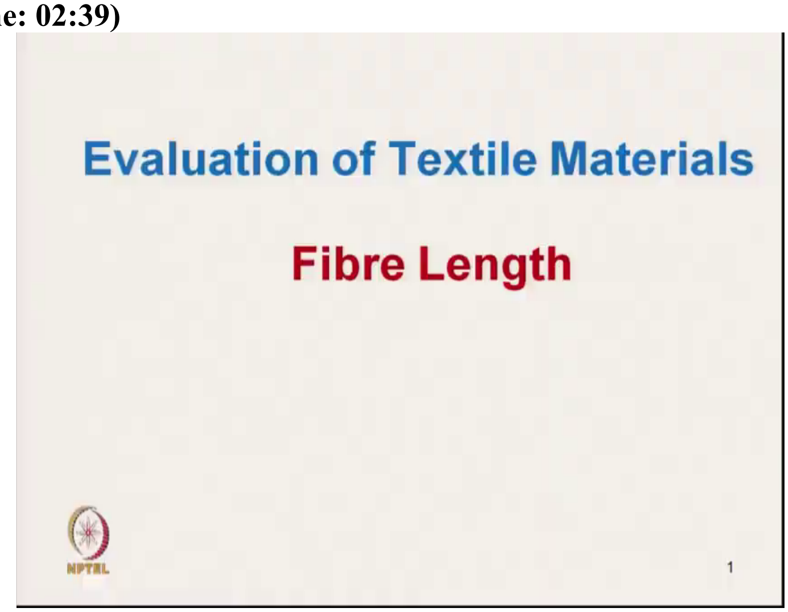
Evaluation of Textile Materials
Prof. Apurba Das
Department of Textile Technology
Indian Institute of Technology-Delhi

Lecture – 09
Evaluation of Fibre Length

Hello everyone we will continue with the course evaluation of textile material. In last week what we have discussed is that the population sample and how to draw the sample we have discussed and also we have seen that different types of material. All materials in the different form, is to be sampled in different way. Also we have discussed about practical statistics like how to do significant testing. What are the implications of this significance testing in taking decisions?

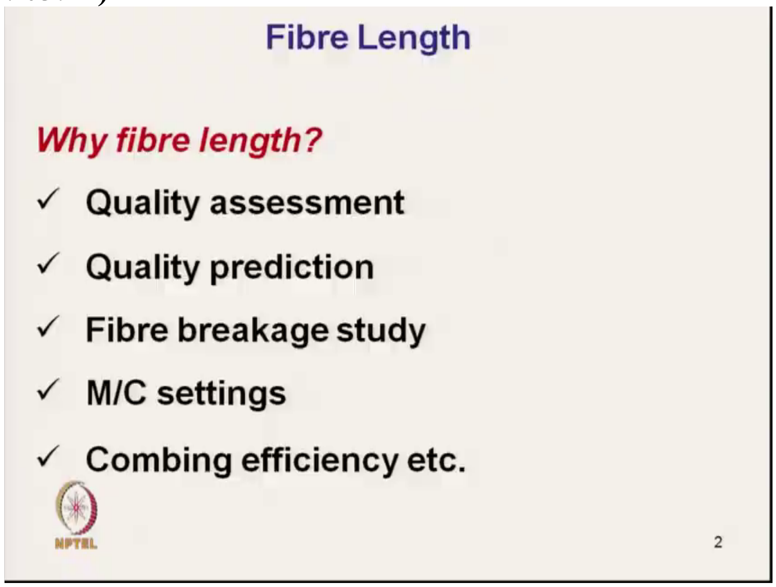
Now today we are going to start the actual evolution of textile material what we will discuss we are actually; it has been divided into three distinct categories because textile materials are mainly in three forms. First it is a loose fibre form, second continuous yarn form, third fabric form so what are all the planning is that we will try to fast finish the characteristics of fibre. Then we will discuss yarn and finally we will discuss the characteristics of fabrics.

(Refer Slide Time: 02:39)



So, today we will start the evaluation of one of the most important characteristics of fibre which is length. Length of fibre particularly the manmade fibre it is not that important. For natural fibre except say silk for rest other fibres are basically discontinuous in nature. So, we must try to see how to measure the fibre length and majority of the fibres textile fibres for apparel use or natural fibre we are talking about is cotton and wool. So our focus will be here to measure the length of cotton and wool.

(Refer Slide Time: 03:44)



So, first let us see why to measure the fibre length? First is that quality assessment, so quality of the fibre is dependent on various parameters for example fibre length, how long the fibrous, its diameter, its strength. So, length is one of the parameter which is important to be measured ok. So, for quality assessment of any fibre so we have to first measure the length particularly staple fibre then quality prediction, so quality prediction here that means quality of final product. So quality prediction here the final product is either in the form of yarn or in the form of fabric.

So, longer fibre will have higher contact area so we can have greater yarn strength. So, to have higher yarn strength we need longer fibre. So, our idea used to measure their fibre length how long the fibre is and if the length is less than the prescribed length we may straight away reject that fibre ok. And also long fibre will have better possibility in spinning. Fibres with short higher quantity of short fibre proportional of short fibre creates problem.

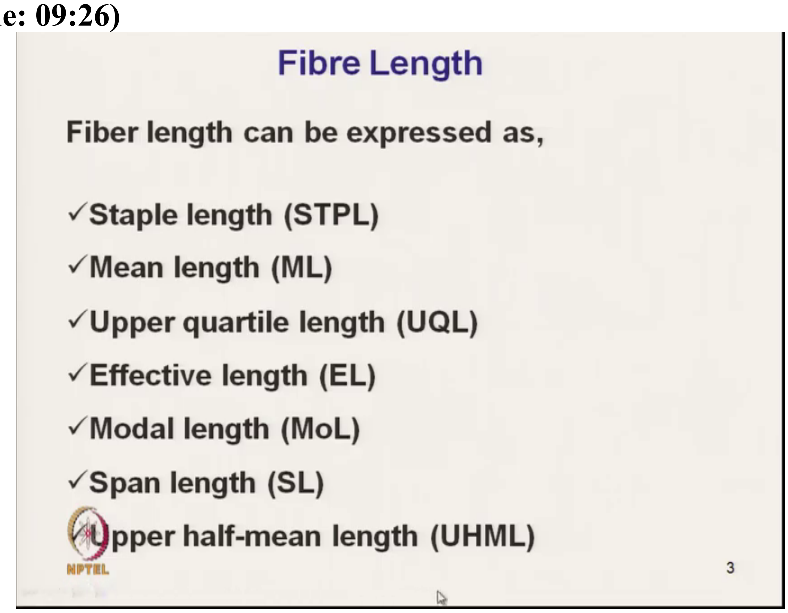
There are various characteristics which are directly related with the fibre length these are strength, evenness and even for longer fibre we can play with the amount of twist. So if we use longer fibre we can have lower twist, lower the twist the appearance of the yarn and fabric will be much better. So, it will enhance the texture of the fabrics. So, directly we can predict from the length value what will be the ultimate quality and characteristics of the final product.

Next important is that fibre breakage study, so may like to know that the weather particular machine like blow room carding or any other mission combing or any other machine. Due to the setting problematic setting fibre may get damaged. So fibre main break so to study the breakage of fibre what we have to do first we have to measure the length. So, we measure the length before processing and also after processing and if we compare whether there is any significant change in length, significant reduction in length if at all there is significant reduction in length.

We can actually reprocess the material and also we can do proper checking of the system. So, by measuring the fibre length we can predict the performance of the particular process. Also machine setting depends on the fibre length. So, depending on the fibre length longer fibre will need longer setting. So, for a machine setting fibre length data is extremely important. Next is that combing efficiency, so in counting what our idea?

Our idea is to remove the short fibre, so that how much short fibre is being removed during combing, that is the combing efficiency that we can predict by measuring the fibre length. And also we can see and check weather in long fibre loss is there or not. So, combing main objective is to remove the short fibre less than prescribed specified length if the combing setting performance is not up to the mark then it may remove the long fibre also. So, by checking or by measuring the fibre length or fibre length distribution we can tell that whether the combing is doing his performance perfectly or not ok.

