Evaluation of Textile Materials
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Lecture-27
Evaluation of Yarn Twist

Hello everyone we will start a new topic today which is twist in yarn.

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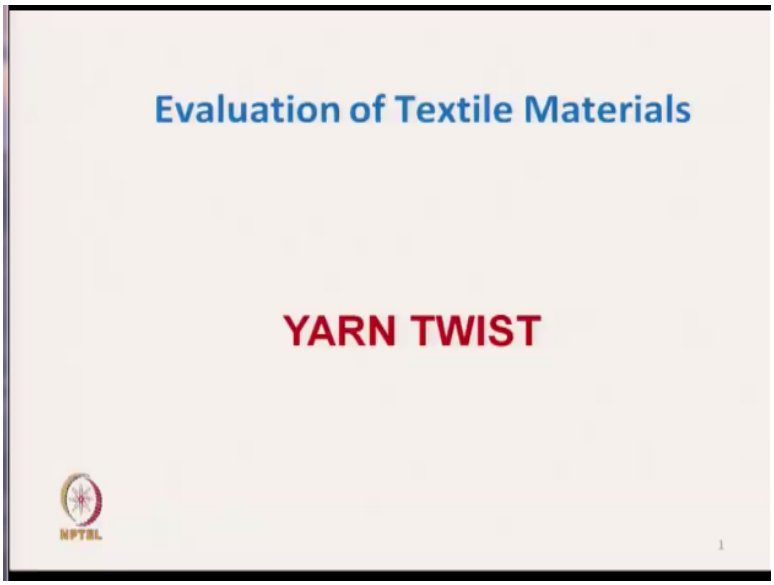

So, we will discuss different aspects related to yarn twist it is importance it is effect and how to measure this twist and we will also try to see some practical problems related to twist.

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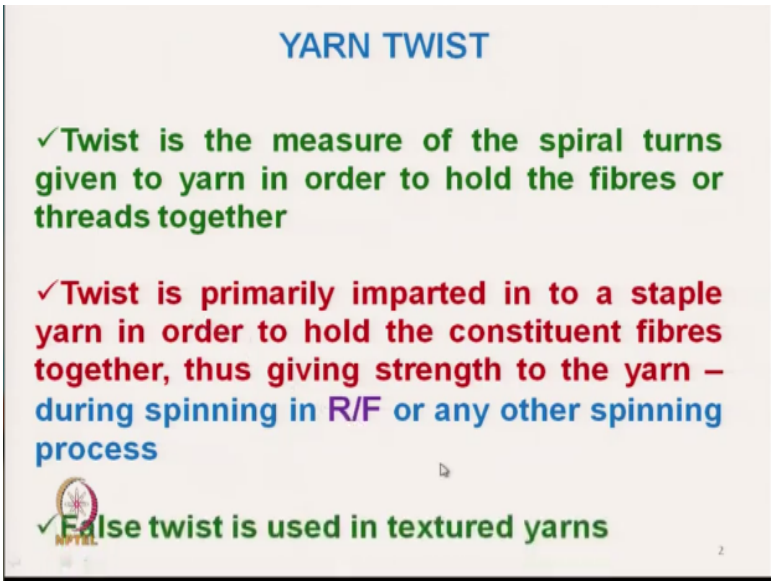

Basically the twist it is a measure of the spiralness of the fiber ok, so twist is the measure of spiral turn given to yarn mainly basically it is a it is a staple yarn we talk about at also in to some extend in filament yarn we need to apply some twist for different purposes. But for staple fiber the twist is important otherwise we cannot actually the form the yarn, so in order to hold the fibers for stapilian and in order to hold the threads for filamentation or for the plydian ok maybe 2 ply, 3 ply.

So, that is the requirement of twist and this is primarily important to the staple yarn in order to hold the constituent fibers together ok. Otherwise the there hold be any strength thus keep the strength of the yarn ok, now this is given during the spinning process of stapling.

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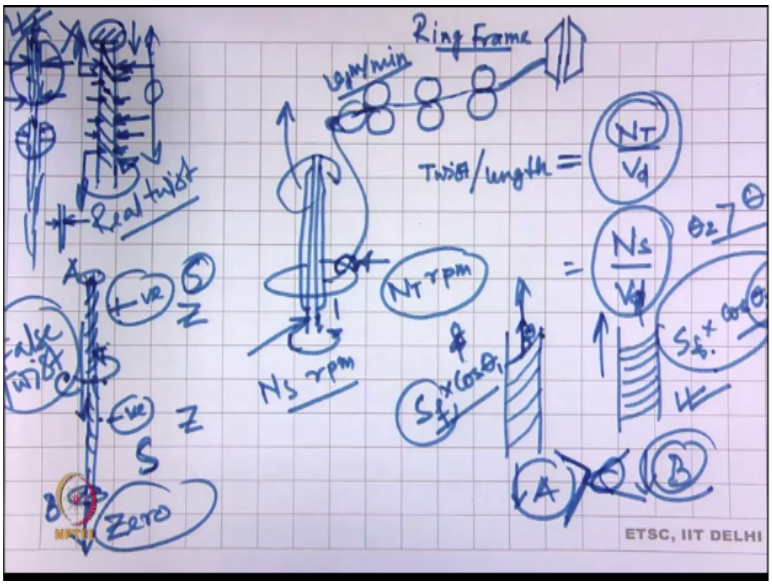

Now let us see this is say deliver ruler, this is the drafting arrangement of ring frame and it is coming from say roving package, this is roving package roving is coming it is getting drafted. And at the exist if we see the fibers strands are like this, this is the fiber very thin fiber strength with no twist. That means we cannot form yarn, this will be disintegrated after applying any force ok, this is with the 0 force 0 breaking strength.

So, this is not going to help although we have got the continuous strand of fibers but we do not have any strength when there is nothing we can actually this will be held together. Now here comes the requirement of twist, now twisting is nothing but to impart some lateral force on the fibers and how do we do, we just rotate keeping 1 end not constant fixed we cannot say it is fixed in the sense it is not rotating 1 is it may move laterally.

But it is not rotating if we impart if we rotate other end then this will impart certain places. And in this OA the fibers in the outer surface will have to travel a longer path as compare to the fiber in the core or inner surface. That means the tension is higher on outer surface fibers on the outer surface that was due to it is high tension at the outer surface this outer fibers at the outer surface will impart invert force on the fibers inside that.

Even the fibers in the next layer also impart force which will be less than this outer surface but still it will have certain invert force. In this way this fibers will have some inward it will generate

some inward force due to the longer path and tension generated on the fiber. So, this inward force but is it doing this inward force increases the it is acts as a normal force which increases the friction, frictional.

So, it will not allow the fiber to slight past over another fiber on the other end in initial case there is no 2: the fiber can easily slight past over other fibers. So, this will actual lock the fiber and ultimately it will develop certain strength ok. So, fiber will not slight over the channel, now this is called the real twist another type of twist is there where suppose this is a strand, this is a strand or say filament ok.

Now here at this end we are not twisting this is fixed and this end again we are not twisting, this is fixed, we are imparting twist at the center in between this 2 points. Now what will happen here A, B and we are trying to rotate at the C, so between A and C the direction of twist will be in 1 direction and in between C if it is say a positive direction and in this side it will be negative direction.

So, why I am telling it is a positive and negative I will come back this direction the positive direction or negative direction this has got specific turn which is called S direction or Z direction or S this is Z. So, this is Z direction this will be this is S direction, so this is actually it is not real twist because while it moves the yarn moves this will get automatically cancelled out and finally the yarn will be a 0 twist end.

And this is called false twist, so this false twisting principle is used in many applications particularly for texturing for many other applications where we do not need real twist. We know need intermediate twist for some specific purpose. Now when this fiber strength in ring frame this fiber strength after drafting it comes out, so without any twist, so we have to impart twist on this strength.

Now it is done by arrangement of it is a weaving an traveler we are not discussing this yarn, so this is a guide and it will go through this guide. And this is say called ring and it goes through the

this is traveler and here it is a bobbing ok. So, bobbing and it goes to there, so due to the and here the spindle which rotates and with the help of the yarn pool this traveler rotates.

So, due to the rotation of the traveler there will be twist imparted on the yarn strength and this twist is real twist. Because here at this end total bobbing total spindle is rotating, so this is imparting real twist. And here we can express this twist in terms of twist/unit length and how do it in express here it is expressed in terms of basically it is a deliver rate if it is V say meter/minute ok and it is rotation.

Here this rotation of the spindle it is say Ns rpm and if it is rotating say it is a traveler NT rpm. So, then the 1 rotation of the traveler imparts 1 twist in the yarn, so it will be basically the NT ok /V V delivery, so Vd. So, NT/Vd is the actual twist imparted/unit length but for all practical purpose, so NT is actually it varies and the all practical purpose after unwinding from this package.

So, it becomes it is a Ns/Vd, so all this details we can learn in other course which is yarn manufacturing but here the application how to apply the twist in the staple yarn it is been explained here. And for other technique other spinning processes the impart the twisting principles are different but for staple yarn twisting is must ok. And false twisting we have discussed, so it is used for texturing for many other applications.

