Evaluation of Textile Materials
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Lecture No-16
Evaluation of Linear Density of Textile Materials (contd.,)

Hello everyone, we will continue with the course, evaluation of textile materials. In the last classes, we have discussed the characteristics of the fibre. Few characteristics like length, maturity, fineness. Today we are going to start the evaluation of yarn characteristics. We will start with the most important characteristic which is a linear density of yarn. Actually, in textile yarn, we would like to know the diameter of yarn or cross section. Same as in the fibre case we have seen that in fibre it is very difficult to measure the diameter of a fibre. So, indirectly we measure the fineness in terms of linear density. So, in the case of yarn also it is very difficult to measure the diameter or cross-sectional area.

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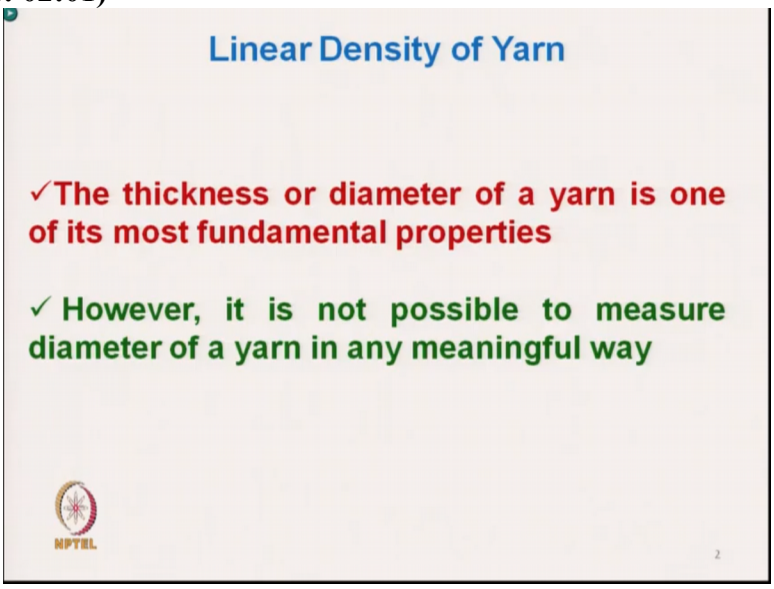

This is mainly due to the fact that the thickness or diameter of the yarn is one of the most fundamental properties. But it is very difficult to measure because it is not possible to measure the diameter of yarn in any meaningful way. Because it is very difficult for, say staple yarn as it is compressible in nature and the diameter also is not uniform throughout the cross-section, throughout the length so it is very difficult to measure the diameter. The change in diameter is mainly due to twist applied on the yarn.

If we consider the distribution of fibres in the cross section are same. Even the most uniform staple yarn will have variation in diameter.

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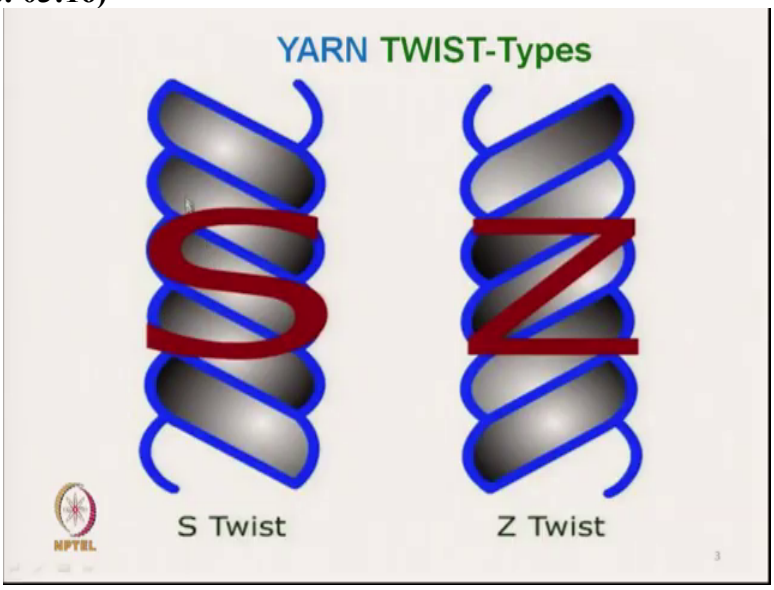

This picture will show that the diameter of yarn at different places are different due to inclined helix angle of the fibre, so this is due to that; at different point also, the packing coefficient of yarn also changes and that results in the variation in diameter so it is very difficult to measure the diameter of yarn particularly the staple yarn. That is why the indirect method of measuring the fineness is the linear density.

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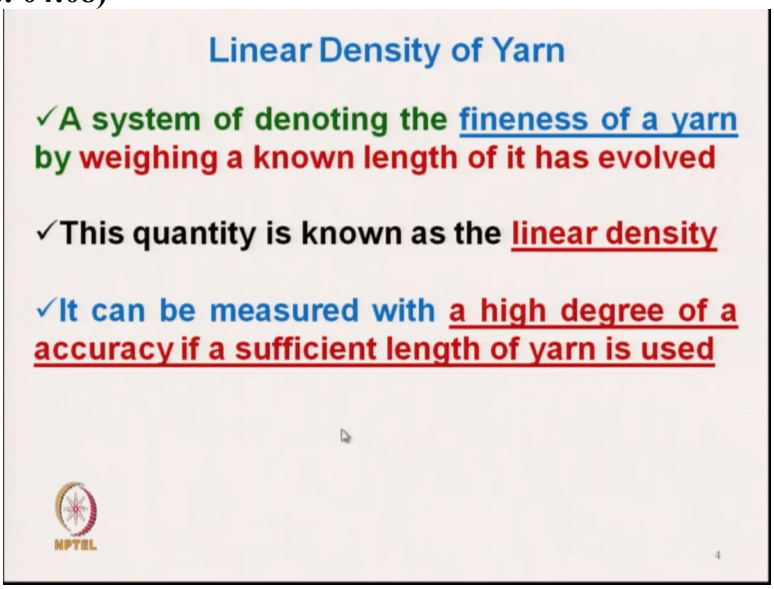

So, a system of denoting the fineness of a yarn by weighing a known length of yarn it has been developed. So, linear density is indirectly showing the fineness of yarn. So, this quantity is known as the linear density. It can be measured with a high degree of an accuracy if a sufficient

length of yarn is used. So, the linear density is extremely important for knowing the length of the yarn for the known quantity. Actually, the mass of the yarn so, this is used in many applications. Suppose if we know the linear difference known linear density yarn if we have a cone of yarn, we can simply take the mass of the yarn okay.

We can take the actual mass of the yarn and from there if we know the linear density; we can calculate the actual length of the yarn. This is used in many applications like in warping. In warping if we know that count of yarn and mass of the package. So, we can predict. We can calculate actually that what will be the actual length of the warping. So, in that total length is need to be calculated and also if in the other way if we know the length of the yarn, we can calculate the mass of the yarn by knowing the linear density.

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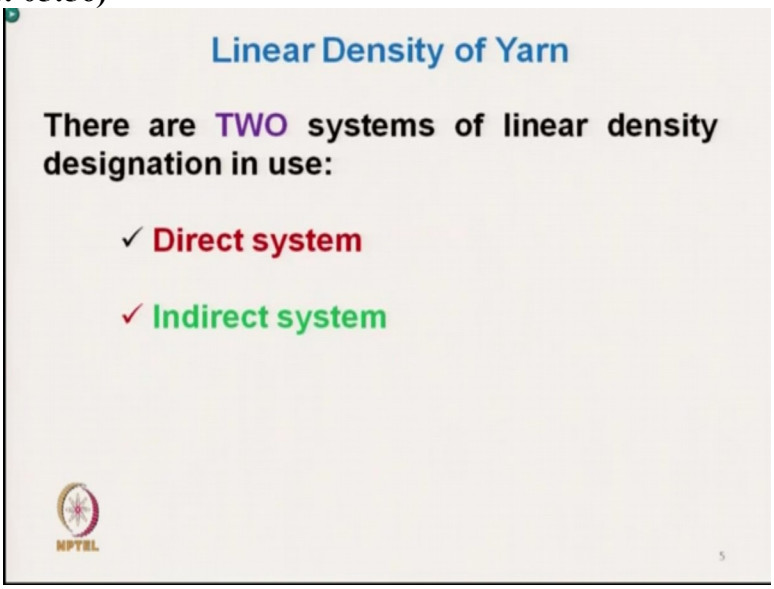

So, there are two systems of linear density measurement. The systems are one is the direct system and next one is the indirect system of measurement.

