Design of Steel Structures
Prof. Dr. Damodar Maity
Department of Civil Engineering
Indian Institute of Technology, Guwahati

Module - 2
Connections
Lecture - 4
Welding

Hello guys. Today, we are going to discuss about welding. In previous classes we have discussed about the connection by rivet connection or bolted connection. Now, one another connection as we have discussed that is welding which is very important in steel structure design we will discuss today. Welding is basically a connection process this basically connect 2 metals by the application of heat with or without pressure.

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That means if we have an angle here and if we have another angle here then we can connect these 2 through some welding process. In place of riveting in the earlier cases we have seen that we are going to make some rivet joint. So, in place of riveting joint we can make also this welding process. Basically mild steel cast iron, copper, brass and aluminum can be welded by application of heat.

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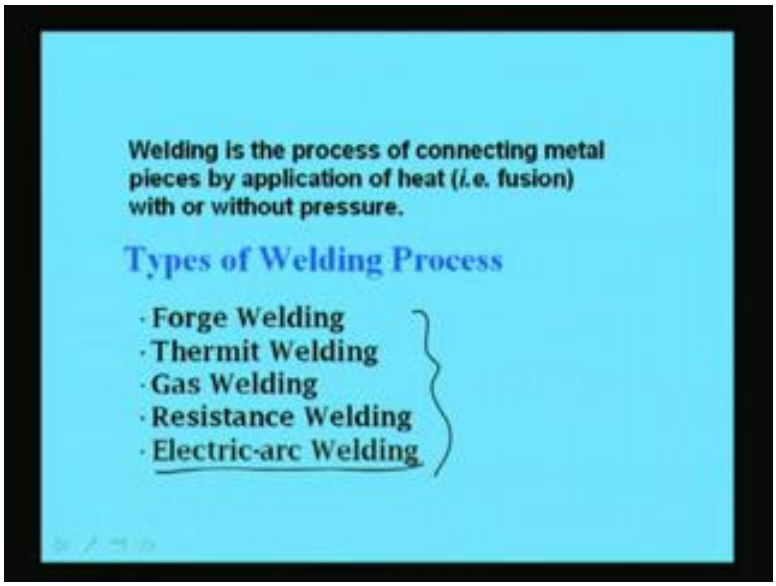

Now, let us see what is the definition of the welding? Basically welding is the process of connecting metal pieces by application of heat which is called fusion with or without pressure. Now, the process of welding can be classified into this 5 category; one is called forge welding another is thermit welding another is gas welding. Then resistance welding and another is electric arc welding. Out of all these the structural members are generally connected by electric arc welding. So, we will be only emphasis on this.

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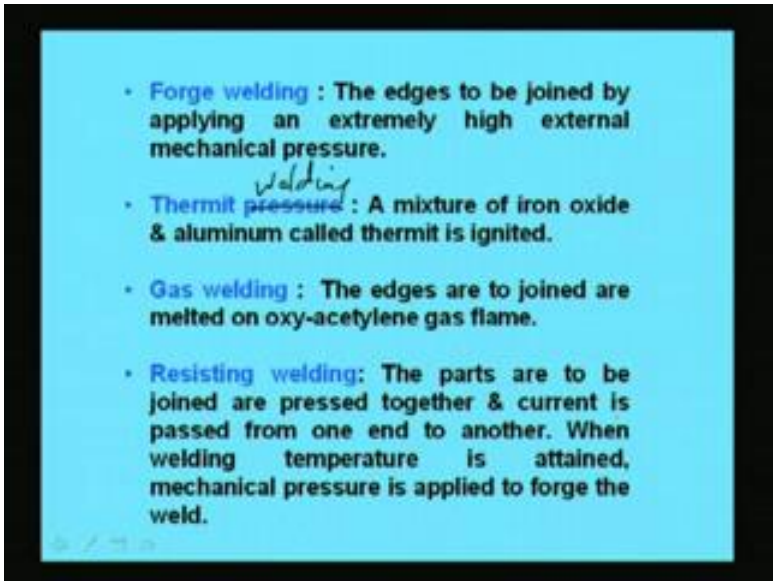

Now, what is forge welding? I will shortly discuss about all this welding type in forge welding the edges to be joint by applying an extremely high external mechanical pressure. In case of thermit pressure sorry this is this will be thermit welding, in case of thermit welding a mixture of iron oxide and aluminum called thermit is ignited. Iron reduce to molt in metal is deposited at the joint. In gas welding the edges are to joint are melted on oxy-acetylene gas flame. In resisting welding the parts are to be joint are pressed together and current is passed from one end to another when welding temperature is attained mechanical pressure is applied to forge the weld.

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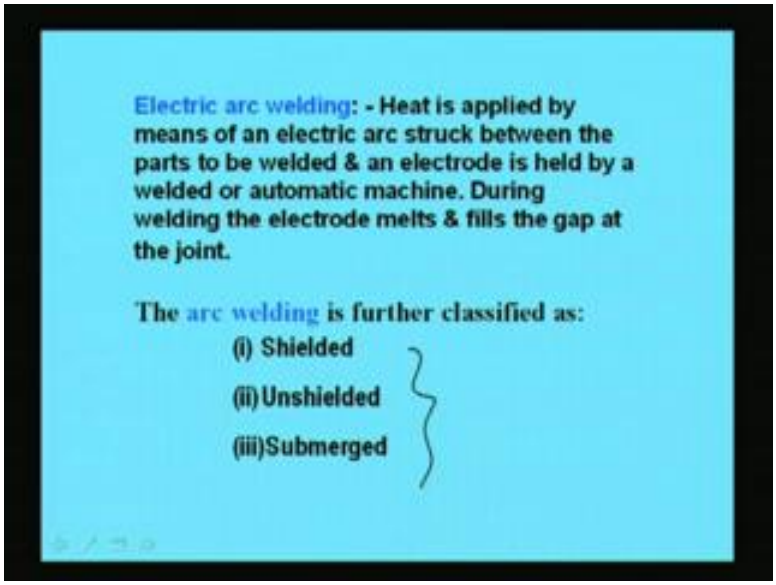

The mostly used welding is electric arc welding where heat is applied by means of an electric arc stuck between the parts to be welded and an electrode is held by a welded or automatic machine. During welding the electrode melts and fills the gap at the joint. The arc welding is further classified into these 3 category; one is called shielded another is called unshielded and then submerged.

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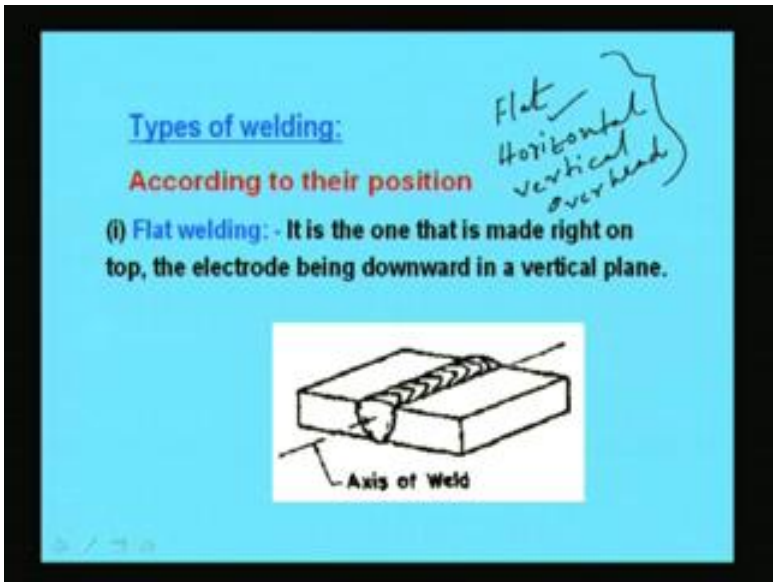

Now, according to their position welding can also be classified these are classified into 4 category; one is called flat welding another is horizontal welding then vertical welding and then overhead welding. So, according to their position we can classify the welding into these 4 categories out of these 4categories generally people are using this flat welding mostly. So, flat welding, horizontal welding, vertical welding, and overhead welding. In case of flat welding it is the one that is made right on top the electrode being downward in a vertical plane and it looks like this type of figures.

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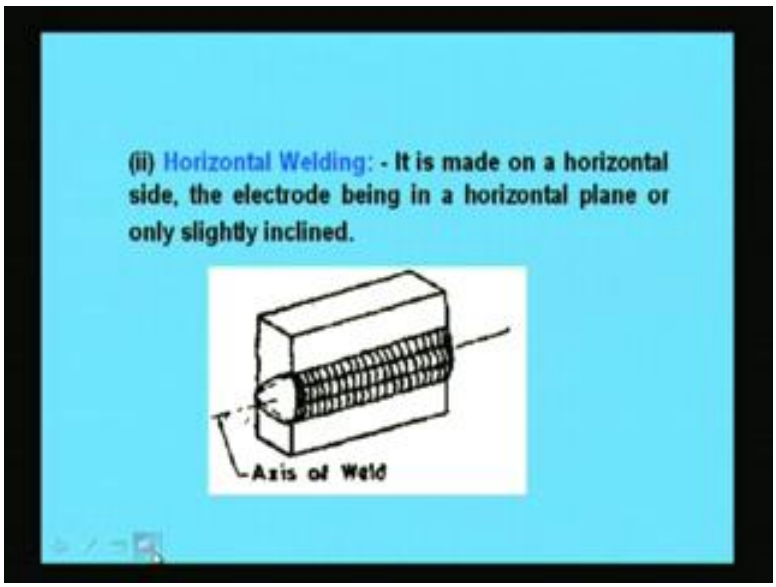

Next in case of horizontal welding it is made on a horizontal side the electrode being in a horizontal plane or only slightly inclined. Axis of weld will be in this way and welding will be in this cases.