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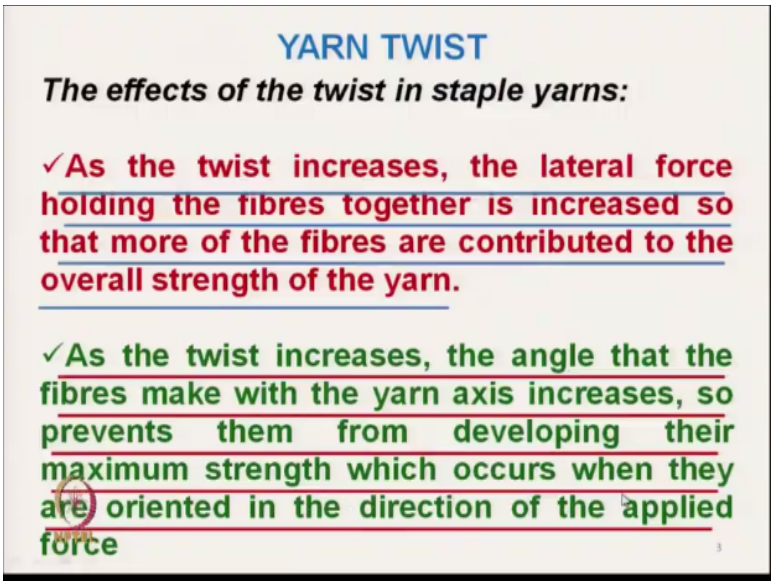

So, now the effects of twist in the staple yarn, so as the twist increases the lateral force holding the fibers together will increase. That we have explained this lateral force will increase, so the fibers contribution towards yarn strength will increase and that, so that overall yarn strength will increase. But at the same time as the twist increases the angle that the fiber make that fibers make with the yarn, yarn axis will increase.

So, now suppose this is yarn, now here it is a this is a fiber, now another yarn with the high twist. Now the when the load is applied on the yarn, the contribution of fiber strength towards yarn strength will be if the it is theta then if the component of fiber strength will be this is fiber strength. So, S fiber strength of fiber it is contribution will be towards yarn strength will be cos theta, that cos theta component will be on the yarn axis towards the yarn axis.

Now here it is cos theta 1 and same fiber cos theta 2, now theta 2 is more than theta 1 that means for same fiber due to this obliquity effect the contribution of fiber strength towards yarn strength is low in this case. This is yarn A, yarn B, yarn B as the cos theta is more, theta is more, so here cos theta component will be less, so this total contribution towards the yarn strength will be leased, less in case of yarn B ok, so this is yarn A it is a angle is less, so it is contribution will be more.

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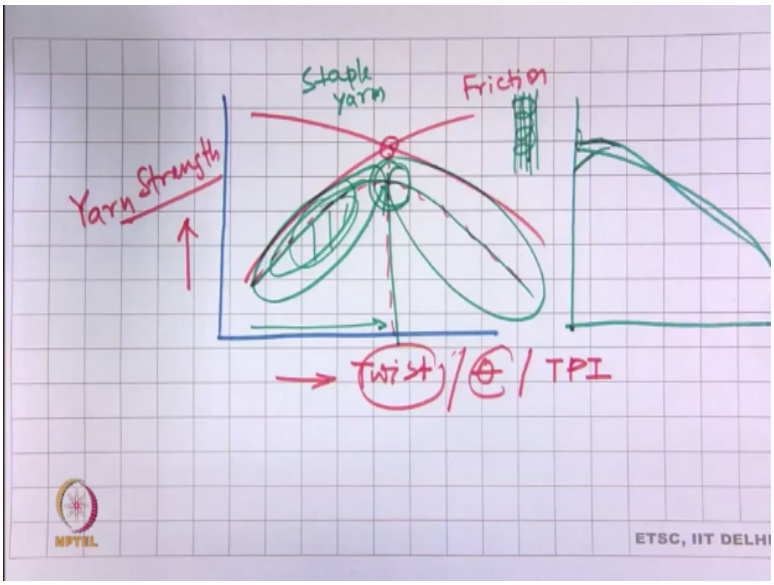

So, that is how, so you will see here we have 2 different contributions, so if we see if we measure, so in X-axis say amount of twist ok or twist angle theta ok or twist/inch, twist/length, twist/inch. So, in X-axis and in Y-axis if the yarn plot yarn strength, in the yarn strength we will have 2 components here in 1 component the due to the friction between fiber to fiber friction the yarn strength increases.

So, it will give us this, so with the increase in twist this is the friction component ok another component is that due to thus we have explained just now with the increase in theta or twist the contribution of fiber, fiber strength towards the yarn strength will continuously decreases. So, this is the point where the actually this is the level of twist where this 2 chords are matching.

Now if we take the average, if we take the 2 effect of the both the factors then we will see a curve like this ok. So, this is the nature of the curve, twist verses strength that means it is increasing initially due to the increase fiber to fiber friction here it is dominating. And in after that after reaching certain level of friction we do not need any more friction because it is reached it is optimum value.

So, further increase in friction does not help, it will not actually prevent any slide because already fibers are locked. Then comes the obliquity effect which is due to this the strength of the yarn reduces ok. So, maximum strength which occurs when they are oriented in the direction of

applied force. So, ideally the maximum orientation or filament yarn, so maximum strength will be with the 0 twist end because all the fibers are oriented in that direction.

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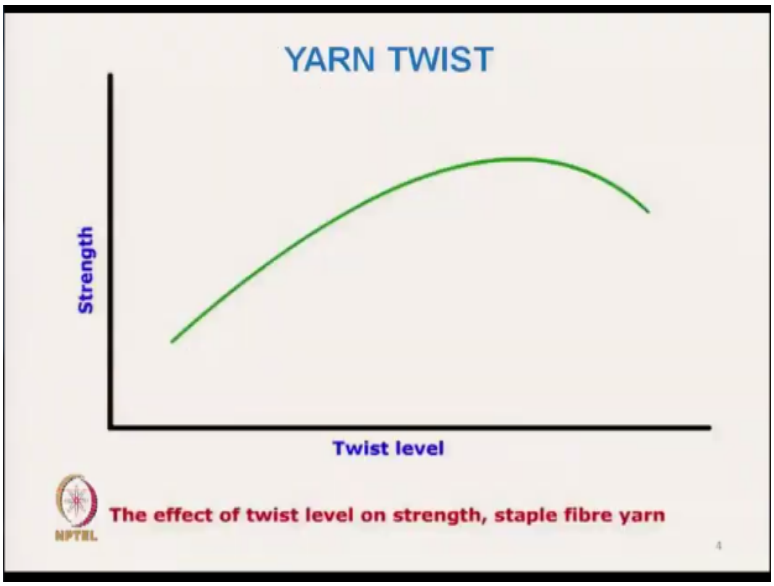

So, towards, so this is the nature as we have discussed just now, so initially it increases then this is called optimum twist. The twist at which the strength is maximum.

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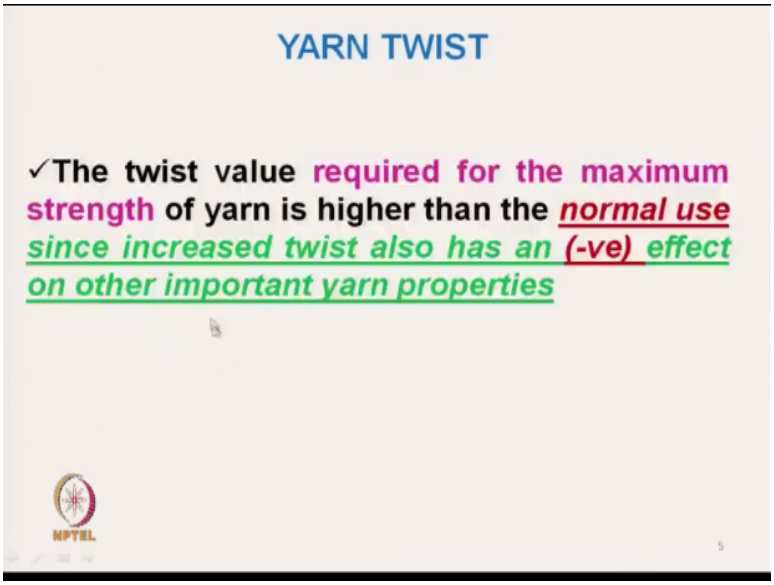

The twist value required for maximum strength of the yarn is higher than the normal use since the increase in twist also has negative effect on the other important properties of yarn and fabric. Now, so this is the point this is the level of twist where the yarn strength is maximum, now we do

not reach up to this point. In all most of the practical purposes we do not reach up because we always deal with this choice.

We said our twist level somewhere between this in this way because as we increase twist in addition to the increase in strength there are various negative effects which actually which affect the characteristics of fabric and yarn, now what are this effects.

