Evaluation of Textile Materials
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Lecture-28
Evaluation of Yarn Twist (contd…)

Hello everyone, so we will continue with the topic twist what we had discussing is that the twist factor ok. So twist factor we have discuss 2 different systems one is in direct system another is indirect system. Now let us try to solves some numerical very simple numerical we will try to solve here.

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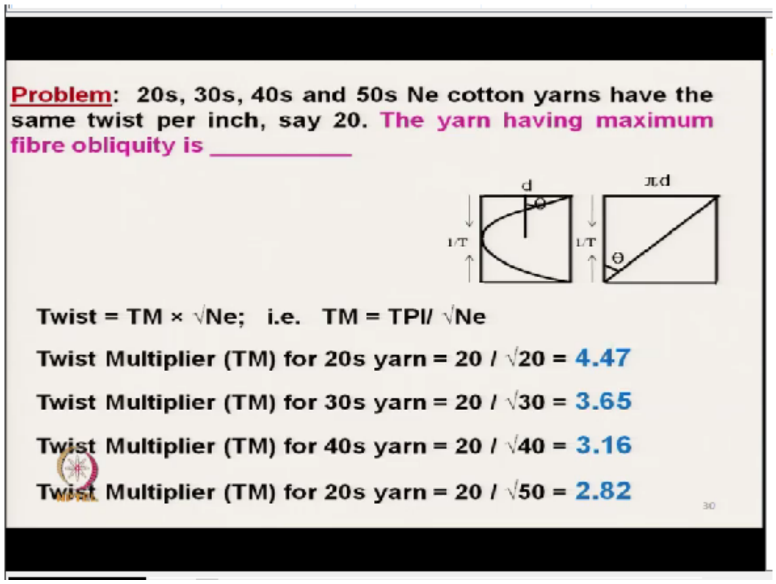

Now this is very simple problem, we have say 4 different types of yarns 4 different yarns of different count ok 20s, 30s, 40s and 50s Ne cotton yarn have same twist per inch same twist say 20 20 twist have been given with the all this yarns ok. The yarn having maximum fibre obliquity is which yarn will have maximum fibre obliquity. This is the question ok, now fibre obliquity means the theta we are talking about the theta.

And tan theta is proportional to the twist multiplier and here if we can measure the twist multiplier of all these yarns and the yarn with maximum twist multiplier will have higher highest fibre obliquity ok. So this is a equation we know and we know the equation here twist per inch equal to twist multiplier* under root Ne. So, TM we can calculate by the formula TPI/under root any, so here TPI is given for all the yarn it is fixed it is a 20.

So, we can calculate twist multiplier for different yarn, so twist multiplier for 20s yarn is 20/under root 20 it is 4.47, for 30s yarn it has become 3.65, 40s yarn it has become 3.16 and 50s 2.82. So that means the yarn forcer yarn if we impact same twist it will give as the higher twist multiplier that means as the yarn diameter increases or yarn becomes forcer. If we impart the same twist level the twist angle will be more, that means in among this yarns this yarn of 20s is hard yarn more.

And softest yarn is the 50s count yarn because it has got less least twist multiplier although amount of twist is per unit length is same.

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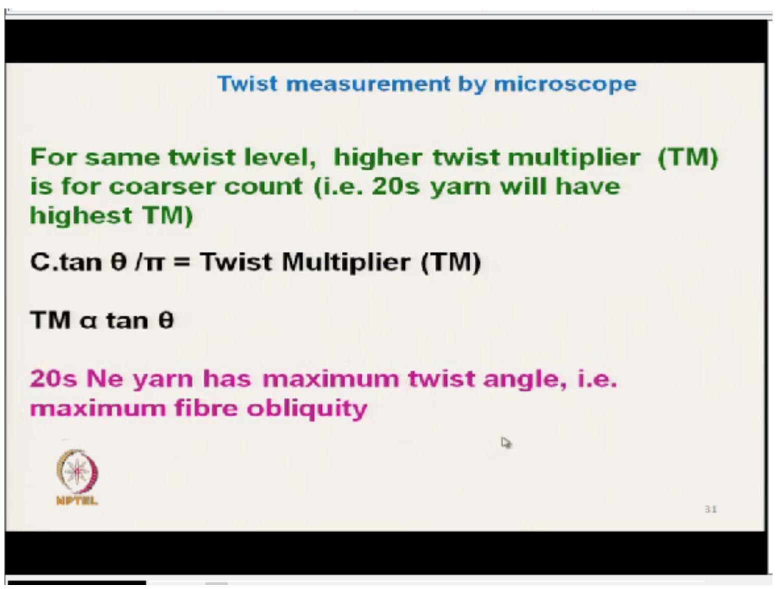