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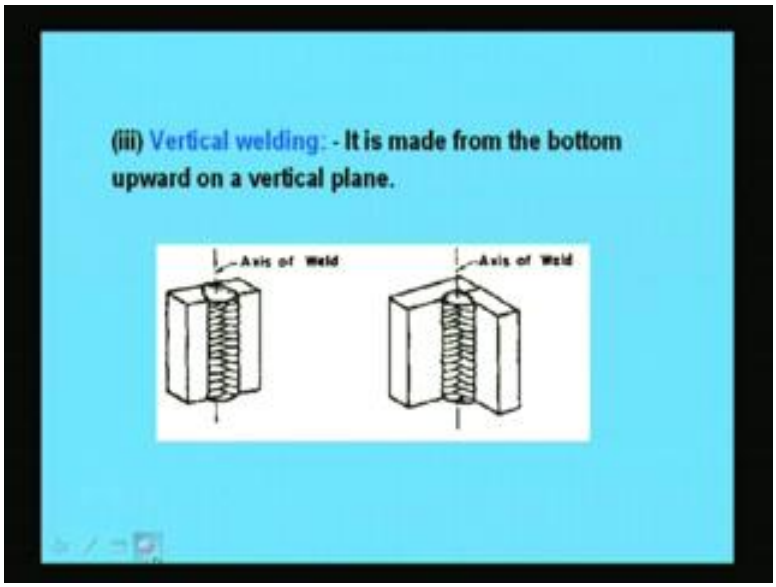

Another is vertical welding it is made from the bottom upward on a vertical plane. Axis of weld will be vertical and the 2 connections 2 members can be connected in this way which is called vertical welding.

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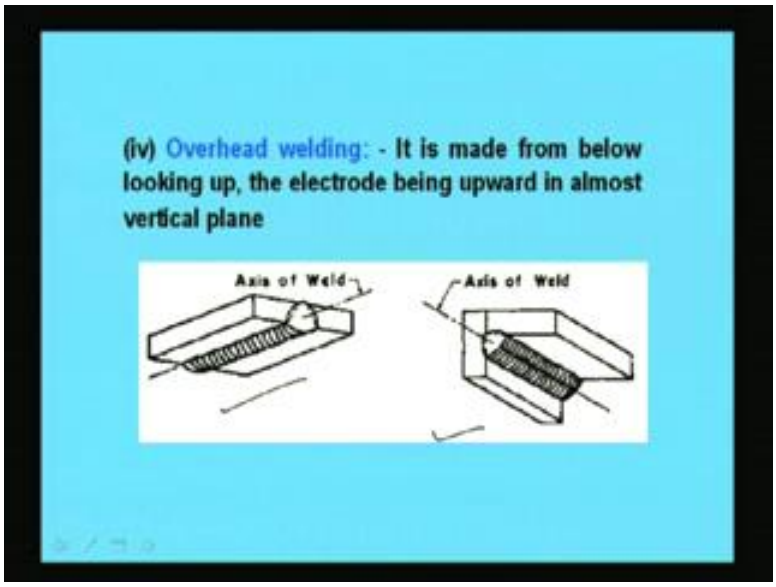

Next is overhead welding. It is made from below looking up the electrode being upward in most in almost vertical plane. This is looking like this axis of weld will be like this or like this and it is connecting in this way.

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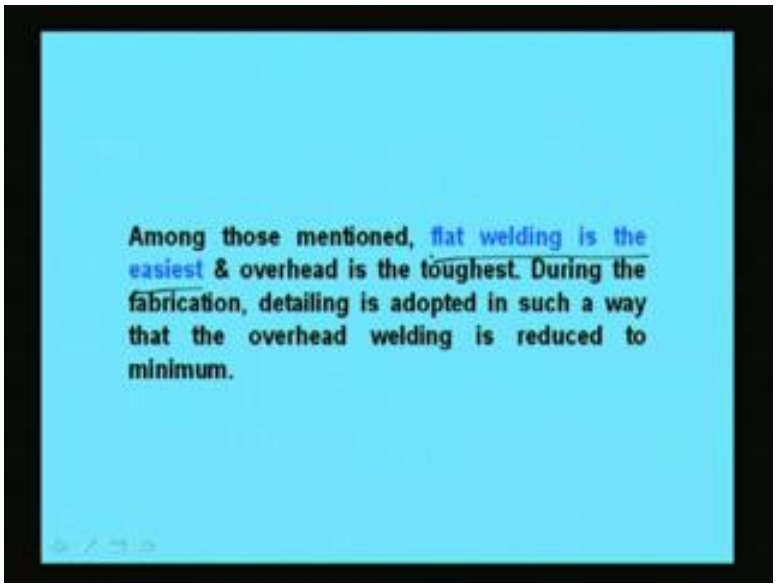

Now, among those mentioned these 4 types of welding. Flat welding is the easiest and overhead is the toughest. During the fabrication detailing is adapted in such a way that the overhead welding is reduced to minimum.

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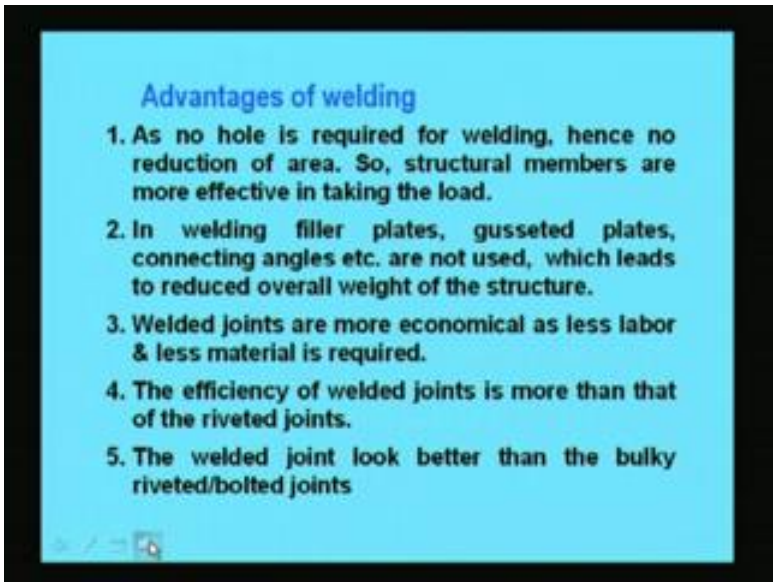

Now, while discussing about the welding we must look into the advantage and disadvantage of welding process, because we know we can join the 2 structural members by riveting 2 steel members we can joint by riveting or bolting. So, why we are going for again welding? So, before starting to welding design we must know what are the advantages over the bolted design andthe rivet design? Then what are the disadvantages that also we have to look. And then only we can means designer can choose which type of joint will be required which type of connections will be made.

Basically we cannot suggest thoroughly that welding is better or bolting is better or riveting is better, so it depends on case to case. So, the type of connections we have to see first then accordingly at the sorry I am repeating once again. This can I repeat once again. So, before going to discuss details about welding we should know about the advantages and disadvantages of welding we have seen how to connect 2 steel members by bolting or by riveting. Now, we will see how to connect these 2 members by welding. Welding connection has certainly some advantages, but it has some disadvantages also.

So, let us discuss about this advantages and disadvantages so that the designer can choose certain type of connections for a certain type of structures. So, one advantage is that as no hole is required for welding hence no reduction of area. So, structure members are more effective in taking the load. In case of rivet joint holes are there. So, because of holes the net effective area is going to reduce that is why the net strength of the plate after riveting is going to reduced. But in this case in the case of welding there will no scope of reducing the area. So, we are going to get full strength of the plate.

So, this is one more means one advantage which the structural engineer has to look. Another is in welding filler plates gusseted plates connecting angles etcetera are not used which leads to reduced overall weight of the structure. Then welded joints are more economical as lesser labor and less material is required. The efficiency of welded joints is more than that of the riveted joints that we have already told that why efficiency is more the welded joint look better than the bulky riveted or bolted joints. In case of riveted or bolted joint, because of rivet head or bolt head this will look bulky the joint will look bulky. But in case of welded joints we can just simply by pressing or without pressing we with the application of heat we can just joint the 2 members.

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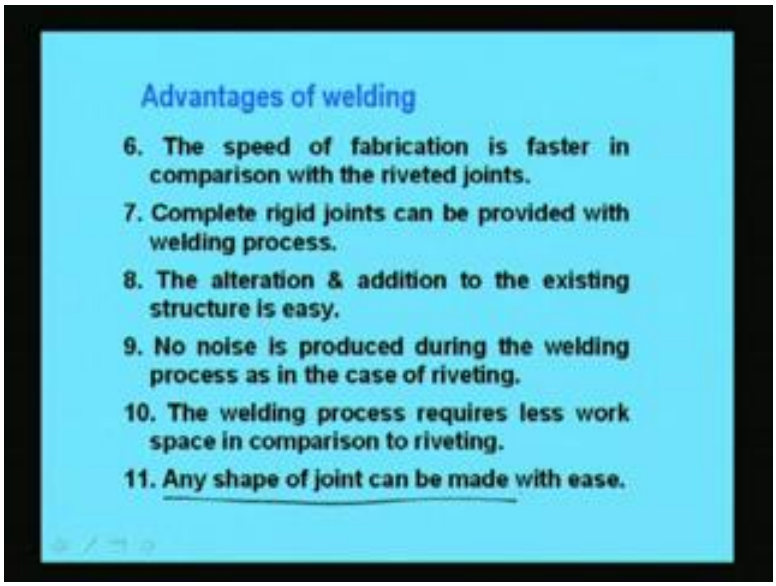

Another advantage is the speed of fabrication is faster in comparison with there with the riveted joints. Completer rigid joints can be provided with welding process. This is another important advantage in case of welded joint. The alternation and addition of the existing structure is easy compare to riveted joints. No noise is produced during the welding process as in the case of riveting. The welding process requires less work less work space in comparison to riveting. Any shape of joint can be made with ease. This is another means important point which the structural designer has to look that any shape of joint can be made where the in case of riveted joint it is little difficult.

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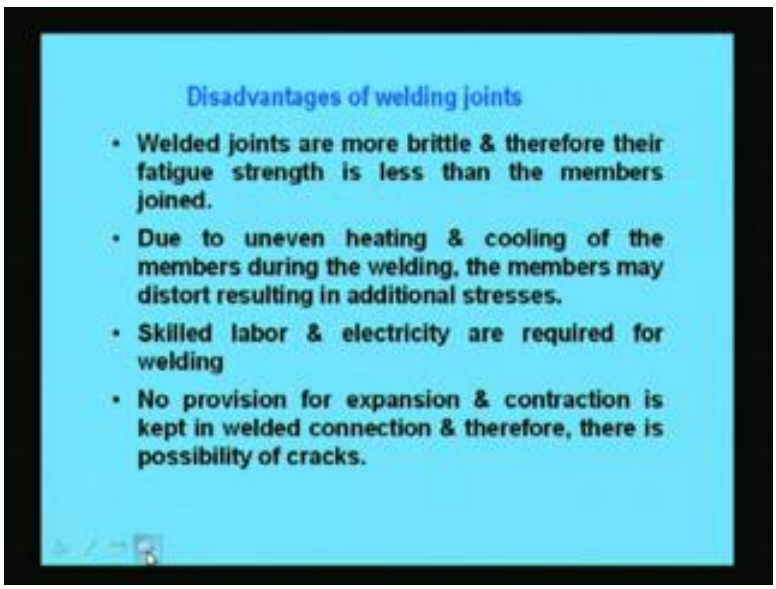

Now, what are the disadvantages in case of welding, the major disadvantage is that welding joints are more brittle and therefore, their fatigue strength is less than the member joined. So, this is one important thing which has to look into while designing the steel structure. Due to uneven heating and cooling of the member during the welding the members may distort resulting in additional stresses. So, because of distortion additional stresses may develop in the member, so that has to be taken care. Skilled labor and electricity are required for welding this is one important need we need skilled labor for connecting 2 members by the use of welding. No provision for expansion and contraction is kept in welded connection, and therefore there is possibility of crack. So, possibility of cracks will be there.

