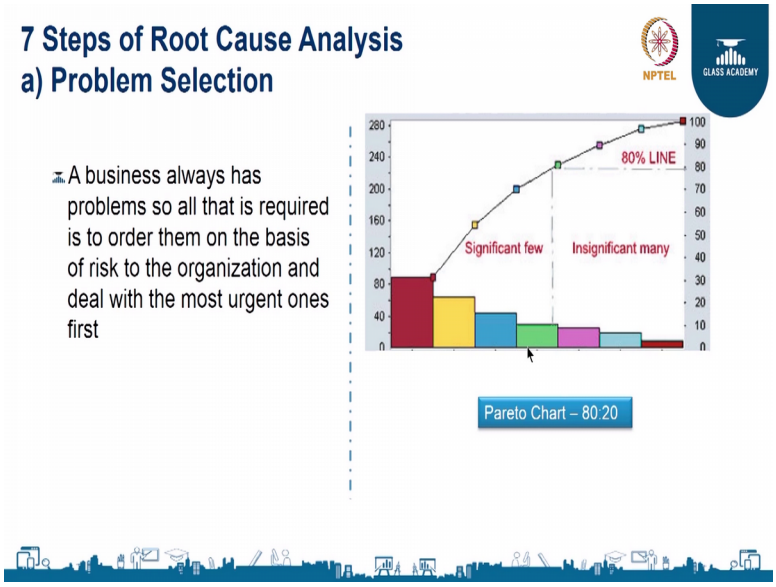

The first is step involved in the root cause analysis problem selection. What is mean by problem selection? If we take any business, we have n number of problem, and which needs to be captured in a data analysis means that before we go into the any problem analysis, we need to select the problem on the business perspective (Refer Time: 07:53) we sometimes we can say past datas or sometimes the last 6 months data's, we need to analyze.

And for that the data capturing is very very important, because without proper data's availability, if you analyze the problem, it will end up in a different scenario. Whatever

we target on the product this thing that output which, will not be achieved at the end of the stage.

So, problem selection, problem selection says is we should collect the data's from the past 6 months. And select the top two ones, which are contributing the significant few that is the Pareto principle. See what we can what the Pareto says is, Pareto says this will list on what all the problems in a defined manner, where we can focus on the 80 percent of the problem, which is creating my total loses or business opportunities.

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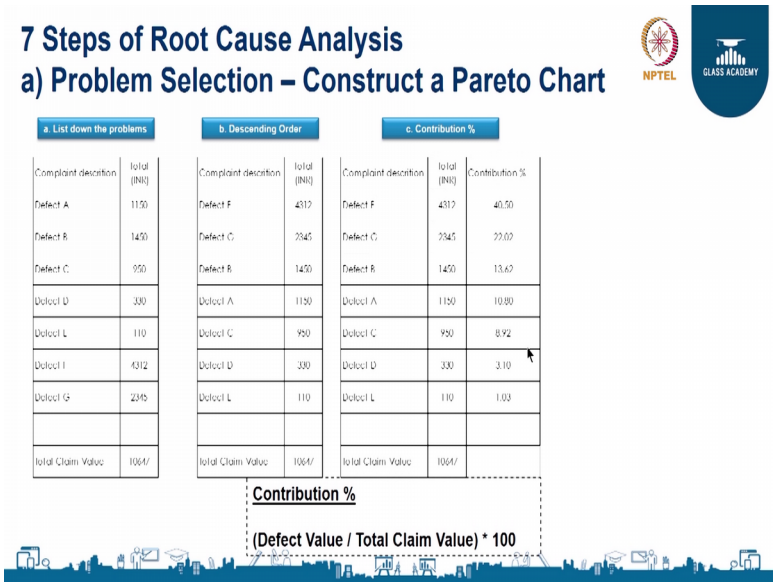

So, let us now talk about on the how to construct the Pareto chart that is the one of the problem selection tool ok. What we here we can see the for example, in a business if you see what are all problems faced that is listed in the in a manner, where the subsequent, what are the in terms of like cost or square meter or numbers what is the loss that is to be captured on the in a defective manner.