So, the conclusion is the for same twist level higher twist multiplier is for coarser yarn ok, so, this is you have seen so, 20s any yarn has maximum twist angle, so maximum fibre obliquity this is the answer.

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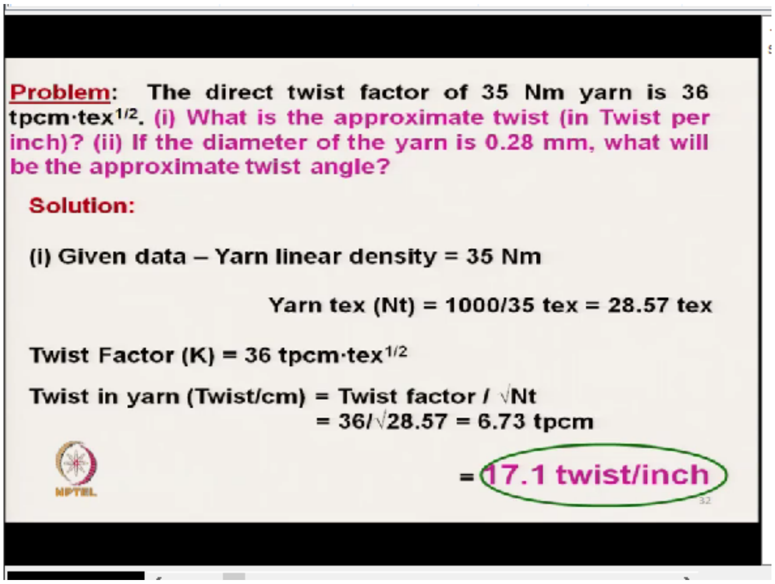

Now next another problem here is the direct twist factor of 35 Ne yarn is 36 tpcm.tex the power 1/2 this is the direct twist factor the yarn count is 35Nm. But here the unit is giving in turns of tex, so we have to convert this 35Nm to tex. And the thing is given what is the approximate twist in terms of twist per inch ok. Here it is given twist per centimeter it is asked the twist per inch, so this is position part I, next is that if the diameter of the same yarn is 0.28 millimeter what will be the approximate twist angle.

So this is the 2 part the solution is that the theta given the yarn linear density is 35Nm. So let us convert it to tex it has become, so tex is relationship is 1000/Nm. So 1000/Nm means 28.57tex, tex we have got and the twist factor is 36 is given here. And the equation is that twist, twist/centimeter equal to twist factor/ under root any, so you can calculate the twist/centimeter in the yarn. So what is twist/centimeter?, it has come out with 36/ under root 28.57.

It has become 6.73 and that is the twist/centimeter and if we multiply it by 2.54, so it will be here twist/inch. So if the answer is that first question is the yarn is having twist of 17.1 twist/inch.

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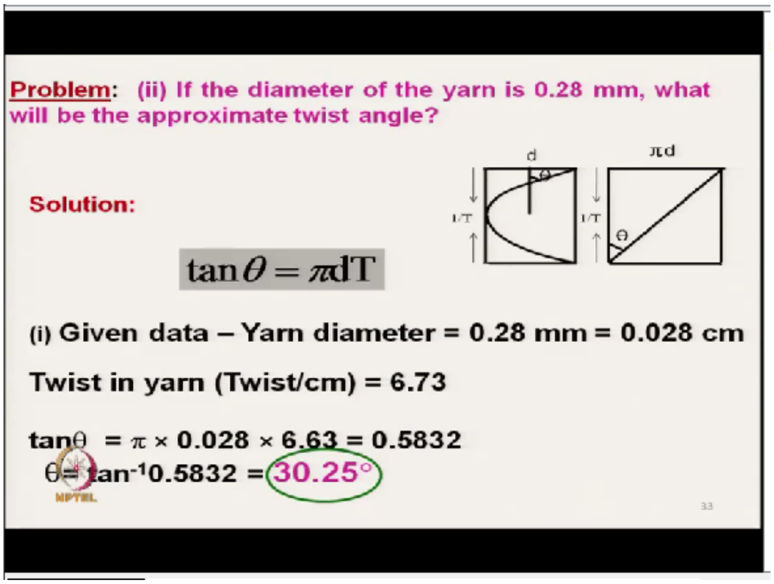