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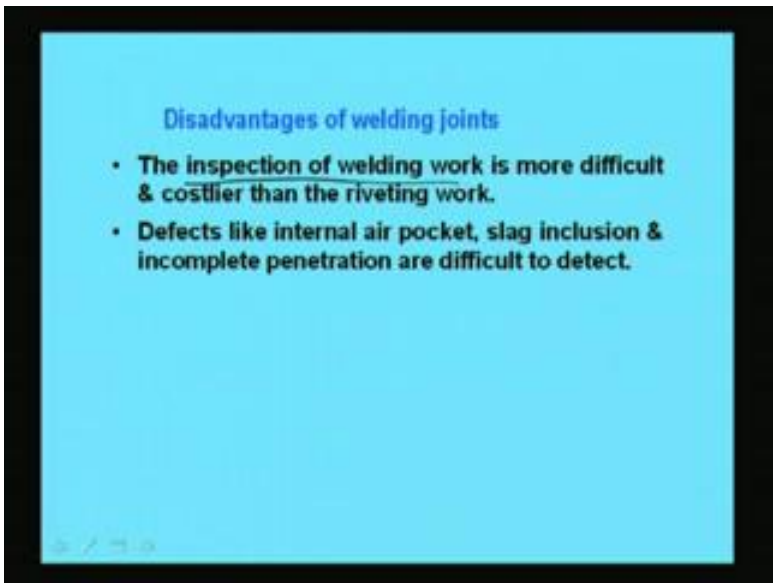

Another important aspect is that the inspection of welding work is more difficult and costlier than the riveting work. So, inspection is difficult inspection of welding work. This is one major disadvantage in case of welding joint another thing is defects like internal air pockets slag inclusion and incomplete penetration are difficult to detect. So, whether the joint has some fault or not that we cannot detect easily through the means if the joint is connected through welding process. So, this is another, because the failure may occur suddenly in case of welding joint, so we cannot keep track. In case of riveting joints this type of disadvantages will not come into picture. So, keeping all this in mind the designer has to choose whether he will go for welding joint or riveted joint.

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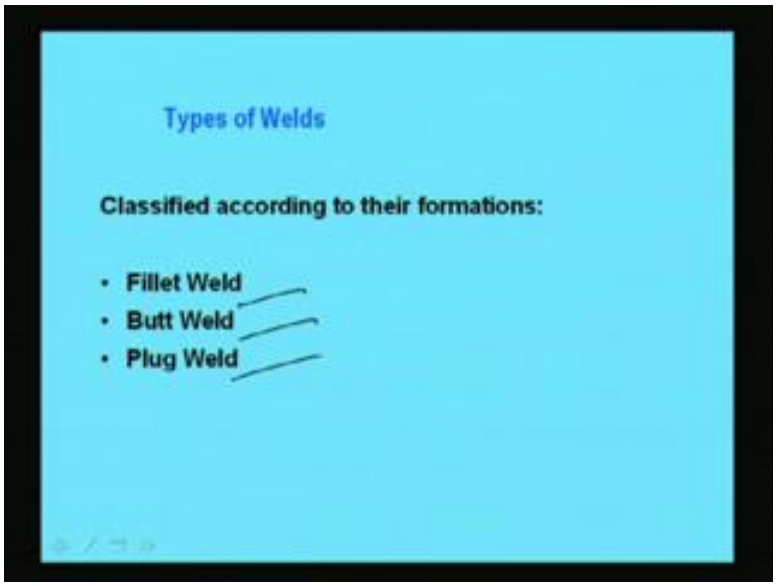

Now, types of weld, basically these are divided into 3 types on the basis of the formation. How it is forming? This is one is called fillet weld another is butt weld and then plug weld. So, this basically this 3 type of weld will be looking for designing of steel members. So, we will see all these in details later.

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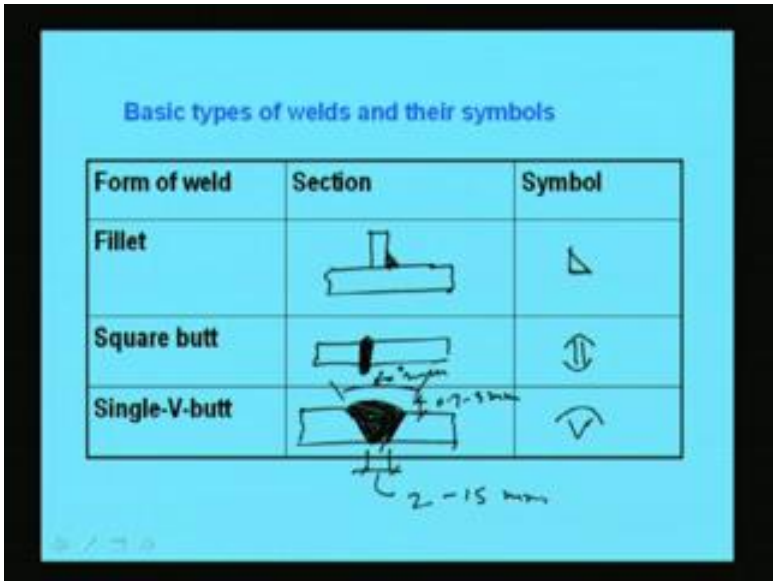

Now, we will discuss about some basic types of weld and their symbol, because when we will go for designing the steel members we have to know what type of symbol we used in drawing. In drawing it has to be used, so that the user can read it and can make

accordingly. So, let us see how it looks like? In case of fillet weld we will see the sections will look like this. Say 1 plate is connected with another plate with fillet weld then if it is fillet weld the section will look like this and symbol will be simply like this. And in case of square butt this will look like this. So, section will be like this and the symbol generally can be like this sorry this will be like this. Now, in case of single V butt the sections will be looking like this. This will be like V shape with having some round here this will be filled with the weld. Now, this height is 0.723 mm. This height if the round height then this width will be 2 to 15 millimeter and this angel will be minimum 60 degree. Minimum angel will be 60 degree and the symbol will be simply like this. So, this will look like this.

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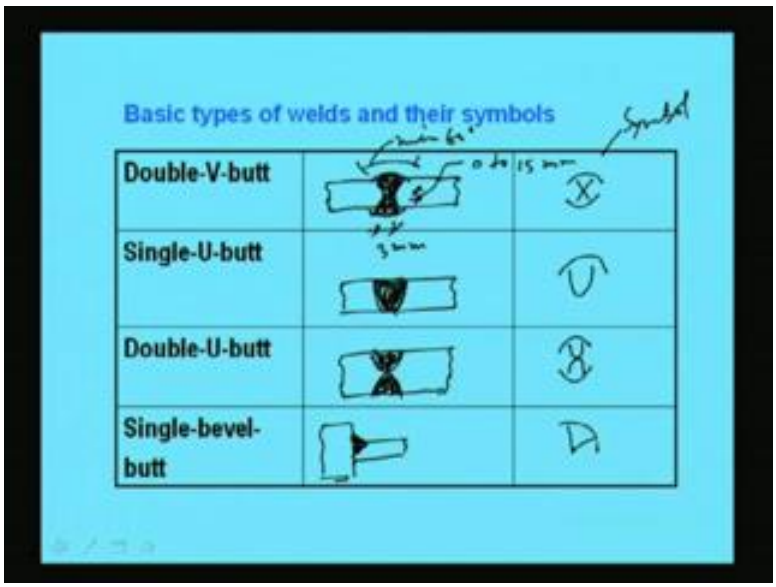

Now, if it is double V butt then simply in 2sides it will be, so we can see the picture will be something like this. So, this is filled with weld and the symbol will look like this. So, in double V butt in both sides it will be this thickness will be around 3 millimeter. And this will be this thickness will be 0 to 15 millimeter and this angle will be minimum 60 degree. So, the detail of the double V butt joint will be like this. Now, in case of single U butt this will be looking like this. This is single U butt and this will be the symbol this is symbol. Then in case of double U butt similar to single U butt it will be only in 2 sides it will be in top and bottom the welding will be there in this type which is called double U butt and the symbol will be simply like this. In case of single bevel butt the sections will

look like this and the symbol will be like this. So, single bevel butt will be looking like this type.

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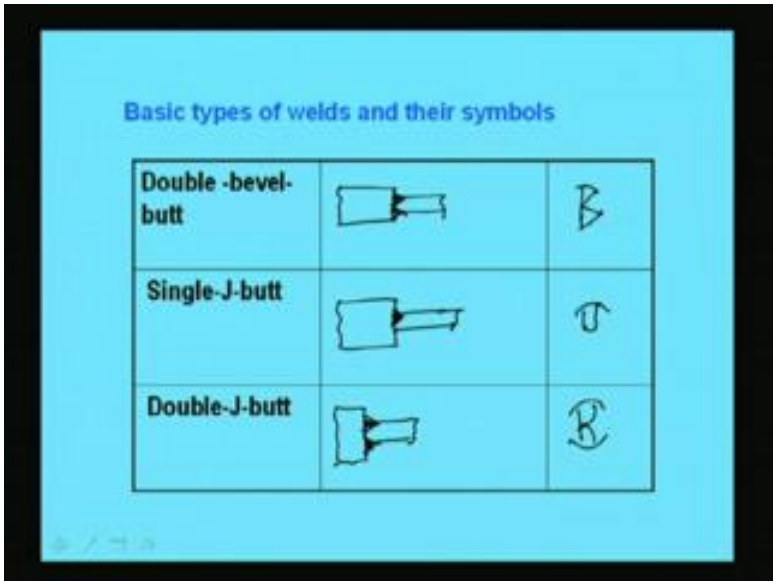

Then double bevel butt will be in 2 sides basically similar to single bevel butt only it will be in 2 sides that means this will be like this and this will be in this way also to like this. So, the symbol will be simply like this and single J butt will be like this. This will be section will be looking like this and the symbol will be looking like this. And in case of double J butt similar to single J butt the section will be only in 2 sides it will be and this will be looking like this.