(Refer Slide Time: 09:26)

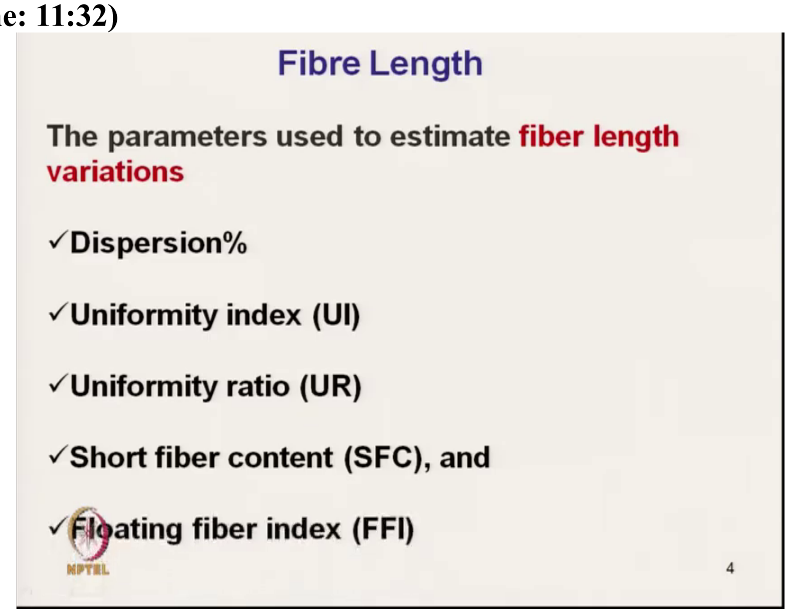


Fibre length; now let us see fibre length characteristics length of fibre how can be expressed what are the different ways to express the fibre length one by one we will discuss in detail. So, the fibre length can be expressed first staple length ok. Staple length we will discuss in detail it is a overall idea about the length ok, this is the staple length. Next is that mean length main length fibre length we can express in terms of mean length. Next is upper quartile length UQL upper quarter length.

Fourth one is by effective length; we can express the fibre length in terms of effective length, model length, span length. Span length there are different span length. So, more commonly used span length or 50% span length 2.5 % span length. Next is upper half-mean length and all these parameters they are important but different measuring technique give different measure of parameters ok. So, these are the upper half-mean length span length these two parameters is given by the fibrogram.

And effective length we can measure by comb shorter diagram, upper quartile length, effective length, mean length we can measure comb shorter diagram. So, different diagrams they give different parameters.

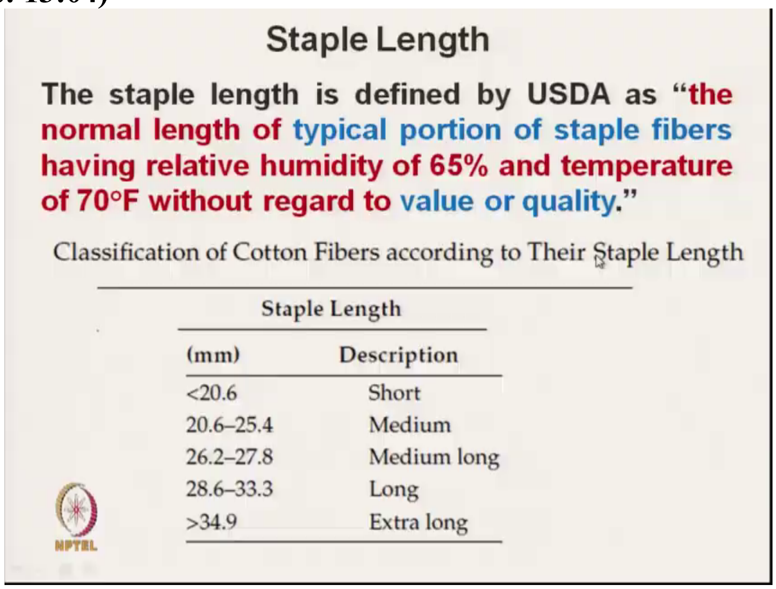
(Refer Slide Time: 11:32)



Next is that after measuring the fibre length we would like to know the variability of the fibre length. So, most of the almost all the natural fibres they are not uniform in length. So, for a fibre which is say mean length is longer but if the variation is very high then they fibre will be reject table. So that performance of the fibre is actually judged by not only by the mean length or span length it is also is judged by the variation in length. So, fibre it is very important to know the variation, variation and length of the fibre.

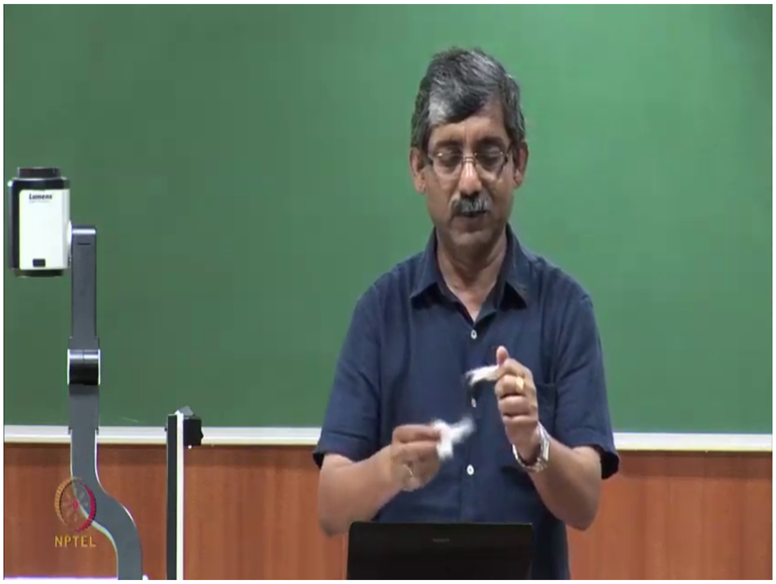
So, variation in the length is expressed by first is the dispersion percent, the dispersion percent we can get from the shorter diagram. Uniformity index is another way of expression of fibre length variation. Then uniformity ratio, uniformity index and uniformity ratio we get from fibrogram these details we will discuss. Short fibre content, we can get from this one different of curves and the floating fibre index. So these are the ways from which we can express the fibre length distribution fibre length variation ok.

(Refer Slide Time: 13:04)



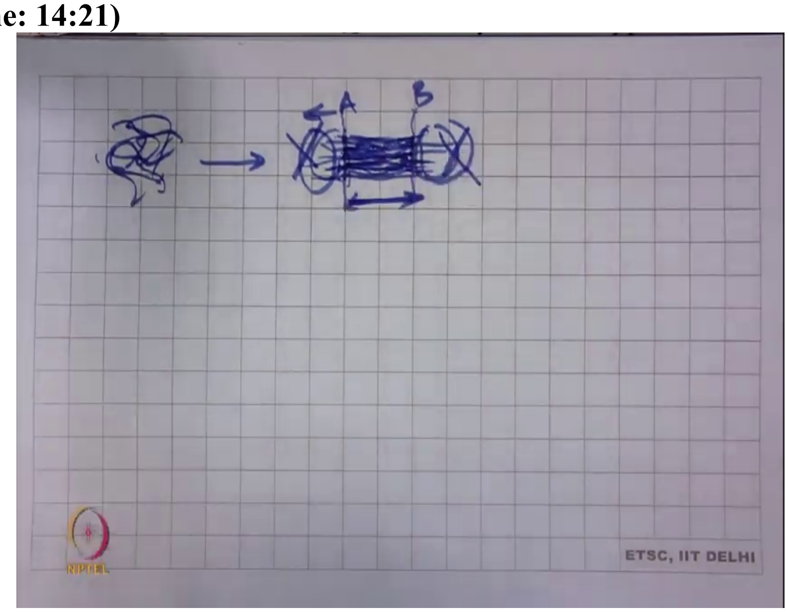
One by one we will try to understand the terms so staple length is actually Defined by us department of agriculture USDA is there standard definition but they are made is the it is a normal length of typical portion of staple fibres having relative humidity of 65% and temperature of 70 degree Fahrenheit without regard to value or quality. So this is the standard definition, now what does it mean, it means that it is a typical length we cannot get exact value it is a typical value.

(Refer Slide Time: 13:54)



So, typically it is here we get like this in the form one so you take one 1 top and draw and double, draw and double we would like to make fibres parallel so most of the most of the fibres we are making parallel buy drawing and doubling. So in this way so it will be typically like of inch thick ok this is the top now let me draw and So you.

(Refer Slide Time: 14:21)



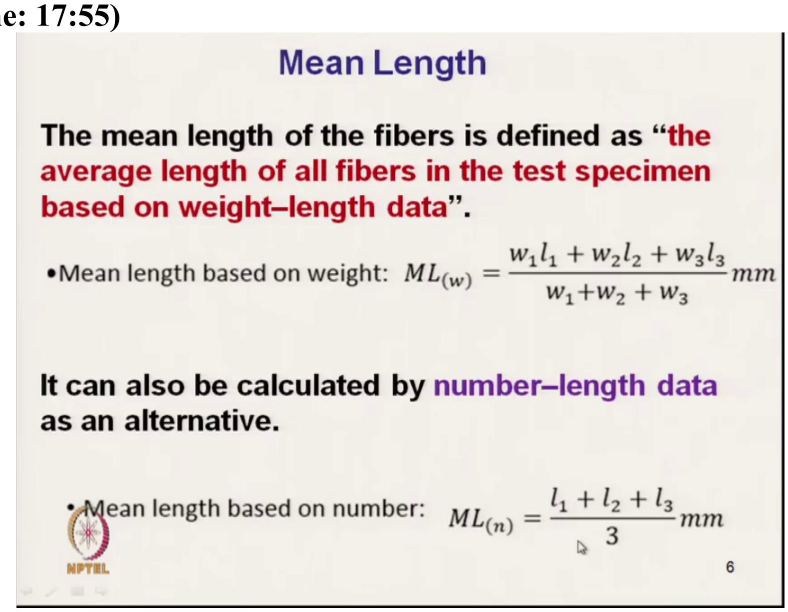
The typical length is that, so this are the fibres ok now this fibre we have actually doubled repeatedly like what we are doing drafting and doubling drafting and doubling in this way what we will get fibre strength like this. So, here what we will do we are not bothered about the long fibres these fibres we are not bothered about the projected fibres or not important for us. Here we will try to do try to take one point there clear change in density. These are the higher density portion where more majority of the fibres are there ok suddenly there is a change. So by actually experiencing we will get length.