Now second problem is that if the diameter of the yarn is 0.28 mm what will be the approximate twist angle?. Now the solution here is that the formula we know tan theta equal to pidT here pi d is known given 2.28 millimeter and d is known that we have calculated earlier. So, diameter we have converted in turns of centimeter because it is a twist/centimeter was given. So, twist/centimeter we have 6.73twist/centimeter.

So, tan theta we have we can calculate pie*diameter 0.028*twist/unit length twist/centimeter. So, it is coming out to be 0.5832 and theta is tan inverse 0.5832 it is coming out to be 30.25 degree. So, that is the twist angle of the yarn. So, in this way we can solve different problem related to twist in the yarn ok these are very simple and if we understand the concept of twist multiplier we can solve many problems ok.

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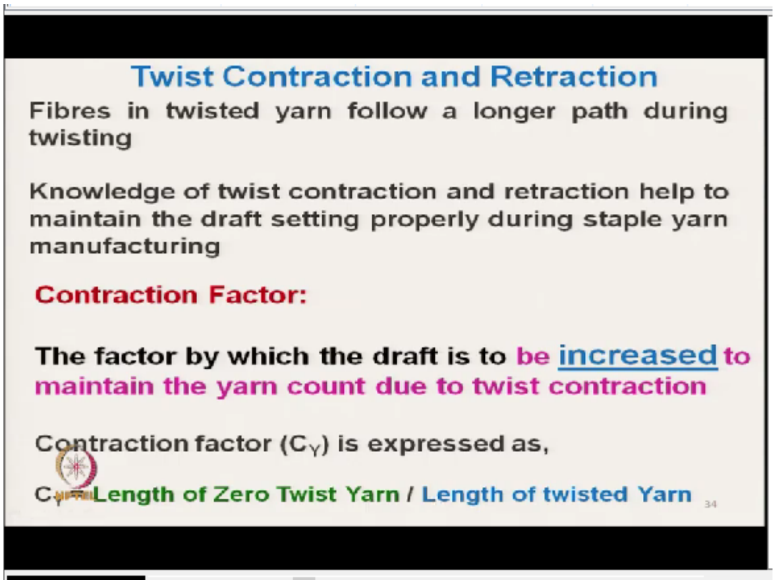

And this is very actually edge of practically it is used in industry ok. Now another terms other terms which is very widely used in industry and people normally get confused with this term. One has to be very careful in using this 2 terms and where do you use this terms, this terms are related to twist but it is a twist contraction as the yarn gets twisted like this is the fibre.

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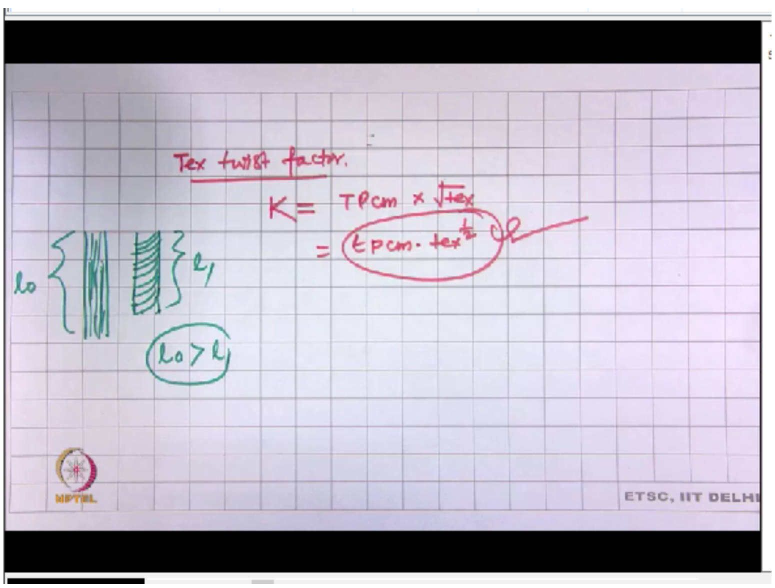