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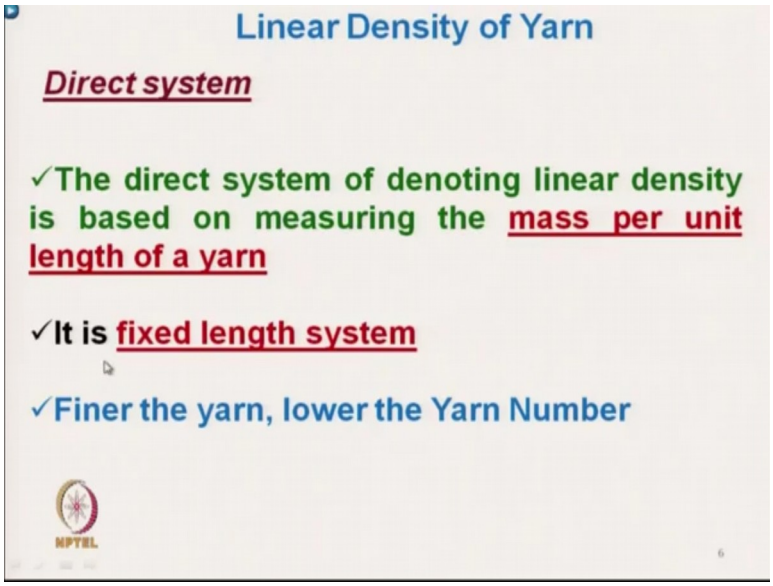

In the direct system which is very convenient system that is the direct system of denoting the linear density is based on measuring the mass of yarn per unit length okay. So, the mass per unit length of the yarn is the direct system for measurement. And here the length unit is fixed. So, if we know for a particular fixed length, we calculate the mass. So directly we can measure by measuring the mass. We take the fixed length; then we measure the mass that will directly give us the linear density in direct system.

That means if a particular x length of a yarn one yarn gives the lower mass means, so that it will have the lower direct system lower count. So finer the yarn, lower is the yarn number. So, take in the direct system whatever the number whatever the system the lower value means the finer yarn. And higher value it is a coarser yarn.

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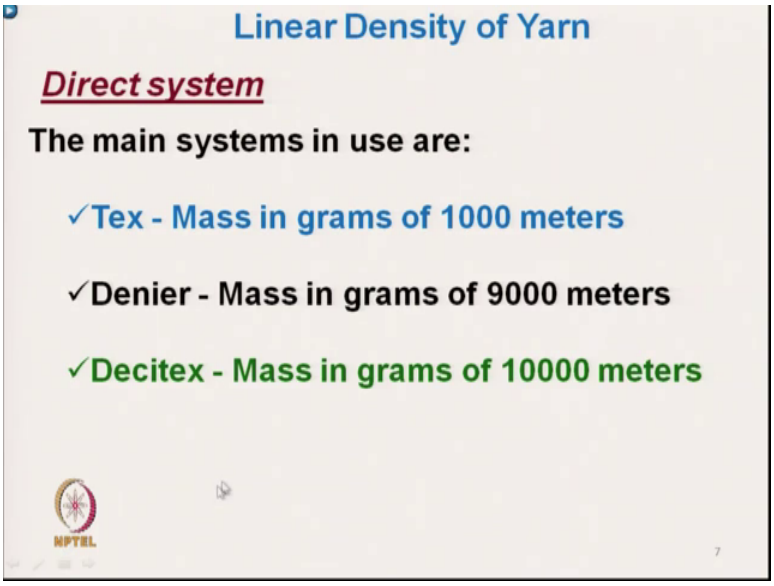

So, there are different systems of measurement in direct system these are the Tex system. Here unit of mass is in gram and the unit length is 1000 meter, 1000 meter so it is 1 kilometer. So, in 1 kilometer yarn we take the length of the yarn 1 kilometer and whatever mass is coming that will be directly termed as Tex. Suppose if we take 1kilometer yarn and its mass is 15 grams then that will be said it is a 15 Tex.

Similarly, if we take 1kilometer yarn if it is a thicker yarn then mass will be say, more than 15 grams, the mass is 30 gram. So, in that case though Tex will be 30, so coarser yarn or thicker yarn will have higher tex value. Similarly, the denier is again unit of mass is gram but the length is 9000 meter, 9 kilometers. That means a 9 kilometer yarn if we take and if its mass is 15 gram that means it will be 15, denier.

So earlier we have given example that 1 kilometer yarn taking its mass is 15 grams so it is a 15 tex. Now we have taken 9 kilometer yarn the mass remains the same 15 grams so it is a 15 denier. Denier is for a 15 Denier yarn and 15 tex yarn. So, 15 Denier yarn is finer by 9 times. So that way we can have different relationship. I will discuss the relationships with different relationship between different count systems.

Decitex similar way it is a mass in gram of 10000 meters, 10 kilometer yarn so it is little bit finer than denier. So that is why these systems are used in different types of material. Like tex system normally used for stable yarn where the count, the number is little bit coarser. And denier and Decitex normally we use for filament yarn. It may be multi filament yarn or monofilament

yarn. These are the conventions but we can use the other way also. Tex we can use for the filament yarn also.

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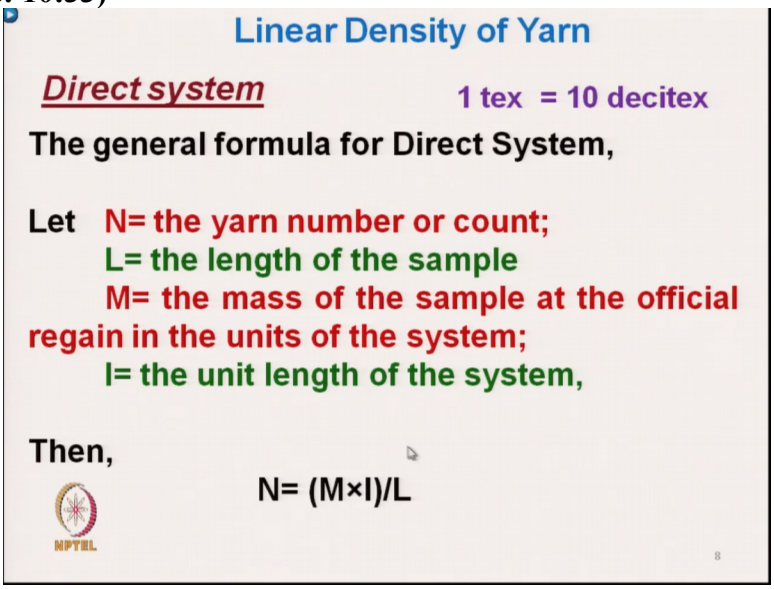

Let us see 1 tex = 10 Decitex ml. That is what we have discussed in tex system the length unit is 1 kilometer and in Decitex the length unit is 10 kilometers. That is why it is 1:10 ratio. General formula for direct system is, if we know the length of the yarn and if we know the mass in gram, mass of the yarn for that particular length. So, we can calculate the tex value or any value in direct system.

So, N is the yarn, this is the general formula, N is the yarn, the yarn number or count system. So, N is the yarn number in direct system, L is the length of the sample, that if we take the sample, it need not be always as per the standard. So, in Tex system if we want to calculate Tex, Tex system the standard length is 1km. We need not always take 1km yarn. We can also take few meters yarn or 100 meter yarn or like that.

