Indian Institute of Technology Kanpur
National Programme on Technology Enhanced Learning (NPTEL)
Course Title
Engineering Graphics

Lecture – 08
Orthographic Projections-Part V

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So last class we have solved few examples by means of third angle projections and complicated object, curved faces that I have finished.

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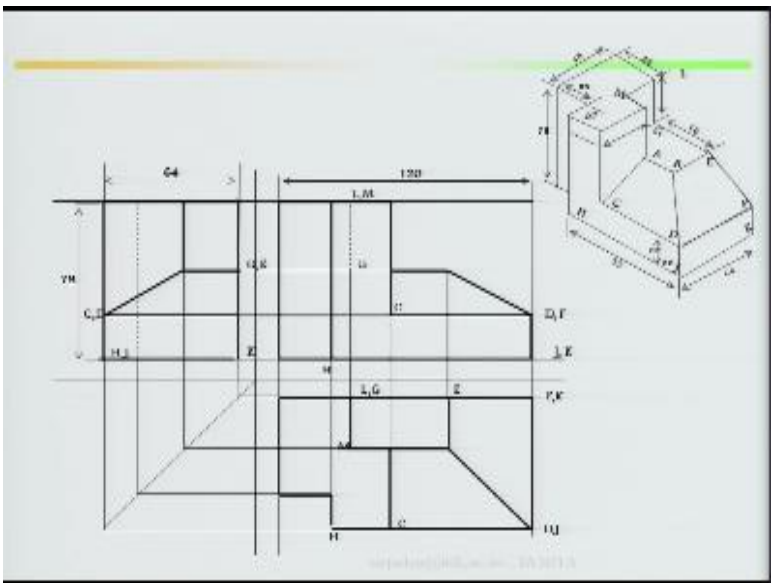

I have shown you how your curved faces coming into picture ellipse.

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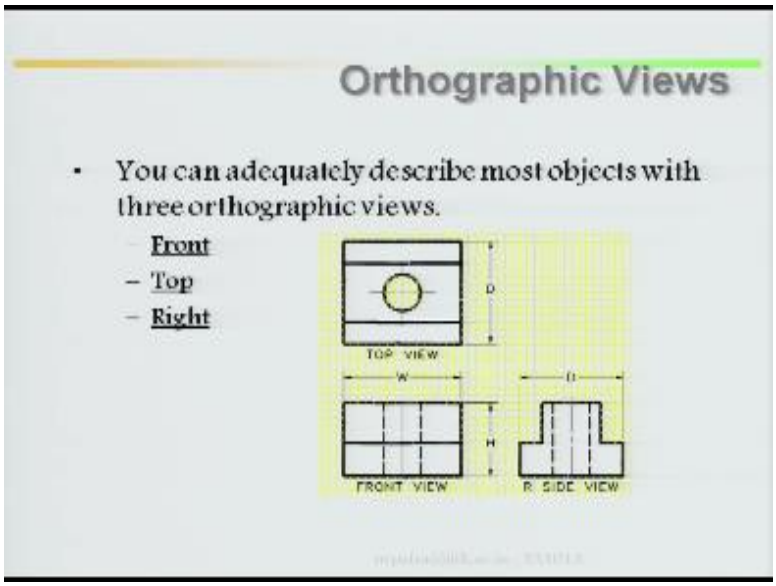

Now come to the another part of this orthographic views, you can adequately describe most objects with three orthographic views, as I said earlier front view, top view, and side view, it is sufficiently you can address about this object. If it is still complicated then you may have additional three views that means total six views are required. Now view selection as I said, view selections – if the object has an obvious top, then it must be the top view.

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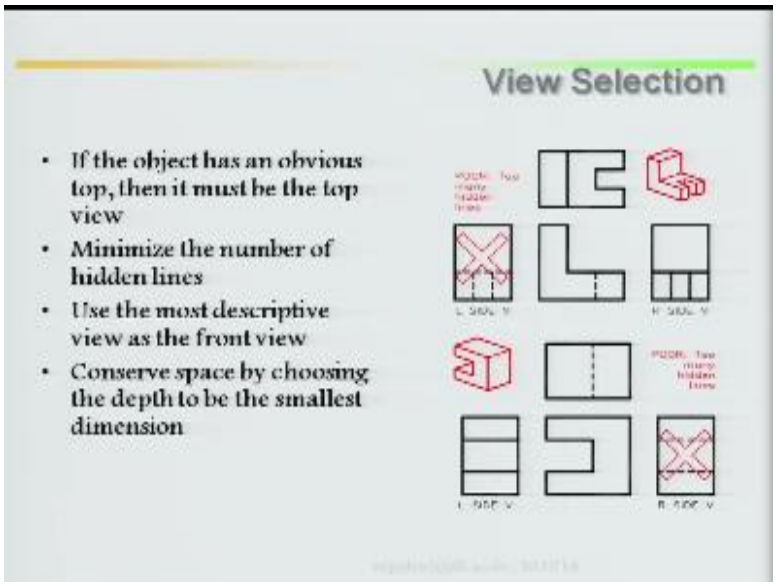

If the object has an obvious top it must be the top view, minimize the number of hidden lines, once you are choosing this is the direction of my view then minimize the number of hidden lines in the front view as I said, use the most descriptive view as the front view. The view where you can see most of the features of the object, that you can describe your front view.

Conserve space by choosing the depth to be the smallest dimension, because if depth is not smallest dimension then it will be very difficult to plot in a simple A_4 or A_3 size of drawing sheets.

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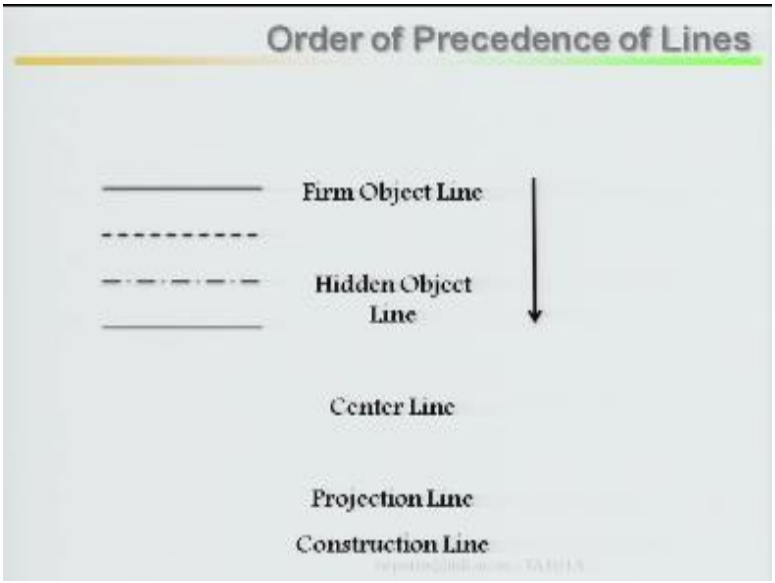

Now order of precedents of lines, maybe before two class I have discussed, so if these are the things available first this is the order. First is your firm object line will come, followed by your hidden object line, then followed by your center line, then followed by your projection line, then you construction line.

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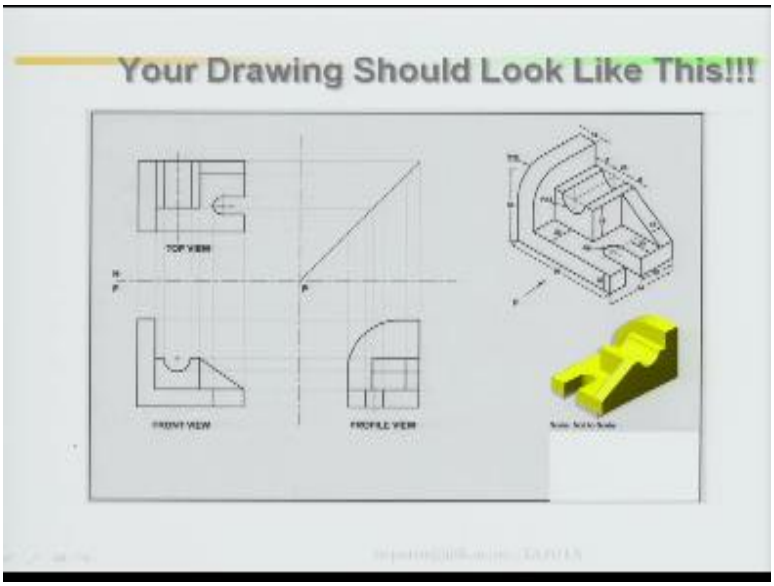

Your drawing should look like, how your drawing should look like, if you look at here this is your object is given, this is your front face, and this is your A_3 size drawing sheet. In your drawing sheet there is a size, here you have to write, explain in the first class, name, roll number, title, and subject, and this is your top view, front view, this is your profile view.

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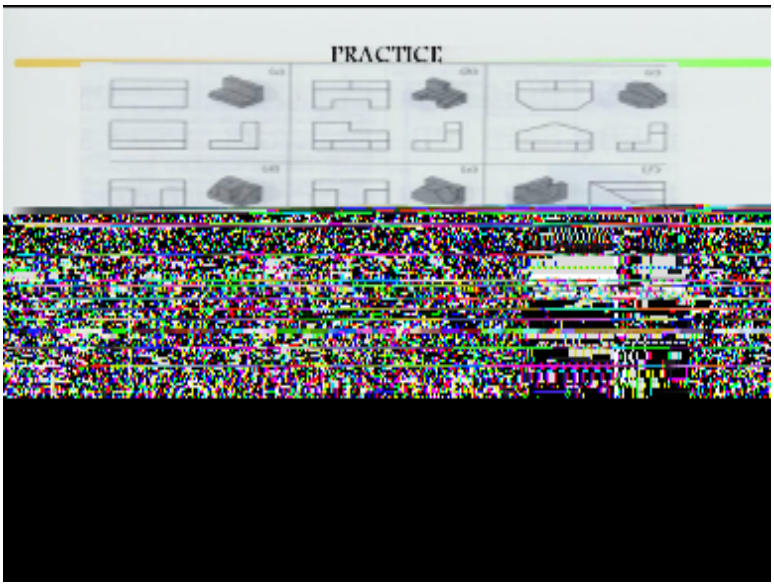

How it looks like just for example I am showing, then these are for practice you can try at your home, these are all different shapes has been given you can try at your home, you can sell practice so that your confidence label can be built up.