This is the strand and it is twist less and when it is twisted the length suppose it is a length l0 this length will get contracted because of the implined helix of the fibre ok. So this is the l1 l0 is more than l1 that is the contraction, this is the contraction. And the knowledge of this twist contraction and retraction helps in maintaining the draft in the spinning process properly. So, you must know the amount of contraction at least rough idea we must have, so that we can properly set the draft.

Otherwise, if we set the draft suppose we want to have yarn of say 30 tex ok, 30 tex say from robbing of say 900 tex. We have a robbing of 900 tex and we want to get 30 tex yarn, now in that case in the ring frame and drafting system we have set the draft 900/30. So 30 draft we have saved**,** so ultimately what will happen if we set 30 draft, so the it is not the 30 tex which we are getting. It is not the tex of the final yarn, it is the tex of this strand which is coming out from the (()) (11:04).

But finally this has shorten to l1 that means it has contracting and the tex means the unit that constant for constant mass what is the length?. That means the mass is constant the length if length is actually contracted that means the tex value final tex value will be more than this value. It will be somewhere higher than this tex value that is why we have actually done some wrong calculation and it will be set suppose 31 tex or something 31, 32 tex somewhere higher than this.

And that is due to that we have not taken into consideration of contraction we do not have any knowledge of contraction. So, if we have a knowledge of contraction then we can actually set draft of little bit more than this higher draft suppose we will draft more than this draft which may be say 31, 32 draft we will set. And if we set the draft more than this the fibre tex the strand takes will not be 30 it will be less than 30 it will be say 29 or something tex.

So, this tex if we get then after contraction it will come out to be close to 30 tex which is our target yet here. So, that is why the twist contraction is concept is extremely important for the setting of draft. So, contraction factor there are 2 factors one is contraction factor. The factor by which the draft is to be increased to maintain the yarn count due to twist contraction, that is the and contraction factor the Cy is expressed as the length of zero twisted yarn/length of twisted yarn.

So, that is why, so zero twisted yarn and length of twisted yarn and length of twisted yarn if it there is noticed if there is noticed in the yarn, so contraction factor will be it will be 1. And if there is a infinite suppose it is a twist search that it has the contracted, contracted and contracted ultimately it has become 0 theoretically. So, the contraction factor will be infinite.

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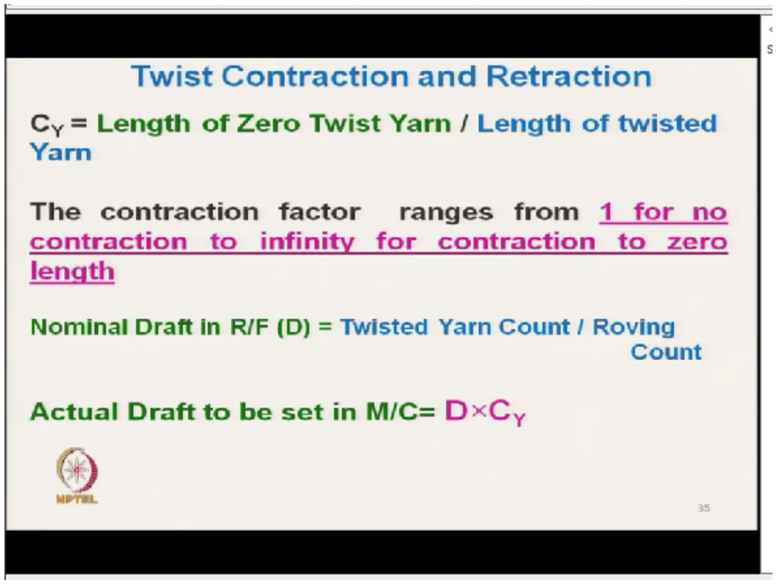

So, the range of contraction factor is that it is a from 1 to infinity. So, that is how we can measure, so it is starts from 1 when there is no contraction ok. And the setting of draft in the ring frame is that the nominal draft in the ring frame is twist twisted end count/roving count that is how we set the nominal count. And actual draft which we have to set it is basically it is a more than that because ultimately yarn count is we know that is a count it is required ok.