This is the length where the either side at this point; so this is the point, this is point A and point B, so between point A and B majority of the fibres are there majority of the fibres are there suddenly after A if you go beyond A, left side of a here we will see sudden change in density is there. There is a clear line is there. Similarly in case of B ok up to B there is density is there more majority of fibres are there. Beyond B there is sudden change in density few fibres.

Discarding this fibres, so this length AB length, this is the actually Staple length. Here staple length we actually cannot use for any quality purpose this is used basically for only comparative; quick evaluation of fibre length that is why it is written that without regard to value and quality. So, we would like to know, what is the overall length of the majority of the fibre? So, as per USDA classification of cotton fibre according to the staple length, so staple length is just by the experienced person ok.

And if different person does, if I give fibre bundle fibre bulk ok to different person, so they will land up with different result. So it is a subjective in nature only experience person can do this. And as per the USDA norms less than 20.6 millimetres it is a short fibre, 20. to 25.4 is medium length fibre, and like that so above 34.9 millimetre is the extra long fibre. So this is the actual classification of the staple length as per the USDA.

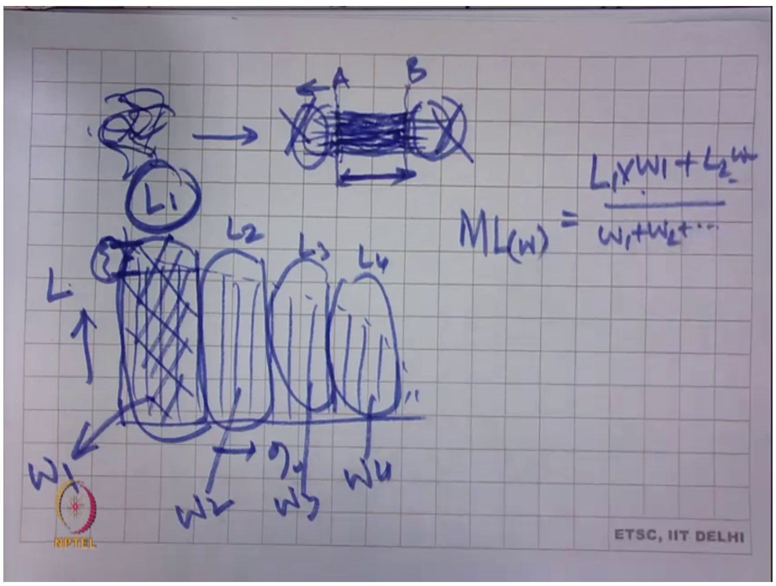
(Refer Slide Time: 17:55)



Next is the mean length; mean length of the fibre is defined as the average length of all fibres in the test specimen based on weight length data. So it can be weight length data or it can be number linked data. Based on the weigh, so based on the mass of the fibre for a particular length group we can get the mean length which is called the weight length data. Mean length is based on weight ML w is the w1 l1 w2l2 w3l3 like that. So, here is the example is that the fibres are divided into 3 length group.

L1, l2, l3, so, l1 length group, so the mass is w1, l2 length group the mass is w2, l3 length group the mass is w3. So the mean length based on the mass, weight so that is divided by w1 w2 w3. Now let us try to see here.

(Refer Slide Time: 19:20)

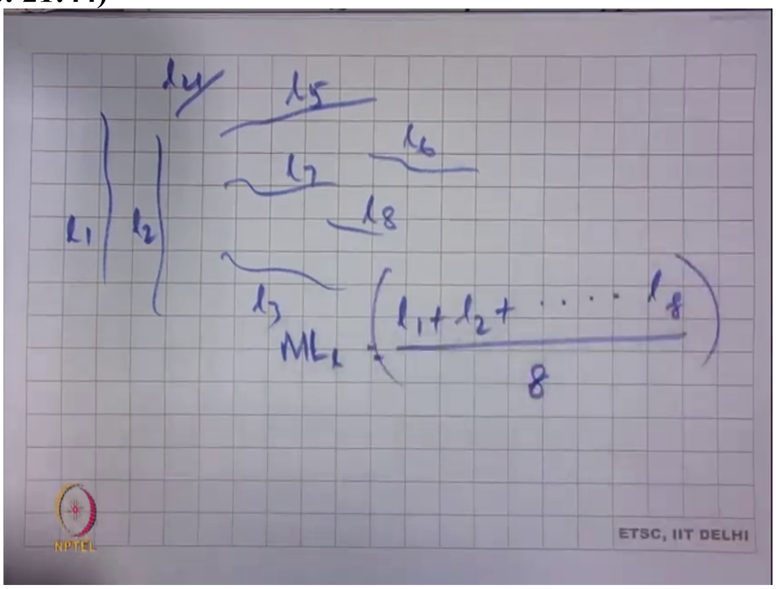


Suppose this is the fibre length distribution, here what we are doing these are the fibres, so cotton fibres are there the amenable fibres. And these fibres, this is the length and this is the proportion of fibre ok. Now this you can have these fibres are linked groups l1 all this fibres. So here we are divided into four length groups. This is a l2, this means l1 means this is upper limit this one is lower limit And this is the mean point, This is the range ok class limit and l1 is the mid value of the class.

This is l1 group, this is l2 and similarly this is say l3 linked group l3, this is the length group l4. And then what we will do we will take these fibres and measure the mass of the fibres in a particular micro valance this is w1, here the mass is w2, hear the mass is w3, w4 like this. So that the mean length based on the mass will be l1 * w 1 + l2 * w2 like this divided by w1+ w2 +, this is the way we can measure the mean length based on mass.

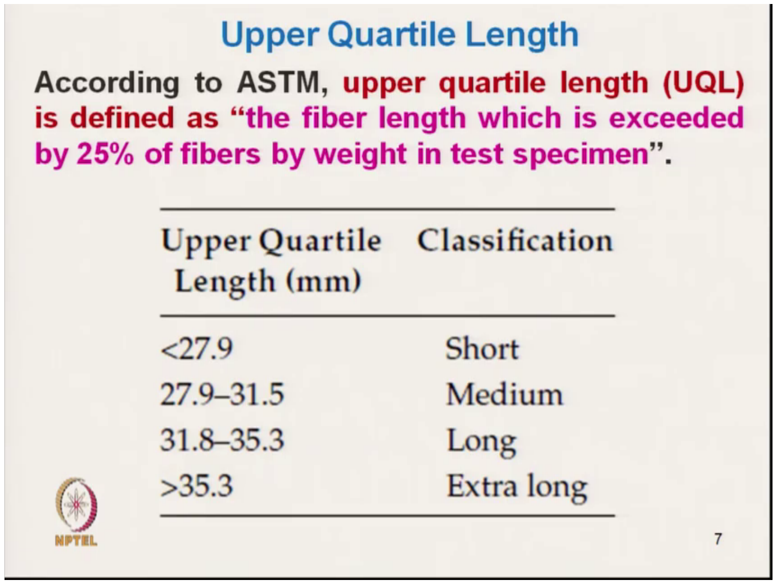
It also can be calculated by number length data as an alternative based on the number in that case it is called the number length data. So, the number length data is simple. So, mean length based on number is ML n l1+ l2 + l3 so on and l is that number.