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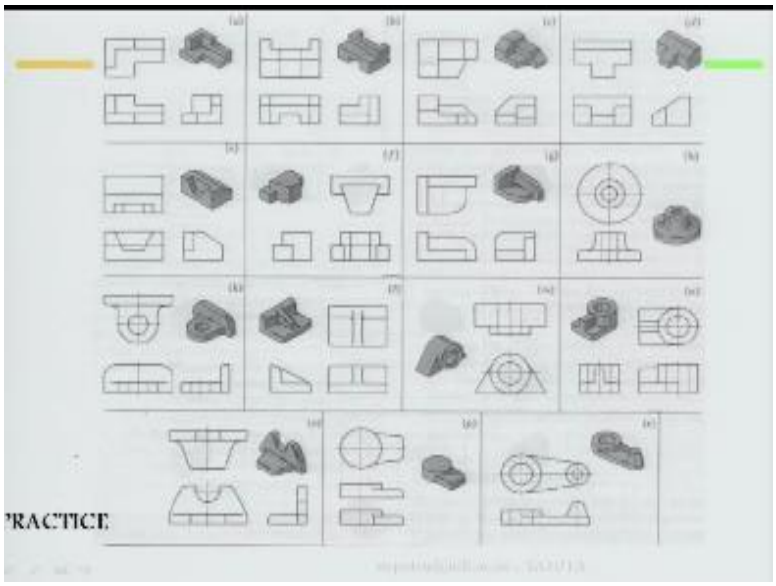

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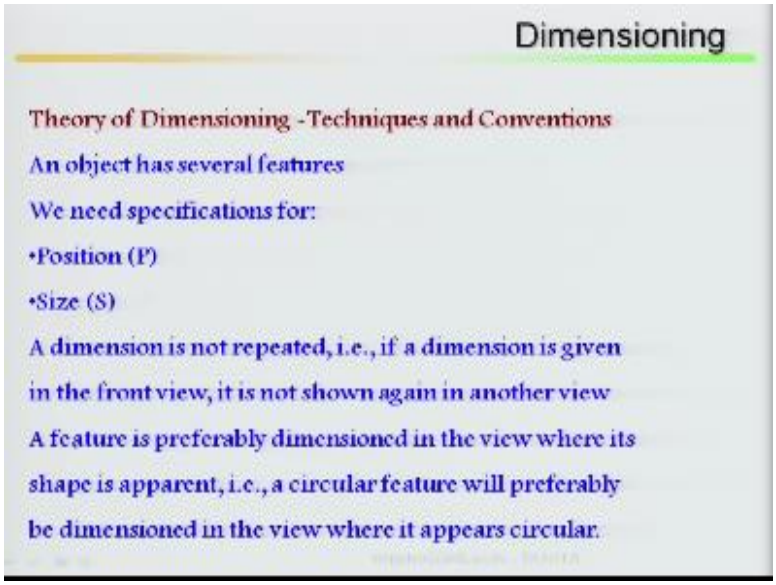

Then next part is your -- after this orthographic projection next part is your dimensioning.

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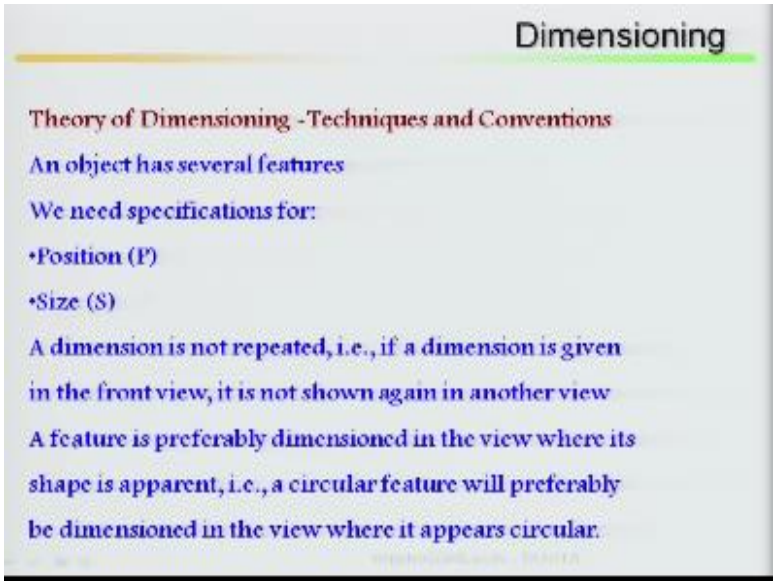

Dimensioning techniques and conventions. An object has several features, many features, we need two specification for position, what is its position, size, length, width, and depth, and dimension is not repeated that is if your dimension is given in the front view remember it is not shown again in another view, I will explain. If one dimension is given in the front view it is obvious that same dimension will other view will be the same.

It should not be repeated, a feature is preferably dimensioned in the view where its shape is apparent, that is a circular feature will perfectly be dimensioned in the view where it appears circular. It is not like that if there is a circular view is there if you are showing in other view it is a ellipse, then you cannot dimension the circular dimension in a ellipse dimensions.

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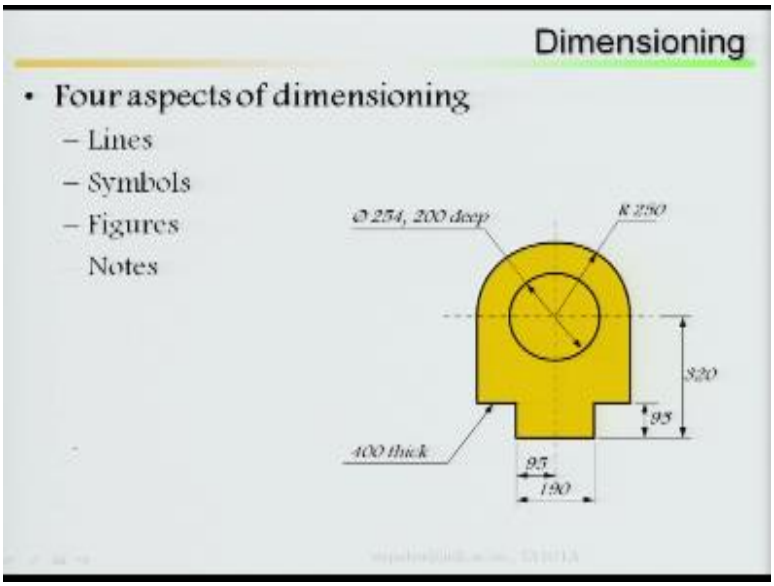

Four aspects of dimensioning this is the object, first is lines, second is symbols, third is figures, fourth is your notes, lines, symbols, figures, and notes.

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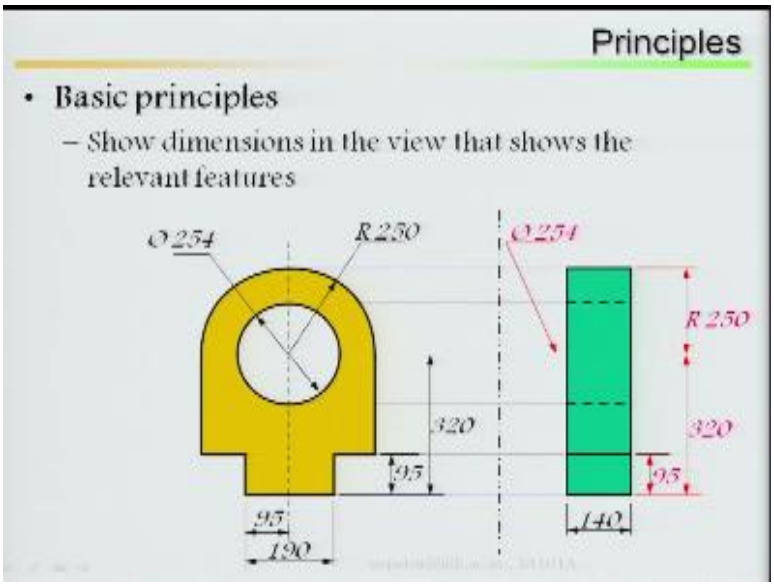

Now basic principle, show dimension in the view that shows the relevant features, that means if you look at here I am showing the dimension from distance from here to here and what is the total distance. Height from here to here and from here to center point what is this, what is the height. And what is the radius or what is the diameter, what is the radius of this curved surface of the circle? Again what is the diameter of the drill, there is a drill or there is a hole, what is that diameter?

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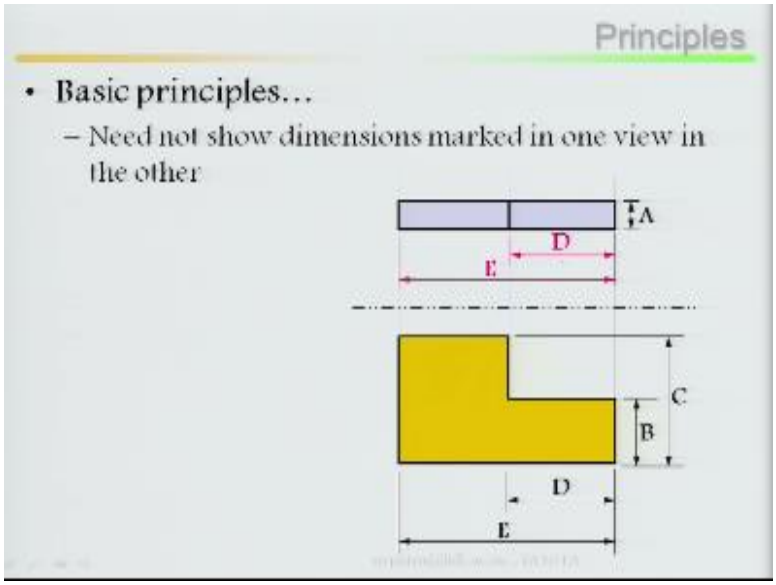

Basic principle number one need not show dimension marked in one view in other, what do you understand, you see here I have shown from here to here, this is a two view has been given, this is your front view, suppose for example this is your top view. Now here to here in the front view I have marked the dimensions, let us say this is D. And from here to here I have marked it let us say this is E.