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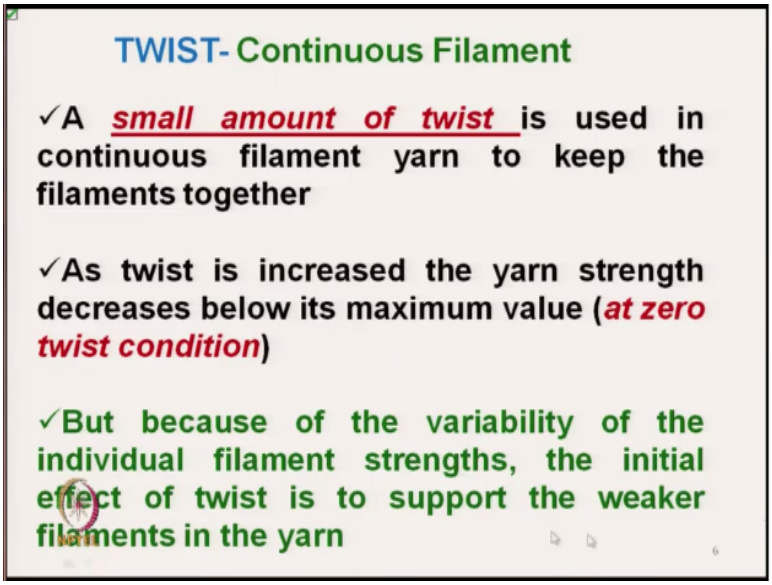

Now let us discuss in detail before that so in continuous filament as I have mentioned small amount of twist is required. So, in continuous filament if we see the nature for this is for staple yarn, for continuous yarn if we see that the effect of obliquity effect it is it reduces (()) (19:47). But initially when the filaments are parallel, so that is the 0 twisted case and when little bit twist is applied initially there will be a frictional assistance.

So, that will increase the twist strength little bit, so that is why that effective nature of the curve is like this, initially there will be small increase little then it will turn. So, that is what is the case in the case of the continuous filament, so it is important to keep the filaments together, that is how we do not use the multi filament of 0 twist end. Because it will create problem in next process like weaving, knitting and so to keep the continuous filament together we have individual filament together.

We impart certain twist, so as the twist increases the yarn strength decreases below it is maximum value at 0 twist length. That will keep on increasing but because of the variability of individual filament strength, so if we impart little bit twist, so it will average amount ok. So, initial effect of twist is to support the weaker filament otherwise the weaker filament will immediately break, so to support and to enhance little bit frictional contact, so that twist is important.

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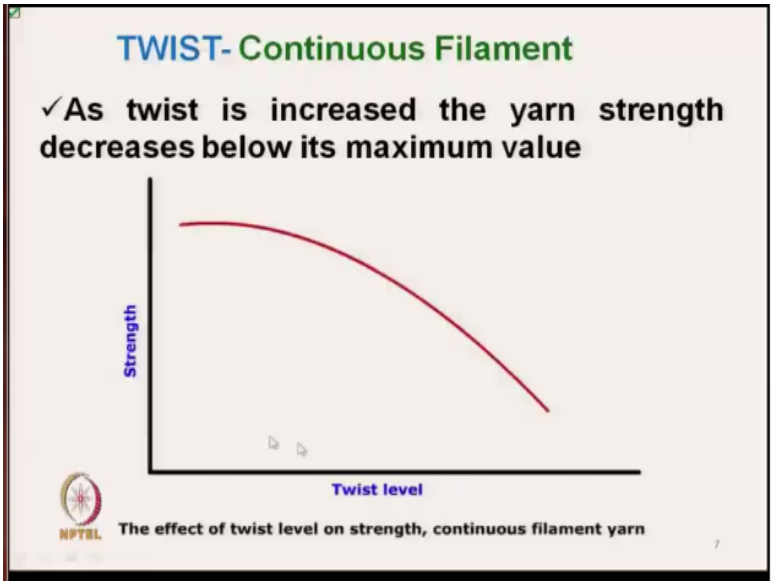

So, the nature is that it **it** initially little bit flat then it reduces ok.

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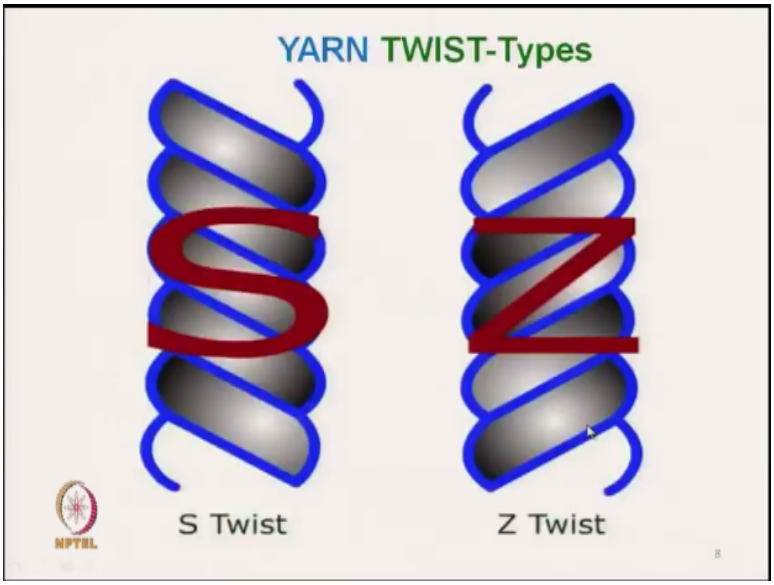

Now the twist of the yarns are of 2 types, 1 is S twist and another is Z twist, this is actually it is easily 1 can identify it, identify based on the type of the alignment of the fiber ok. In the surface if the fiber alignment is in this fashion, so it is it forms S type fashion then it is called S twist if it forms the Z type at alignment then it is Z twist. There are 2 different types S twist S twist and Z twist and this direction twist direction this has got great impact on the various effects on the fabric.

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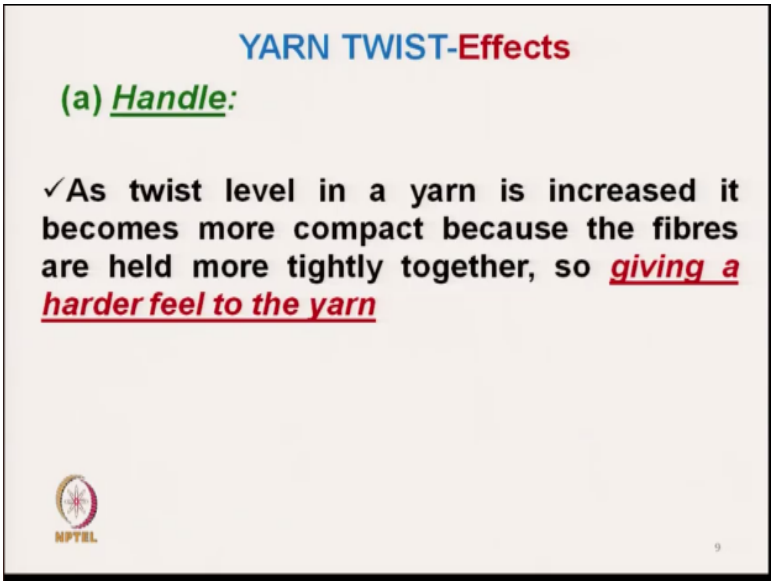

So, the effects are fast effect of twist is the fabric handle ok, now as the twist level in the yarn is increased it becomes more compact ok it becomes harsh. If the yarn becomes hot ok the fibers are held together for giving harder feeling of it. So, if we want soft feel, soft touch, so is must go for allow to study yarn ok.

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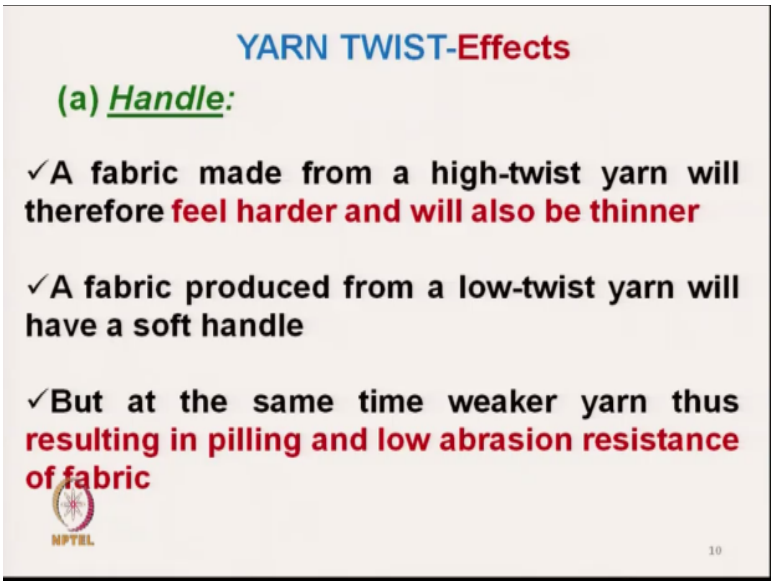

A fabric made of high twisted yarn will therefore feel harder ok and it will be thinner because high twisted means the diameter of yarn will be less. A fabric produced from a low-twist yarn will have soft handle ok but at the same time it will be weaker. So, that is how the problem is that the with the soft twisted yarn, so if we want a fabric with soft twisted soft handle.