So, any yarn that is the length of the sample and then what we do after taking that known length we take the mass. That mass, M, it denotes the mass of the sample at the official regain in the unit system that is if it is in gram, then we have to take mass in gram system. So, and it says official regain, so that regain moisture regain has to be perfect otherwise there will be difference in yarn number. So, as per the; that is why to get the official regain we have to condition the material for say 24 hours before we measure the count.

And that is why we have to allow the yarn to settle to actually get that regain ok. And l is the unit length of the system so for Tex system unit length is 1000 meter. So, l for Tex system will be 1000m. So, using these parameters we can calculate the yarn number using the simple formula N = (M*l) /L, M is the mass of the material sample; L is the length of the sample.

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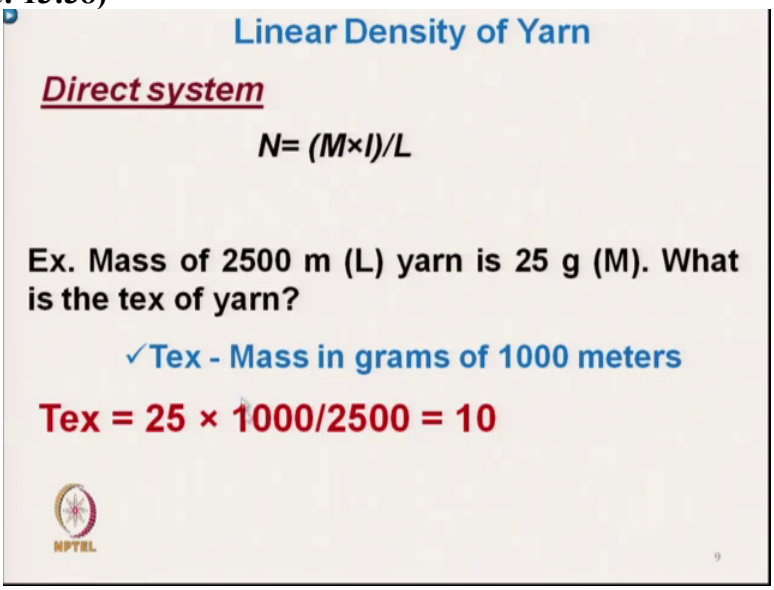

Let us take one example. Mass you want to know the tex value of yarn. For a mass of 25 gram and length of the yarn is 2.5 km. So, mass of 2500m yarn is 25g. What is the tex value? It is very simple using the formula, Tex system mass in gram of 1000 m, so, using that formula mass of the yarn N is 25 g, l is 1000m and L our sample length is 2500m so using this simple problem we can calculate tex value of the yarn.

So, we can also if we want to calculate denier, the denier the main difference is the small length. In denier the small length it will be 9000m. If we use in place of 1000m it will use 9000m then it will be 90 deniers. So that way we can calculate if we know the mass of yarn for a particular length so we can calculate the yarn number.

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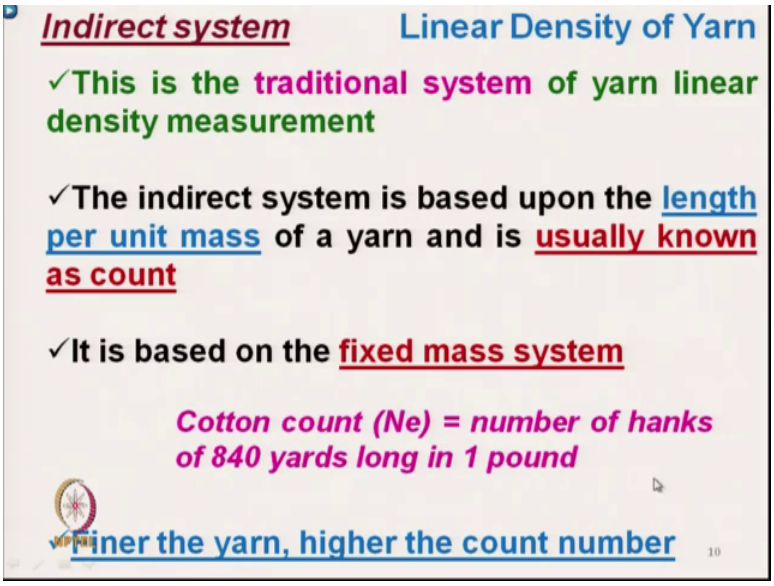

Now coming to the indirect system, so indirect system is little bit complex. It is not the direct. But this system is the traditional system. So, this is the traditional system of yarn linear density measurement. Nowadays we also follow the indirect system but as far ISO, the Tex is the standard system of measurement. So, the indirect system is based upon the length per unit mass so, in direct system, mass per unit length.

If we measure the length then we can take directly the mass. But here the length per unit mass. So, mass is fixed and for that mass what is the length. So, here it is little bit awkward looking because if we know the mass ok, then we have to calculate the actual length of the yarn. That is why it is indirect system. But in traditionally it was used. The indirect system is based upon the length per unit mass of a yarn and is usually known as count.

Now this is the term it is a; normally people ask, why it is called count? Why the linear density we call as count? It is based on fixed mass system as it is length per unit mass. So, mass is fixed. Now let us take one example for cotton yarn because the count came from normally cotton yarn. In earlier days during trading the people; the unit of mass was used as pound ok, pound is the unit of mass. And the length of yarn was actually 840 yards it is a hank of yarn it is a skein of yarn.

So, what they used to do, they used to make one lea ok. So that one lea is length is 120 yards, 120 yard lea, such 7 leas are there. So, 7 leas of 120 yard will be 840 yards. So, they used to make one bundle of 840 yards. So they are making one bundle of 840 yards and these bundles there was a weighing balance they used to put the bundle. One bundle they put and they keep on

putting the bundle till the mass becomes 1 pound. They have to actually they have to make a bundle of one pound ok.

Now they are trying to put 1 hank of 840 yard, it is not 1 pound then 2 hanks and they keep on counting, 1 hank, 2 hanks, 3 hanks like that they keep on counting. And suppose it is a 30 count. So, after putting 30 such hanks of 840 yard it has become 1 pound. So, they are packing as 1 pound bundle. 1 pound bundle of say that bundle there are 30 such hanks are there. That means that will have 30's counts. They counted the number now; suppose it is a finer yarn again they are putting hanks of 840 yards.

If it is a finer yarn then the number of such hanks will be, they will again keep on counting, they will count the number and that will be more than say 30 say suppose it is 50. So, they will count 50 such hanks are there. Then they are putting the bundle of 1 pound in that bundle there will be 50 such hanks. So, they have counted the number as 50 that is how the term count came and this 50 count. So, here in the indirect system higher the count number, finer will be the yarn. That is why the indirect system is a system of counting. So, count term normally came from there and nowadays we use English count or any count people use to say tex count.

The count has become term for linear density but actually initially count was used for indirect system. Finer the yarn, higher the count number and also people used to say yarn number. What is the yarn number? The same way the number came. How much? How many such bundles are there? How many hanks are there in 1 pound? So this English system, English count Ne is still used particularly in cotton yarn system. It is also called cotton count.