Now same D and E cannot be shown again in the top view this is wrong, because again and again you no need to show it, so that if somebody read this is your dimension obviously in the top view this will be your D and E.

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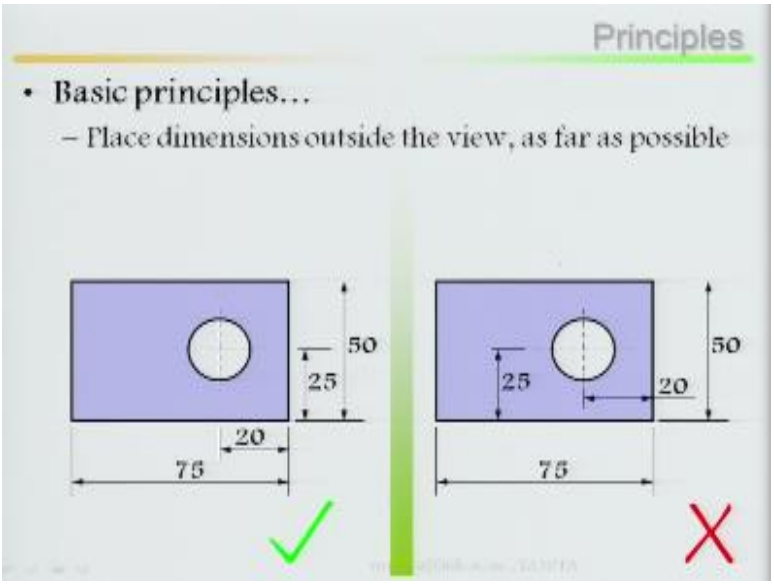

Place dimensions outside the view.

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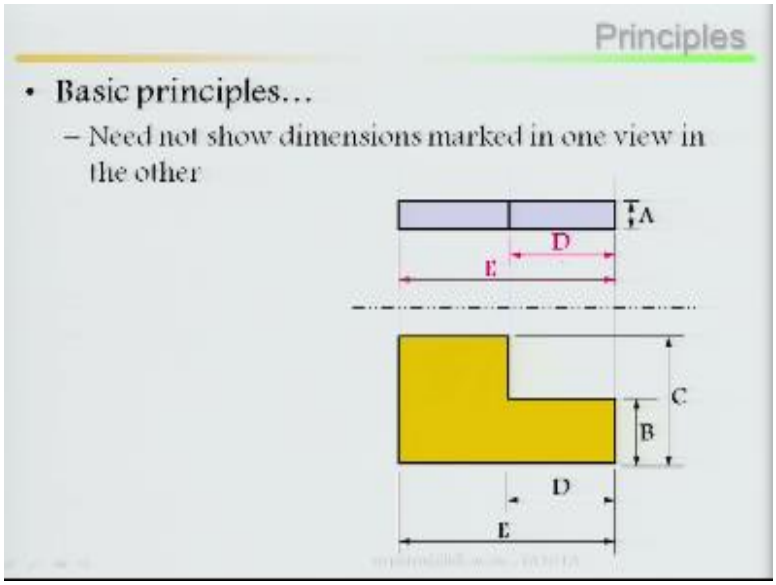

What is the number one position, number one point of basic principle need not show dimensions marked in one view in the other.

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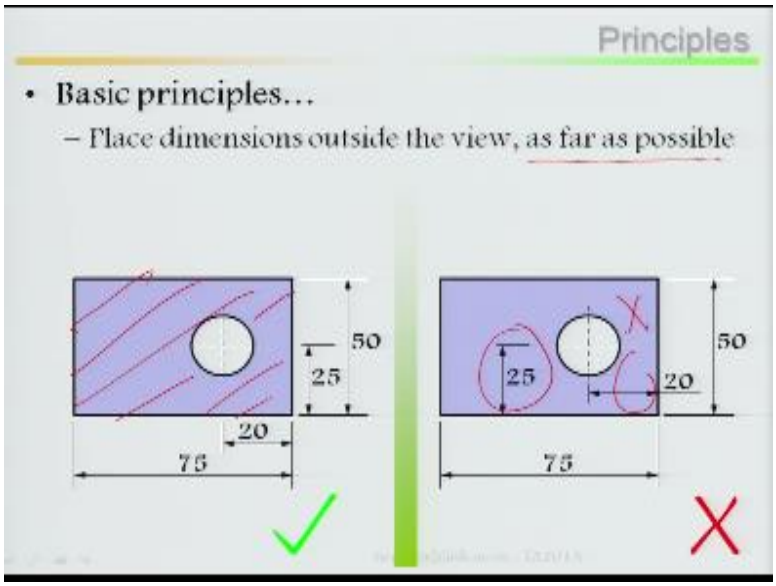

First point, second point place dimensions outside the view as far as possible, you see there is a sentence given as far as possible, if there is a sufficient space in that drawing seat then place the dimensions outside there are two example. Here the dimensions are outside, this is my figure and these dimensions are outside, but here there are certain dimensions are inside. So this is wrong, so second point is place dimensions outside the view as far as possible.

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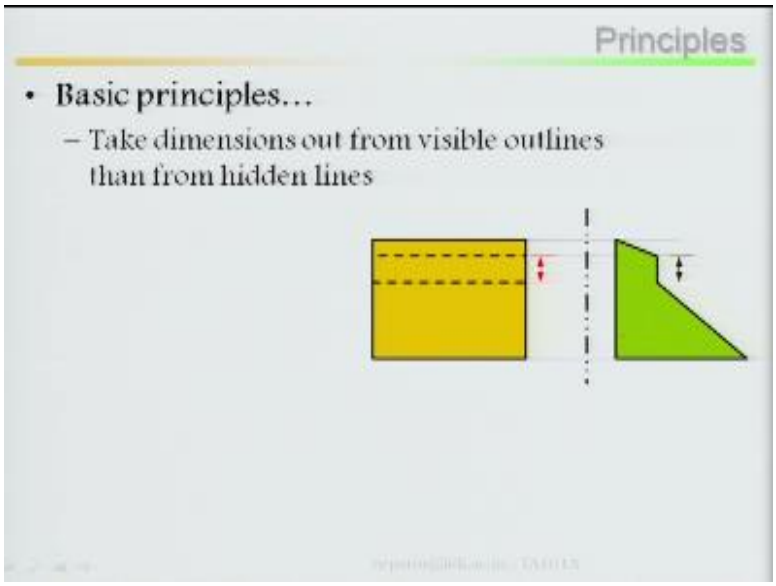

Third principle, take dimensions out from visible outlines than from hidden lines, take dimensions out from visible outlines than from hidden outlines.

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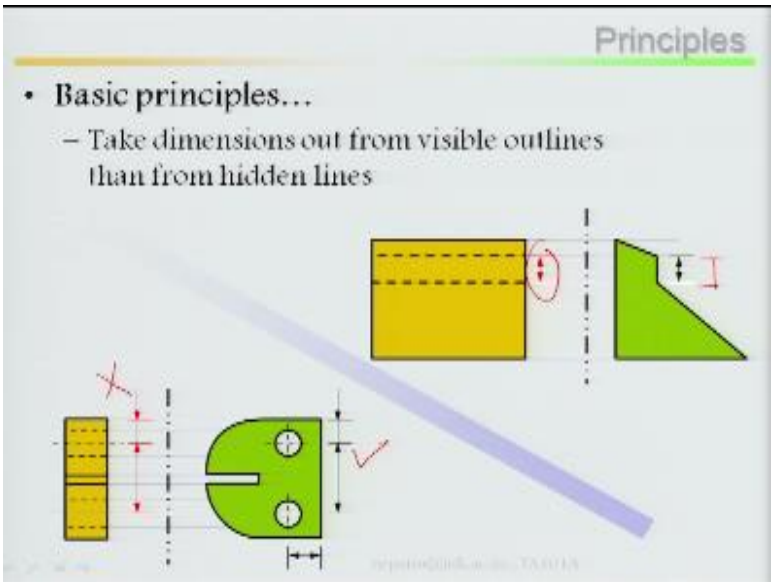

Look at here these are all two views, this are two views, here this is your hidden lines, here this is your visible lines. Instead of doing dimensioning here you take out here and dimension it. Avoid dimensioning from hidden lines taking out from the hidden lines. Here this is your hidden line, this to this, this to this, instead of doing this you do this, this is your correct, third point this is your third point.

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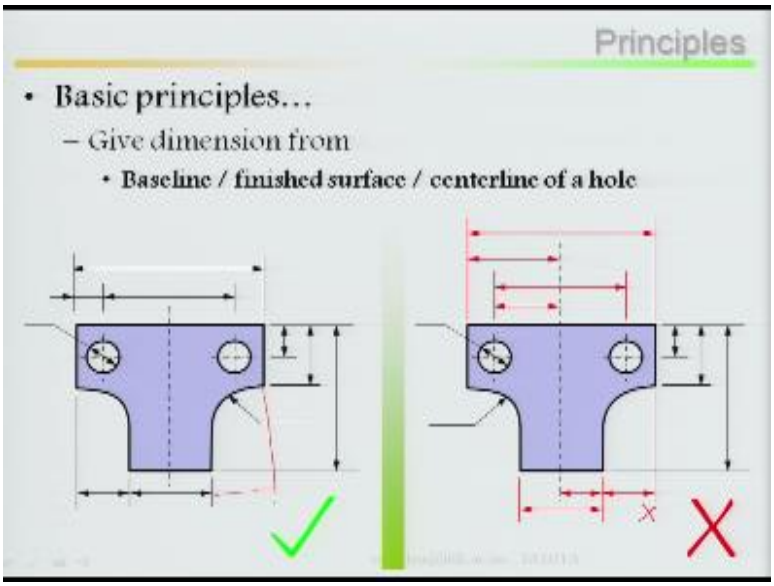

Fourth point give dimension from base line, oblique, finished surface, oblique, center line of your hole. Give dimensions remember from the baseline, number one is baseline, what is your baseline? Then finished surface, this part is your finished surface, then center line of a hole, center line of a hole. I am giving the dimension from the center, there is a hole here, there is a hole here, now this is the center point of the hole, this is the center point of this hole, from center to center the dimension has been marked.