(Refer Slide Time: 21:44)



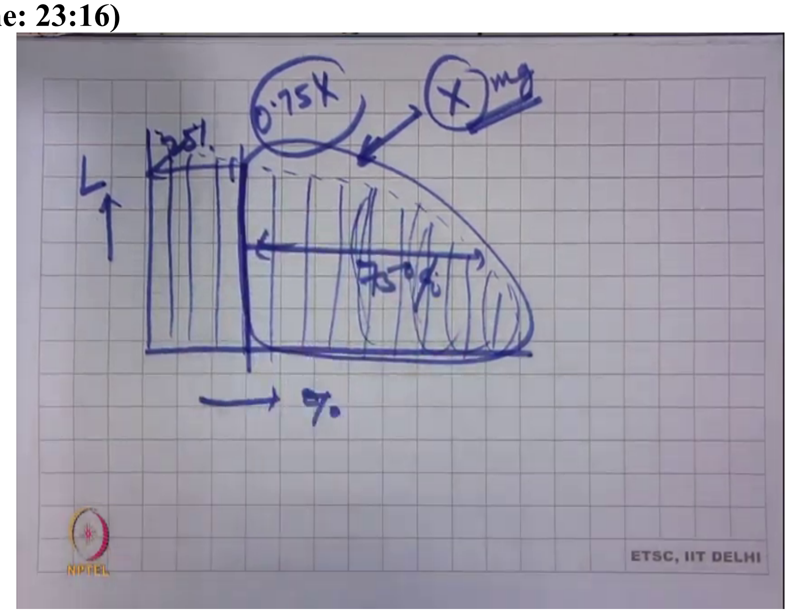
Let us see once again suppose we have fibres these are the fibres what we do this is l1, l2, l3, l4, l5, l6, l7, l8, these are the l8 fibres. So, you want to know the mean length this very simple just add and then divide by the number of fibres. So, this is 11+ 12+ 13+ 14+ 15+ 16+ 17+ l8 divided by 8 so this is the mean length divided by standard length. So we must clearly understand the difference between the mass based length and number based length. So, these terms are widely used in industries both in Cotton Industry particularly in woollen industry. The mass based data and number based data.

(Refer Slide Time: 22:47)



Next is term is that upper quartile length as per ASTM upper quartile length defined as the fibre length which is exceeded by 25% of fibres by weight in the test specimen that is the upper quartile length. Now again let us discuss the upper quartile length.

(Refer Slide Time: 23:16)

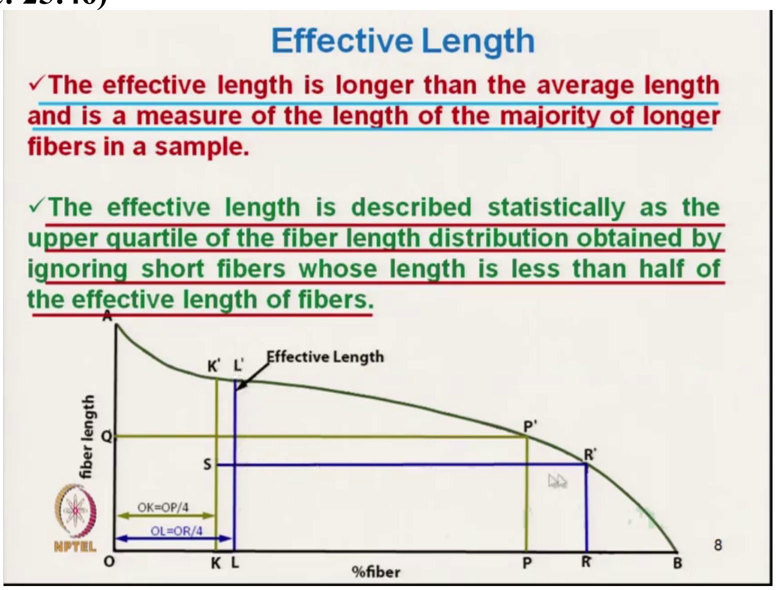


This is mass again this is the fibre length distribution length and this is the proportion of fibre ok. Now this mass has got ok X mass, if you take the total fibre, the mass of the total fibre is say X milligram. Now, then we will keep on making the starting from right side we will keep on going this way. So, what is that it is the top 20%, 25% ok so that is why till it has become 75% at this point this is the weight of; that is 0.75X mass. So from that there this point, this is the 25% weight, 25% weight mass; if we talk about the mass total mass is 75%.

So, this length is called upper quartile length so that as per definition the upper quartile length is defined as the fibre length which exceeded by 25% of fibres by weight so that is that particular length ok is exceeded, so that 25% fibres will be more than that length ok that is called upper quartile length and based on that the it is been classified again. The upper quartile length we can see less than 27.9 it is a short fibre, 27.9 to 31.5 medium fibres then this is this classification as per ASTM classification.

But this may not be true for all fibres some short staple fibres we cannot use this kind of characteristics of classification because the short staple fibres 27.9 millimetres maybe the longest fibre So in that way this is for the particular type of fibre.

(Refer Slide Time: 25:46)



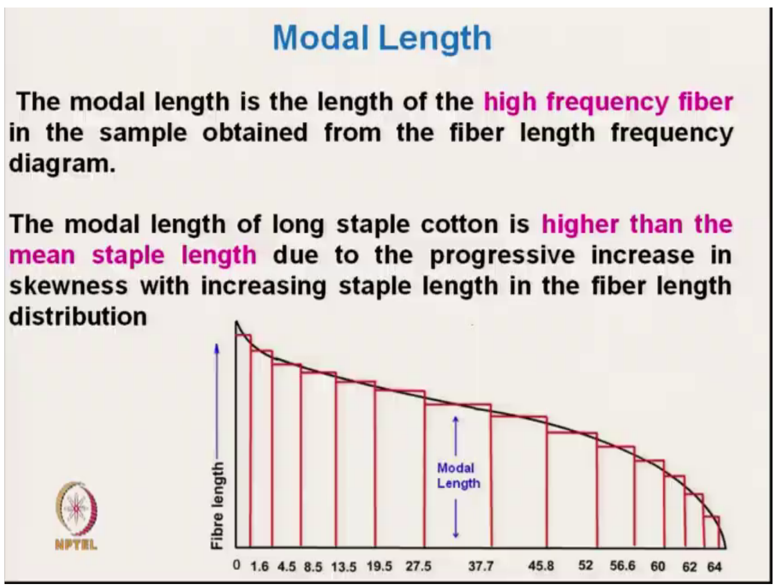
Next is the effective length, So, the effective length is the longer than the average length it is the longer than the average length and it is the measure of the length the majority of long fibre in the sample. So here in this picture this is the shorter diagram, in this shorter diagram we will discuss the detail of the shorter diagram let us try to understand the effective length here LL dash is the length ok. LL dash is the length which is called effective length.

Here it is longer than the mean length which is somewhere here the mean length will be somewhere here, so effectively it is longer than the average length of the fibre and it is the measure of the length of the majority of the long fibre here. So, the majority of the long fibre it is the effective length. The effective length is described statistical by the upper quartile of the fibre length distribution obtained by ignoring the short fibre. Now this is you have to understand here.

So, this is the length statistically by the upper quartile of the length distribution this is the length distribution obtained by the; by ignoring short fibres whose length is less than 1/2 of the effective length. Now suppose this is the effective length this is the midpoint about the effective length is this one suppose if we remove this length this RB, RRB portion if we remove. That is the remaining fibre is this one OR, so OR if we divide into 4 equal terms then this OL is the upper quartile length.

So, quartile so you divide OL in another 1/4th so that up to OR, so OR is dividing into 4 terms the top 1/4th that L1 and L2 it is called the upper quartile of the fibre length distribution this is effective length. So in detail we will discuss and this effective length is mainly used for roller setting ok. It is basically supposed longer higher portion of the fibre length.

(Refer Slide Time: 28:29)

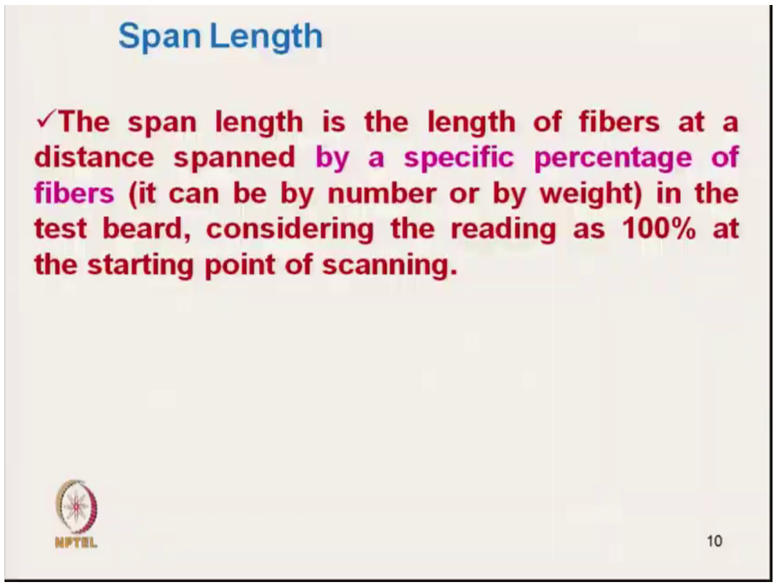


Next comes the model length; model length is the length of the fibre with higher frequency that means the majority of the fibre length or in that zone so if we take the distribution here so suppose this fibre particularly at this length the frequency this is the frequency, this is the proportion of the fibre. Next is that this is the profession ok and like that the proportion is actually given here ok at the horizontal line. Now we have to see here which portion has got the width of the rectangle is the highest.