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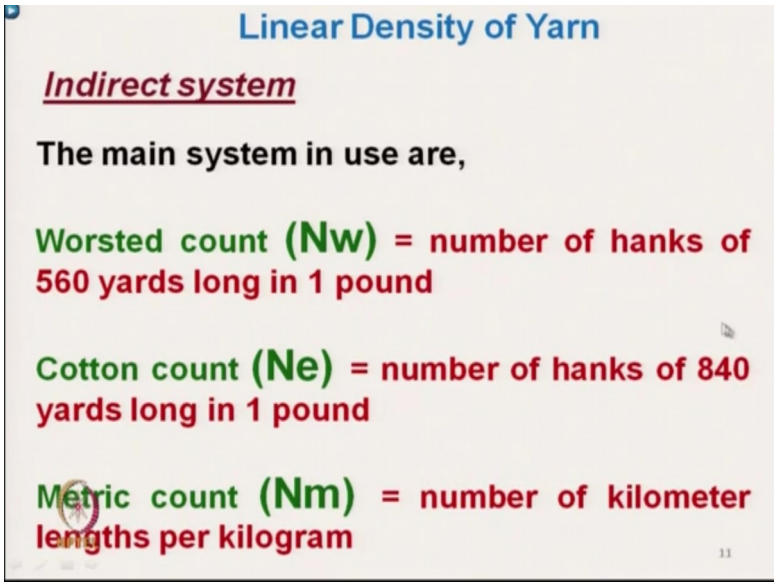

So, in indirect system there are other methods of indirect measurement. Worsted count Nw number of hanks of 560 yards in 1pound. So, for worsted system we do not make a hank of 840 yards here we used to make hank of 560 yards. Because worsted yards are little bit bulky in nature. So, if we actually make 840 yards then it will be little bit bulky and voluminous that is why hank system here. So, here the hank is 560 yards. That is why new counting system Nw is evolved.

Cotton system as we have discussed 840 yards. Another system is metric count; metric count where we use these terms yard and pound in terms of kilometer and kilogram that is the Metric system. So, number of kilometer lengths per kilogram, here what we do we take the yarn of one kilometer each, so such how many 1km yarns will be there in 1 kg that will be the number? Now we will see we can convert that actually transfer from one system to another system that we will discuss.

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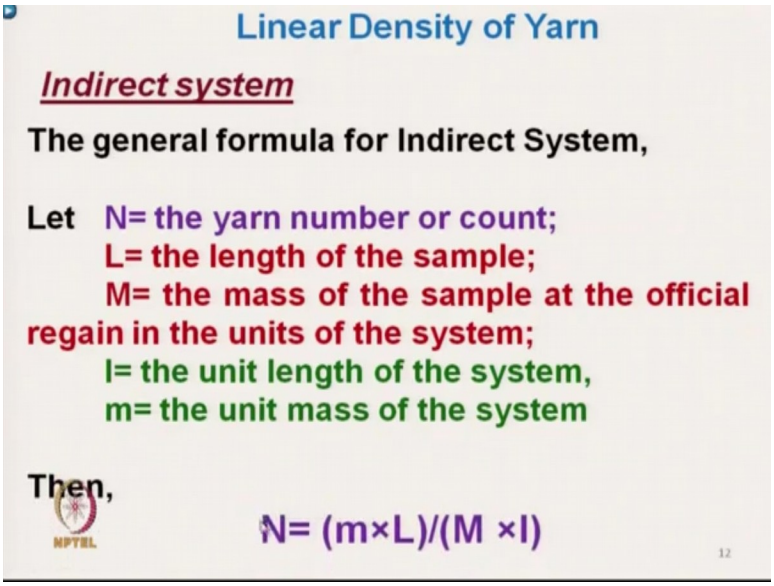

The General formula for indirect system is again N = yarn number or count of that system, L = length of the sample suppose we have taken certain length ok for testing is the length of the yarn and the mass of the yarn suppose it is 120 yards of yarn you have taken we have not taken the whole length taken only 120 yards of any length and mass of the yarn official regain in the units of the system in the same unit we have to take.

And l is the unit length of the system; m is the unit mass of the system because in direct system we have not used unit mass m. In most of the system we have seen it is gram 1 gram per something number of grams. So, here m is the unit mass system and this is the general formula this N unit of mass of the system, L is the actual length of the system, actual mass of the sample, unit of length of the sample.

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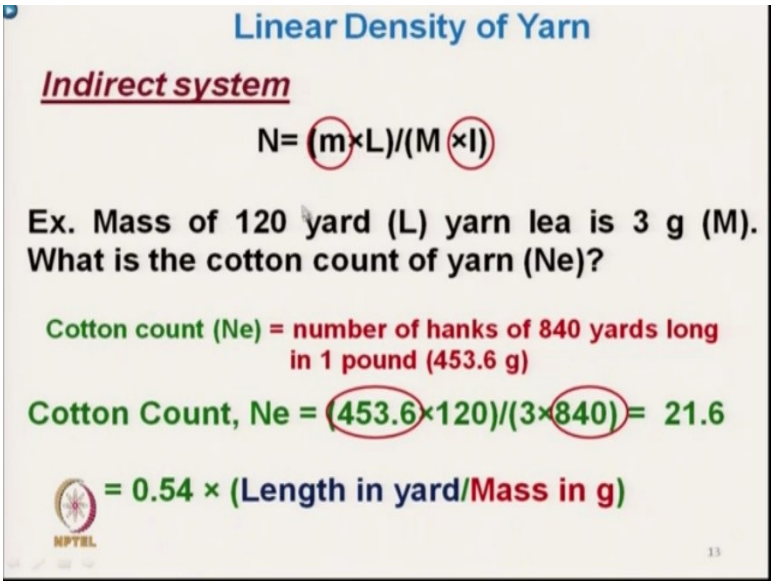

Now, Let us take one example here. Mass of 120 yards of yarn of yarn lea is 3g. So, we have taken mass of yarn and we have made lea and we have taken the mass it is 3g. What is the cotton count of the yarn? So, Cotton count Ne is the number of hanks of 840 yards long in 1pound that we have discussed. Now cotton count is using this formula here m is the mass of the; that system what is this 1pound. And in 1 pound we are trying to convert in same unit of mass, so here the mass of sample is 3 grams so you can convert this 1 pound to gram so 453.6 that is the gram.

And 120 yards we are keeping the length as 1 yard because it is the same unit as the count system so 120 yards and this mass of the sample M is 3g and length unit is 840 yards. In that way we can calculate the count in English count. So, English count is 21.6. So, what happened here we can see that this mass m is always constant 453.6 is constant and this l length is constant. If we take the yarn in a sample, if we take mass length of the yarn in yard unit and mass of the yarn in gram unit if we take that one then we can simply eliminate this term and we can actually use this constant term and that constant is 0.54 that is 453.6 by 840.

So, that means directly we can use 0.54 multiplied by length in yard divided by mass in gram. So in that case one care has to be taken we should always take yarn in yard unit and length in gram. Because yard unit in rapril normally you get the yarn length in yard unit also mass unit in meter also available in that case to change this factor ok if it is in mass unit, so if it is in meter unit then we have change this factor little bit so in that way directly, we can measure the yarn count.

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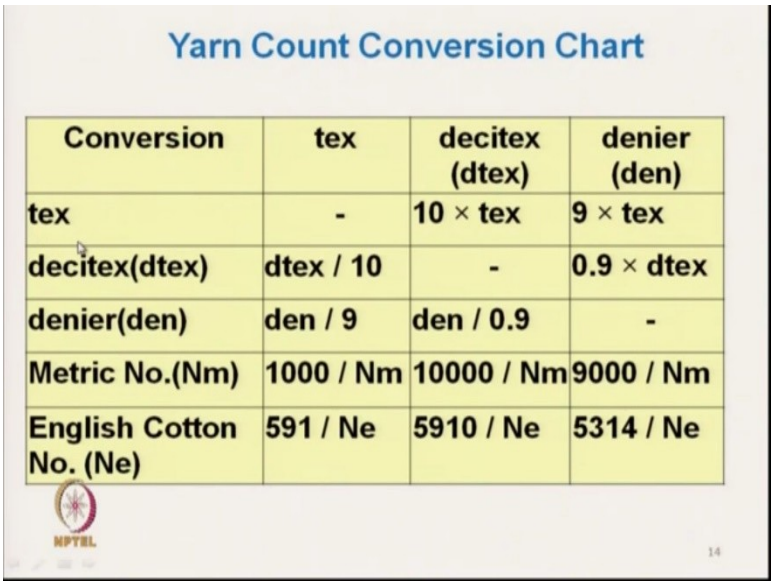

Now we can see how to convert one count system to another count system. This we can calculate but this table will give us direct count conversion system ok. Now this table we can just see from Tex to Tex it is ok directly it is a tex value. And if you want to take the tex value, tex to decitex suppose you have 1 yarn of say 10 tex yarn so what will be the decitex? 10 *10 it will be a 100 decitex. If we convert, if we want to know the denier of the yarn that means you have to multiply by 9 so 90 denier of yarn.