It should not be like that dimension has been marked from here to here bypassing the center. And here if you look at here, I have never marked from here to here dimensions, this is wrong. Give dimension from baseline, finished surface and center of a hole, this is the center of your hole, I am taking dimension from center of a hole to finished surface, center of hole to finished surface, center of hole to finished surface, between the two center of the hole I am marking the dimension, here it is wrong.

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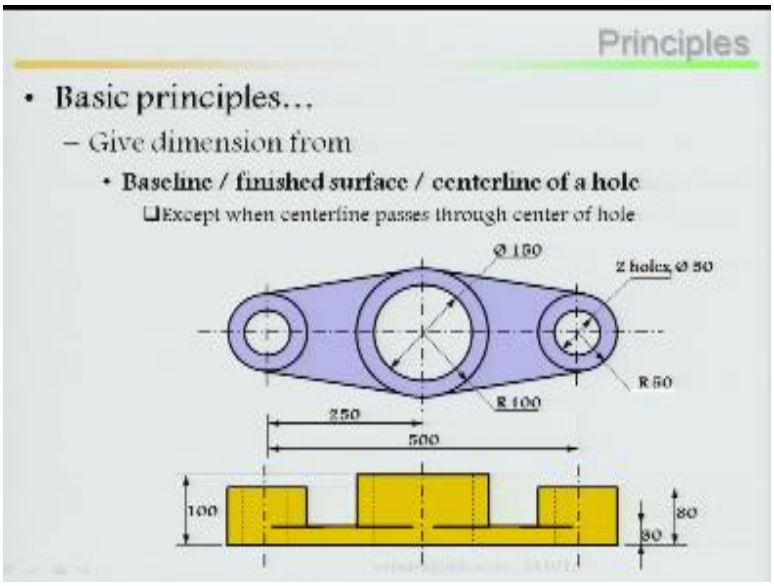

Pip point give dimensions from baseline, finished surface, center line of a hole except when centerline passes through center of a hole. This is a repetition of fourth point, but there is one exception. Except when centerline passes through centre of a hole, that means center line passes through your center of a hole means, that means this center line passes through center of a hole, because there are three holes.

In that case we can do it, the other part you can do it from here to here between you can take it not like from this hole to this hole, as a hole you can take it.

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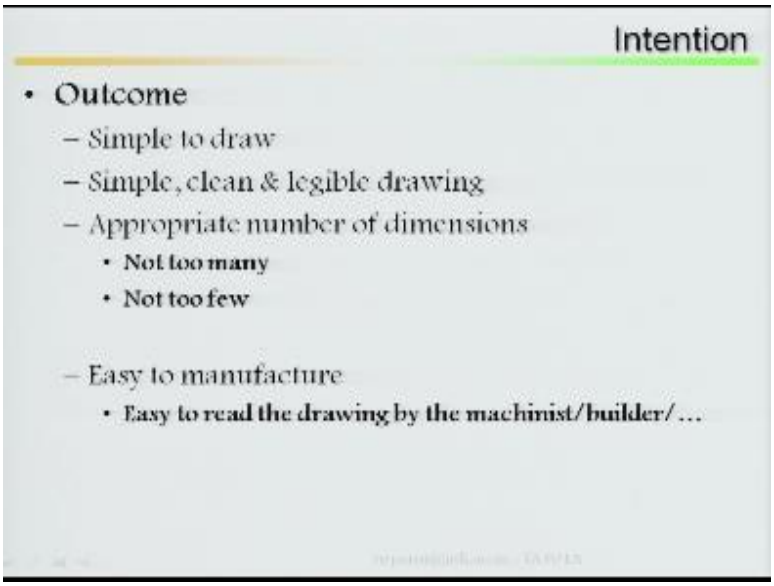

Outcome, intension, what is the intension of doing the dimension, simple to draw, simple, clean, legible drawing, approximate number of dimensions, not too many so that you cannot read it, not too few it should not be too less, it should not be too many. It would be easier for the manufacturer remember, the point will come why you are giving the dimensions, because once this views seen by the manufacture he can easily take the dimensions and he can easily read out what is the actual shape of this feature or actual shape of that object, easy to read the drawing by machinist or builders.

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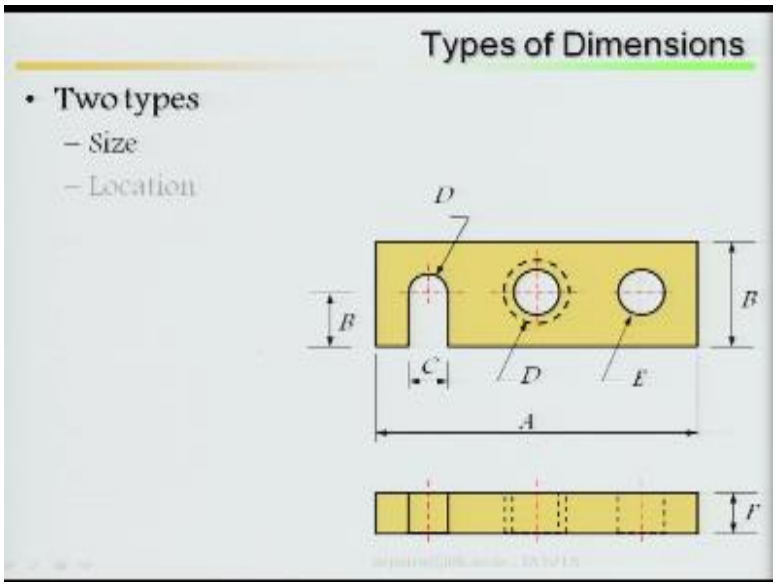

Type of dimensions, two types of the dimensions, one is your size.

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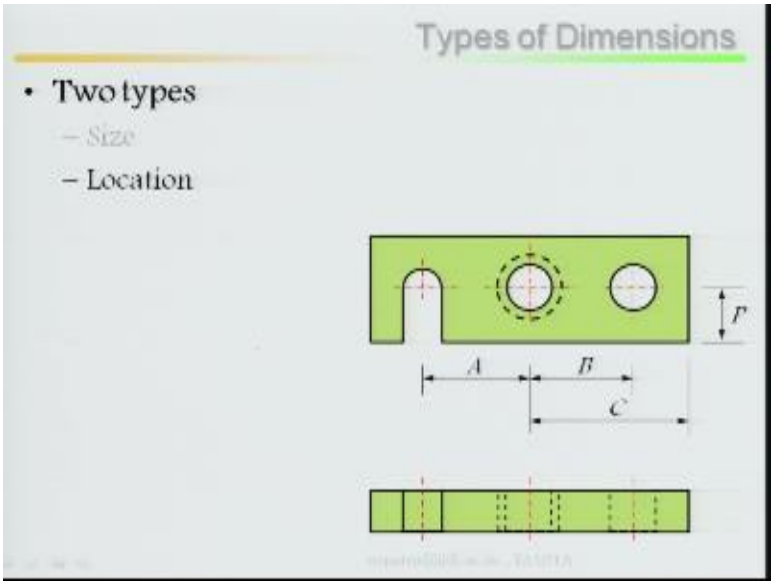

Second is your location.

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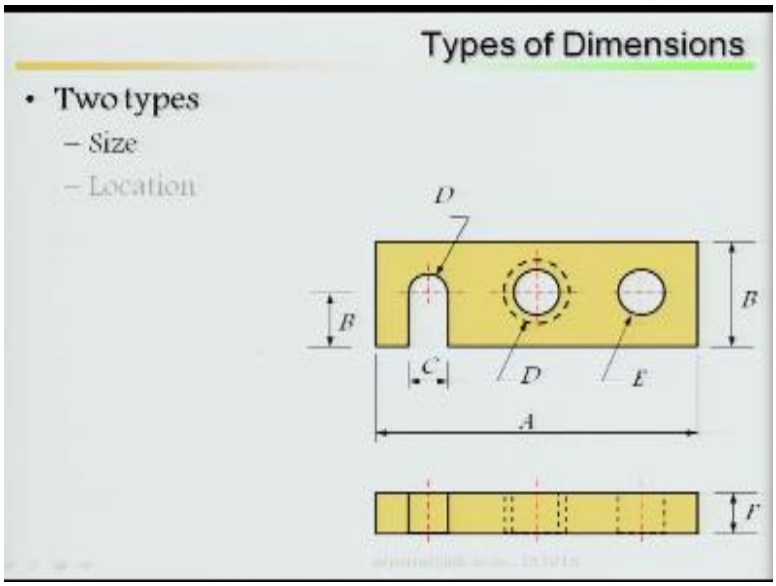

Type of dimension two types one is size, look at the difference.