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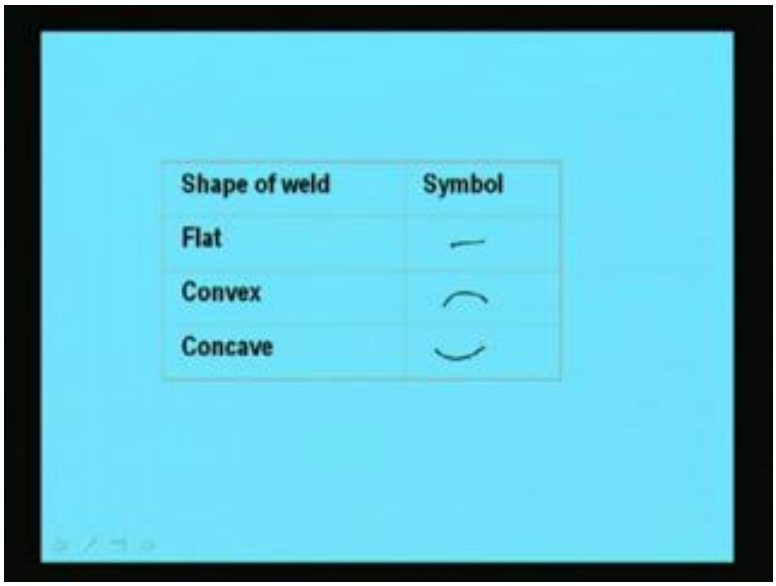

And the shape of weld can be make in case of flat weld the symbol will be like this, and in case of convex weld this will be like this. And in case of concave weld it will be looking like this.

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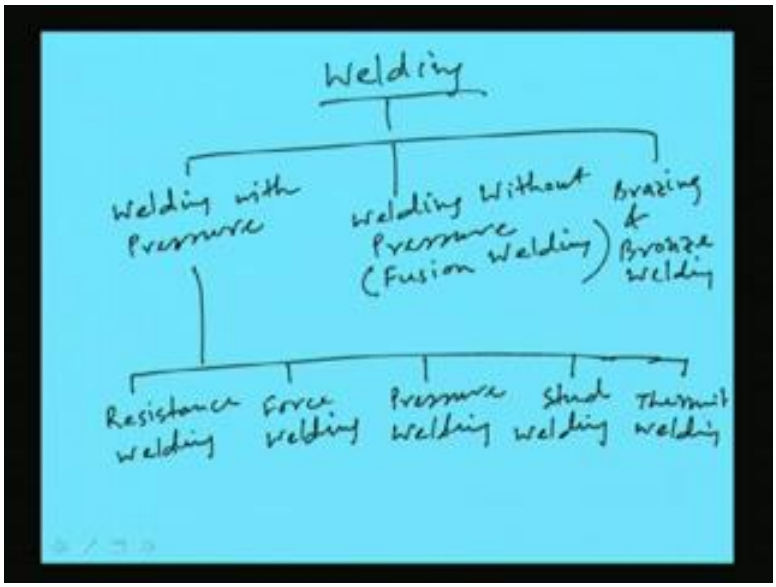

Now, we will classify the welding process in2 different categories say welding this can be classified into 3 categories. One is called welding with pressure another is welding without pressure without pressure which is called again fusion welding. Welding without pressure is also called fusion welding and another category is brazing and bronze

welding. So, these3 types of category can be made where these again will be of 5 types one is called resistance welding. Another is force welding another is pressure welding pressure welding, then stud welding and the last one is thermit welding. So, these 5categoriesare coming.

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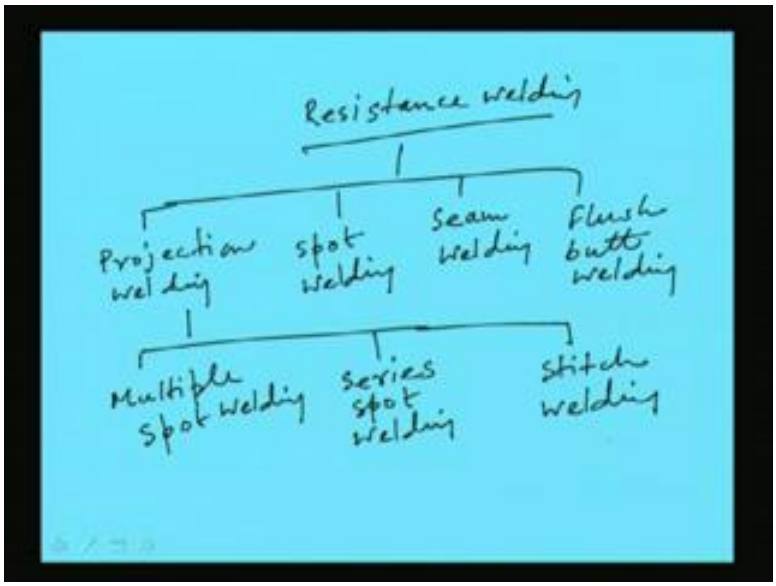

Then again if we see resistance welding can be classified into 4 categories. One is called projection welding then spot welding next is seam welding and the last one is flush butt welding. So, these 4 types of resistance welding are there. Again this projection welding can be divided into 3 categories. One is called multiple spot welding then series spot welding and stitch welding. So, projection welding again can be classified into 3 categories which is called multiple spot welding, series spot welding and stitch welding.

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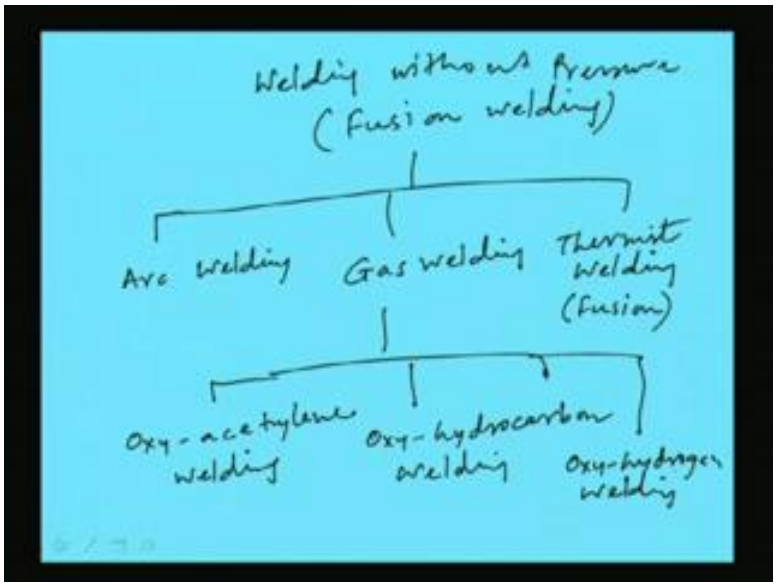

So, again this welding without pressure which has defined earlier that can be classified into 3 types that means the fusion welding. This can be classified into 3 categories. One is called arc welding then gas welding and then thermit welding or this is fusion welding. Again this gas welding can be divided into 3 categories 1 is called oxy-acetylene welding another is oxy hydrocarbon welding and the third is oxy hydrogen welding. So, this gas welding can be classified into 3 category; one is called oxy-acetylene welding, oxy hydrocarbon welding and oxy hydrogen welding.

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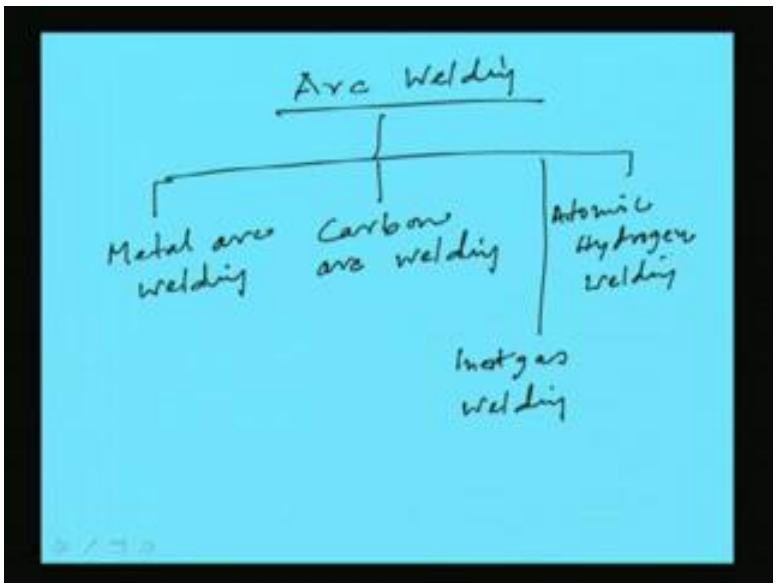

Then again arc welding this also can be categories into 4 types. Arc welding this can be divided into 4 types one is called metal arc welding then carbon arc sorry welding then inert gas welding and atomic hydrogen welding. So, this arc welding can be classified into 4 categories. One is metal arc welding, carbon arc welding, inert gas welding and then atomic hydrogen welding.

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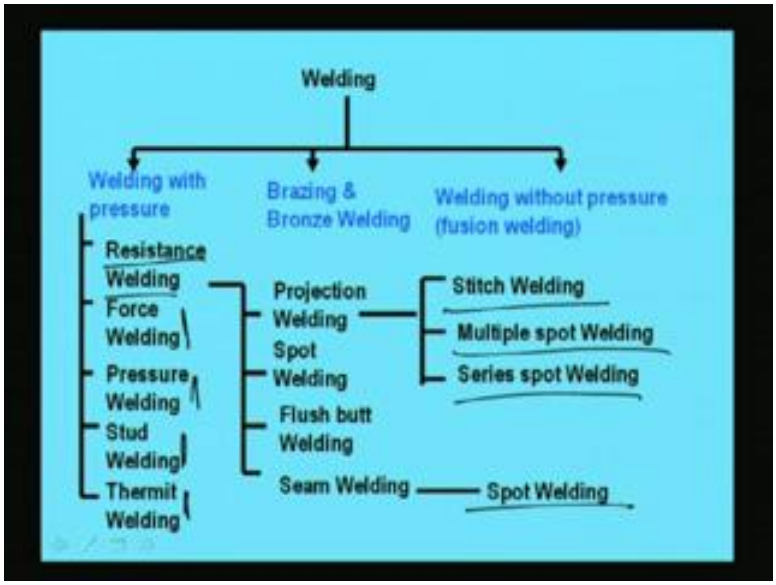

So, this again we can summarize in this way. That welding can be categorized into 3 welding with pressure welding without pressure which is called fusion welding and brazing and bronze. And this welding with pressure can be categorized into this 5 category. One is resistance welding another is force welding then pressure welding, stud welding and then thermit welding. Again this resistance welding can be classified into 34 categories. Projection welding, spot welding, flush butt welding and seam welding again this projection welding can be classified as stitch welding this multiple spot welding and series spot welding. And seam welding can be again made into spot welding.