Suppose we have the value decitex value. Say 100 decitex, what will be decitex value so, the Tex value will be 100 /10, 10 tex value. 100 decitex what will be the denier. It will be 90, denier ok. Similarly suppose we have 18 denier yarn 18 denier fibre. So, what will be the Tex 18/9 so that will be 2 tex. In that way we can convert. Similarly, for a metric count suppose we have 100 Nm yarn, 100 metric count yarn. What will be the Tex value so it will be 1000/100 so, it will be 10 tex and then it will be 100 decitex and it will be 90 denier.

So, in that way we can simply convert and if you want to convert the English count to the other count. Suppose it is 10 English count then tex will be 591 approximately/ Ne 591, 59.6 Tex. So, in this way we can convert all the count systems. Now this 591 how this 591 came? It is a very simple calculation we can calculate we can just simply convert the mass and length units and you will get value.

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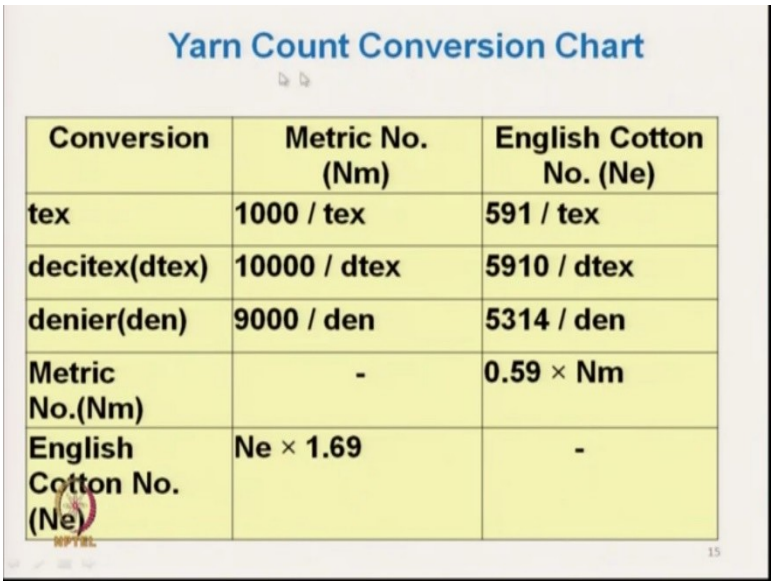

Similarly, it is conversion another conversion system is the tex to metric count. If you know the Tex then you can calculate the metric count. Earlier it was tex to other count, tex, decitex here metric count and English count. So, we can convert from one count to another count so if we know the English count you can get the metric count so in this way we can calculate.

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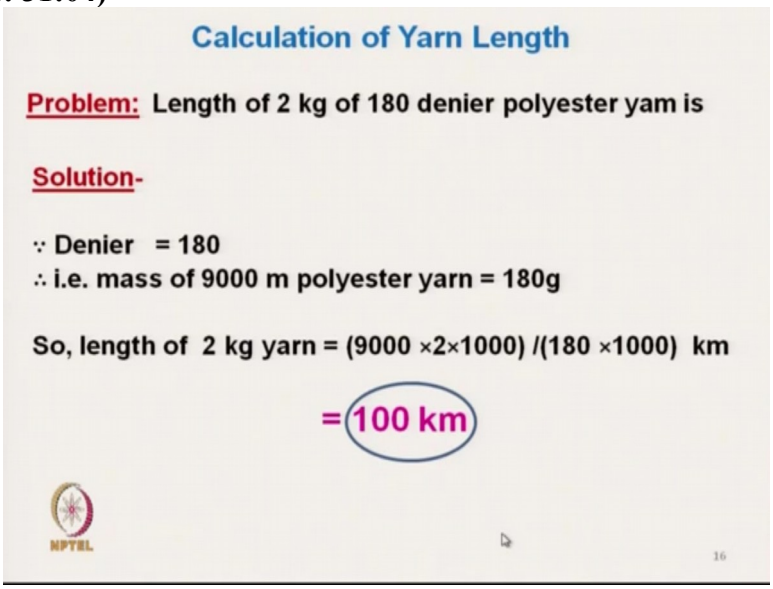

Now the use of these counting systems is that as though I have mentioned we need to know precisely the actual length of material, actual length of yarn in a consignment. So, the yarns are in the package, so the length measurement is not that easy we cannot unwind the yarn and measure. In that way counting system helps. Suppose the polyester filament yarn in a package is package is mass 2kg and its denier is known to be 180, denier.

So, for my production knitting or weaving or any other process for a particular requirement I need to know what is the length available how much length is available. So, this the say that one example I have 2 kg of 180 denier polyester filament so I need to know the length so I can predict whether it will serve my purpose or not it will be sufficient or not ok. Now denier is known here and mass of 9000 m of polyester yarn is180g if it is 180 denier, that means 9000m of filament we have 180g and then simply we can calculate the length.

So, the length of 2kg yarn is 9000 that is the 180gm becomes 9000/180 that is for 1gm*1000 this 1000 for 1kg yarn and this much kg yarn and for 2kg we can multiply by 2, so this total quantity 9000*2*1000/180 this term comes out to be in meter. If you want to have in km you again divide it by 1000, so that is how we calculate the total length of yarn. And if we know the length of yarn then we can actually plan our production ok. Suppose our production line needs the yarn of say 150kg so in that case I can tell 2kg yarn will not work. So, in that way 150 km yarn my production line product whatever oven fabric of knitted fabric depending on the air calculated.

Suppose my requirement is 110km yarn ok in that case if I take 2kg yarn then it will work so in that case I can precisely calculate how much weight how much mass is required how much quantity of yarn is required ok so that is the solution.

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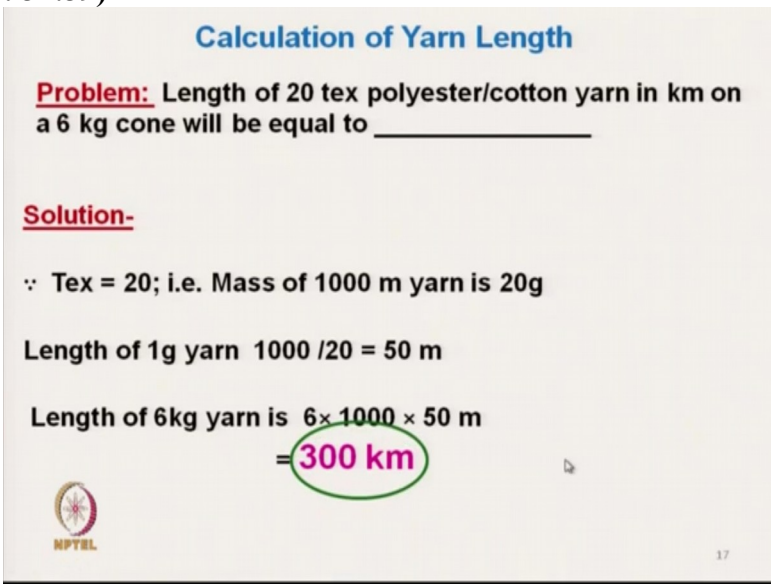

Next is the, another similar problem. Length of 20 Tex polyester cotton yarn in km of 6kg cone will be equal to? So, I have a 6kg cone. I need to know what is the length? So 20 tex is there so mass of 1000m yarn is 20g. Similarly way, we can calculate that 1gm yarn will have 50m ok. So,

6kg yarn will have 6 *1000*50 that is this much 6kg this much meter yarn and you can calculate the yarn it is 300 km of length.