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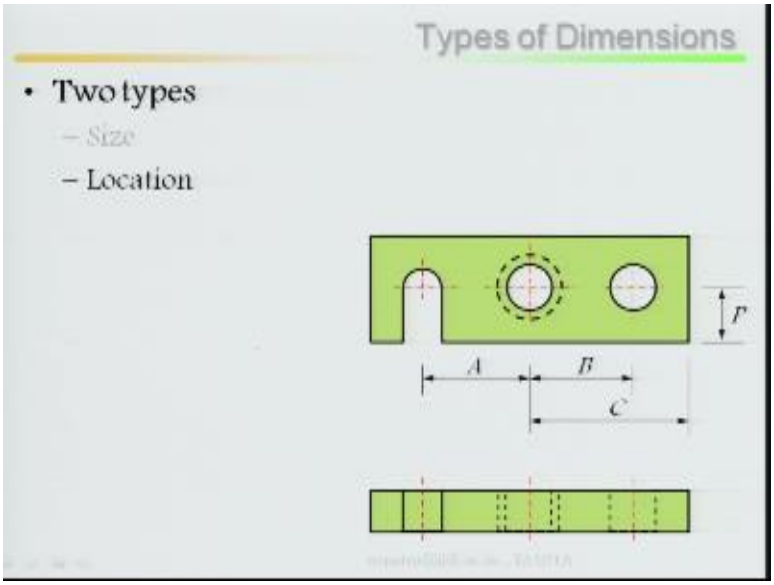

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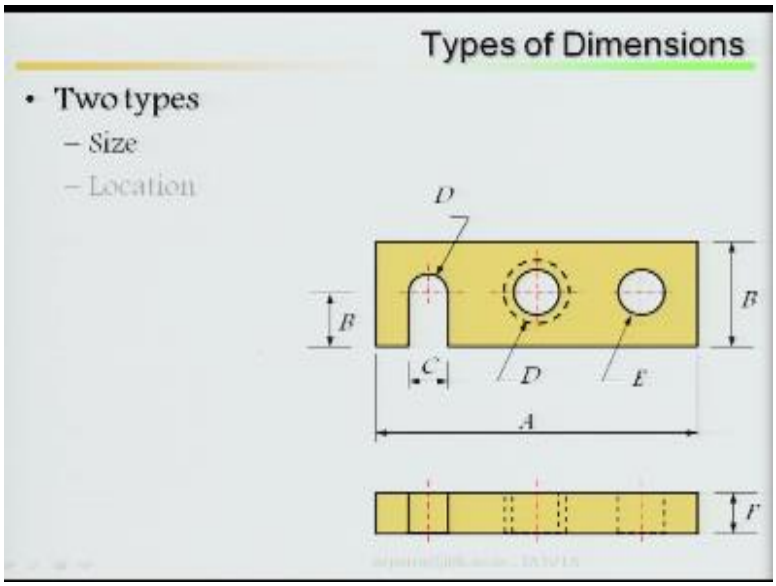

Tell me what is the difference you are looking at here?

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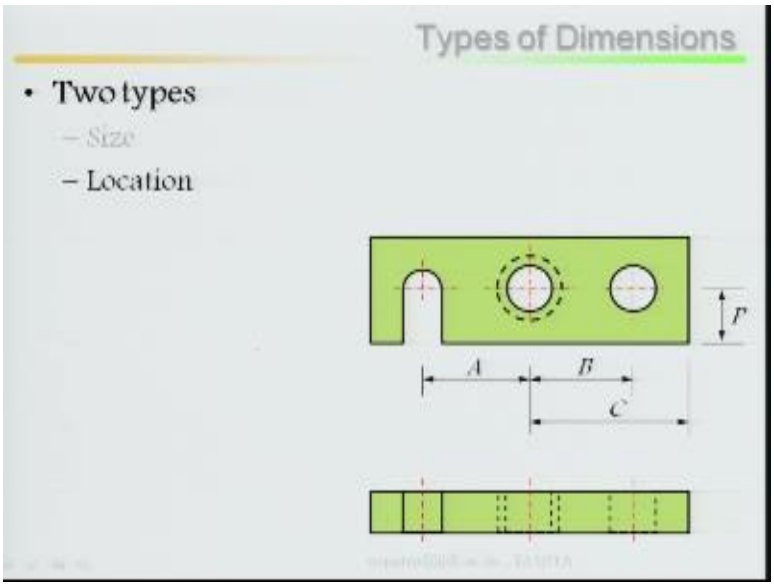

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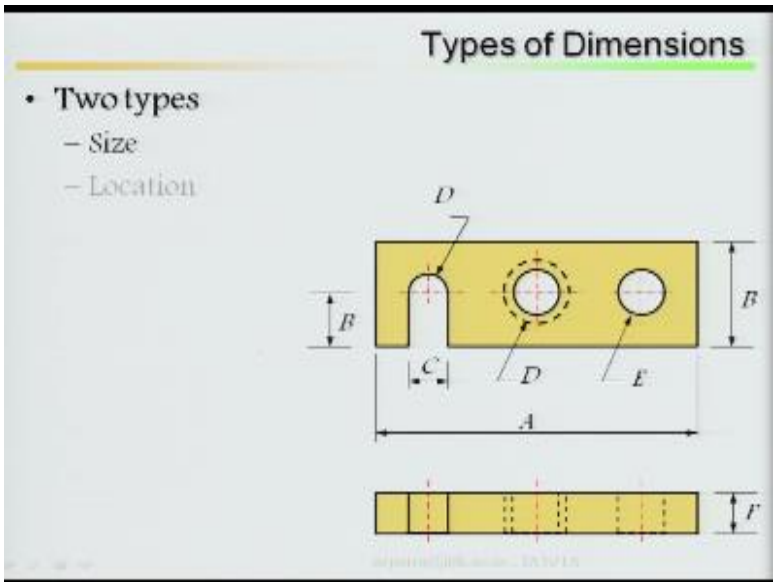

One is size, what is the size of your dimensions you are putting?

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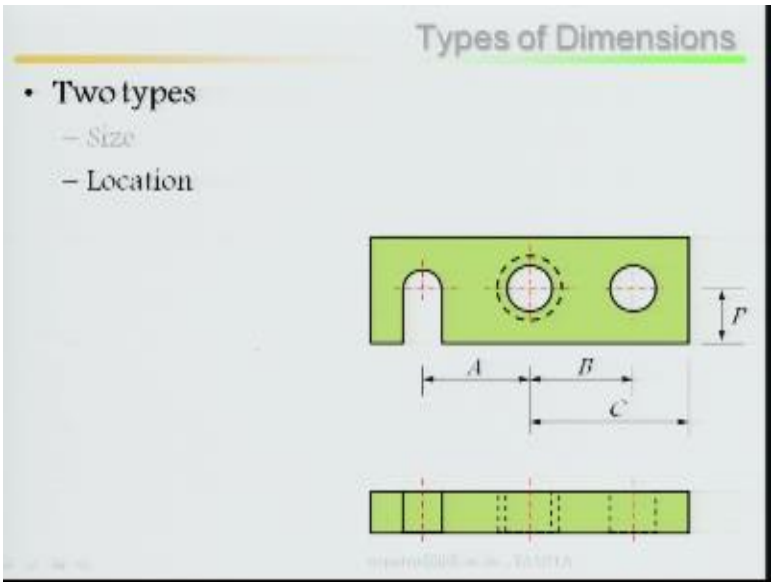

Other is your location, where you are putting the dimensions, locations.

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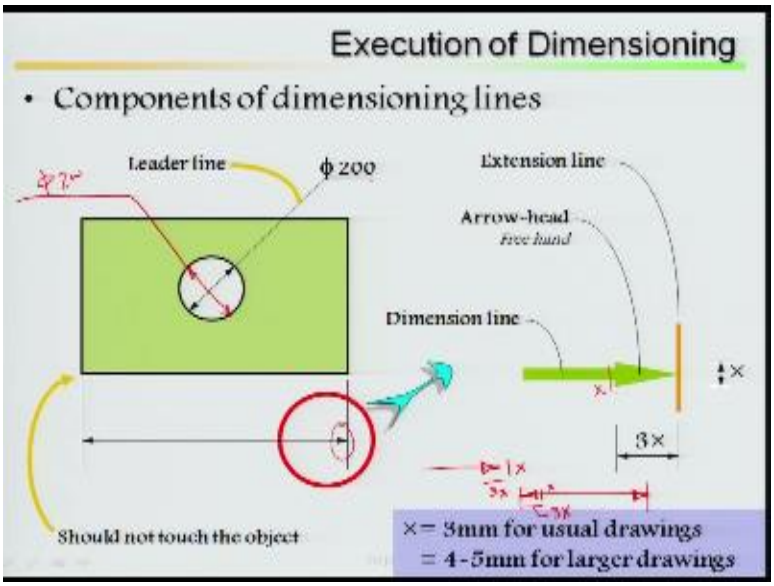

Component of dimensioning lines, if this is my dimension lines arrow I put it that means I am taking out, there is a simple dimension of this finished surface from this end to this end. This is the dimension line or this is the arrow. If I am taking this arrow this is your dimension line, if you look at there, that means from this to this is your 3x and this to this is your x, this is your x, this is your 3x that means once I draw it then I will make it in such a way that this to this approximately it will be 3x, and from this to this it is x.

X=3mm for usual drawing, this will come over the period of practice, it is not like exactly I will maintain that this will be 3mm, 2.5 or maybe 3.2 this will come over the period of time it will be the practice. 4 -5 mm for larger drawing, 3mm is for your regular drawing. This is your extension line, this is your arrow head by free hand, I have shown how I have drawn it. Suppose this is my dimensions, then how I have drawn it by means of free hand.

See this side by means of free hand that means here is approximately x and from here to here is approximately 3x. This is the leader line, leader line means for a diameter of a drill, if this is a diameter either this side or this side, this side you take it out and do it like this. This is called this dimension has been taken out and put it here, this is called leader line. Then from there you write

it Φ 200, here it is given Φ = 200 that means drill unless or otherwise as I said in the beginning of the class, unless or otherwise it is not mentioned these all dimensions are in mm.