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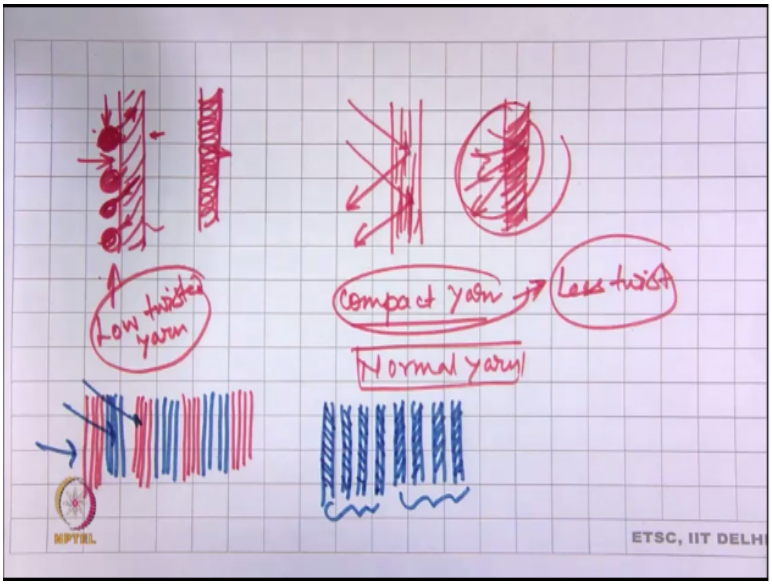

So, we must apply less twist, so it is it will give us the highly soft fabric ok but if we increase that level of twist diameter will reduce and this will give the hard feeling. Because the yarn is not compactness of the yarn it is not compressible yarn, this yarn is compressible because of the less twist. But the main problem with that this type of yarn is that as this is the almost open structure this is softer one the fibers whatever fibers are protruding.

This fiber will be easily come out, so this way result hairiness and also this fiber will tend to have tend to rolled up and gradually as this fibers are not firmly gripped inside. This fiber will gradually come out from the structure and the hairiness that feel is that call peel, peels will become larger and larger gradually due to the use. Due to the movement, due to the force applied, so suppose if we apply force yarn there will be a rolling action on of the fiber.

And this will tend to pool the other end of the fiber and this the peel, size of the peel will gradually increase and this is actually very prominent. This phenomenon is prominent for low twisted yarn but in case of the high twisted yarn as the yarn structure is very compact this won't allow the fiber to come out easily. This so this will not result the pilling, so that is why the pilling tendency is more in case of low twisted yarn.

And also the abrasion, so the low twisted yarn fabric made of low twisted yarn at the fibers easily come out from the surface or from the inside the fiber fabric. So, that is how it is a it result the weaker abrasion resistance it is abrasion resistant would be poor.

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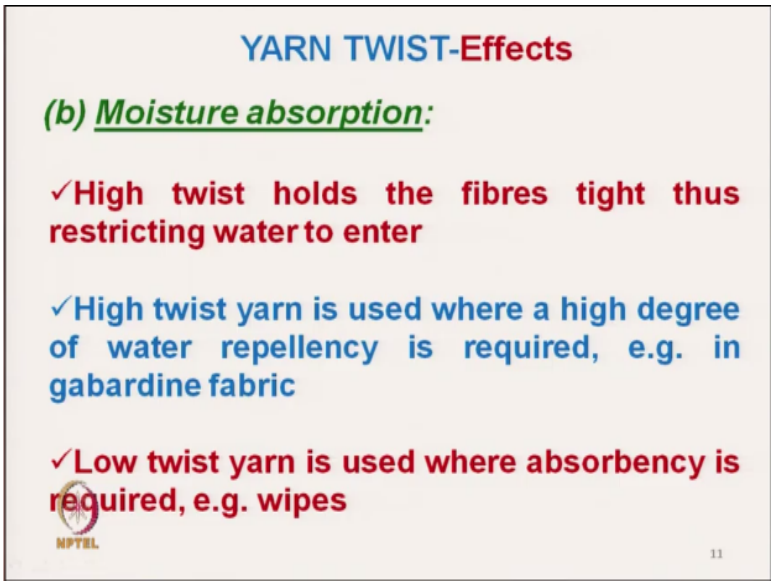

And if we talk about the moisture absorption the high twisted fiber actually yarn the hold the fibers tightly and it does not allow the moisture that moist it does not allow the moisture to penetrate inside the structure. So, restrict what are to enter inside, so it is moisture absorption is

low, so if we want to enhance the moisture absorption we must use a fabric made of low twisted yarn.

So, high twist in the yarn is used when the high degree of water repellency is required, so there are various applications like gabardine fabric is 1 example when where we use high twisted yarn. So, that means it will give us the water repellency type finish some time like in umbrella fabric if we use the high twisted yarn, so it would not allow the water particle to come inside the fabric.

So, that is how so water repellency it characteristics also controlled by the twist, low twisted yarn is used where absorbency is required like wipes. If when we use a fabric for wipes will use low twisted yarn. So, by controlling the twist we can control the absorption capacity for a same fiber.

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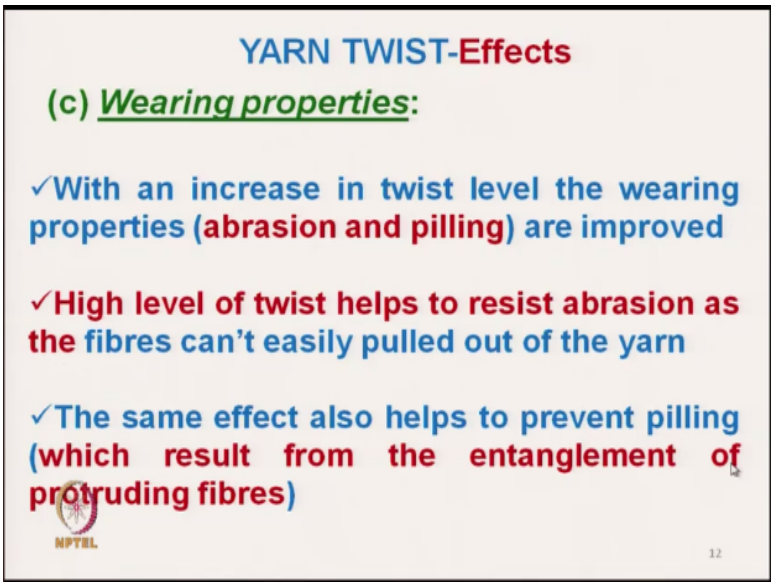

Wearing properties mean how the fabric gets wearied out ok, now with the increase in twist level the wearing property like abrasion and pilling as I have just mentioned are improved. So, if abrasion resistant or resistance are pilling characteristics we have to improve then we must use a fabric made of high twisted yarn. High level of twist help to resist the abrasion as the fibers cannot come out easily ok.

And the same effect also help preventing pilling that I have just mentioned ok, so it starts from entanglement, small entanglement gradually the entanglement gets bigger and bigger due to pulling out of the fiber from the structure L structure ok, it gets rolled.

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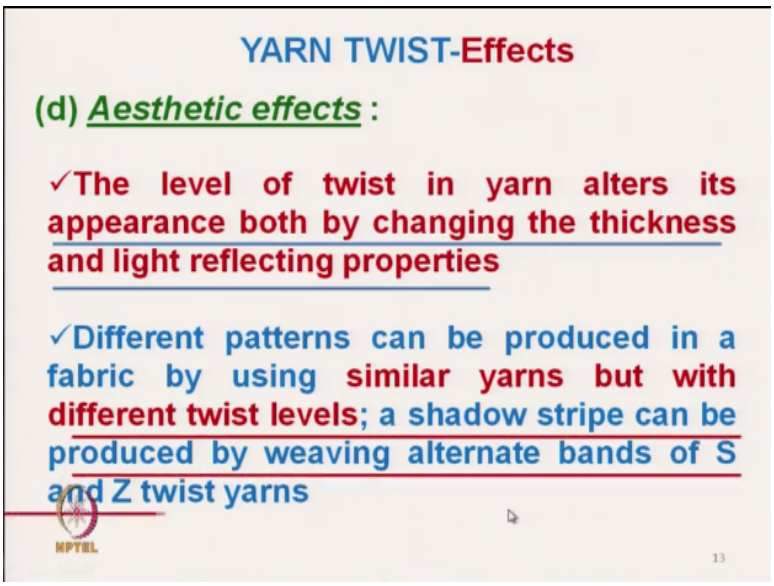

Next characteristics is the aesthetic property, now aesthetic it is is 1 of the aesthetic properties it is a shine ok. A level of twist in yarn alters the appearance both in both by changing the thickness or by light reflection. So, the fabric with a low twisted yarn will have uniform reflection whereas in case of the high twisted yarn that will start reflecting the yarn with of the reflecting the light of it will scattered the light.

Like a fabric made of say 0 twisted yarn and another fabric made of say high twisted yarn this will actually reflect light uniform reflection will be there. So, that will keep the shining measure but here this will with as high twist that will starts scattering the light at different angle. So, this will result the dull nature of the yarn, so this is actual this we can get observed here if we use a fabric made of filament without twist, twist less filament.