So, this way we can calculate length of yarn from known mass or from length if we know length calculate the, what will be the mass. This mass also; this system also helps in other way. Suppose my production line needs a certain length of yarn. And we can calculate how much quantity because we cannot order yarn, we cannot purchase yarn in terms of length. But our planning department suppose after calculation suppose what we need this much length of yarn from there if we know the yarn count then we can calculate how much quantity of yarn required. So, this counting system helps in both the ways.

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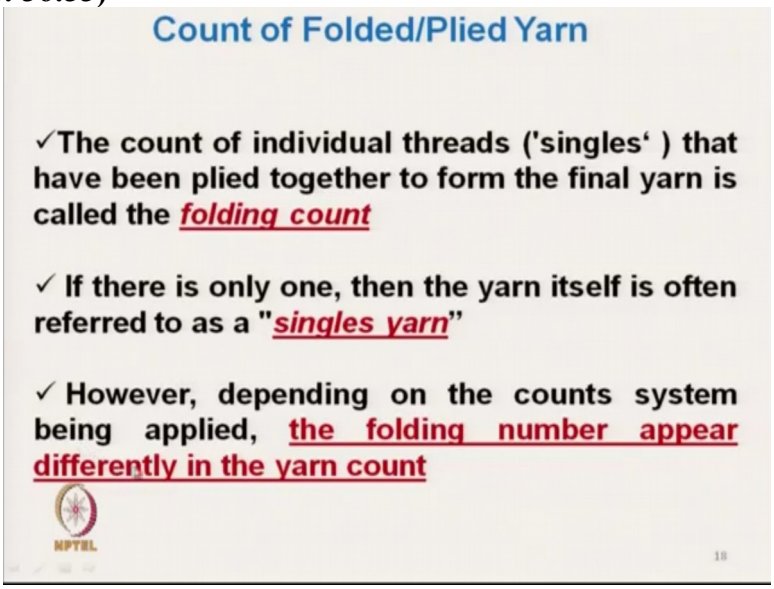

Now try to see how to calculate the count of the folded yarn. Folding and plying is very common practice in textile industry because in most of the cases we need the folded yarn ok that we must know how to express the; how to calculate the count of folded yarn. And if we know the; because folded count we can also measure by measuring the directly the count system but if we know the individual yarn count, so in that case we can predict what will be the folded yarn count.

The count of individual threads that is singles that have been plied together to form the final yarn is called the folding count. So, that means if we twist, if we fold a number of single yarn and then if we measure the count of plied yarn and then that will be called as folding count. So, if there is only one plied, then the yarn itself is often referred as singles of yarn. That is single count another is folding count.

However, depending on the counts system being applied whether it is a direct system or indirect system we can calculate or if it is that is direct system or indirect we can calculate the resulting count. But different counting system like cotton counting system, worsted counting system, or Spansil counting system the folding number how they appear it gets changed. The folding number appears differently in the yarn count system here. And here we should be very careful in which counting system it has been expressed.

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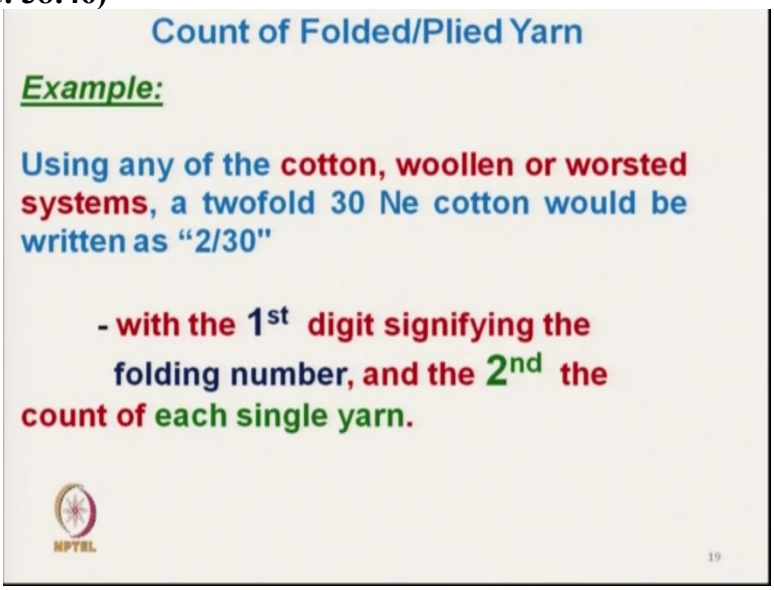

Using any of the cotton, woolen or worsted systems, so if we use a cotton system woolen system or worsted system, the 2 fold system 30's count, 30 Ne cotton yarn we can write as 230 ok, 230 means it is single yarn count is 30 and it is applied in 2 times ok, 2 threads are there. Similarly, 3 20's mean 20 single count yarn is twisted with the 3 plies, 3 folds of yarns are there where 1st digit signifies the folding number 2, 30's means, 2 is the number which is the folding number and 2nd digit is the count of each system.

Now the problem here is that this system it says that all the individual yarn count should be exactly same. Here the same yarn is twisted if it twists 30s count or 40s count in that case, we cannot express in this way 2 30s. If it is in cotton system or cotton system of expression 2 30s means 2 30 count yarn is being twisted. So, you will have certain resultant count.

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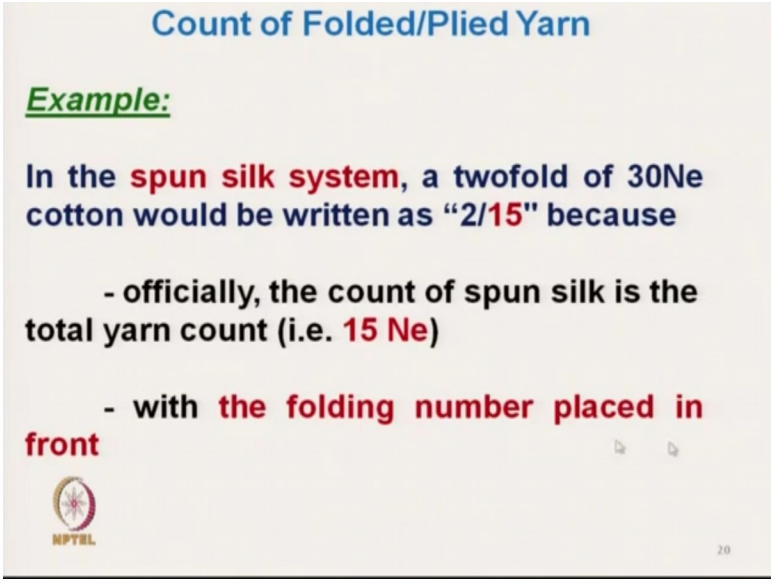

But this problem is actually eliminated in another way which is known as spun silk system. Just to, actually avoid any confusion. So, Spun silk system here a twofold of 30s cotton count would be written as 2 15 because officially the count of spun silk is the total yarn count. This is the total yarn count, 15 count okay. That is twofold of cotton yarn so if we see in the next section if we twist 2 30s count yarn the resultant will be that is any yarn the resultant count will be15. So here in this system 1st digit shows the number of ply and the 2nd digit shows the resultant count.

So, these counting system spun silk systems we can use in various actually use in wide application are there where number of yarns of different count, different nature can be twisted and we can express. That we will discuss.