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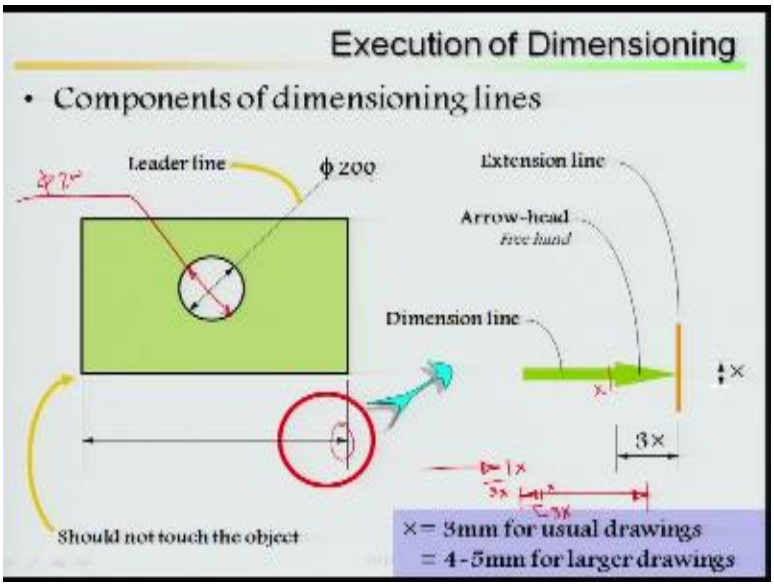

So drill of diameter is equal to 200 mm.

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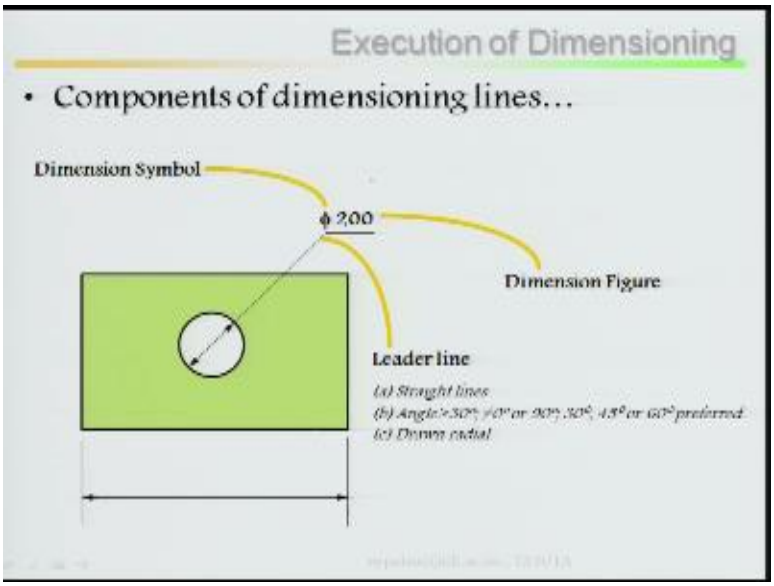

Dimension symbols Φ this is for drill, 200 dimension right, dimension figure.

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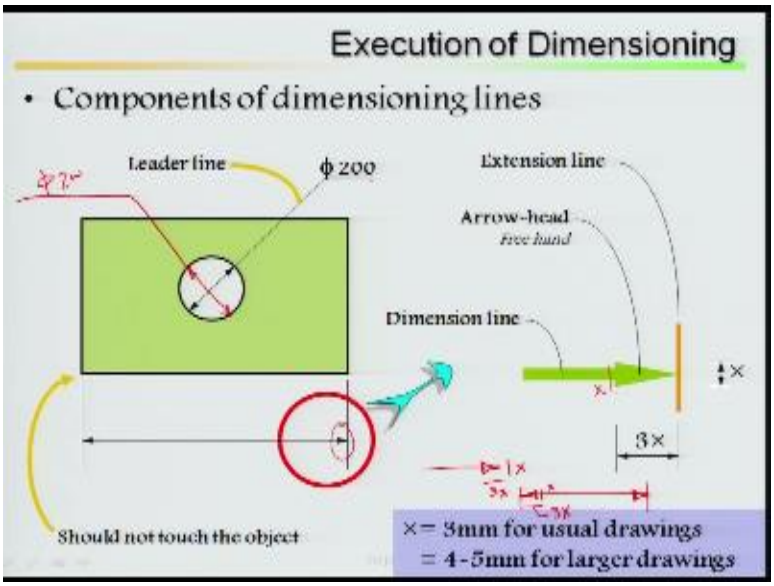

As I say size.

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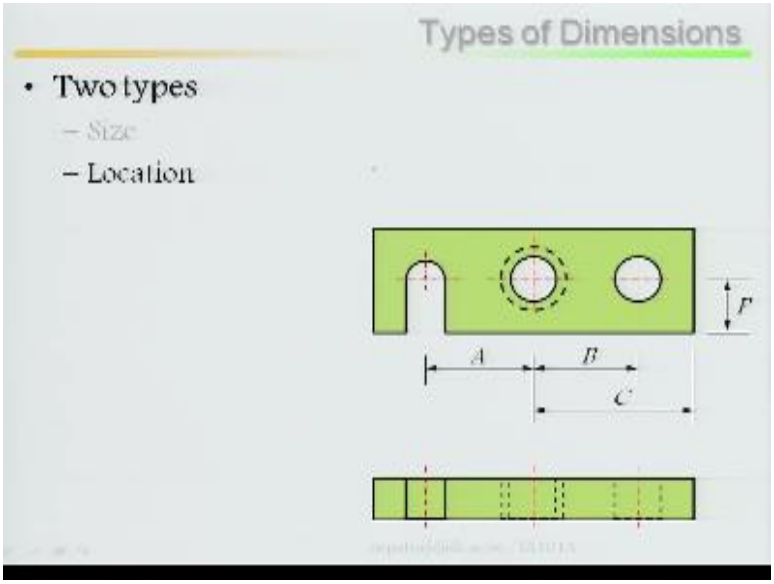

Here I say two types, size and locations.

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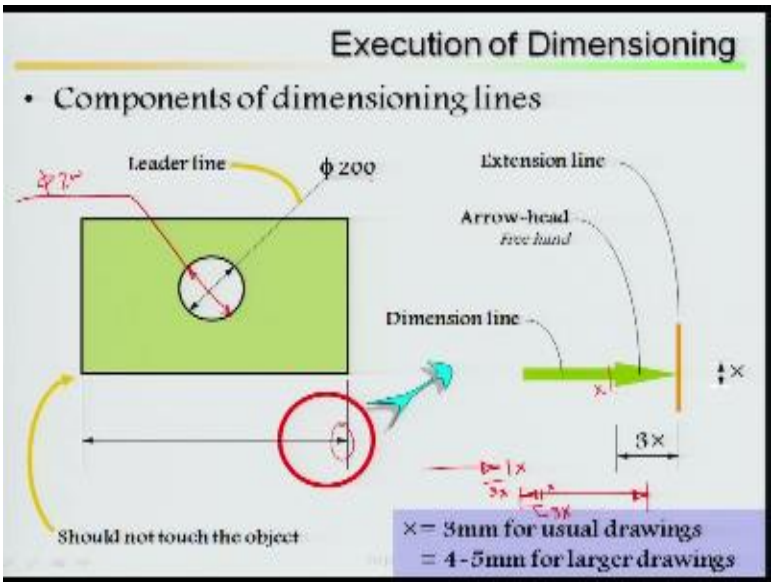

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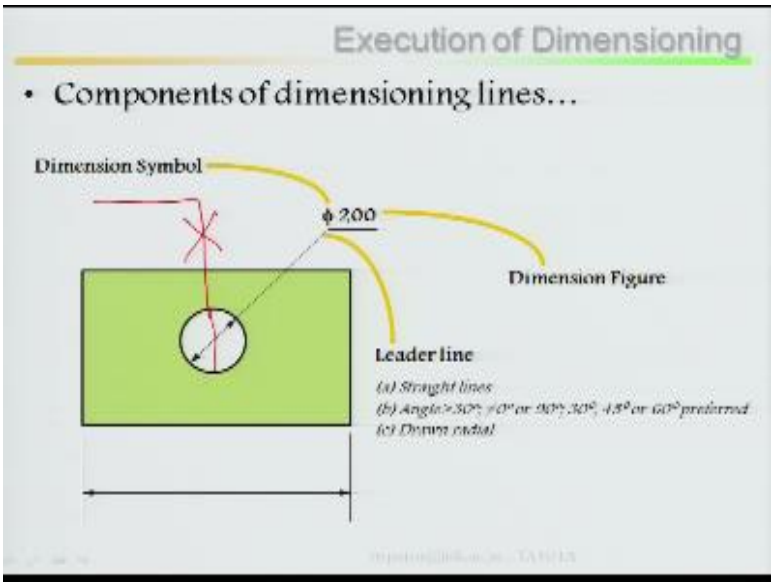

What is the size and what is the location, here it is the size dimension figure, where is the location here in terms of leader line. Leader line again it is a straight line from here to here, then angle greater than 30˚ not equal to 0˚ or 90˚ or 30˚ or 45˚ or 60˚ preferred, greater than 30˚ drawn radial, in radial direction always it has to be drawn, you cannot do as far as possible you cannot do like this, avoid this, try to avoid this.

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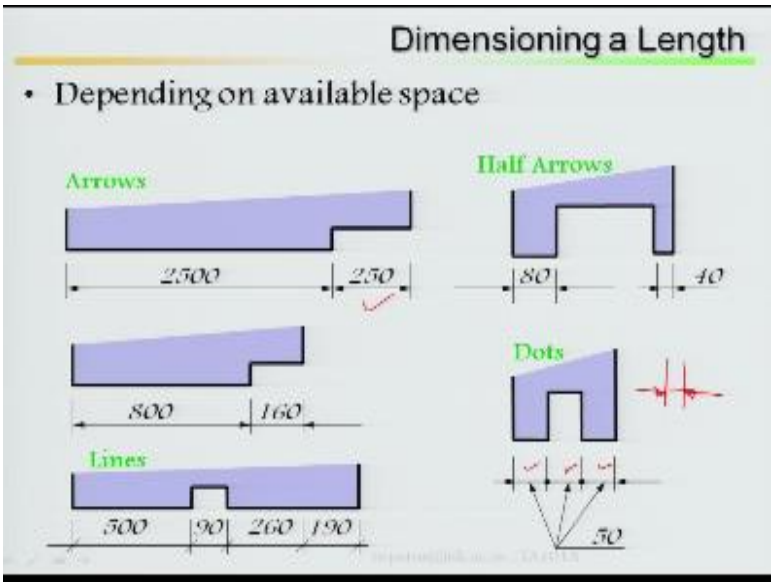

Depending upon the availability of space, look at here depending upon the availability of the space. Now here in this case arrows I can do it, because I have a available of space, now here arrows I can put it here, arrows I can put it. But if you look at here it is very difficult to put arrows inside, here it is very difficult to put arrow inside, because this is a very small dimensions. In this case you can take it like this draw it from outside you draw one arrow, then from outside you draw one another arrow so that it reflect.