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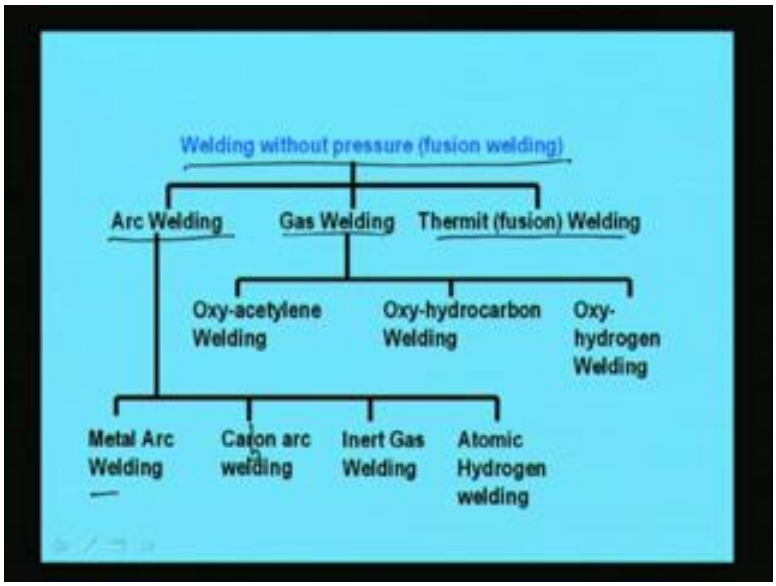

Then this welding without pressure this can be classified into 3 categories. One is called arc welding then gas welding and another is thermit or fusion welding. This arc welding can be of metal arc welding, carbon arc welding this will be carbon arc welding, inert gas welding and atomic hydrogen welding. And gas welding will be oxy acetylene welding oxy hydrocarbon welding and oxy hydrogen welding. So, these are the different categories of welding.

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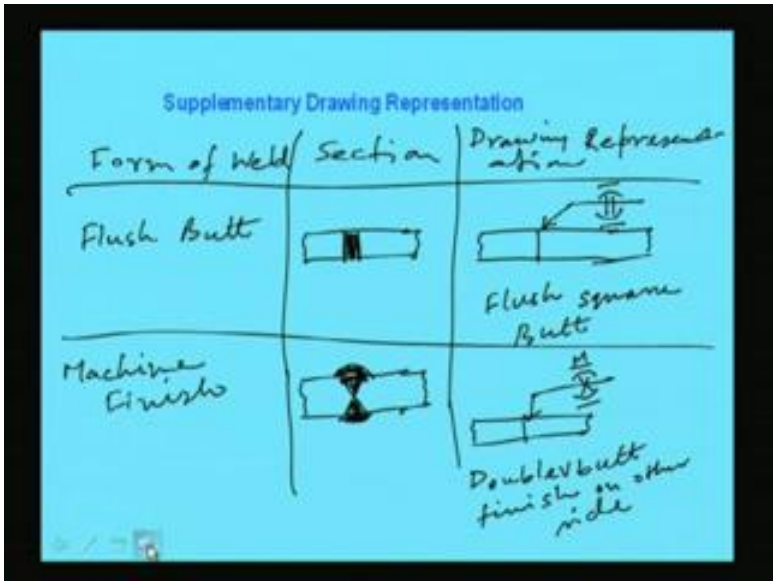

Now, some drawing we have to know how to represent different type of welding in the drawing, because the designer has to read from the drawing and they have to implement in the construction, so this has to be known. So, let us see how drawing can be done. One is we can make in a tabular form. One is form of weld what type of weld formation is going on? Then section and then drawing representation means how in the drawing we will represent drawing representation. So, in case of flush butt welding means form of weld will be flush butt. So, section will look like this and drawing will be representing in this way. This is very important, because in drawing we have to understand how it has been represented and what does it mean. This is the representation of flush butt flush this is blush square butt. So, in this way the designer has to represent in his drawing then say for machine finish. In case of machine finish the section may be look say suppose like this then in the drawing it can be represent like this. It should be a simply like this then it will look like this. So, this is double butt double V butt finish on other side.

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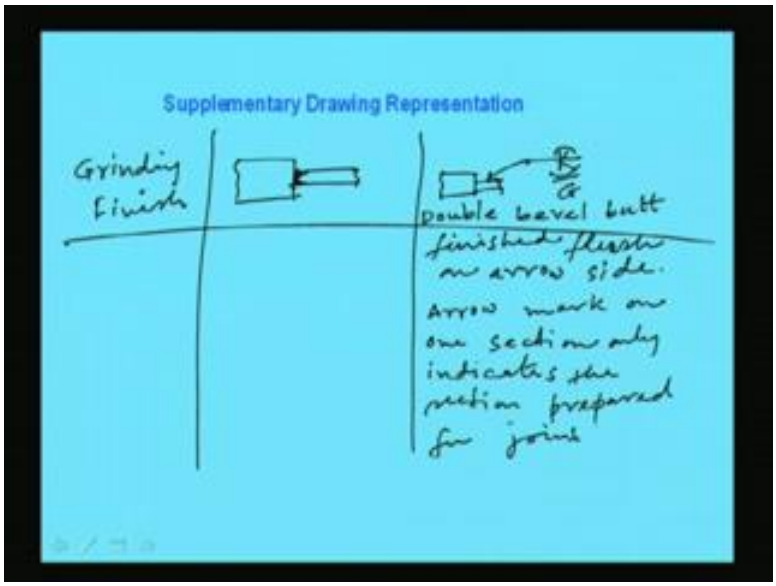

So, in this way we can represent few more welding types which is the form of weld will be grinding finish. Grinding finish and the section will be looking like this and the drawing representation will be like this. This is grinding finish this will be like this and this is basically double bevel butt finished flush on arrow side. Here arrow mark on 1 section only indicates the section prepared for joints prepared for joints. So, in this way the drawing representation will be there.

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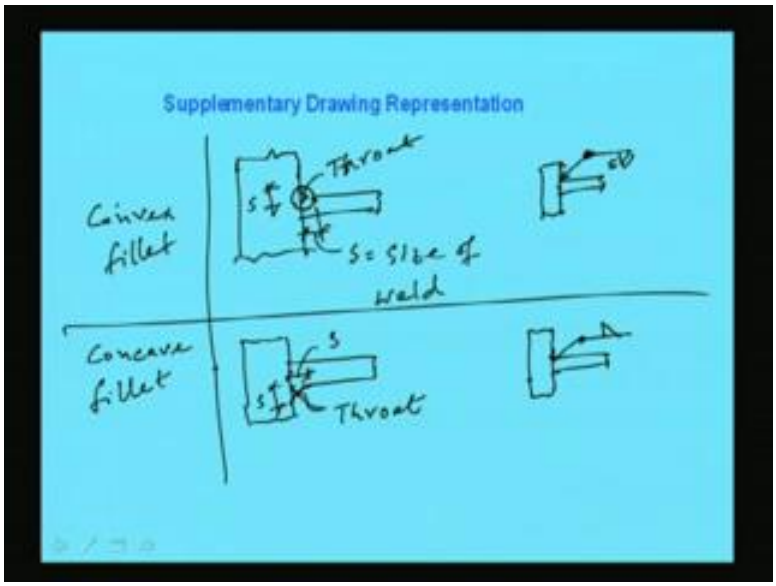

So, another type of weld will be convex fillet the section will be looking like this. Now, this will be basically convex this will be convex. It will be something like this. So, this will be S which is called size of weld. This will be also S this is size of weld and the throat thickness which I will discuss later in details this will be called throat thickness t this is throat and this distance would be throat thickness that I will discuss later in details. Now, the drawing representation will be very simple. It will be like this then I have to put an arrow mark and then we have to tell in this way that S with convex fillet. So, this will look something like this.

In this way one can represent another one is the difference we can see here concave plate this will be looking like this. So, basically it will be same type only concave weld will be there. This will look like this then it will come then it will like this. So, this would be like concave, so this will be the size of weld and throat thickness will be this one. So, this will be, so section will be like this. This is size this is again size of weld and to represent in the drawing this can be made like this. So, in drawing we can easily represent only thing is we have to know the meaning of representation how it is done. Now, this is looking like this. This is concave, so concave sign will be given. Here black circle indicates that field weld; black circle here will indicate the field weld.

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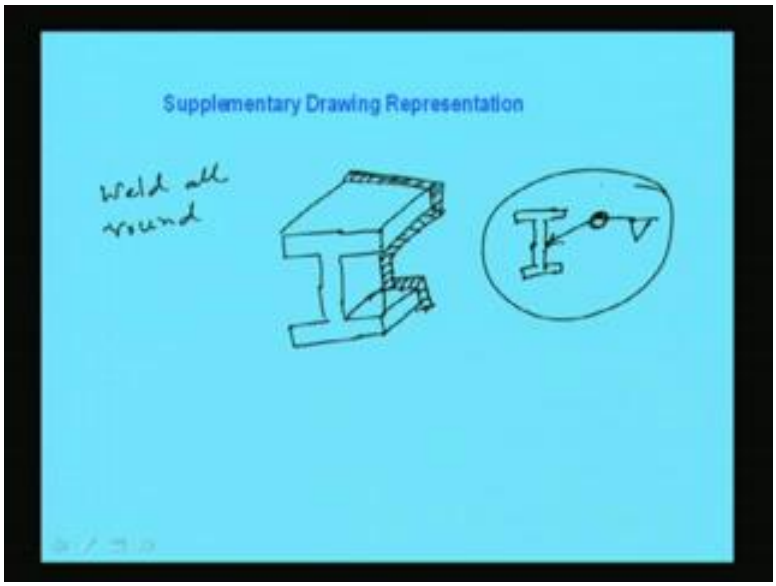

Another one is weld all round the form of weld is weld all round. If it is like that then the section will be like this. So, suppose one I section is given now, if I see in the 2 dimensional it will look like this and this will be forming in this way. These are basically forming by weld all around this will be, so this will be like this. So, that basically forming all around, so drawing representation will be simply like this just you give the I section then is it given like this.