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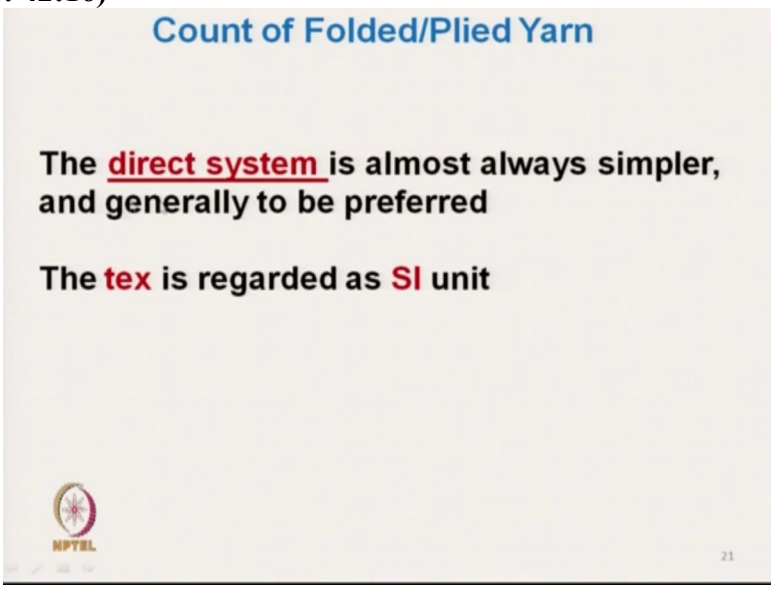

With the folding number placed in front and that total digit resultant count is in after that folding number is 2. The direct system is almost always simpler; so it is very simple and generally is to be preferred. Now in SI system it is a tex is regarded as the linear density as the expression of linear density in of a yarn. So it is a tex we do not normally we do not use any or any other method in the SI system. So, if we have yarn linear density in English system Ne or any metric system, in SI system we always have to convert it in terms of tex. That is the SI system internationally accepted system.

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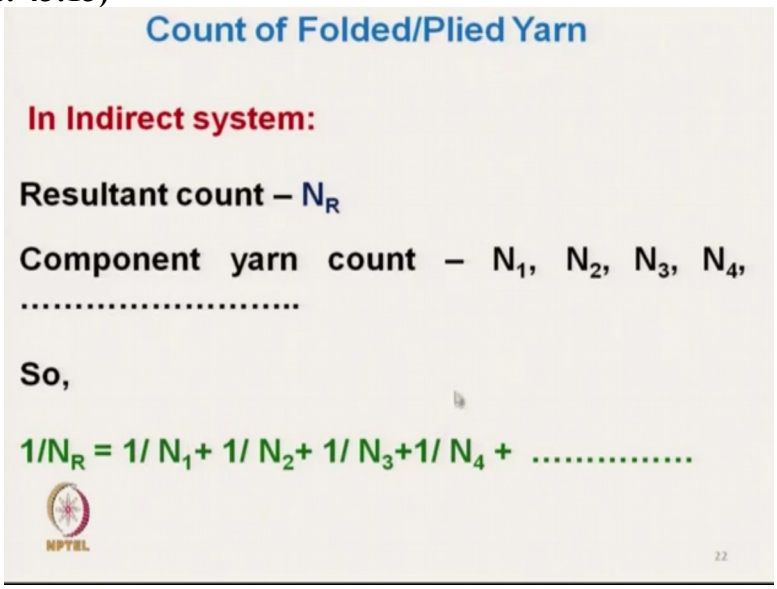

Now try to see the count of folded yarn. It is say resultant count in indirect system. Resultant count is Nr. So, Nr means length of yarn for a particular mass ok. That is the indirect system Nr. So, suppose the component yarn there are n number of components N1, N2, N3, N4, are the count of individual components ok. These are the individual components as first component N1 and second component N2 in this way. Now we want to know what will be the; if we actually fold together all these yards or plied together.

And if we twist together, we would like to know the resultant count, resultant Ne of the yard in English system any indirect system of the yarn. Here the assumption is that during twisting or folding there is no change in actual length of the yarn. That assumption is there. But if at all the contraction is known then we can actually calculate the actual count by actual correcting the factor using correction factor.

So, the resultant count is the reciprocal of the addition reciprocal of the count. 1/Nr = 1/N1+1/N2+1/N3+1/N4+ in this way directly. Simply we can use. We can actually derive this formula also but it is a simply it is a simple derivation we can use this formula of count of folded yarn.

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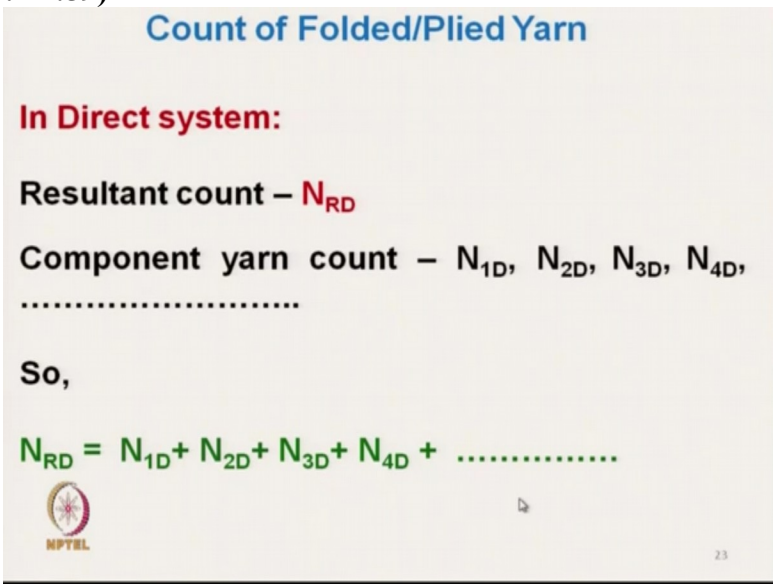

In direct system it is a simple one because it is a mass per unit length. Now if we fold say 2 yarns the length is fixed mass will be simply added. So that means in direct system the count of folded yarn is simple addition of individual count. So, Nrd ok that is the resultant count in direct system, individual component 1d, 2d, 3d like this so, this is a simple addition ok. Suppose 1 yarn of certain length has got say mass of x. Another yarn of same length has got mass of y then the resultant yarn of same length will have mass of x+y. In the same way it is simply added ok.

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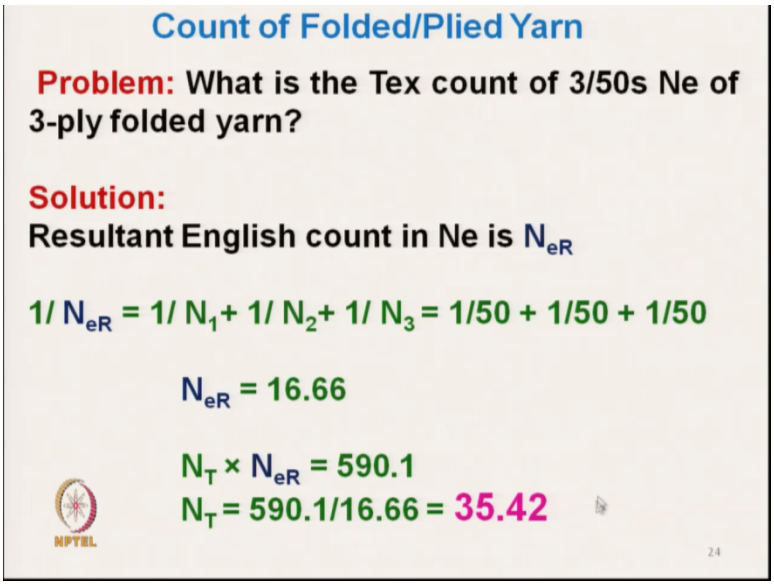

Now let us try to solve few problems some problems. What is the tex count of 3 50s Ne of 3 ply yarn, 3 50 Ne yarn. So that is the folded yarn's count you want to measure. This is English system of expression that means the individual Ne count is 50 and plied 3 times ok 3 ply. So, resultant count in English system first we have to calculate so the individual yarn count is 3 50's, so, resultant yarn count using the earlier formula of folded yarn 1/N1 +1/N2 + 1/N3.

