Manufacturing System Technology - II
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Module – 18

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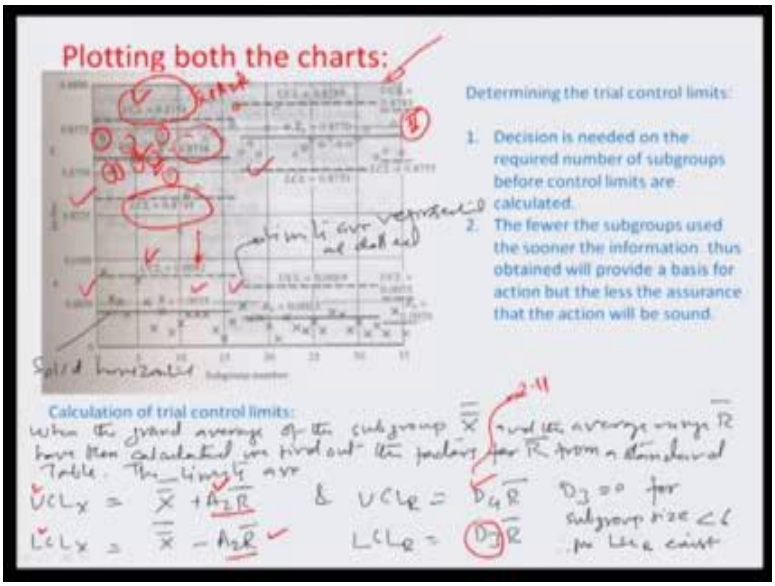

Hello and welcome to this Manufacturing System Technology part two - modules 17 and 18. So, you have the both the cases recorded here of the control chart. So, we now actually start plotting these charts. You can see that the x double bar line particularly is falling around as I had illustrated earlier, the mean of means was 0.8758, so this is how the x double bar has been recorded. And you have the UCL which is based on x double bar plus A 2 R dash where I thing A 2 had been illustrated as one for sub group size of 5. And the similarly the LC X has also be in recorded as x double bar minus A 2 R bar I thing I have described this while doing the recording. So, you have a recording of the observation in the previous form. So, LCL and the UCL constructed for the x double bar chart.

And similarly if we look at this particular portion you can see the UCL and the LCL, so that does not exist an LCL, because the sub group size is less than six, and so therefore and the limit here D 3 becomes equal to zero. And D 4 basically the range in this case which is actually 2.11 and think I had suggested this and this can come directly from the ((Refer Time: 01:30)) chart table which I will share with you later on when we finish this

particular module. But therefore, you can actually calculate the R bar and the UCL in this particular zone, and now all you need to do is to actually independently record you know the different x bar values these open dots for example are those x bar values. The moment it goes beyond control you will see one value going out of this particular UCL or LCL. So, there is the very good a real time indication of the process happening and how to controlled it.

So, this for example, is the you know the later on case when we talked about that what happens after the second control chart with the lesser degree of accuracy and also lets say after the correction factor which has been incorporated because earlier the samples are all heated and the dimension are slightly change because of the heating. So, there are some variations as you can see you know from case one to case two because of that. And so, similarly from again the range chart also their quite variable in terms of their means of the UCL or the LCL and how far they are way from the mean. And obviously, a tighter control or better control can be reflect it you know in probably second case here because it is ordering for that factor of post cooling recording of the milling width slot width into question. So I think this is sort of giving an idea of how the control chart can be plotted.

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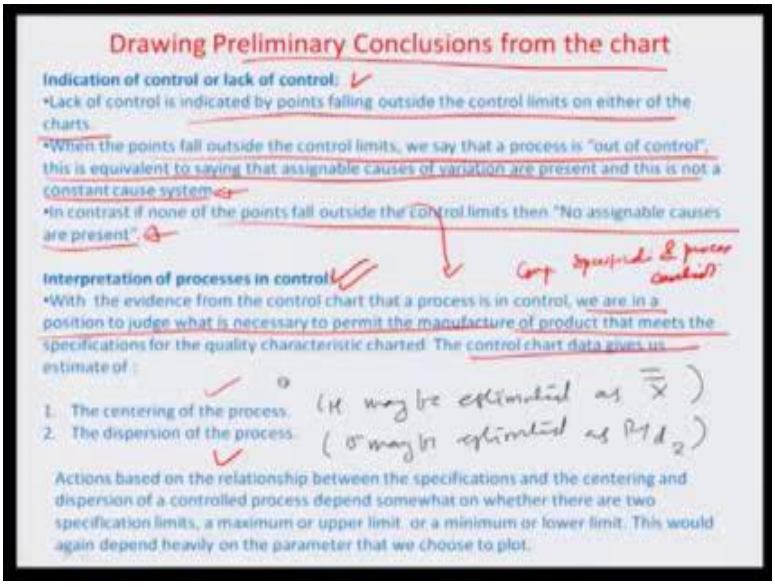