This is basically this representation has been made basically to simplify the drawing, because in the drawing it is not possible to make all the details. So, if one knows the conventional things then the user can easily read the drawing and can make the things properly. This circle indicates fillet weight all around the section this circle this is indicating that fillet weld is all around the section. So, in this very simple way we can represent a complicated one. And the construction engineer who is going to construct the building steel building they can use the drawing and accordingly they can make things properly.

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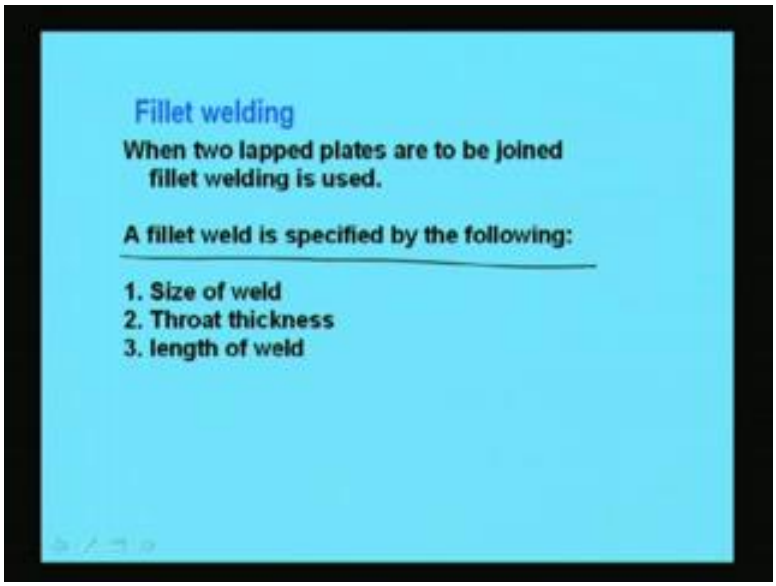

Now, we will discuss about details about fillet weld we have seen that there are different welding was there one is fillet weld another is butt weld then plug weld. So, when basically 2 plates are left then we generally use fillet welding. So, a fillet weld can be specified by the following parameters1 is size of weld it is throat thickness and the length. So, when we are talking about the fillet weld fillet weld what is the size? What is the throat thickness and what is the length of the weld? So, these 3 things we have to know while using the fillet weld.

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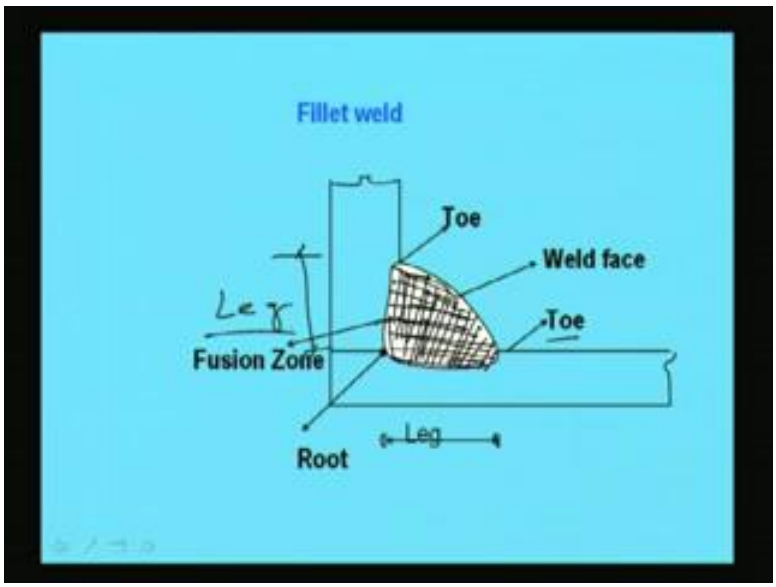

So, the fillet weld can be shown in this way. This is the weld which has been made to connect 2 steel parts. Now, if we see this is called toe these 2 part is called toe. And this is basically weld face face of the weld. So, welding will look like this. Basically 2 parts we are going to connect. So, this is toe and this is weld face and this is basically fusion zone and this point is called root. So, the leg will be this 1 we can call this is as leg and this side also we can call as leg. So, we can ((Refer Time: 42:46)). So, in this way the fillet weld can be represent.

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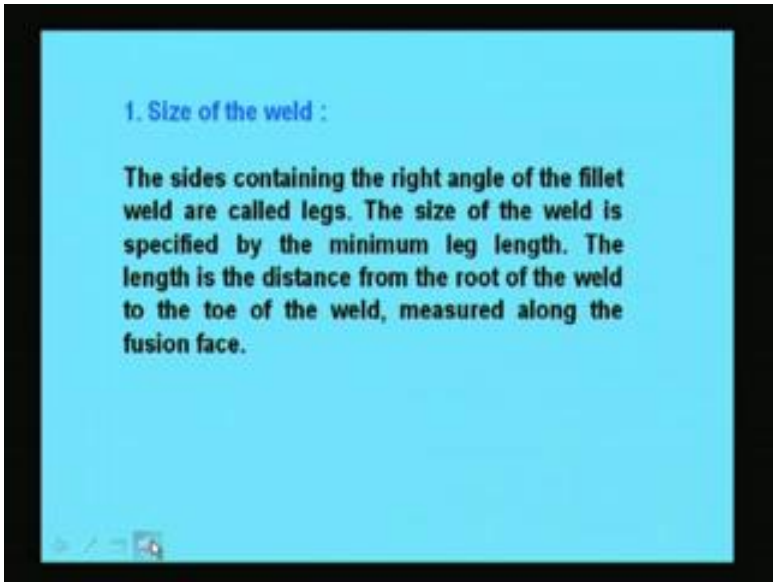

Now, what is the size of the weld? The sides containing the right angle of the fillet weld are called legs what I have shown here in the previous slide. The size of the weld is specified by the minimum leg length. So, the minimum leg length will be the size of the weld. The length is the distance from the root of the weld to the toe of the weld measured along the fusion face. So, here you see, so from the toe to the root this is called leg and the smaller of this 2 leg will be the size of the weld which is represented by s size of the weld basically we use to tell as s.

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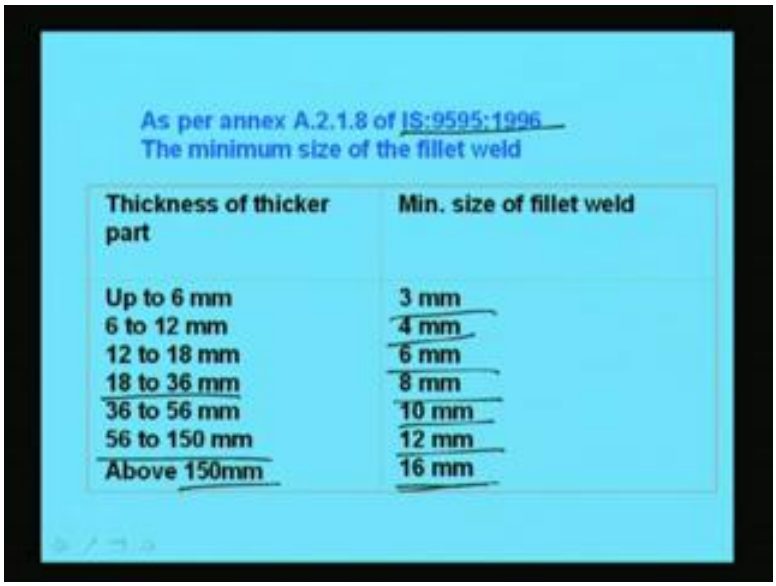

Next as per the codal provision some minimum size of the fillet weld has been given. In code IS 9595 in 1996 in the annexure A 0.2.1.8. The minimum of size of fillet weld has been given. So, this minimum size depends on the thickness of the thicker part of the member. Thicker part of the member means the, if 2 plates are joining then the thicker part of the member will be the, we have to consider. So, minimum size of fillet weld will be say for up to 6 mm thickness it will be 3 mm, so minimum will be 3 mm. And from 6 to 12 mm thickness of the plate minimum size of the fillet weld will be 4mm.

For 12 to 18 mm size of the fillet the thickness of the sorry minimum size of fillet weld would be 6 mm. If the thickness of the plate become 18 to 36 mm then the size of the fillet weld will be eight mm. Again if the thickness varies from 36 to 56 of the plate then thickness will be 10 mm similarly for 56 to 150 mm thickness can be increased to 12 mm. And if the plate is above 150 mm then minimum thickness has to be given as 16 mm. So, minimum thickness has to be given as 16 mm if the plate thickness becomes more than 150.

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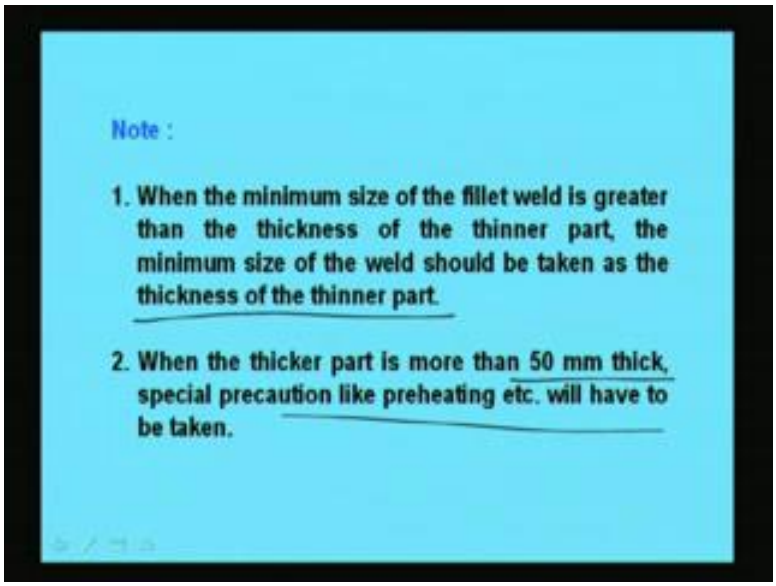

Now, you have to note the following points. One is the when the minimum size of the fillet weld is greater than the thickness of the thinner part. The minimum size of the weld should be taken as the thickness of the thinner part. So, you have to remember this point. Another point is when the thickness part is more than 50 mm thick special precaution like preheating etcetera will have to be taken care properly. So, this is another important part while joining the 2 plates with welding.