So, here this rectangle of this portion the width is highest, so that length, the height of that length that rectangle will be termed as the model length which means the majority of the higher frequency of the fibre length is in that range ok. Model length of the long staple cotton is higher than the mean length so it will get shifted to the higher direction due to the progressive increase in the skewness with the increasing staple length of the fibre. So it will be skewed towards the higher length because of the; if you are talking about the long staple cotton.

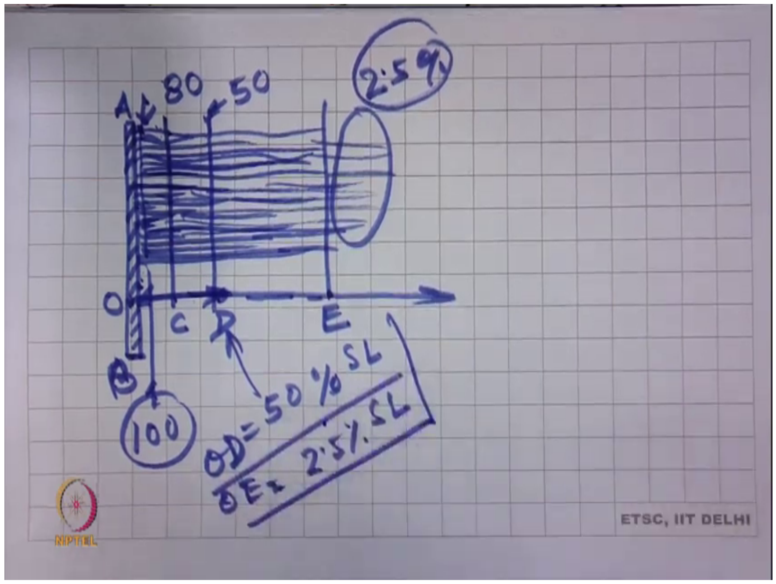
The long staple cotton the majority of the long fibre will be longer side ok. So that majority of the fibres so that is why the model length is higher. So from model length we can get the overall idea rough idea about the length distribution.

(Refer Slide Time: 30:20)



Next come the term span length; the span length is the length of the fibre at a distant spanned by a specific percent of fibre or it can be by mass ok number or by mass in the test beard considering the remaining sorry considering the reading 100% at the starting point of the scanning. Now let us try to understand here.

(Refer Slide Time: 30:58)



Suppose we have fibre clamp this is the clamp ok. And this is typically used in fibrogram fibre sampler. Now this clamp is clamping the fibre and this is the type of wire, type of distribution. So all the fibres they are starting from the; this point clamping point ok. Now we like to scan the fibre from this point, this is the starting point close to the this clamp ok point A, this is the point A, At this point at the end point here the number of fibres say 100.

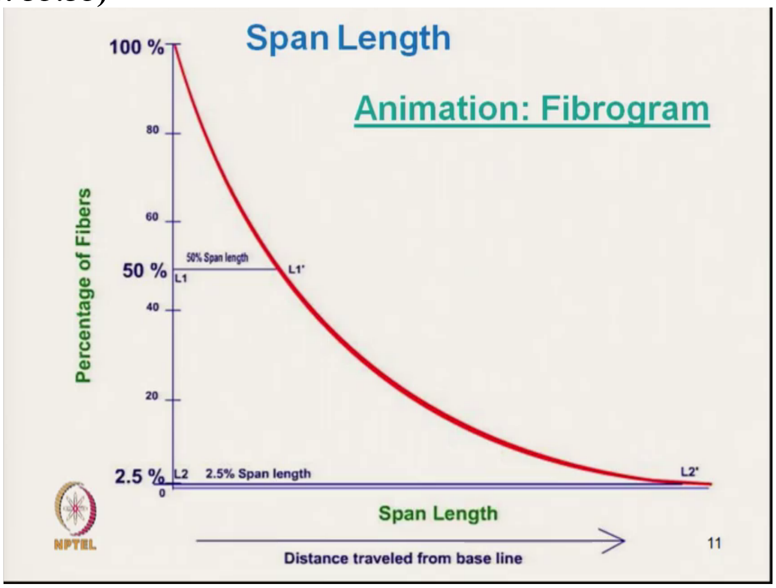
At this point number of fibres say 100, let us say now we try to count the number, number of fibres here, at this point is 100 then we are we try to move from this point AB, this line AB move this way, away from the clamp. Suppose at this point, say at point C, again we are trying to count the number of fibres here we count 100, suppose at this point suppose we are counting fibre as say 80, so this is O at this starting point , at C point at 80.

After again moving further, suppose at this point D we count the number here this number suppose hear 50, initially there was 100 fibres now it is 50. Now this distance OD is known as 50% span length. This is the distance OD is the 50% span length that is 50% of the total fibre are longer than this length. That is why 50% span length OD is the 50% span length. Now again go further we have reached suppose a point there is a E point.

So, at distance OE, so at the point E, we found that only 2.5% of fibres are there. 2.5% of fibres are there so here this distance OE is called 2.5% span length. So, that is why this is the distance one should be careful here higher percent means lower in span length. So, 50% span length means it is lower in value, then 2.5% span length ok. So that the distribution of the fibre length it gives idea about the total distribution of the fibre length.

And so the span length is the length of the fibre, fibres at a distance spanned by the specific percent of fibres it can be by number or it can be my weight. By weight we can also do ok in the test beard considering the reading as 100% at the starting point of the scanning ok. So, it is the most common span length or commercially used are the 2.5% span length and 50% span length.

(Refer Slide Time: 35:35)



As we have already discussed we have seen this is the type of curve we get ok this is the fibre curve ok. We will try to see this is the fibre curve fibrogram how to form.

(Video Start: 35:52)

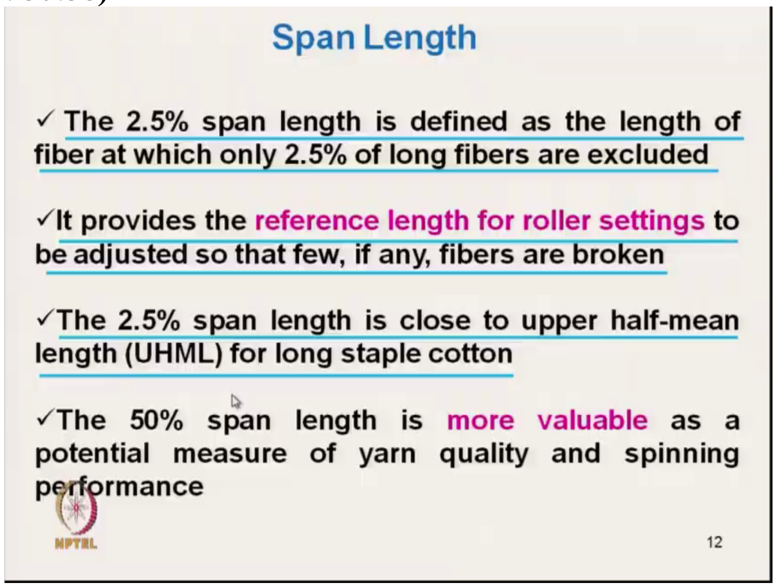
Initially we have 100% fibre length here, now we are started scanning normally it is optically scanned density are the number of fibres. So, as it is moving here at this point here it is 50% of the fibre this is called 50% span length. So, it is moving further ok and so number of fibre so as it is moving further number percent of fibre reducing gradually. So, the length from the starting point clamping point is actually increasing so number of fibre is reducing 20% then 10%, 5% almost 5% and it is also reducing gradually it is reducing to 3% and almost it has reached to say 2.5%.

And that is why this is the 2.5% point here we have reached and after that it is going and then ultimately it will be zero. So this length is 2.5% fibre, if there are 1000 fibres so that range 25 fibres will be there more than that length that is why it is called 2.5% length ok. In this way we can measure the span length.

(Video End: 37:31)

And based on this fibrogram do we can do lot of calculation other information we get that we discuss gradually.

(Refer Slide Time: 37:38)



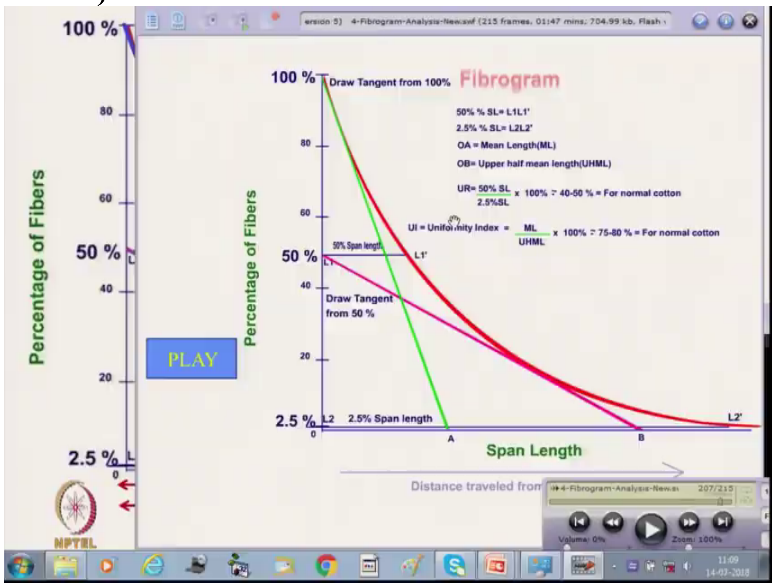
So, 25% span length is defined as the length of fibre at which only 25%, only 2.5% span length, of long fibres are excluded. Rest 97.5% fibres are below that length it provides the reference length for roller setting ok. So we can set the roller 2.5% of fibre length because it is majority of the length. Only 2.5% of fibres are there which are actually longer that may get damaged. So, we may that is the reference point. If you feel we can set the length little bit above the 2.5% length but that is the reference length to be adjusted so that few or if any fibres are broken.