If we see the example here, I have just taken a example of customer claim that is the customer complaint, where you see there are 7 defects, where each defects what is the cost incurred to the company. That is for example, here the complaint taken is a defect either all some 7 to 8 defects, we have taken. For each defects, what are all the cost incurred that is how much we have the company has lost and paid to the customer.

First we need to list on what are all the defects, and what is the amount incurred for each defects that we need to capture here. Before going to further step, we these what is the total value, and what is the defects of each this thing is covered here. Then the next step is those defect needs to be arranged in a descending order to see what and all is coming top, and what and all is least incurred one.

If you see here the defect F, contributes 4000 rupees. And the second one is 2345 rupees, the total claim value comes around 10,000 rupees. If you see, here also we can decide the top two is the bigger one, where the it contributes higher value, but here with this itself we cannot conclude that how many defects contributed 80 percent. In the sense, whether the top 2 or top 3 or top 4 that we do not want this stage.

So, for that we what is the next step is see the contribution percentage of each defects that is how to calculate the contribution percentage. For example, the contribution percentage of the defect F is that is 4312 rupees divided by the total claim value that is 10647 into 100. If you apply this formula, we can able to get the contribution percentage of each defects. Why it is mainly important this is unless, we know what is the contribution percentage of each defects, we will there will not be method to select the what is the top 2 defects or top 3 defects, which we need to focus on this.

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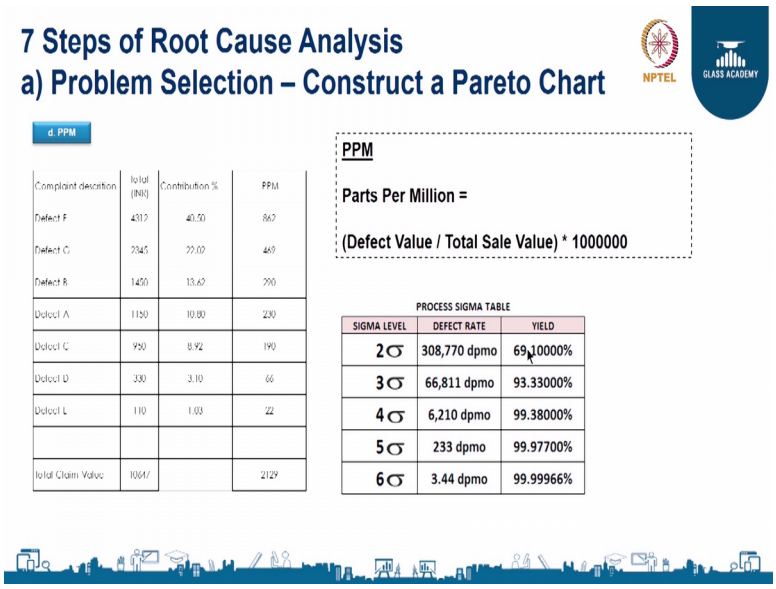

The next one is PPM. The some of the companies, where the mostly they focus on the PPM. In the sense, some company some of the business depends on the organization

size, and what is the product what they met, the what where they mainly focus on this PPM is the defect level is very very less there, we can say it is less than 0.1 percent, less than 0.5 percent. In that case, the business procedure they go for the PPM type of trackings, which is very very less of loses in nature of their business.

The PPM what it this thing is the PPM of any business will tell us how what is the loss occurred in their regular manufacturing process. Example, if the PPM of the company is say let us say example less than 10 PPM, which means that the process control and the manufacturing capability of the plant is very very good, where the defects cannot skip from the process or manufacturing industry to the customer.

This is the what is the definition of PPM is the Parts Per Million. In the sense, if you produce in some for example 1000 numbers, if the plant PPM is let us say 100, which means that there is a chance of 100 numbers of effects can generate, when you produce 1 million components. This is a interpretation of PPM. In the sense, what PPM formula is its PPM is equal to effect value divided by total sale value into 10 million 10 lakh. This is the interpretation of PPM misses the yield of the any business.