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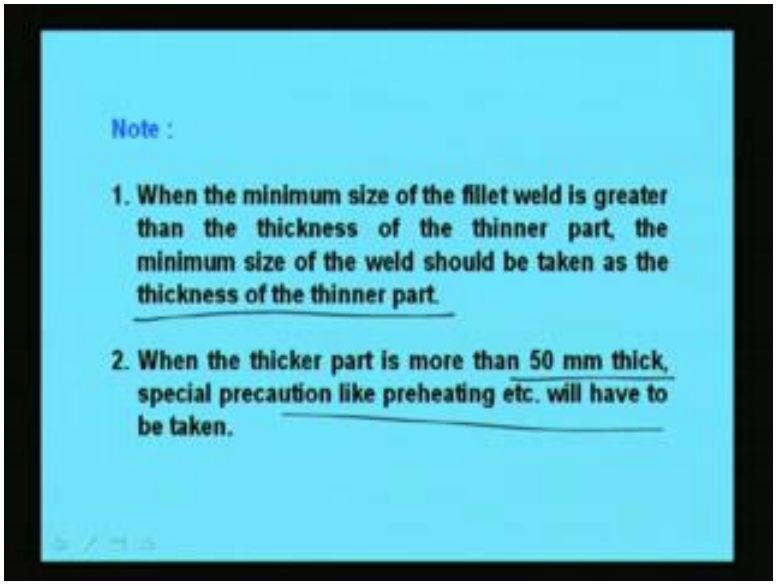

Now, another parameter which is important in case of welding design is called effective throat thickness. Basically the effective throat thickness of a fillet weld is the perpendicular distance from the root to the hypotenuse joining the 2 ends of the legs while reinforcement is neglected. What is this? That means if our weld is something like this then the perpendicular distance from the root this is the root and this will be the perpendicular distance from the root. So, this will be the effective throat thickness. So, this can be calculated approximately.

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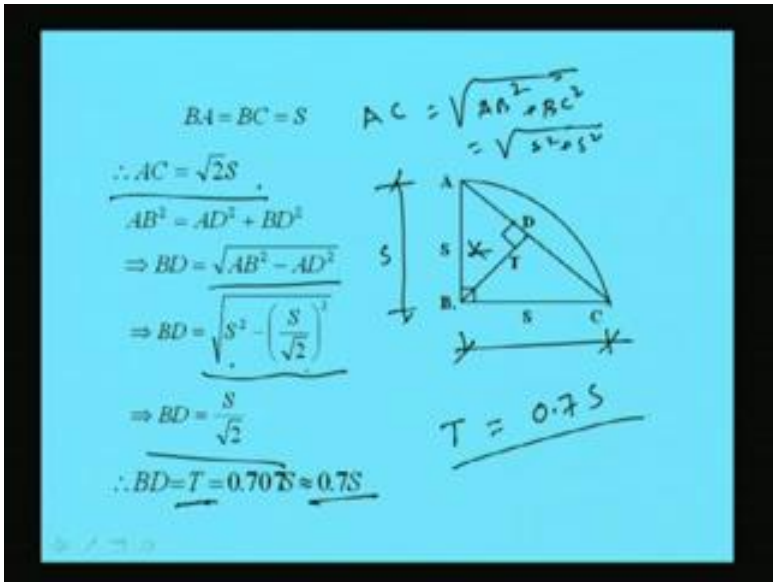

How? So, let us see in case of effective throat thickness if we see that if this is the size of welds if we call then this is also size of weld. So, AB and BC will be equal which is size of weld, so we can find out the length of AC.AC will nothing but square root of AB square plus BC square that means A square plus S square. So, AC will become finally, root over 2 into S right. Now, again as this is a right angle. So, we can find out the throat thickness T this distance basically BD is called throat thickness. So, BD can be find out. So, AD will be basically half of AC and AB is S.

So, BD can be find out from this triangle ABD, so we can write AB square equal to AD square plus BD square. So, BD this distance will be basically root over AB square minus AD square. So, BD will be root over A square minus S by root 2 whole square, because now, AD will be becoming S by root 2, because AC is root 2 S. So, AD will be AC by 2; that means, S by root 2. So, BD will become finally, S by root 2 after calculating this. S

by root 2 means basically 0.707 S. So, BD which is called throat thickness T is coming 0.7 S approximately. So, throat thickness of the fillet weld can we defined as 0.7 S where S is the size of weld. So, in this way we can calculate.

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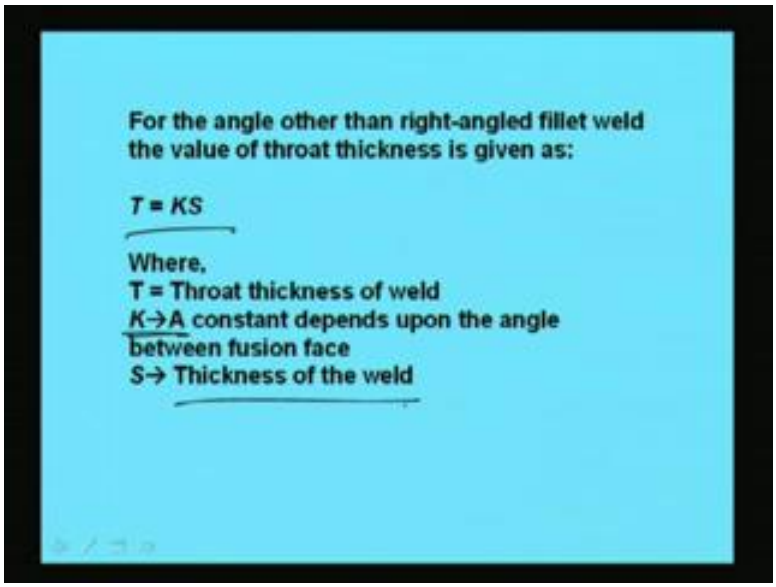

However, always it may not be rectangle for that the code has provided some guidance. For the angle other than right angle fillet weld the value of throat thickness is given as T is equal to KS where T is thickness of the weld and S is the thickness of the sorry T is throat thickness of the weld and S is the a size of the weld and K will be a constant depends upon the angel between fusion face. So, this K basically it may not be right angle which we have shown here always it may not be right angle. So, if this angle differs how the throat thickness is going to vary that has been described by the code.

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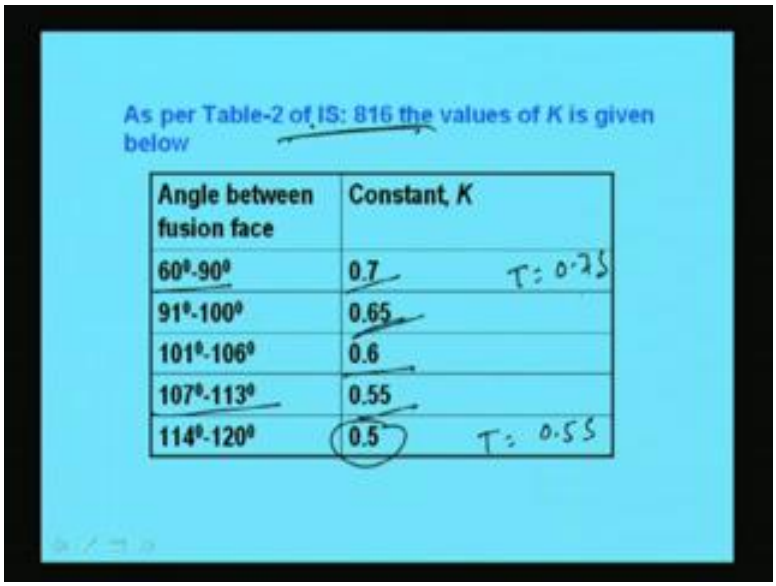

So, if the angle between the fusion face becomes 60 to 90 degree in between then this constant will be 0.7 S. So, T can be written as 0.7 S in this case, but if the angel become more than 90 degree say from 91 to 100 degree this constant K is becoming 0.65. This is given in the table 2 of IS 816 in this code it is given. If the angle becomes 101 to106 degrees then this constant will become 0.6 and if the angle of fusion means angle between fusion face becomes in between 107 degree to113 degree then it will be 0.55 and 114 to 120 degree the constant will become 0.5; that means T will become in this case 0.5 S. That means the throat thickness of the weld can be find out from either from this table or if it is not given then assuming the throat thickness to be 90 degree we can make that T is equal to 0.7 S the way we have calculated.

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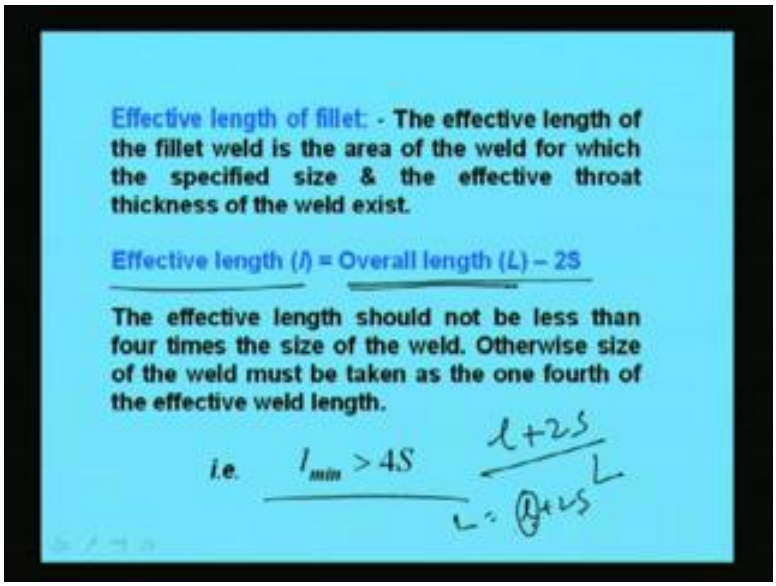

Now, another important parameter is effective length. The effective length of the fillet weld is the area of the weld for which the specify size and the effective throat thickness of the weld exist that means effective weld basically will be the overall length minus 2 S. So, when we are calculating the length for the design purpose the effective length will be the overall length whatever is given minus 2 S. So, the effective length should not be less than 4 times the size of the weld. This is another condition has been given by the code that minimum length should be greater than 4 S where S is the size of the weld.