So, our idea is there is to ok; only 2.5% may break if it is there ok. 2.5% span length is close to upper half-mean length it is very close to if you do that upper half-mean length for long staple fibre this is very close. Upper half-mean length we will discuss and the 50% span length is more valuable as a potential measure of yarn quantity and fibre spinning performance. So 50% span length is more valuable as a potential measure of yarn quantity and fibre and spinning performance. So 50% span length is used for no know the overall fibre length ok and spinning performance.

And 2.5% span length is basically used for roller setting, it is a longer fibre. If we know the 2.5% then we cannot say that this fibre is longer it is not that. So, if you want to know the average about the fibre length we have to use only to 50% span length, 2.5% so the majority of the fibres are short ok few fibres long that will give wrong impression ok that is why to know the fibre length characteristics overall length we do not use 2.5% we only use 50% span length ok. 2.5%

span length only use setting of yarn setting of machines drafting molar setting different machine setting so less fibres are broken ok.

(Refer Slide Time: 40:16)



Now what we have discussed that it also give the idea about the 50% span length and 2.5% also gives the idea of mean length and upper half mean length. So from mean length and upper half-mean length we can get the idea of dispersion of fibre characteristics fibre length. Now let us see;

(Video Start: 40:44)

We can see very carefully here this is the fibrogram and how the fibrogram is generated that we have seen ok. So, 50% fibres are there and then it is moving and fibre percent is 20% like that 10% ultimately it will 2.5% this here. 2.5% of fibres are here and then share it has ended that is 0% here. Searching so this is the 2.5% after that what is the; what we have to do we have to draw tangent.

(Video Start: 41:36)

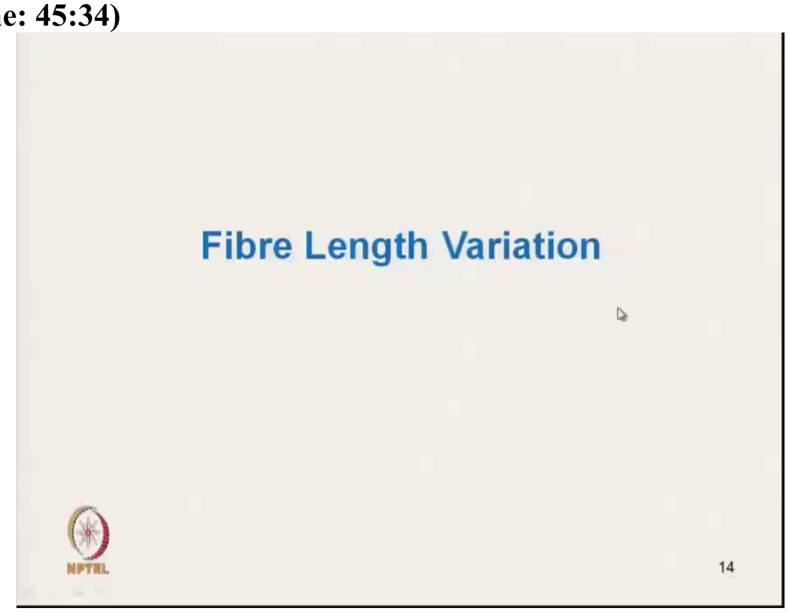
From 100% point of the chord, so once we draw the tangent From the 100% point it will actually intersect with the X axis at a point A, this distance OA is called mean length which is very close to 50% span length ok that is the mean length another tangent we can draw from the 50% point and here this is a point B and this distance OB is called upper half-mean length ok. So, OA is the mean length and this of is the upper half-mean length. And from there we can do some calculation ok. 50% span length is LL dash and 2.5% span length is L2 L2 dash, so L1 L1 dash is a 50% span length.

L2 L2 dash is the 2.5% length and OA is the mean length and OB is the upper half-mean length and if we take the ratio off 50% span length that is the L1 L1 dash this one and 2.5% span length L2 L2 dash this ratio is known as uniformity ratio ok. You can express either in fraction or in percent. So it is normally expressed in percent so this multiplied by 100. Typically for cotton fibre it ranges from 40 to 50% that is the range of the uniformity ratio and the uniformity index this is the;

Uniformity index is the ratio of mean length OA mean length and then upper half mean length so OA and OB this ratio is the ratio; this is the uniformity index and again we can express in the fraction or in terms of percent by multiplying by100. And for normal cotton it is ranging from 75 to 80%. This is there actually people may get confused uniformity ratio and uniformity index. Uniformity index is the ratio of mean length and upper half-mean length.

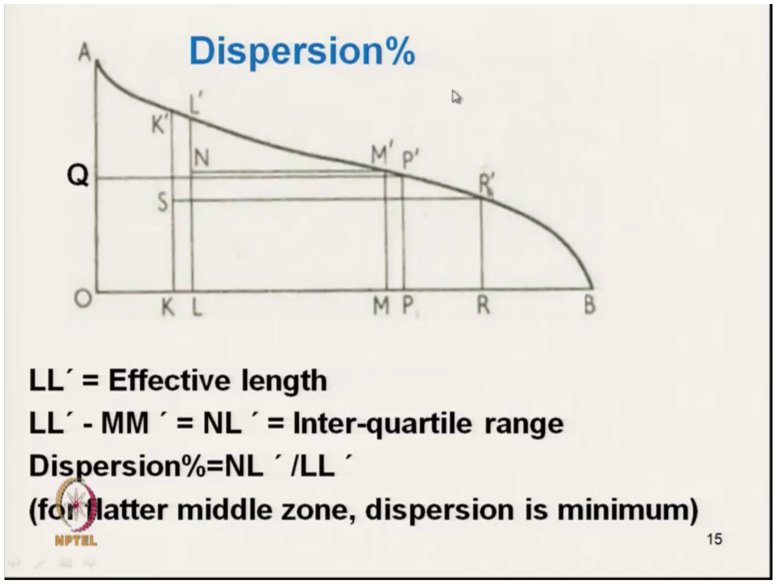
Uniformity ratio is 2.5%, 50% span length by 2.5% and if you see the value this is actually the; basically upper half-mean length, The uniformity ratio is 1.8 times less than the uniformity index typically it is the Cotton. And we can calculate that you will see for most uniform fibre length. That is the fibre length of a cut Polyester fibre so all the fibres are of same length in that case we will see the calculation the uniformity ratio it is typically around 51% and uniformity index is 100% this we will see.

(Refer Slide Time: 45:34)



Now fibre length variation; but this part we have seen here the uniformity ratio and uniformity index. There are other parts the dispersion percent.

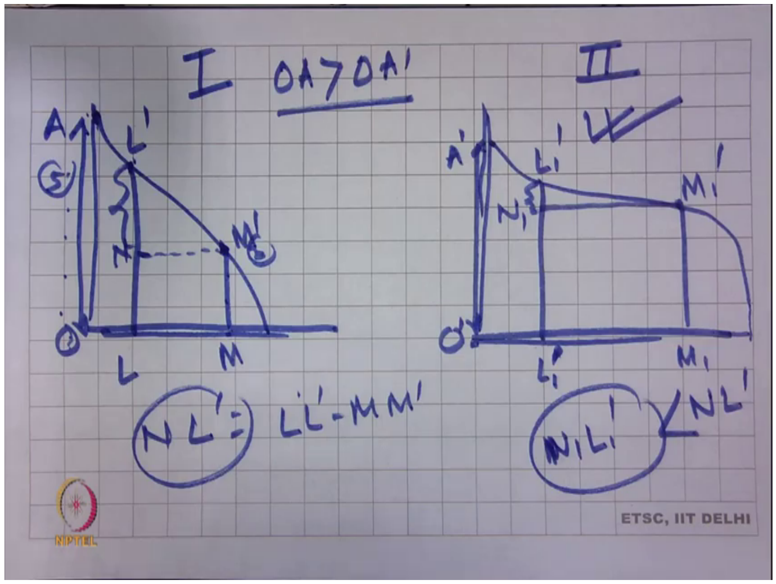
(Refer Slide Time: 45:45)



As I mentioned earlier dispersion percent we calculate from comb shorter diagram we can calculate the dispersion percentage and LL dash is the effective length here, LL dash is effective upper quartile length and NN Dash is there lower quartile length ok. If you divide OR into 4 terms that will be OL the midpoint and that point into and NP this is the output ok that means NR and OL are same. And this is the upper quartile length the LL dash is the upper quartile length which is known as the effective length.