Then here you write it 40, but if you look at here the arrow has been drawn inside the dimensions here it is there. Here it is a half arrow, here it is a full arrow, because here in this case there is no space is available. If you look at here, here it has been marked, but here it is very difficult, because this is equal, this is 50, this is 50, this is 50, so again it has been marked by arrow, here it is written 50 because it is very difficult to write inside 50.

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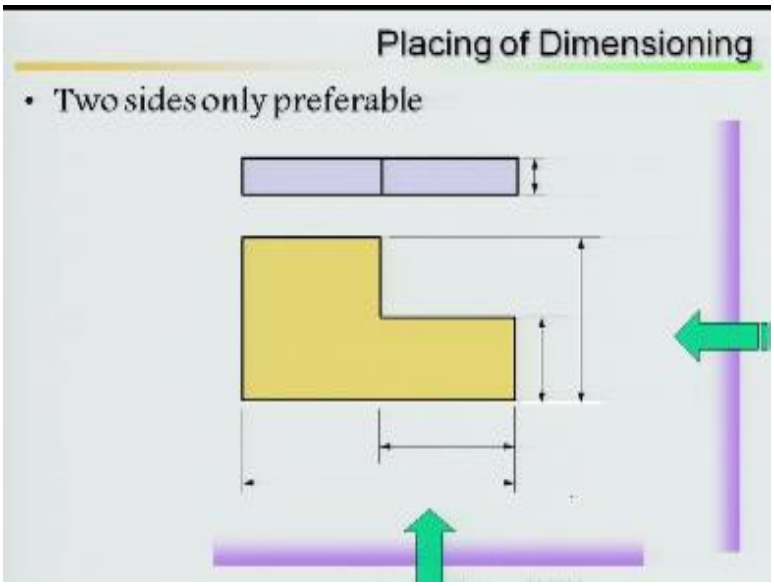

Two sides only preferable if it is orthographic any views whether it is side view, top view or front view, if it is a front view for example only preferred two sides this side this side, or this side this side, or this side this side, not all sides. If you start do the two sides same thing will continue for other faces also.

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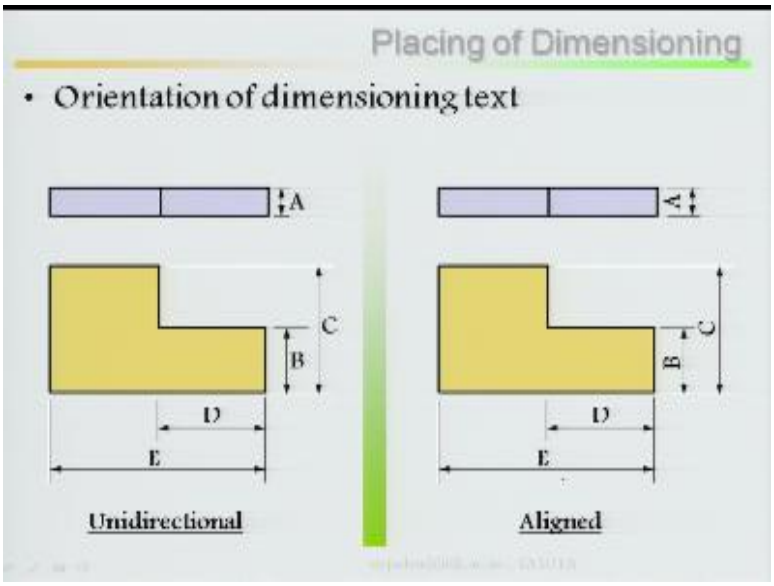

Arrow and text, placing of dimensioning, how do you place the dimensioning unidirectional, and second one is your aligned. What do you mean by unidirectional, second one is your aligned. If you look at here unidirectional, I am putting arrow writing E, D, B, C, this is the unidirections, but here E, D is aligned in this directions, B, C is aligned in this directions. So you can do it either unidirection or you can do it aligned also.

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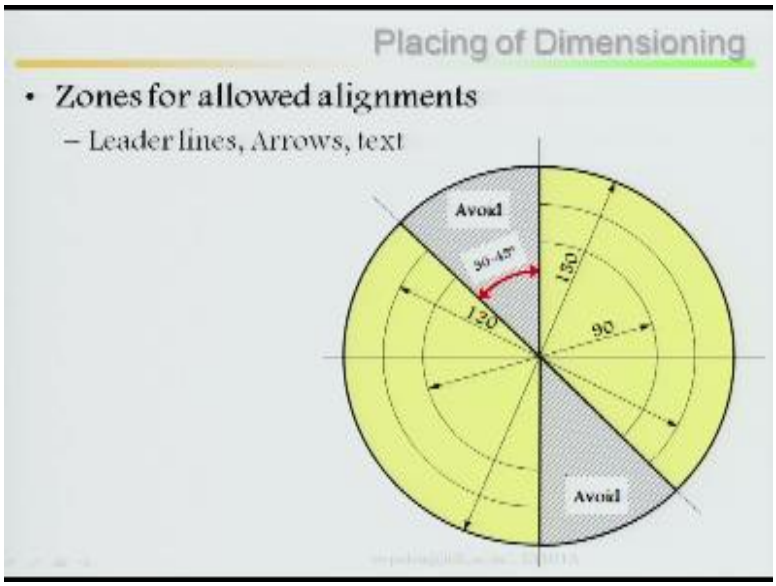

Zones for allowed alignments, leader lines, arrows and text avoid, 30˚ to 45˚ to avoid.

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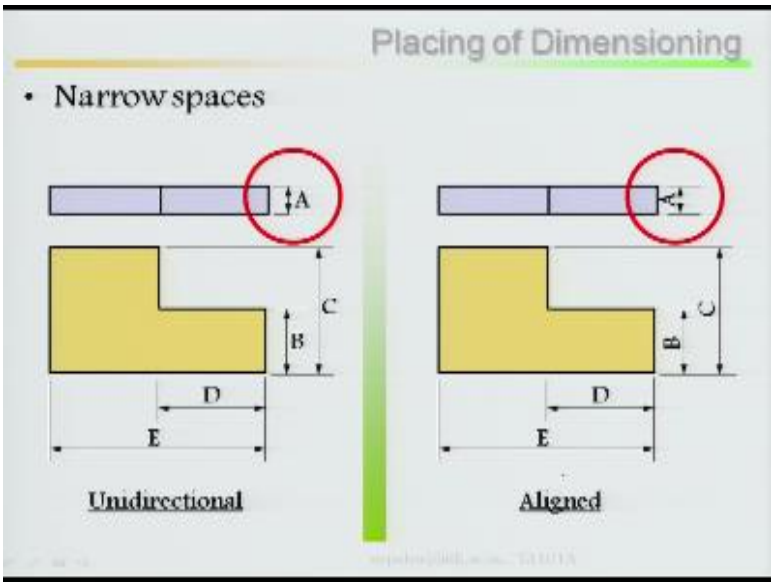

Narrow space, if there is a narrow space unidirectional.

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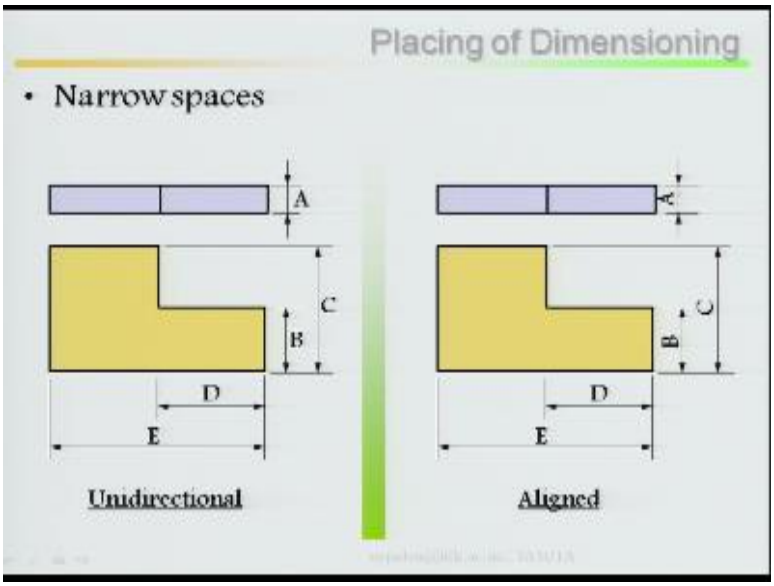

See I am writing this way, this is very difficult to write, this is a narrow space, as I said earlier arrow will be placed very difficult then in that case how it has been, done earlier arrow is inside so now it is not possible, then you put it outside arrow write it inside. Similarly in case of aligned case, same cases it is aligned because in that direction the dimensioning has been done, here it is very difficult inside, then you do it outside and mark it A.