Here it is a indirect system, in direct system roving tex/yarn tex. So, in that way the actual draft will be we have to multiply the nominal draft/the contraction factor. So we must have knowledge of contraction factor, so that we can set the actual draft in the ring frame.

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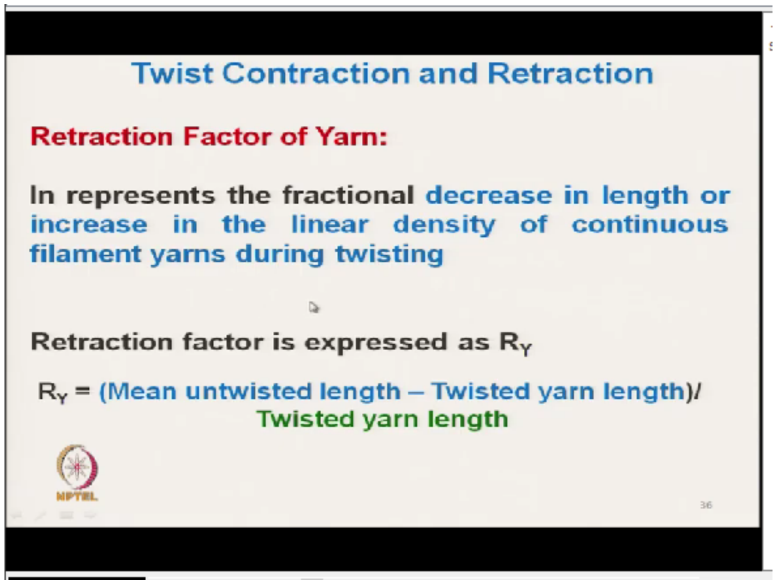

Similarly the retraction factor is that it represent the fractional decrease in length or increase in linear density of continuous filament yarn during twisting. So this retraction factor is normally used in filament, so this retraction factor is normally used in filament multi-filament. So, it is a fractional decrease, so mean and twisted length by twisted length/twisted yarn length that is the **re** retraction factor. So, we must have knowledge of contraction and retraction.

Then we can actually set the draft proper draft or proper twist level we can set. Because retraction factor is important because if we know the twist if we know the retraction then we can calculate the length of the filament, otherwise the filament length calculation will be wrong. So, the calculation is important here, but in stable yarn it is the draft, so the differences that stable yarn the length calculation is not done by the twist there it is done by the delivery rate ok.

But here it is a length which we have already produce the filament twisted and before twisting we know the filament length. And if we know the retraction factor we can actually predict what will be the actual length of twisted filament ok.

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Now we will discuss the techniques of measurement of twist ok. There are different techniques available, first is that direct counting method ok.

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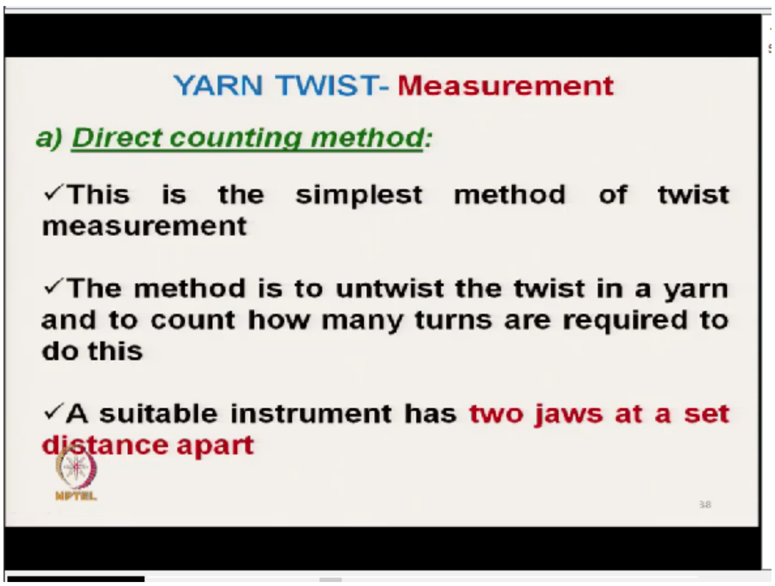