And MM Dash is the lower quartile length and the difference between the upper quartile and lower quartile is known as inter quartile range. So that LL dash - MM dash what does it mean LL dash- MM Dash will be L dash N NL dash which is inter quartile length. That length ok divided by LL dash divided by AL dash it is called dispersion percent ok now let us see how what is the importance of inter quartile range.

(Refer Slide Time: 47:28)

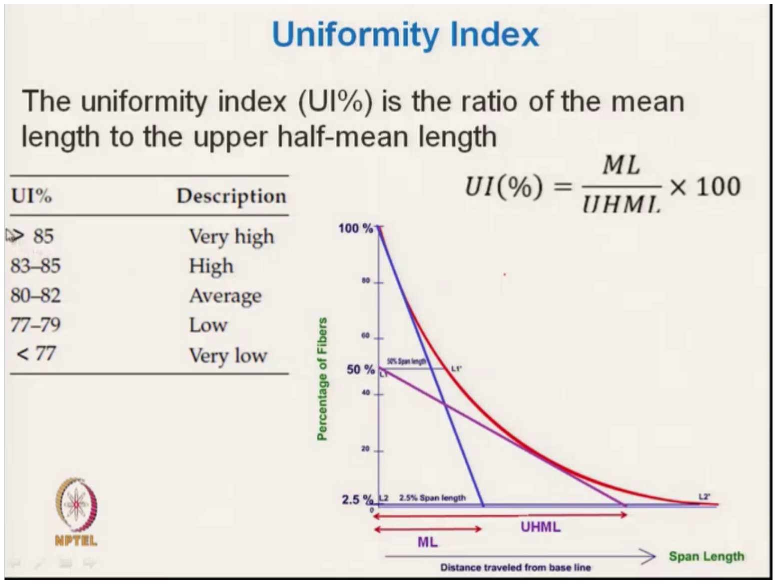


Two fibres distribution, 1 fibre is having longer length is, this is the distribution Here it is the same point we have started. Longest fibre is here OA. Another distribution this way O dash here the longer fibre is little bit shorter A dash, this is the distribution. Now we have to decide which; this is fibre1 and this is fibre2. Now we can decide which is we have to see like the longest fibre length is OA, so OA > OA dash that is perfect. Based on the maximum length should we go for the fibre length calculation?

Now here we can measure the length distribution. Now this is the length suppose this is effective length upper quartile length ok LL dash and here if say suppose MM dash. Now how the inter quartile range will be save this is 1, 2, 3, 4, 5 units ok this is 1, 2, 3 unit. So, this inter quartile range say will be N. So NL dash will be LL dash - MM dash here. But here if you see L1 L1 dash and here it will be M1 M1 dash. Now here the differences are; So, N1 L1 dash, this N1 L1 dash is much less than NL dash this one.

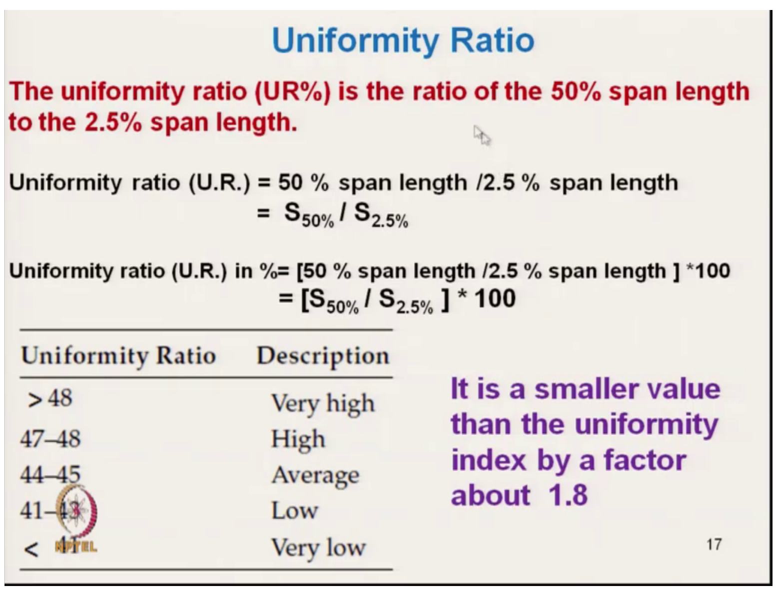
So, this distance this one is variation, this although the fibre1 having longer length, higher maximum length, fibre2 as lower maximum length but as the variation of the fibre is less much list here so the performance of the fibre2 is much less than the fibre one. Here there will be high floating fibre the fibre loss will be very high we should go for the fibre2 based on the dispersion percent. In this way we form the shorter diagram we can calculate the dispersion percent and we can take decision. Dispersion percent will keep idea about the running performance of the yarn.

(Refer Slide Time: 51:29)



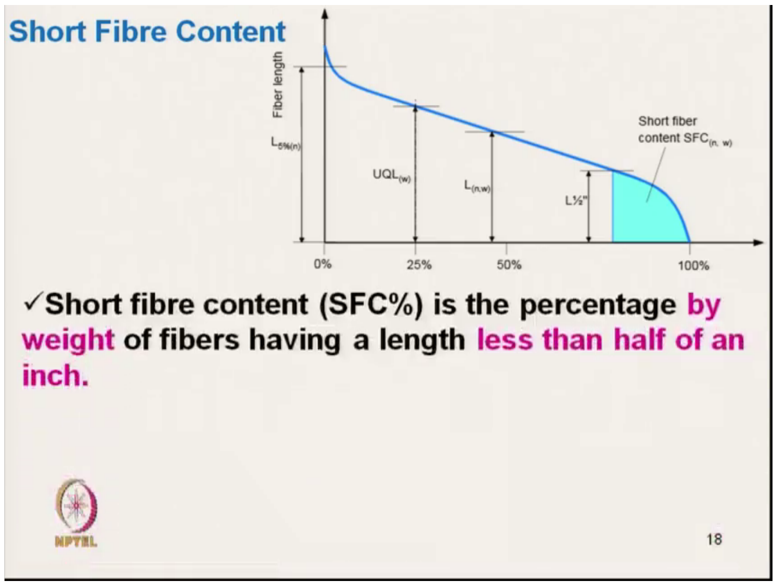
Now the uniformity index; the uniformity index that we have already discussed this is the ratio of the main length to the upper half-mean length that is the uniformity index. This is uniformity mean length and upper half-mean length that you have seen. So for very high uniformity index is it is more than 85% we can tell it is very high uniformity index and if it is less than 77% so it is a low. It ranges from typically this is for very good quality but in general cotton from USDA for general it varies from 70 to 80%.

(Refer slide Time: 52:14)



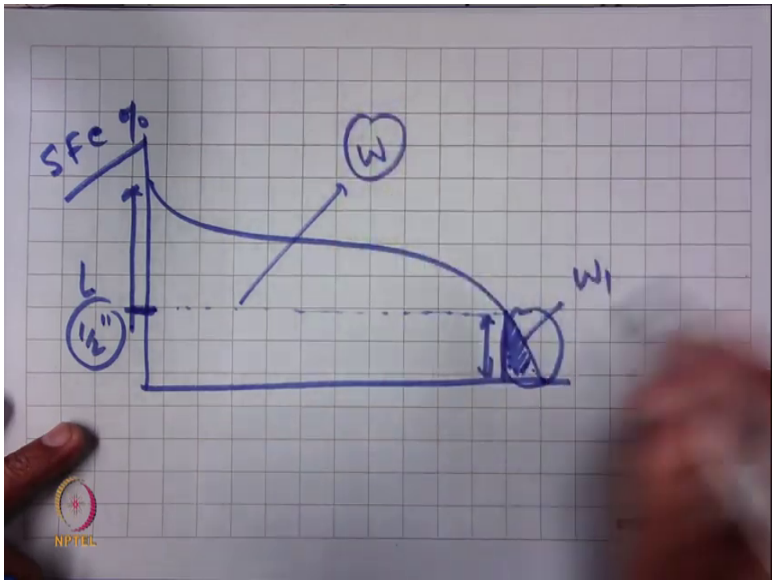
The uniformity ratio that we have already discussed it is the ratio of the 50% span length divided by 2.5% span length and if you can express in terms of percent also by multiplying by 100. And this is value so this is typically 40 to 50% that is the range. That is the smaller value uniformity ratio always we should always remember it is smaller in value then the uniformity index factor roughly about 1.8. If someone ask for; I have a yarn, I have fibre of say 45% uniformity ratio what is the expected uniformity index. That is if you multiply it by 1.8 so then we will get rough idea about index ok.