And another fabric from the same filament but twisted filament, twisted filament fabric will give dull and that without twist, twist less filament fabric will give a shiny nature. This effect we can observe also fabric made of compact yarn or another is normal yarn. Compact yarn, main

advantage is that in compact yarn as there is no hairiness and fibers are parallel ok and so **most** almost aligned.

So, compact yarn we impart less twist, so as it is less twist is important, so it results shiny in nature. So, compact spawn yarn is actually shining it is more the aesthetic characteristic is better, so better light reflecting properties. And also different patterns can be produced in the fabric by using similar yarn but at different twist level like if we have a say pattern say straight of say different twist then we can generate different pattern.

Now we can see suppose we have 2 yarns, 2 types of yarn say 4 yarns of say this is radius high twisted, this is higher high twisted end and blue is say low twisted. So, this will high twisted and low twisted and light will get reflected in different way and if we design if we same yarn with different twist will give very nice shadow effect. This type of arrangement this type of effect we can also get by having say this is say S twisted.

So, few S twisted yarn 4 say S twisted yarn is placed in the stripe and 4 another 4 yarn of say Z twisted. So, this stripe will give a light reflection in different way than this strength this is called twist shadow effect ok and this is very actually popular it is widely used in (()) (34:07) suiting. The shadow stripe can be produced by weaving alternate bands of S and Z twisted yarn ok.

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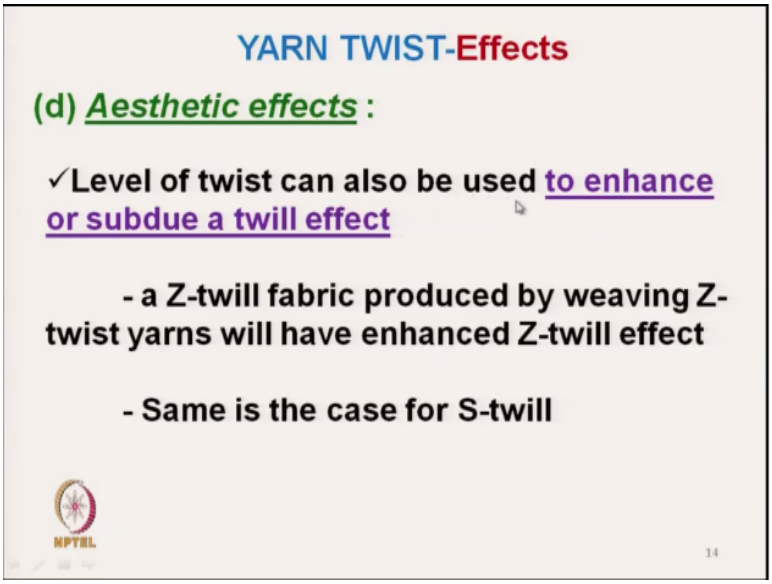

Level of twist can also be used to enhance or subdue the twist style twill effect, so if we have say Z twill fabric and if we use Z twisted yarn then it will give enhanced Z twill effect. Similarly for S twill, so if we use S twisted ok, so that is how we can enhance the effect aesthetic effect of a particular fabric.

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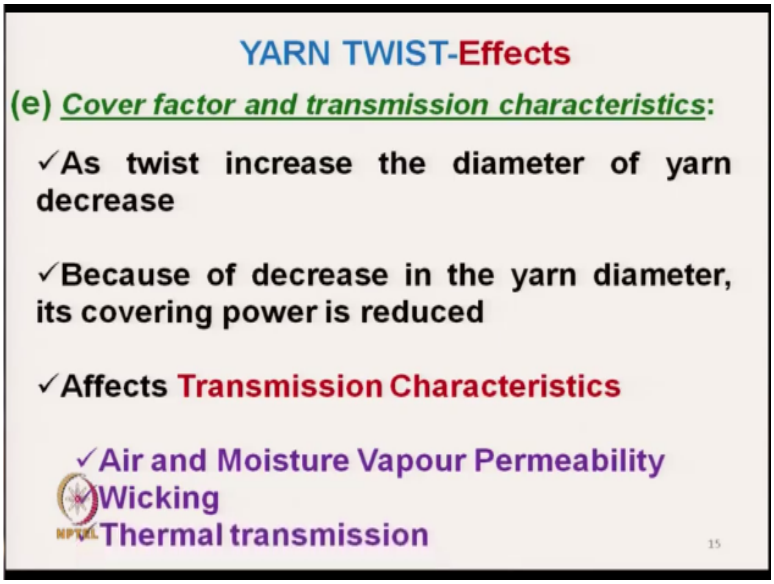

Now cover factor and transmission characteristics, transmission means air, moisture or thermal heat transmission. So, as twist increases diameter of yarn decreases and because the diameter decreases keeping everything constant, so it is covering power will reduce. So, there will be higher more and more force and that will result the higher air transmission. So, that means air permeability increases with increase in twist and transmission characteristics it affects.

So, air and moisture vapor permeability increases and it also affect the wicking characteristics. Because with the increase in twist the wicking that means transmission of liquid decreases because the fiber the water has to travel a longer path.

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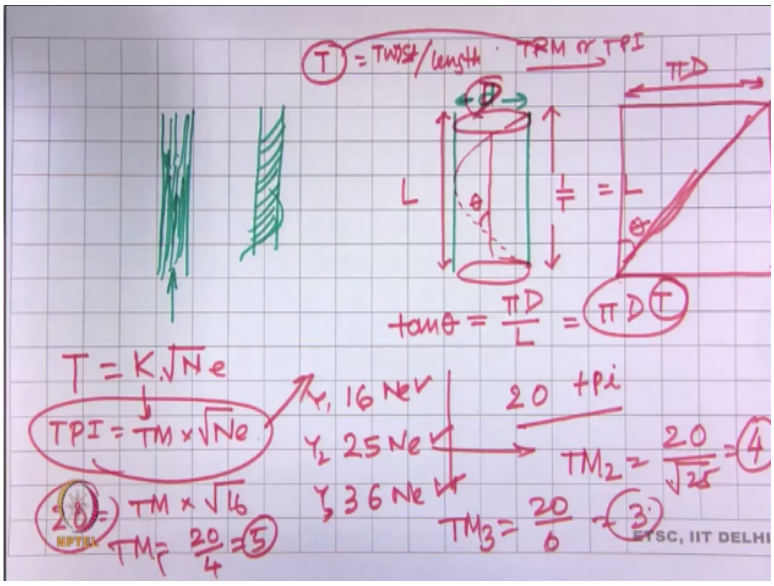

This is yarn, suppose fibers are parallel and during wicking the water will actually transmit along the capillary. But once there are twist high level of twist is there the water has to travel along the curve path ok helical path. So, the wick ability the wicking speed gets reduced ok and thermal transmission, so as the twist increases the entrapped air inside the structure reduces. So, thermal insulation effectively reduces with the increase in twist ok.

So, we have seen that if we actually can incorporate entrap air inside the structure. So, if we for thermal insulating cloth we must use low twisted yarn.

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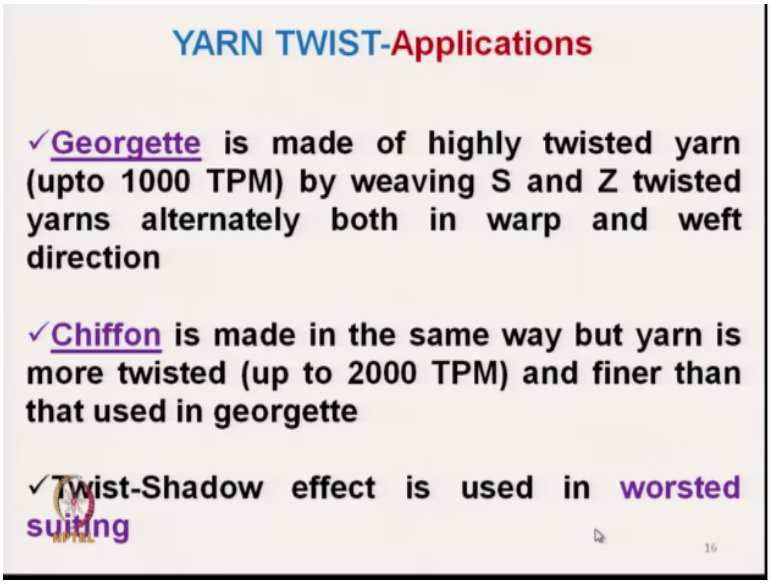

Now there are few practical application where we use high twisted yarn and to get certain specific nature specific characteristics of fabric like here we will give 2 examples which are very commonly used 1 is georgette, another is chiffon. Both of them are having high twisted filament made of filament normally it is a Z and S twisted in a warp and wept ok.

And chiffon as got having little bit higher twist it is almost double ok here but this 2 types of fabrics are actually known for the high twisted yarn ok. And twist shadow effect as I have mentioned in worsted suiting is there, now georgette coming to the georgette and chiffon.

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If we see here this is georgette fabric it consist of high twist continuous yarn in both warp and weft having small creped type of structure on surface, this is georgette high twisted.