Let us talk about very much on this. If we take the defect F, the PPM is around 800 PPM. The right hand side table if you see, it falls under between 5 and 4 sigma ok. What it is sigma means is it is process spread. In the sense, there is a if the sigma level is more, the defect generation is very very less in the manufacturing this. If the sigma level is very very less in the sense, there is a huge scope for improvement and lot of variation in the production process.

Let us talk on this sigma. What is sigma here is for example, if the sigma level is 2 sigma, if you see the defect rate that is three lakh that is a defect per million opportunity that is 308,770 defects can generate per million products that is a yield of if you see, if you convert that into what is your product input and output that is a called yield, that yield it should come will be around 70 percent only that is 69.100000.

If there defect level of 3 sigma, which means that the process can generate 66000 numbers of defects, when we produce 1 million components of a business that the yield would around 93 percent. Say like that if many companies now a days focus on plus six sigma company, where the if you produce 1 million component, there is a chance of only 3.4 that is roughly 4 components defects can generate in a per million production of this

thing, where the yield would come around 99.9 percent. Many of the automotive industry, now for they focus on this sigma level; see now they want like tyre 1 company like tyre 4 Daimler. And all they expect as a company needs to establish this process to achieve 6 sigma level.

And example if you see the our example case here, whatever the defects listed here? Those can those are very very which means that 800, the total PPM of this defects is coming around 2000 PPM, which means that if it is falling around between 4 and 5 sigma, which is very very in terms of yield if you see 99 percent, but still the expectation of the customer, which now a days very very keen on this defect how the defects are been controlled at production process. How you are ensuring, this is not skipping from my your process to customer end that is customer place.

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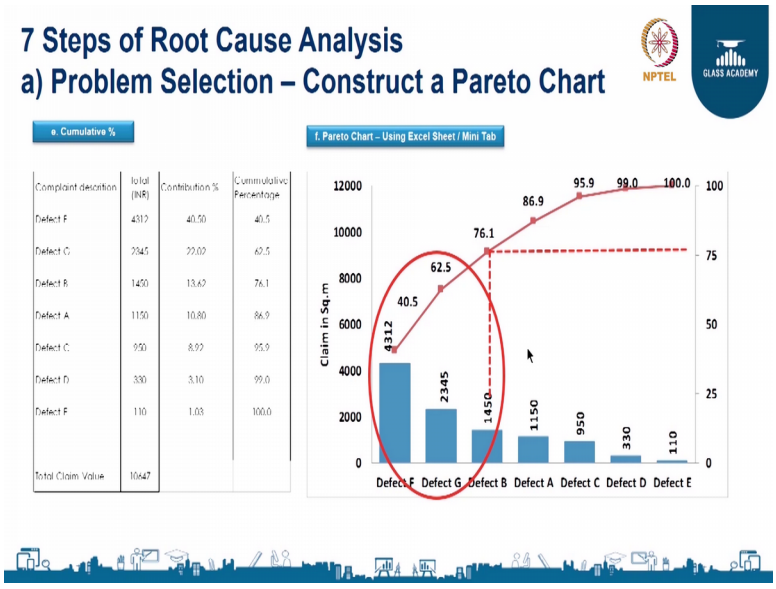

And the second thing, let us talk about only the percentage and cumulative percentage of this example case. Let us now this PPM on this much on this, because the PPM is its very very less level product defect generation areas. Here we these steps, what are the root cause analysis is on the percentage base. In the sense, where in a general operation industry, this would be followed; this PPM business or mostly on the automotive phase.

This is at the cumulative percentage; cumulative percentage if you see, the first defect of F says comes around 4000 rupees of 40 percent the cumulative percent is 40 percent. The defect G of second defect of G is 2400 rupees that is contributed around 22 percent. How

to calculate the cumulative percentage, that is the adding of the previous the first defect contribution parentage and the second defect contribution, which comes around 62 percentage in such a way the total cumulative percentage is been calculated here. The Pareto chart is been plotted.

Once the how the Pareto chart is been plotted based on this data, we have it can be plotted either to the excel sheet or is a software called mini tab, which means that there is a software available, where all the datas can be analyzed. There is a quality datas like Pareto chart, and histogram, high level statistical everything can be analyzed through the meter.