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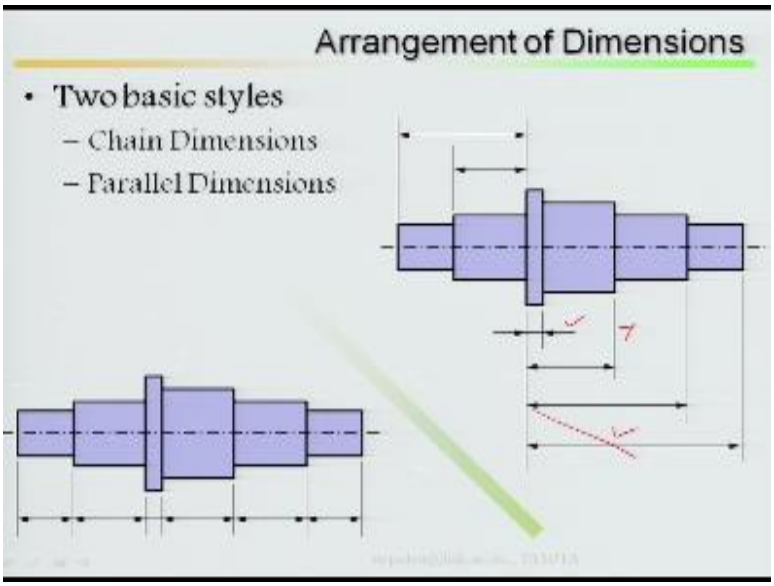

Two basic styles, there are two basic styles, one is your chain dimensions, second one is your parallel dimensions. If you look at your chain dimensions, chain dimensions means it will be here, here, here it will be continuous in the same chain. Another one is parallel like here it starts, then parallel to this, then parallel to this, then parallel to this, both are correct. Both dimensioning are correct, this is the follow up either chain or parallel.

But here once you have taken it parallel you cannot do it arbitrarily dimensioning like this or like this you cannot do it, this is wrong. Either you do it parallel or you do it chain dimensions.

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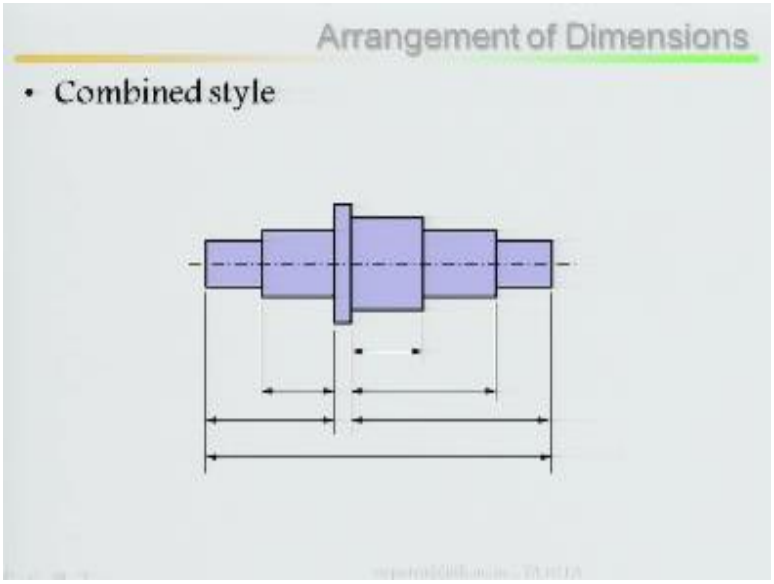

Combined style also possible that means chain as well as parallel also possible. This is your chain as well as parallel.

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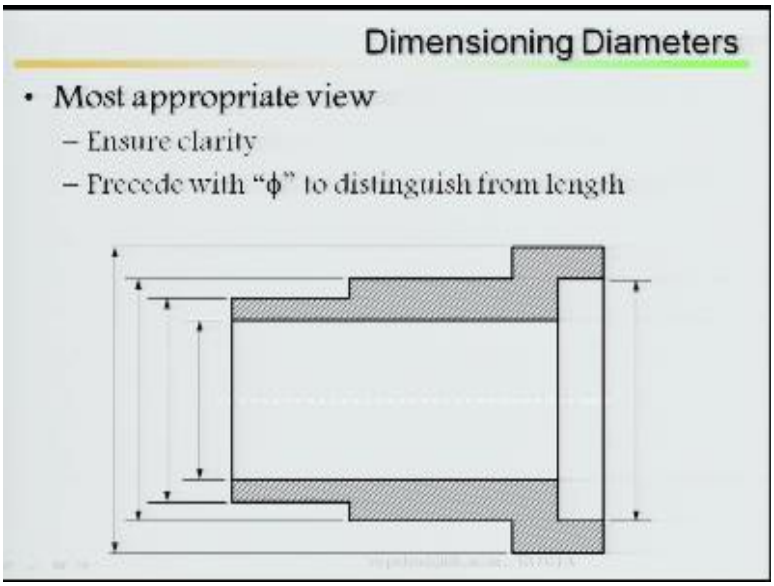

Most appropriately view ensure clarity, precede with Φ to distinguish from the length. If you look at here length Φ has to be distinguished from your length, here there is a drill Φ, here there is a Φ it should be very clearly distinguished.

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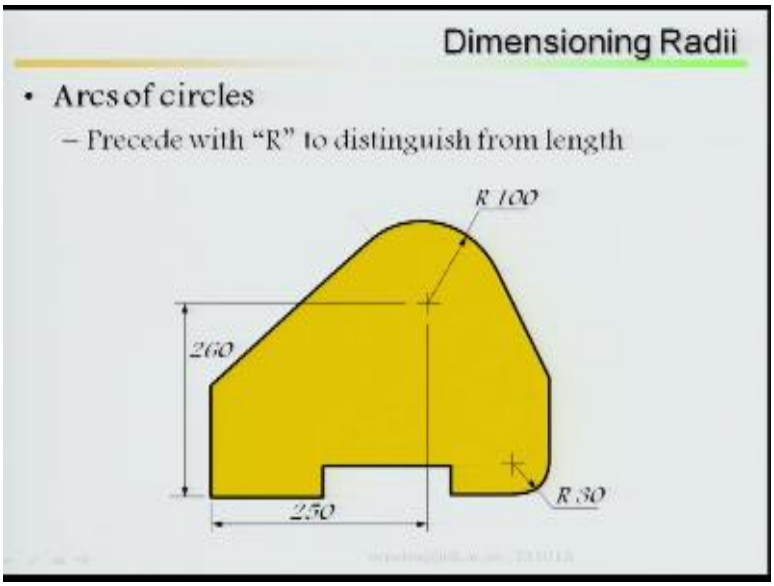

If I come to this example, arc of a circle precede with R to distinguish from the length, this is your length from here to here it means 260, this is your length from here to here it is 250 mm. But the moment I do it like this, then this, this is your R that means for this arc this is your radius. Again this is your R, but this arc this is your radius.

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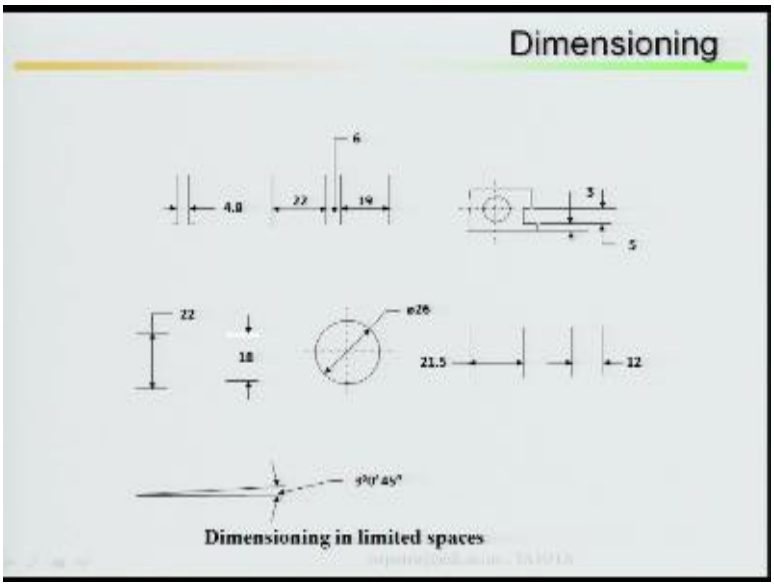

How for narrow space the dimensioning has been done, there is a very narrow space one arrow can be taken out and put it here 6, then one arrow can be taken out put it 22 here it can we do it. Within small angles 3˚, 2˚, 1˚ how we are going to do the dimensioning. Take it, take it, mark the arrow, mark the arrow, here slowly you mark 3˚, 0 min 45 second, because it is impossible to write it inside.

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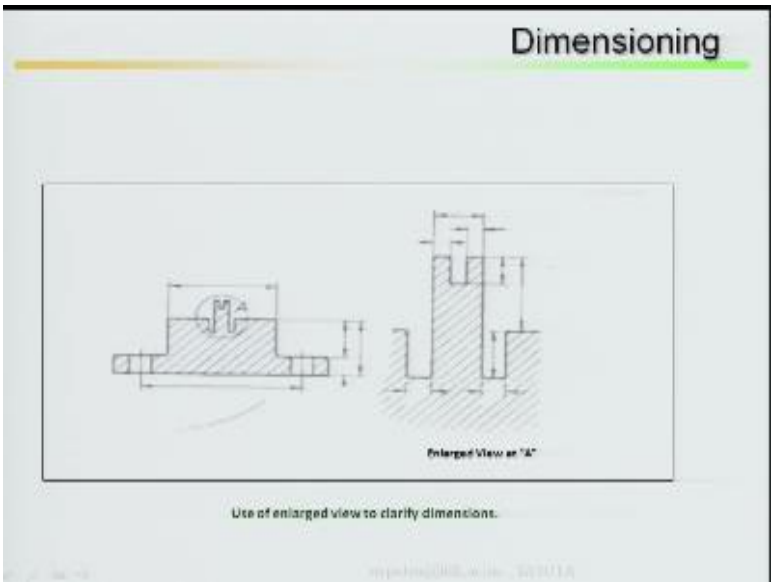

Use of enlarged view to clarify your dimensions, enlarge view suppose this is a view, this is a view then this is your small part of the dimension is not clearly specified. In a drawing you can take enlarged view of this how it looks. Then show the dimensioning, so that the manufacture can read what is the inside diameter, what is the inside diameter here, here to here what is the dimensions or what is the dimension here, what is the inside dimension here, what is the inside diameter also here, what is the spacing here, everything it can be marked.

As far as possible you can enlarge for clarity, I will stop it here, tomorrow I will start examples of dimensioning as well as I will proceed for your isometric projections, this is all about your orthographic projections and dimensioning, thank you.

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