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And chiffon it consist of warp and that it is again continuous filament high twisted and it is called Yoryu in Japanese ok maybe it is a that is the term they use.

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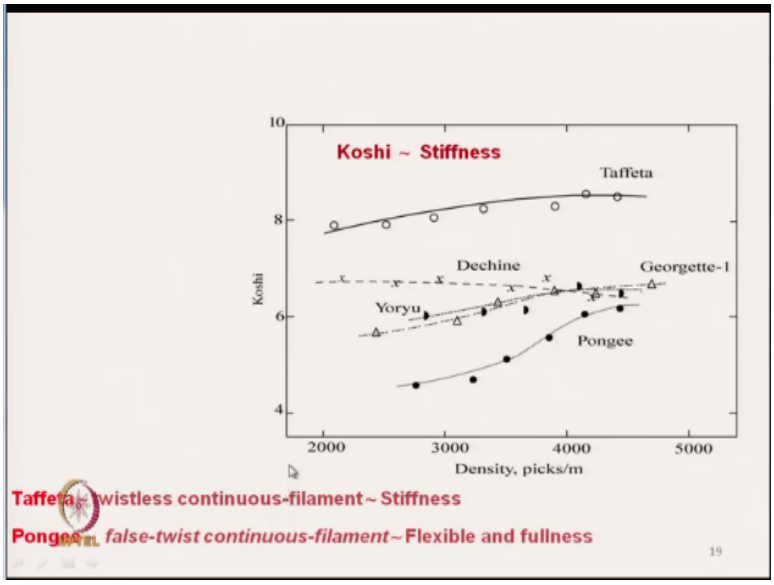

Now if we see the term it is Koshi in (()) (39:37) evaluation tester where it is a stiffness, stiffness of fabric. Now here what we have compared with the fabric without twist taffeta is the fabric is made of continuous filament ok without twist. Now here if we see that with the effect of twist the georgette and chiffon has got much lower stiffness than the taffeta which is made of the twist less that means the twit has got it is effect by changing the twist level.

We can change we can actually control the stiffness of fabric, if we want lower stiffness of fabric lympy fabric we must go for the higher twisted. So, if we increase the twist the fabric becomes lymp.

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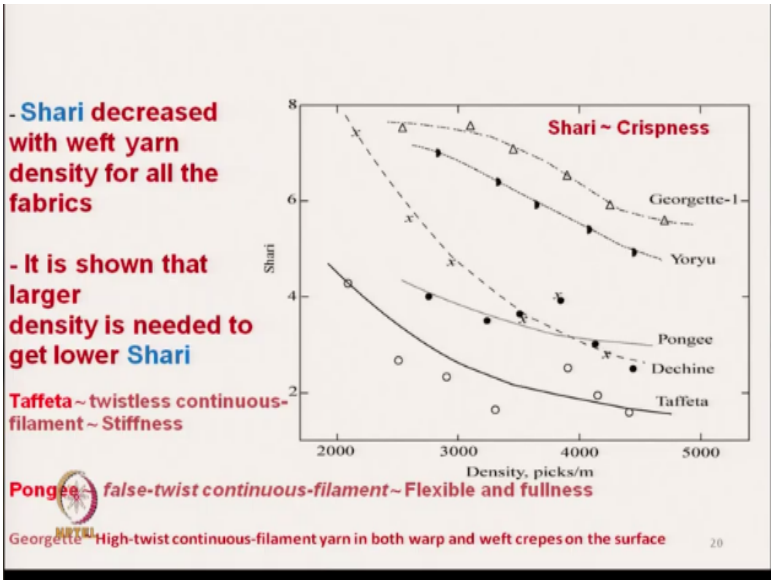

Similarly if we want crispness a some feeling which is crispness feeling in that case we have to go for high twisted. You can see the georgette fabric or chiffon they have they are having very high cripses, so that so the fabric handle or fabric feel can be controlled by changing the level of twist ok.

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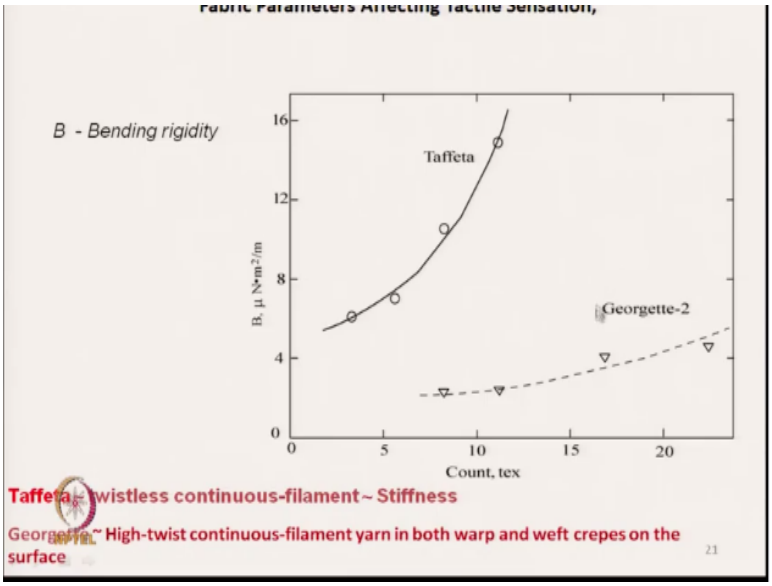

Now we have discuss the bending rigidity you can see here the bending rigidity here it is a much lower than the twist less filament.

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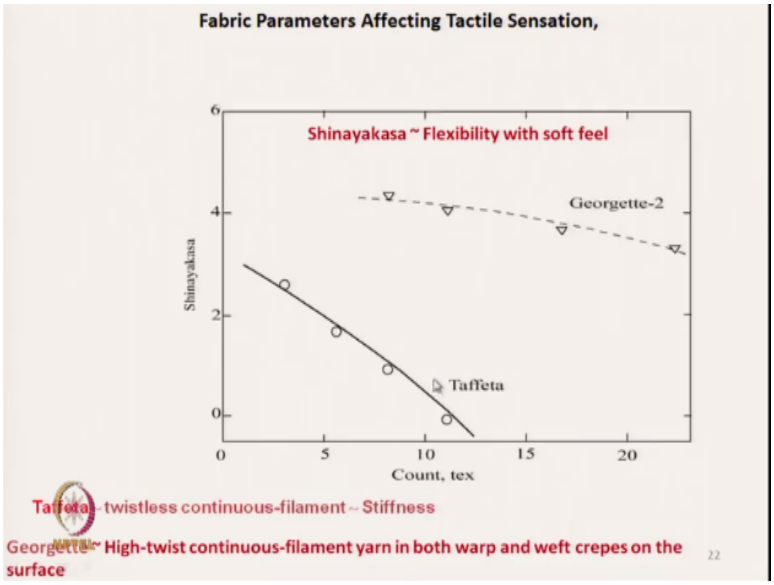

Flexibility, flexibility also increases it is more flexible, so if we want high flexibility then we must go for higher twisted yarn. But flexibility in the sense of bending of the yarn it is not in the sense of other thing ok. So, it is a flexibility the bending characteristics we can improve.

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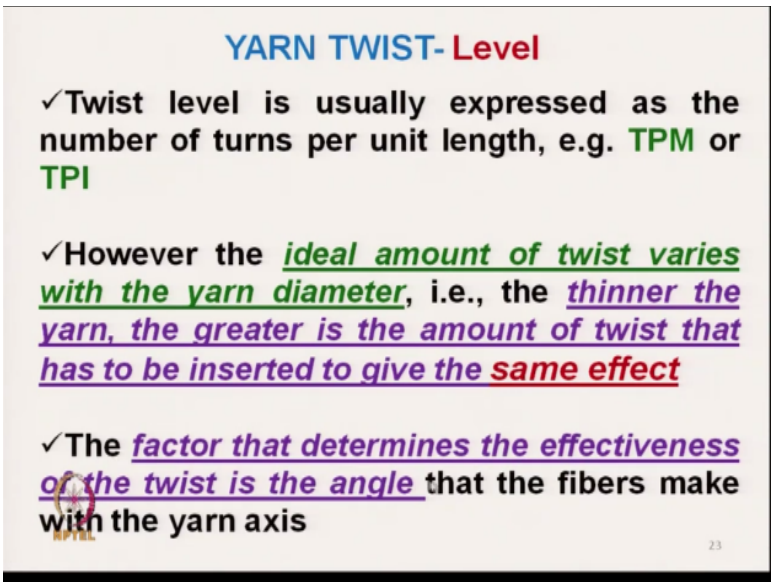

Now coming to the most important characteristic which are the level of twist how to actually express the level of twist, typically it is very simple it is a term it is shows it is a very simple term. Level of twist means is measure the twist in per unit length ok that is ok. So, the level of

twist is usually expressed has the number of turns per unit length that is twist/meter or twist/inch or twist/centimeter.

But it is not the end of the story it is actually twist/meter if we express it is not telling everything, so there are something else. However the ideal amount of twist where is with the yarn diameter, now the term came yarn diameter then it is making the things complex. So, for different yarn diameter if we impart same twist then will not gave the same effect ok, a thinner the yarn the greater is the amount of twist that has to be inserted to give the same twist effect, same effect, what is the effect same effect.