Example, if you see here in this case, they have top 2 to 3 defects are comes that is the defect F, G defect B that is the if you plot the 80 20 principle were we talked earlier that this the where it falls here is there is a defect that is the first three defects. Defect F, G, and B, which means that the 80 percent of the problem covers the contributed factors are the only the top 3 defects means, if you attack this top 3, you would there will be a huge improvement in the business perspective there is loss reduction loss.

The risk 3 or 4 what are the 20 percent that will contribute only less amount of the total 10,000 rupees. A example if you see here, the last 4 percent the 4 defects which contributes are around only 2500 rupees of that is the 10,000 rupees. The remaining all three number of defects is only 3, but the contribution factors are in the higher severity. Higher severe in the sense, it contributes the first effect contributes 40 percent of the total defects. And the second contributes around 22 percent. The third is 13 percent. And the here we need to focus on the top 3 defects that is the 80 percent, where here defect of G and B.

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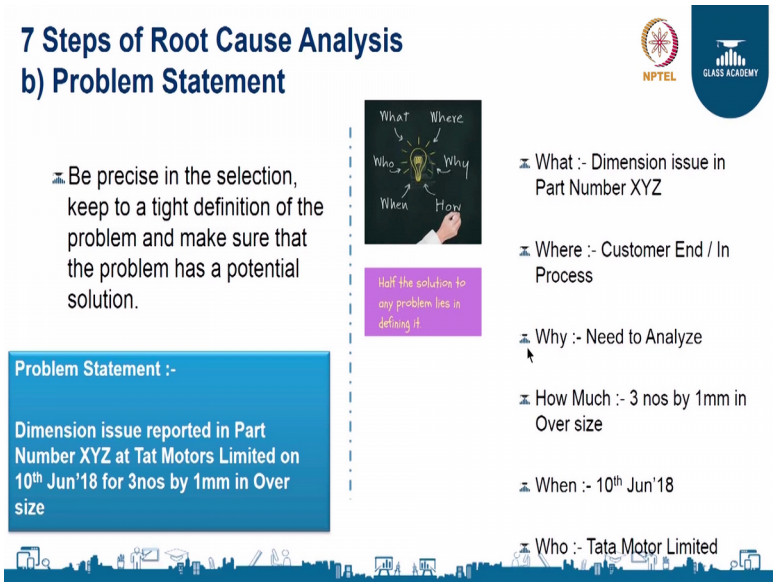

The second is on the problem statement. Once the problem is been selected from the Pareto or the first data analysis, you need to select the problem very precisely. In the sense, if unless if you unless if you define the problem correctly, there will not whatever you do the analysis that backup data if it is not clear, it will end up in end data will not be as decide, what we wanted. There are some general methods available that is the 5 W 1 1H that is the general method available in the QC methodology to define the problem. If off the solution to any problem lies in the defining stage, if unless you define the problem, there will not be any concrete solution based on the analysis.

Example, let us take one issue I say example that is we will apply this 5W and 1H. Like what is the problem, there is a issue from my customer end saying that dimension issue in part number so on so part number. And where it is at customer end or we give example the other example could be the our during process stage itself. Why that we will be analyzing, now in the root cause analysis method that, we will be just mentioning and it come analysis. And how much that is how many numbers reported the customer, there is the problem. There is like in this case if you take 3 numbers by 1 millimeter in over size, and when that is reported on 10th of June 2018. Who, there is a customer name like Tata Motors example here, I taken as a Tata Motors, like what is the customer you complaint you got from the customer.

And this with all this 5W 1H, we can clearly state the problem. Like example, if you see in this case with respect to the this 5W 1H, we can draft a statement that. Dimension issue reported in part number so on so number from Tata Motors limited on 10th of June for 3 numbers by 1 millimeter in oversees. Here if you see, it is very very clearly stated, where it is what is the problem, where it is being reported, from when, at what how many numbers, and what is the issue.

If you state the problem clear, this is the clear cut picture, this is the problem where it is happen. So, the team move is working on the root cause analysis, they will understand that this is the problem. If the problem is not been clearly defined, then whatever without knowing the problem how the team can work on. So, the critical thing on any problem analysis or any methodology, we work on the cause analysis. The defining the statement of problem is very very important.

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