This is the it is the simplest method where we actually we untwist the yarn, the method is to untwist the yarn whatever twist available in the present in the yarn. And the to count how many turns are required to make it zero twisted. So, if we have to keep on untwisting till it is become zero twisted ok. A suitable instrument has 2 jaws at a set distance ok the distance is known.

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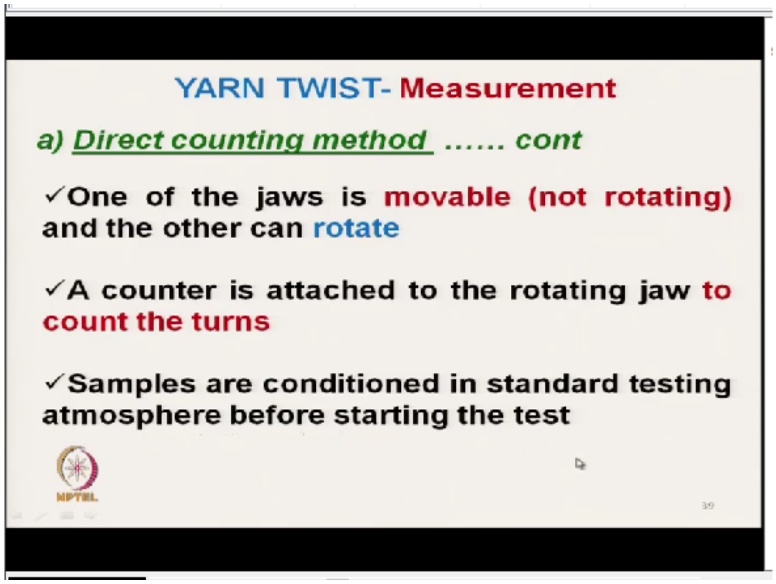

And out of this 2 jaws 1 jaw is only laterally movable it does not rotate. It moves to set the required test length. And another jaw which rotates just to untwist the yarn up to the level of zero twist ok. So a counter is attached to the rotating jaw just to count the number of turns samples are conditioned in the standard testing atmosphere before starting the test.

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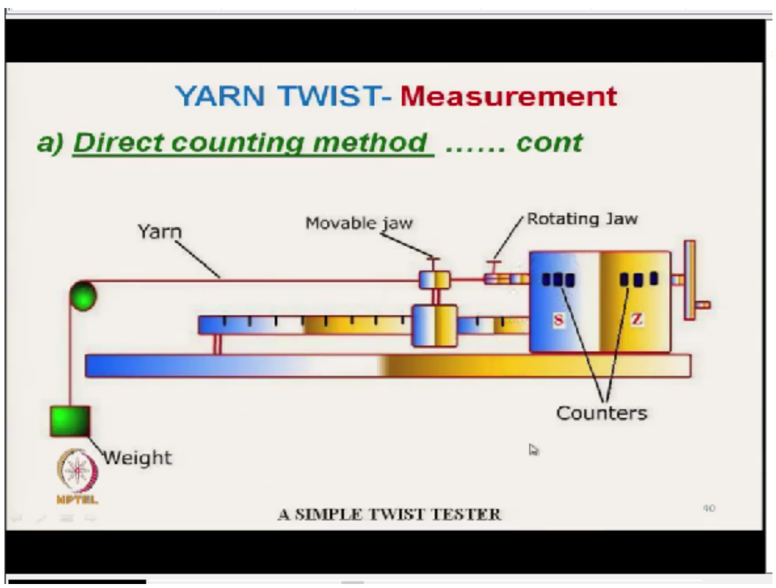

Now this is the instrument where this is the movable jaw which moves laterally ok. And the scale is there which determines the test length suppose we want to test at say 10 centimeter length or say few inch length ok 10 inch gauge length. So, we move this jaw, first what we have to do we have to fix the yarn end at the rotatable jaw ok that we are fixing, then we set the movable jaw the length test length we are setting after that we start the count this untwisting by rotating the handle ok.