Now effect here is that we want the effect which is the same feel, same touch, same hardness of the yarn and that is actually that is something else. That by imparting same twist we cannot achieve the same effect, here the yarns are if the yarns are of same different diameter so we cannot impart the same twist TPI or TPM to get the same effect. So, we have to impart different twist/unit level different level of twist.

So, that the factor that determines the effectiveness of the twist is the angular twist, so we must keep the twist angle constant. So, that we can get the same effect, so it is not the twist/unit length it is the angle twist angle of yarn, twist angle of fiber in the yarn that controls the effect. That controls the all that it is not the only the strength only the hardness it controls everything, it controls the shining it controls the fabric handle everything.

So, this is the twist angle but main problem of twist angle is that it is very difficult to measure, the simplest way of measurement is that twist/unit length ok. So, if we can measure the twist/unit length which is measurable and if we know the diameter of yarn then we can get idea about the twist angle ok.

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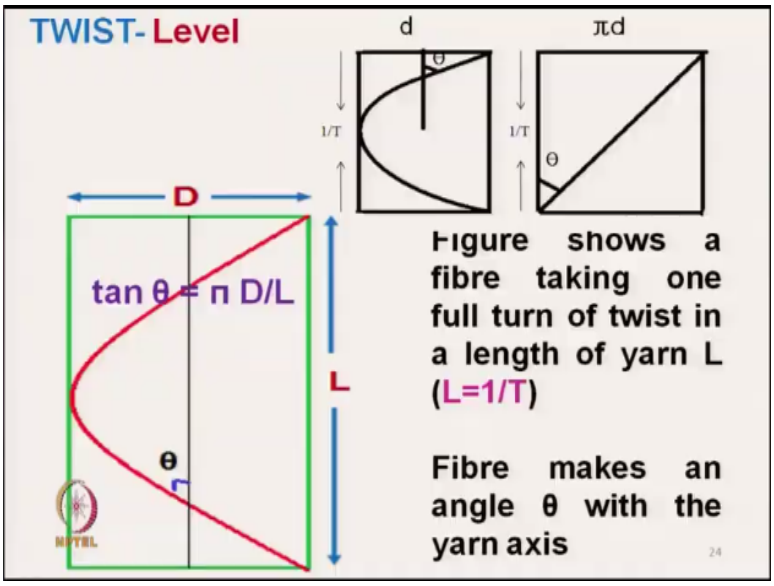

Now we will see we should very carefully you can observe here this is 1 the yarn of diameter D let us and consider yarn as a circular perception ok of diameter D. And here this rate color it is a fiber ok 1 fiber here it is a raft around that it is a surface fiber. Now this is yarn of diameter D and 1 fiber as got that is taken turn of 1, 1 full turn it has taken. That means it has twisted once now this length suppose it is a L length.

Now once it is twisted this is 1 now if it is if the twist/unit length is T as we have mentioned TPM or TPI this is the T ok. Now that means for 1 twist this length will be 1/T that is nothing but L ok, now this if the diameter is D, so it is let us take it is capital D and this if it is say circular in cross section, yarn is circular in cross here. Now imagine we are now just opening up this portion, so we are making it flat opening, this is the situation here.

So, this length this width become pie D and this fiber which has made which has actually angle of twist if it is theta if we totally open then it will become this angle will become theta ok, this is the twist angle. Now if we want to measure the twist angle theta, so here tan theta will be pie D/L ok and 1/L=T so we can write pie D T, T is the twist/unit length ok, now, so the fiber makes an angle theta with the yarn axis ok.

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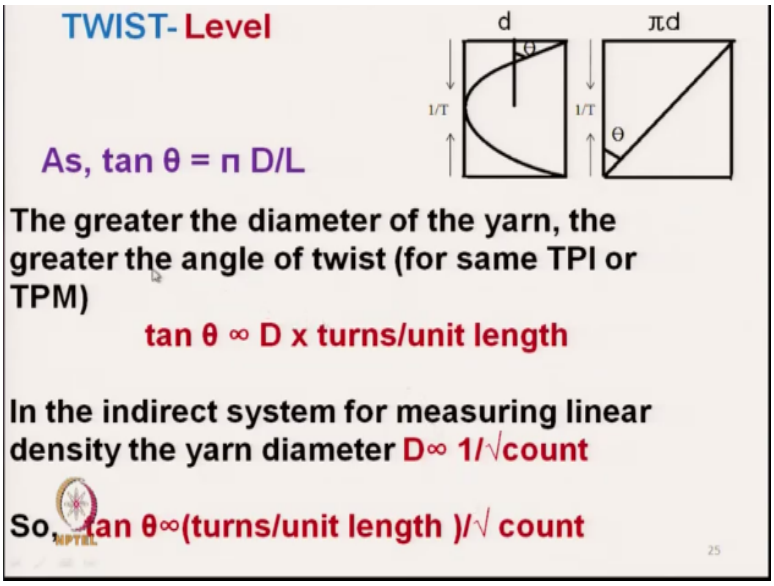

Now here tan theta=pie D/L, so at effectively it is pie DT, now the tan theta is proportional to the D diameter of yarn and turns/unit length T as I have already mentioned. So, in the indirect system, indirect system of yarn count the diameter is inversely proportional to the under root of yarn count. So, tan theta is proportional to turns/unit length/ under root of count.

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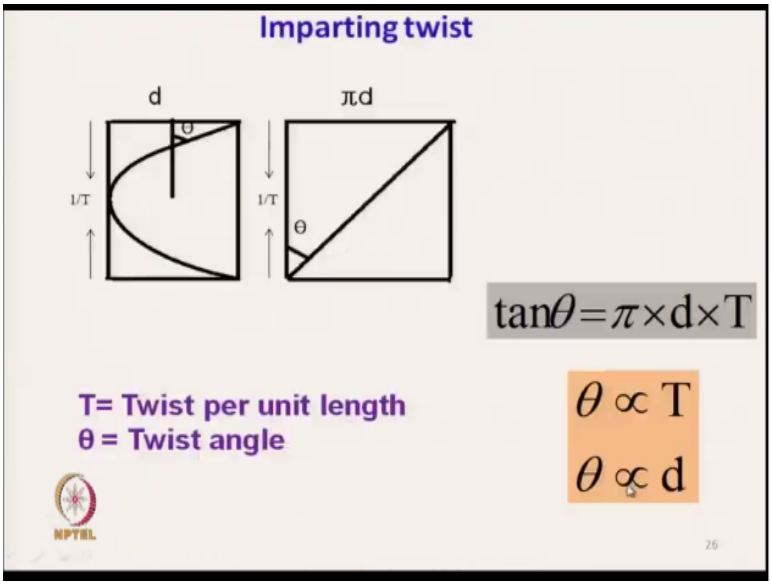

So, tan theta pie DT and T is the twist/unit length, theta is the twist angle.

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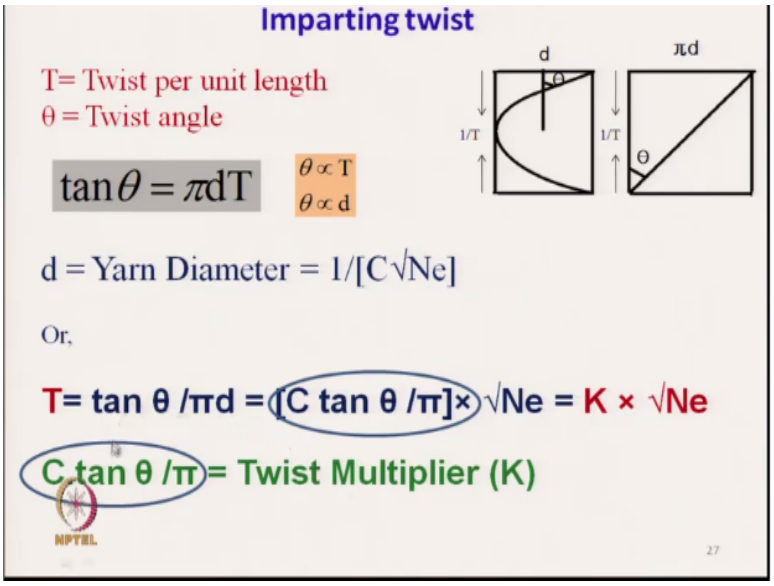

Now the T twist/unit length from earlier one, so D tan theta=pie d in multiplied by T, T twist/unit length d is the diameter of yarn. So, d what is that it is a 1/constant under root C ok, now here if we see the tan theta=tan T=tan theta/pie D from there we are getting 1 parameter this parameter which is exactly it is constant parameter, this is the parameter which is constant parameter.

And this we can see here actually here it will be C/ see the C/under root Ne this C will be this is there will be C/under root Ne. So, effectively this is the total C tan theta/pie this is total constant ok this constant is known as the twist multiplier. This is the constant that means the twist multiplier K it is nothing but C is a constant factor, pie is constant factor and theta that means twist multiplier it is a proportional to the tan theta.