Now the other issues are about some of the primary conclusion that you can draw from this charts. So, the first conclusion that you can draw is either whether the process is in control or out of the control. So, you have either have an indication control process or a lack of control in the process. So, lack of control obviously would be indicated by points or outsides the control limits on either side of the control charts. And when the points fall

outside the control limit we say with the process out of control this is equivalent to saying that assignable causes of variation are points and this is not a constant cause system. In contrast if none of the points fall outside the control limits then no assignable causes are present so that very, very good interpretation. Also you know you can interpret for all the process in control with the evidence from the control chart that a process is in control, we are in a sort of a position to judge what is necessary to permit the manufacture of product that means the specifications for the quality characteristic charted.

So, you can have based on a control process in analysis of comparison between this specifications and the process control, so that you can determine whether your process is capable of producing these specification. So, here the control chart would give you data about the centering of the process in the depression of the process, and you can see whether the process is out by two sigma or three sigma, and all those different issues by aligning the specification limit given in the design with respective the process limit which happen by the control chart plotting.

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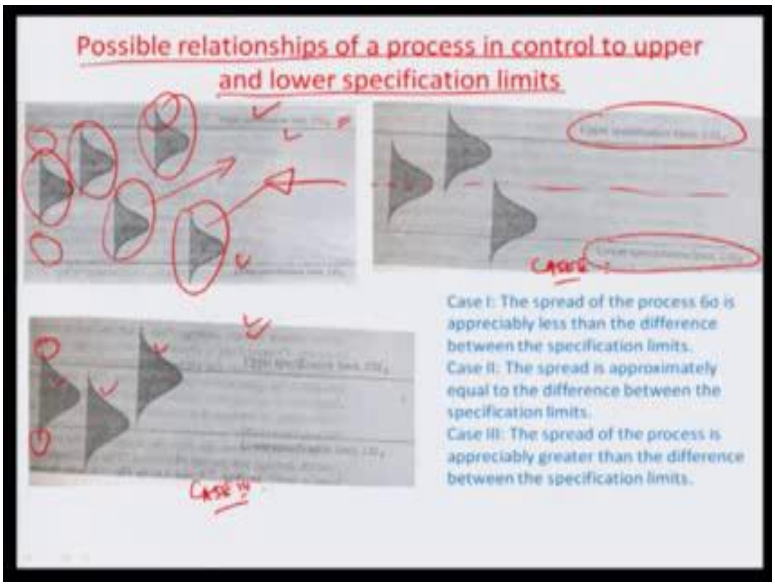

So, this for example is a sort of kind of possible relationship which would exist in sort of control to upper and lower specification limit of process. They are showing five different process here for example, you can see a, b, c, d, e these are different processes and I some cases it is going in a manner of it is placed in a manner, so that part of it is going above the upper specification limit as given to the design details. And therefore, we can say that these processes are out of control that may be some rejections because of that.

However, what is good in this process is that the dispersion and the mean are placed in the manner, so that they are they can be with little bit of process control well within the upper and lower specification limits because this you can see the overall sort of process spread, if the mean work to be central around the specification mean that would really cause almost hundred percent acceptance, because there are hardly values which a falling outside the upper and lower specification limits.

In the second case here for example, this is case two. You do not find that to happen you find out that its very well balanced process where if you are exactly at this center of the specifications that would be a only case where would have hundred percent acceptance. And in fact this processes even one step ahead where even if there is let say a centering there is always tendency of rejects to be produce. So, these kind of link is between this specification limits in the design specifications as well as the process control which has been illustrated here would really able you to analyze about the process capabilities of a machine.

So, if process is really capable of producing the specification would typically have the case one type of condition you know and case two and case three would really not emerge. And in case you have a case two case three then you have either consider revising these specification limits which is really related to change of the designs specs or alternately we have do something to enable your machinery, so that your process control can become tighter, and it can be over the mean in the spread can be less. So, these are some of the interpretation that you can really have from all the control charts experiments that you have done. There are some more interpretation which will details later on before we go to the attribute control charts which probably do in the next lecture.

Thank you so much.