If it is not then what we have to do that size of the weld must be taken as the 14th of the effective length that means the size of weld has to be decided in that way. And finally, you have the designer have to remember that overall length will be more than the effective length. So, whatever effective length is coming you have to add plus 2 S to make the total length means the overall length as L, so L will become basically l plus 2 S where S is the size of weld and l is the effective length. So, when we are going to get the effective length we have to increase the overall length as by 2 S.

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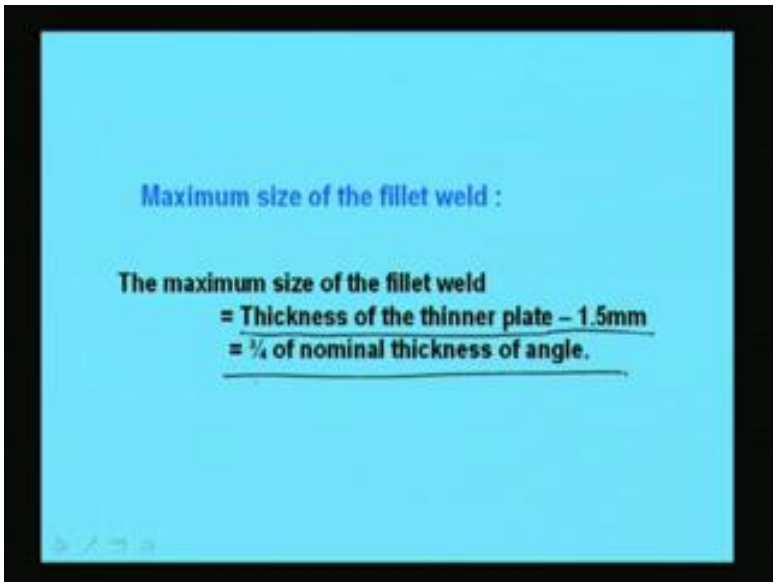

Now, maximum size of fillet weld that has been guided by the code as the maximum size of fillet will be the thickness of the thinner plate minus 1.5 mm this will be the maximum size of the fillet weld. Thickness of the thinner plate minus 1.5 mm and this will be three-forth of nominal thickness of angel. If it is connected by the angle then this will be three-forth of nominal thickness of the angle.

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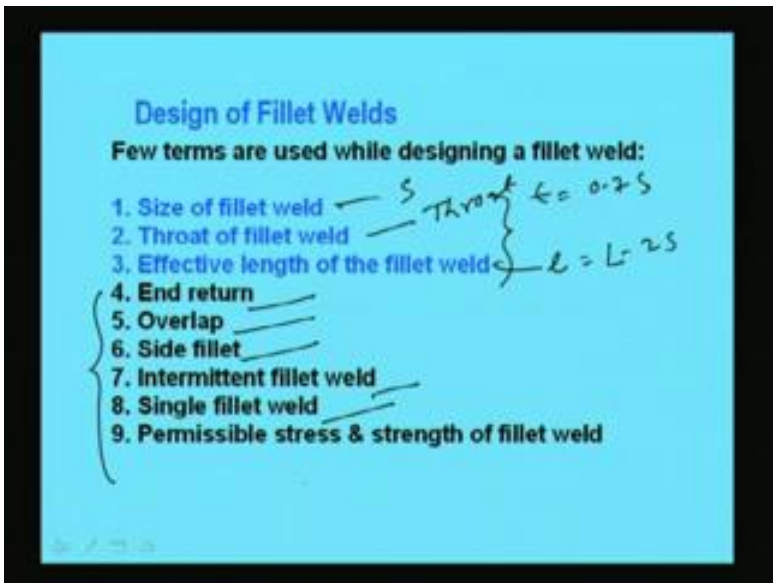

So, now, we will go for discussion about the design of fillet weld, but before that we have to know few terms which are used for designing the fillet weld out of this first 3we

have already been discussed. The size of fillet weld which is termed as S how to find out and the throat of fillet weld the throat thickness throat thickness means T. And effective length of the fillet weld effective length of the fillet weld where l is equal to basically L minus 2 S and this T will be equal to 0.7 S in generally we use to make. Now, other terms we have to know while designing the 2 means while designing the members by using the fillet welds. One is called end return this term we have to know another is overlap side fillet, intermittent fillet weld, single fillet weld and another is permissible stress and strength of fillet weld. Those things we have to know in details otherwise we will not be able to design the fillet weld properly.

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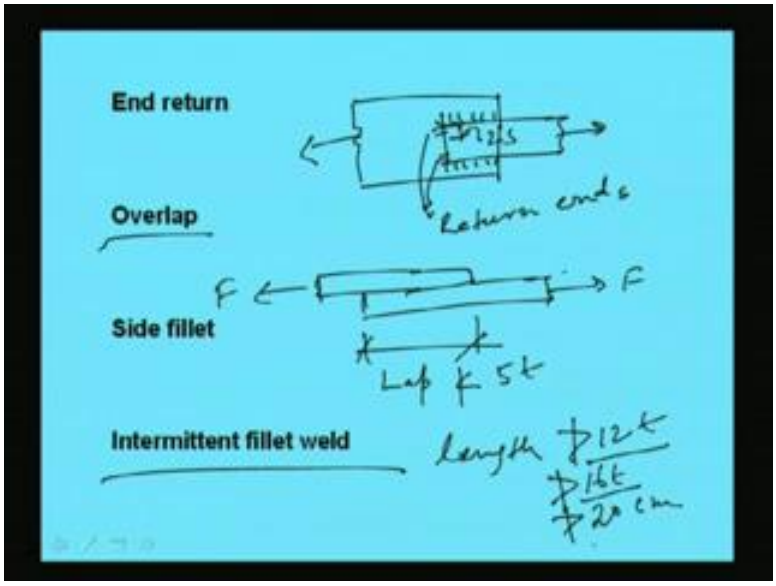

So, the terms we have to know now one is end return. In case of end return let us see how means what is the end return if one plate is joint with another one now, welding has been done here and up to this portion is called return ends. That means the fillet weld terminating at the end or side of a member should be returned around the corner whenever practicable. For a distance not less than twice the weld size this also we have to remember that it should not be not less than twice the weld size that means these distance will be at least2 S it should be more than 2 S. Another term which we use to make is called overlap. Overlap means the when 2 plates are joint by some overlapping say like this.

Force is acting in this then this is called lap this should not be less than 5 t. This is called overlap this should not be less than 5 t where t is the thickness of thinner plate. And next is intermittent fillet weld intermittent fillet weld that is sorry. Next is intermittent fillet weld, So, here the length intermittent fillet weld length should not be greater than 12 t when it is under compression and this should not be less than sorry it should not be greater than 16 t for tension and in any case should not be greater than 20 centimeter. So, intermittent fillet weld length should not be greater than 12 t for compression and should not be greater than 16 t for tension and should not be greater than 20 centimeter in any case and where t is the thickness of thinner plate.

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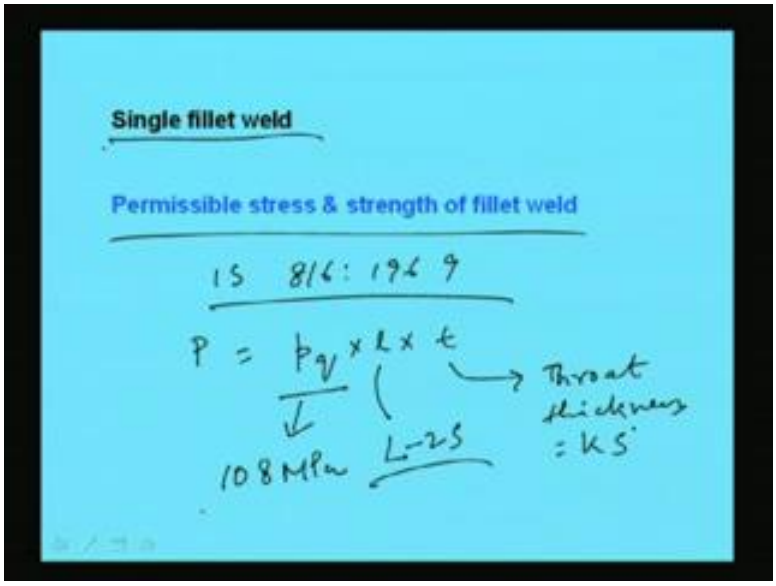

Now, another term which we use generally is called single fillet weld. A single line of fillet weld when it is used sorry another term sometimes we use is called single fillet weld. It should not be used while subjected to bending that means once again I am repeating. Another parameter sorry another term which we use is called single fillet weld basically single fillet weld should not be used while subjected to bending. So, this we have to remember when the members are subjected to bending then we cannot use this single fillet weld, because is it cannot take care. Another important parameter which we have to know is that permissible stress and the strength of fillet weld.

For as for IS 8161969 the strength of the weld can be calculated as p is equal to pq into l into t where t is throat thickness. This t is called throat thickness and that can we

calculated as K into S; where K is the constant which depends upon the angle and S is the size of weld. So, from this we can find out the throat thickness. Another is l; l is the effective length of the weld; that means, basically the overall length minus 2 Sand pq is the permissible stress taken in general 108 MPa. For welding cases the permissible stress of the weld has been taken as 108 MPa. So, p will be the strength of fillet weld will be basically pq into l into t.

So, from this formula we can find out the strength of the weld and accordingly we can design the joint. So, in today's lecture we have emphasized on welding connection. In welding connection again we have discussed the different aspects of advantages and disadvantages of welding. Now, as per the requirement of the designers we have to choose the process of welding means what type of welding we are going to do and different type of welding process has been discussed. And the different drawing representation for different cases of welding has been shown from which one has to know the meaning of drawing what the drawing is saying and accordingly what we have to make in case of construction.

So, those things from the drawing we have to understand and the how to design a fillet weld that also we have discuss today. The basically how to find out the strength of the fillet weld that we have discussed which is basically given by the formula that p is equal to pq into l into t where pq is the permissible stress and l is the effective length and t is the throat thickness. And what is effective length? What is the throat thickness? What is the size of weld? What are other parameters require? So, all the details we have discussed basically we are emphasized on fillet weld. So, next class we will design a connection using fillet weld and how the strength can be calculated in a connection that we will discuss in next class.

Thank you.