If we can measure the angle then we can calculate the value of K value and as the tan theta the theta cannot be measured easily. So, we can get the this K value indirectly by measuring the yarn twist level and yarn count, so the general formula T indirect system the twist/unit length=the twist multiplied by under root count. Now the implication of twist multiplier what we have seen T=K under root N.

That means TPI=K is nothing but 2:multiplier under root Ne English count, this is the indirect system of measurement. Now here the thing is that if we want to use the finer count onto produce finer count suppose we are producing 1 yarn of 16 count, 16 Ne another you say 25 Ne another is

a 36 Ne like this. we are producing 3 count this is closer, medium and finer count. And we are imparting same twist say 20/twist/inch we are imparting.

In that case the yarn 1, yarn 2, yarn 3 in the yarn 1 what are we getting 20 TM under root 16 that means TM will be 20/4 5 TM. For say 25 count yarn we are imparting the same level of twist, same TPI, TPI of 20, so for 25 count yarn what will be the TM value TM1. So, TM2 will be 20/under root 25, so it will become say 4 TM becomes 4, now for say 36 count TM3 will be 20/6 it will be somewhere around 3.something 3.

So, as we have seen here keeping the twist level same if we increase the if we make the yarn finer and finer then we are getting lower and lower TM, what does it means, what does it mean TM. This have that means we are getting the yarn that fiber angle, twist angle it is gradually reducing. So, for same twist level imparted, same twist/unit length imparted if we produce the finer count the angle of twist will reduce.

And that angle of twist reduction means yarn becomes softer and softer and the softness of yarn is reflected by twist multiplier. That means twist multiplier is a parameter which actually reflects the hardness of the material, hand of the material. It does not give idea about the twist/unit length until and unless we know the count of the yarn. So, if we know the count and twist multiplier then we can get the twist/kg.

But twist multiplier concept is entirely different from the twist/unit length, twist/unit length gives it is a physical measuring characteristics. It is a physical parameter which can be measured in yarn but the twist multiplier it is gives the inner feel of the yarn ok. What is there inside the yarn and that indirectly reflect the twist angle ok. So, that is why twist concept of twist multiplier is extremely important.

And this is the way we can calculate, so we cannot calculate tan theta, we do not have the idea of the C value constant value for yarn. So, we indirectly can calculate with the measurable parameter which can be easily measured. The twist/unit length we can be measured and the yarn count can be measured, so twist, so we can get idea of twist multiplier.

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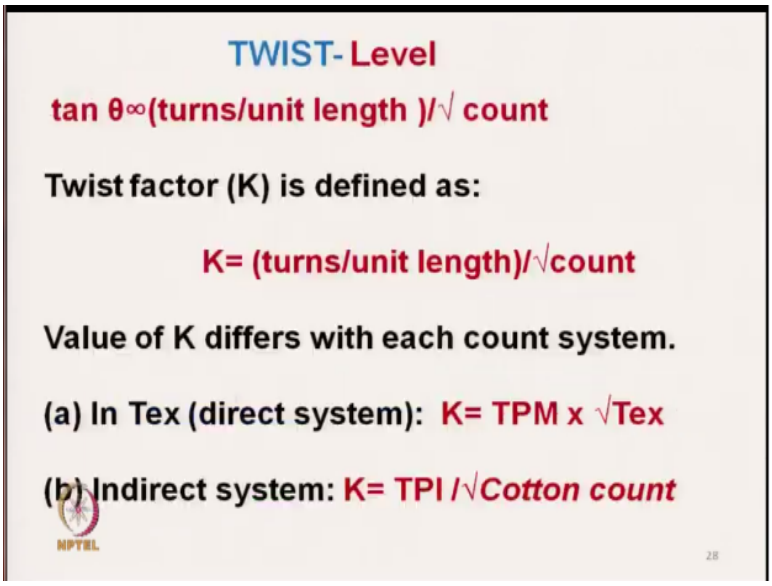

So, what we have discussed till now it is a indirect method, indirect twist multiplier is it is a the indirect twist multiplier it is a K=TPM*twist ok. And in indirect we have mentioned K=TPI/cotton count, so in that way we can get the twist multiplier and which is the idea of twist angle ok. So, twist factor is defined as the twist/unit length/yarn count that is the in indirect system and direct system it is a twist/meter or twist/centimeter and yarn tex.

Now if we want to know now see for direct system what we have seen the twist tex twist multiplier is the, it is called tex twist multiplier.

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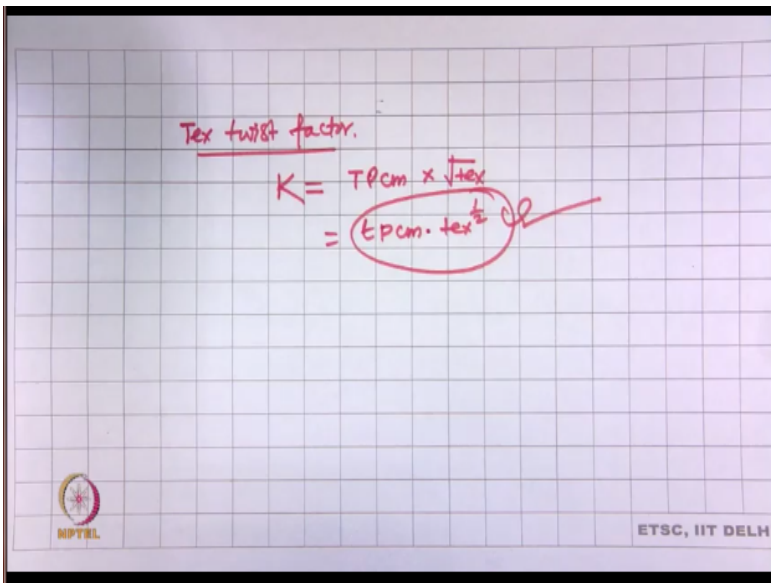

Twist say twist factor say or constant it is called it is K it is nothing but twist/TPcm and multiplied by under root tex. So, the unit of twist multiplier indirect system will be tpcm*tex in the power ½, this is the unit we use or direct twist multiplier.

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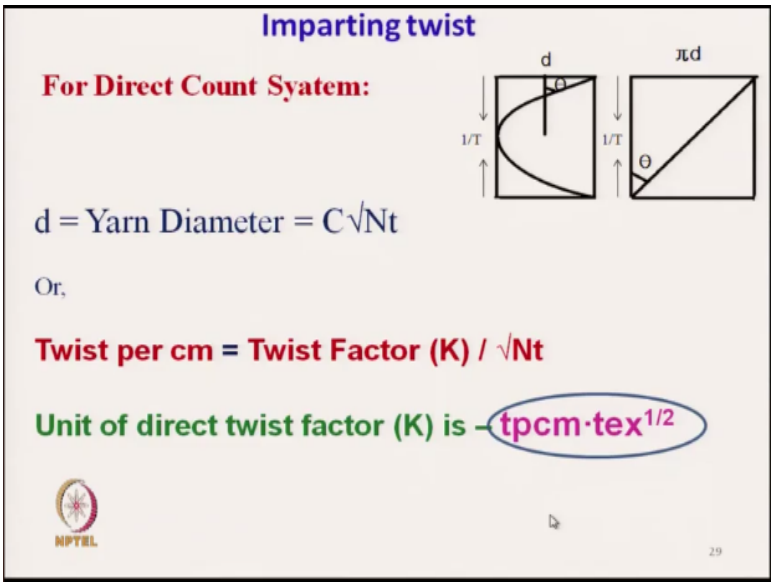

So, for direct count it is there twist/centimeter=twist factor/twist the under root Nt ok, so the unit of twist factor is tpcm*tex to the power 1/2, so that is the ok.

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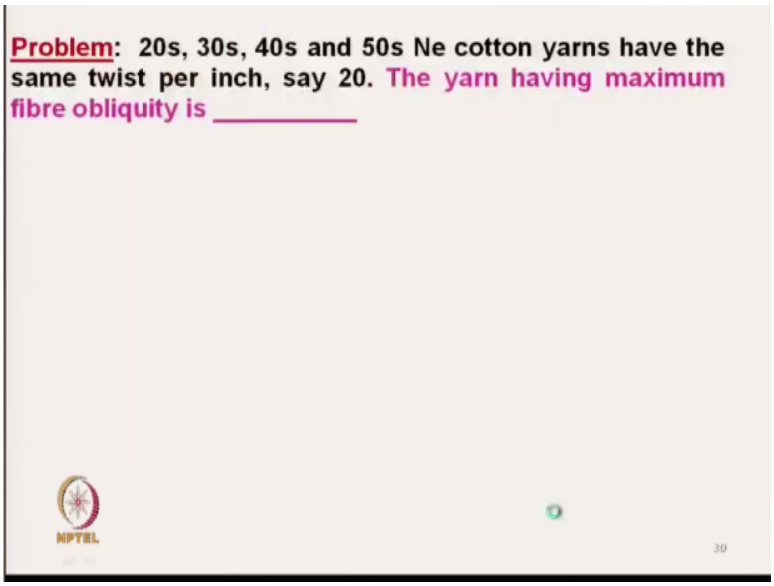

Now we will stop here and related to this all this twist multiplier and twist factor will see different numeric consequents in next class, till then thank you.