(Refer Slide Time: 53:19)



Short fibre content; that we can get directly from the shorter diagram, so what is the shorter diagram that we have to these are the different length. This is the upper quartile length this is the lower quartile length and length less than anything less than 1/2 inch the proportion of fibre ok that may be by a mass or by number also normally by mass. So, short fibre content is percent by weight of fibre having length less than the 1/2 of the; 1/2 of an inch ok.

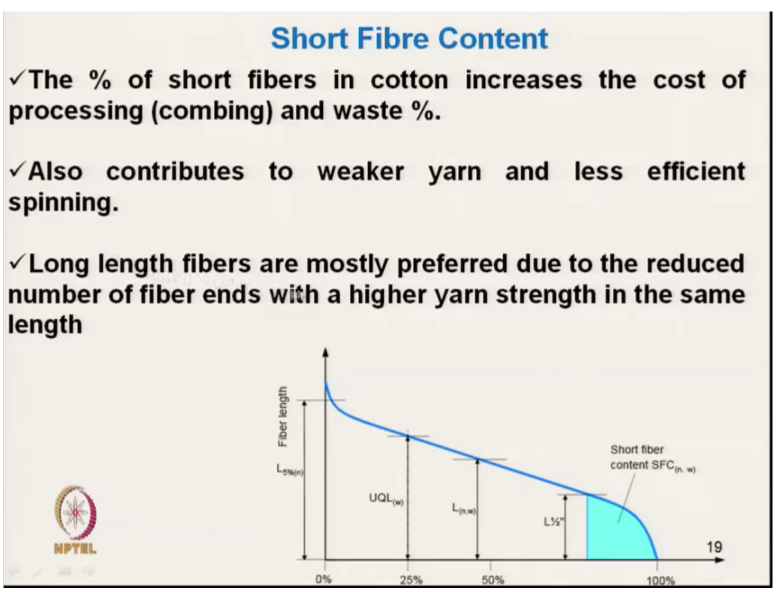
(Refer Slide Time: 54:08)



Now short fibre content SFC percent what to do this is the shorter diagram and we know that this is the length, where suppose this length say 1/2 inch. Now we take this length of 1/2 inch length now we discard this length, now collect this fibre, we collect this fibre and this is the and then we can take the mass, total mass of this fibre w, here it is w1. So, that we can get the proportion percent we can take the mass this that is the percent of the short fibre content important in various applications.

It can also be measured by percentage by number as I have mentioned fibres having number less than 1/2 inch ok with the respective short fibre content percentage in number ok. That by weight or by number we can calculate.

(Refer Slide Time: 55:35)

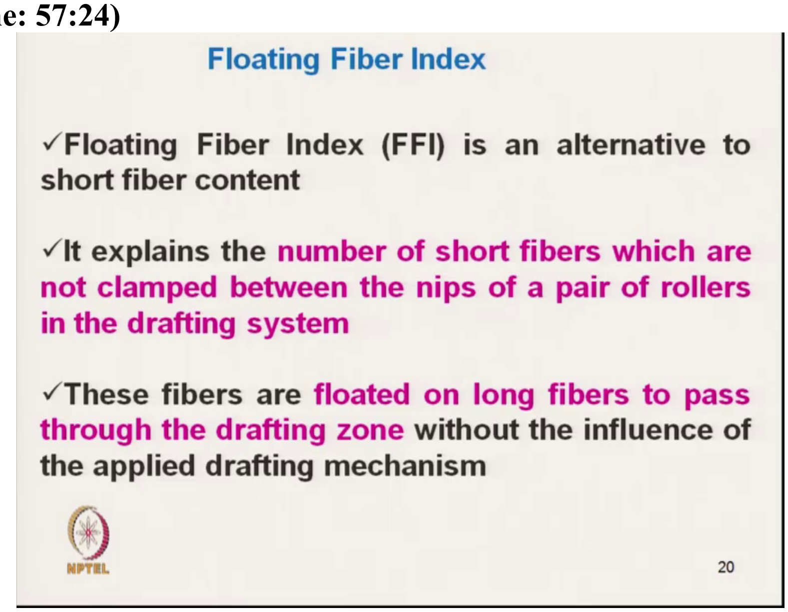


And the short fibre content of fibre is very important particularly in combing the percent short fibre in cotton increases the cost of processing ok. Like if the short fibre content is more the fibres less than 1/2 inch typically we would like to remove discard this fibre ok. Once we go for combing we tried to remove all the fibre less than 1/2 of it. These fibres create problem of erroneous and strength related problem and higher short fibre content means it go for waste and it is here economically it is not viable.

The cost of processing will be increases more short fibre content as normally do not use for carded yarn then we have to go for combing unnecessarily there will be a costing implication. So, for that we must short fibre content of the fibre mass. Also it contributes to be weaker yarn, so yarn strength will be less and less efficient spinning process because; as short fibre content will have weaker yarn and also the yarn uniformity will be poor because it will create the floating fibres ok.

Long length fibres are mostly preferred due to reduction in number of fibre ends that this is yarns higher strength yarn in the same length.

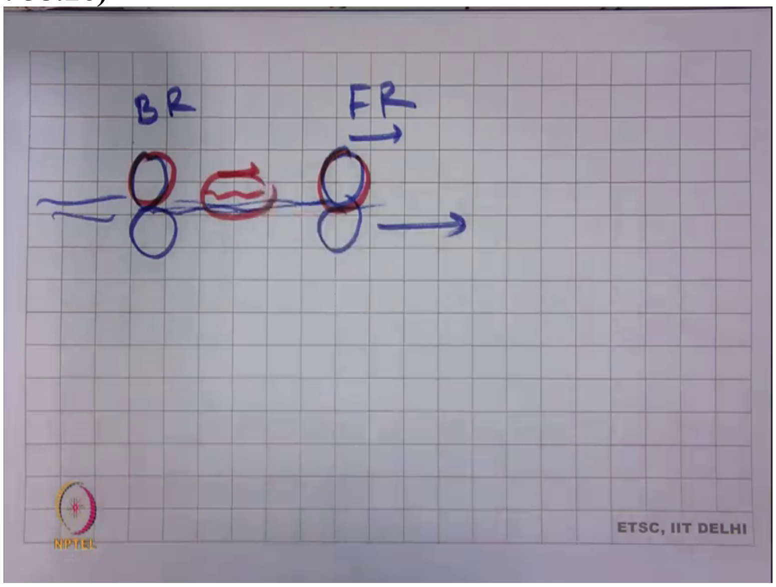
(Refer Slide Time: 57:24)



And floating fibre index; floating fibre index is an alternative to short fibre content that is there I have already mentioned the short fibre content is the indication of floating fibre index. So, the shorter the fibre more will be the floating fibres. It explains the number of short fibres which are not clamped in between by the neps. Now the short fibre content is high it give indication of floating fibres and which will actually create problem this are not actually kept by the drafting roller.

Fibres that are floated on long fibres to pass through the drafting zone without the influence of the applied drafting mechanism so drafting mechanism is actually is not giving any help like;

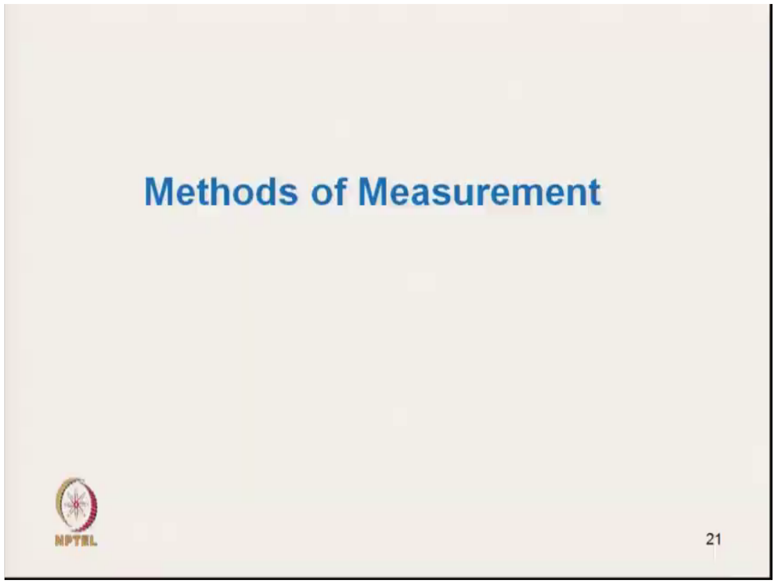
(Refer Slide Time: 58:26)



Now this is the shorter fibre length this is the front roller this is the back roller the fibre mass is getting drafted this is moving in faster speed this will be slower speed ok. Short fibre content short fibres are; floating fibres this is either drift by the back roller or by the front roller it is floating it is moved by the surface contact short fibres. These are the floating fibres, these floating fibres creates problem of yarn uniformity.

So, what we have discussed we have discussed in detail of fibre length parameter, fibre length uniformity parameter and

(Refer Slide Time: 59:22)



Now in the next segment we will discuss the methods of measurement till then thank you.