So, this is equal to 1/Ner, resultant count of English system and the resultant count will be 50/3 that is 16.66. And using the earlier table we can get the resultant count in tex system. Here it is asked the count to be in tex system. So, we know Nt *Ner = 590.1 approximately it is 1/4th. So, in that case Ne is known, Ner is known so we can calculate Nt. So, 590.4/16.66 is coming out to be 35.42 Nt. So, for 3 50s yarn the English count yarn the tex value is 35.43 ok. In that way we can always convert. This is the answer.

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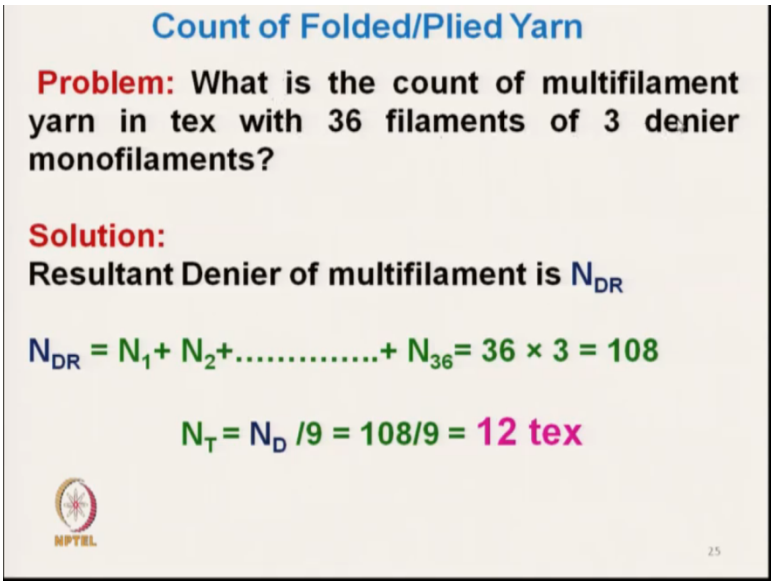

So, we can see next sum. What is the count of multi filament yarn in tex with 36 filaments in the multi filament mono filament of 3 denier monofilaments. So, each monofilament has got 3, denier. Such 36 monofilament are there to form that multifilament ok. So here the count system the linear digit system is in direct system. And such that 36 filaments are there that means it will be 3, denier will be added 36 times. So this is the resultant denier of multi filament is N DR ok.

So, this is count number in denier of resultant yarn. So, N DR =N1+N2+N3 up to N36 and all the counts are same 3 counts so it is multiplied by 36 means 108 denier is the denier of multifilament. And we can simply convert this denier to Tex by dividing with 9 so it is coming out to be 12 Tex. This yarn is converted to 12 Tex. Although it is very simple but the application are wide. So, we can always convert this term the people would like to know in terms of Tex. Just for comparison we may get the yarns or filament in different count system. But people would always like to know in standard system. Just for comparison ok. This is the 12 count,

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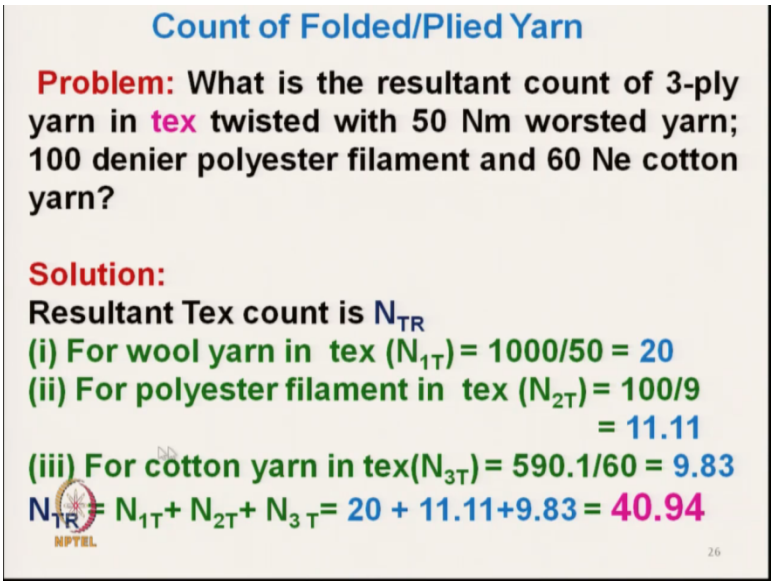

Another system is that is this problem. This is the practical problem and which we actually face in day today industry ok application. It is not that in multi folded yarn the idea is not always to get a thicker yarn or to get some even yarn or ok stronger yarn. Some time we try to ply to get proportion certain blank proportion or certain special characteristics. We sometime ply the filament with the staple yarn ok. Polyester with wool, polyester filament with cotton filament cotton staple yarn like that. So, cotton yarn with polyester filament or nylon.

These type of combinations are required in many applications particularly in technical applications. So, we must know how to calculate the resultant count. So, what is the resultant count of 3 ply yarn in tex twisted with 50Nm worsted yarn? So, one component is worsted yarn of 50 Nm. Next component is 100 denier polyester filament ok and then 60Ne cotton yarn. So that is the combination. This polyester, cotton, wool or wool blend whatever may be this is the combination.

We would like to know what is the resultant count in tex. So, here the resultant count in tex in N TR. So first here we have to first stake is that we have to convert individual count into different count into particular single count system. Here what we have done to a count system which is required, Tex system. It is not always necessary to convert into a required system. We can convert into any other system. And finally, we can convert. The resultant tex count is Ntr.

So, for wool the count was 50 Nm. From the earlier table conversion table, we have seen tex is tex and Nm conversion was 1000, so 1000 by 50 it has become 20, 20 tex is wool yarn similarly for polyester filament it has actually given in denier term. So, the denier was 100, denier

polyester. So, the in tex the polyester filament was 100 by 9. So, it has become 11.11. So that is the tex of polyester filament.

Now the 3rd component is the cotton it is 60 Ne cotton yarn. The third component again we have converted third component into tex system. So, 590.1/60 it has become 9.83. Now we have got 3 different yarns of same count first we have to convert it into same count then we are trying to ply apply the formula of plying and here again the assumption is that there is no contraction. So, then we are applying the formula of folding.

So, the folding formula for direct system as we have converted into direct system so, it is always a good idea to convert to any of the direct systems. That will help us in just simply adding. So, 20 tex + 11.11 tex + 9.83 tex so if we add together is coming out to be 40.94 tex. So that is the required count ok. This type of problem is always faced in industry so we can simply calculate ok. This is the answer.

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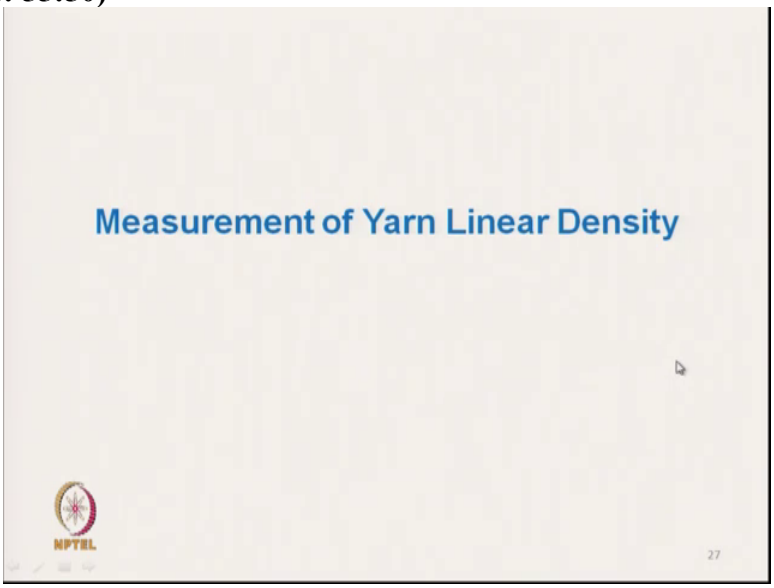

Now in the next segment we will start the measurement of yarn linear density, till then, bye. Thank you.