And where depending on the direction of twist we can use the counter for s twist and z twist and number of turns are counted. It is a straight forward and where a standard dead weight is placed hang. Because to remove the undue creep in the yarn ok to make the yarn straighten then the jaws are tighten and then start rotating.

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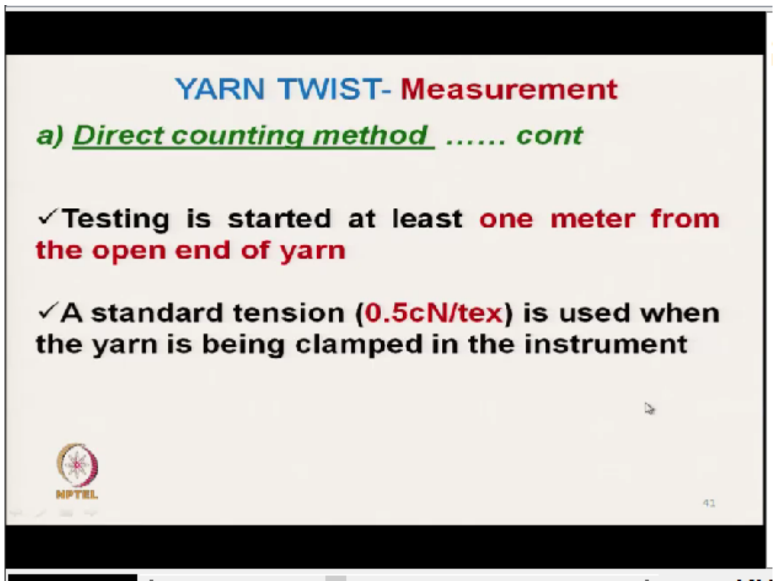

Now the testing is started at least 1 meter from open end of the yarn that we have discussed during sampling we have to take the yarn at least 1 meter from the away from the end. Because at the end if we take that may give wrong result because of the torque present in the end those at the end it will get untwisted standard tension it is a 0.5 centimeter/tex is used. So, when the yarn is being clamped in the instrument.

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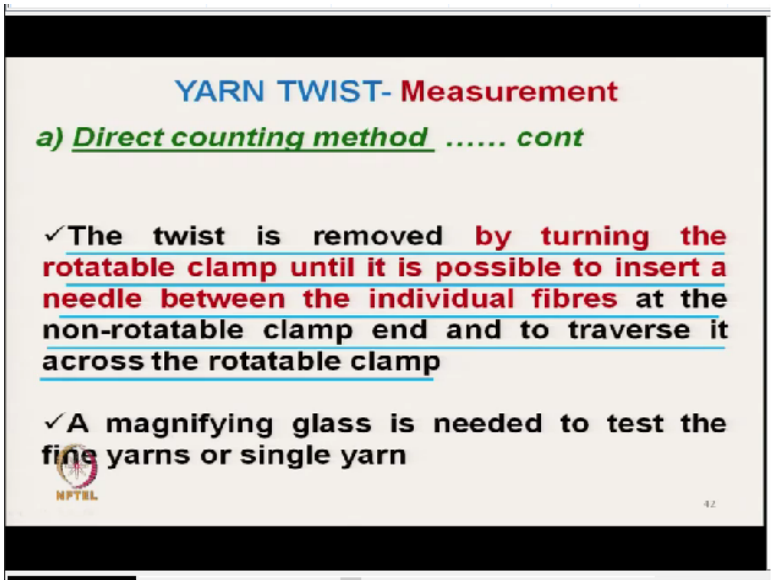

The twist is removed by turning the rotatable clamp until actually possible to insert the needle ok. Now the yarn when it is twisted, in the twisted yarn this is the twisted yarn that depending on the direction of twist.

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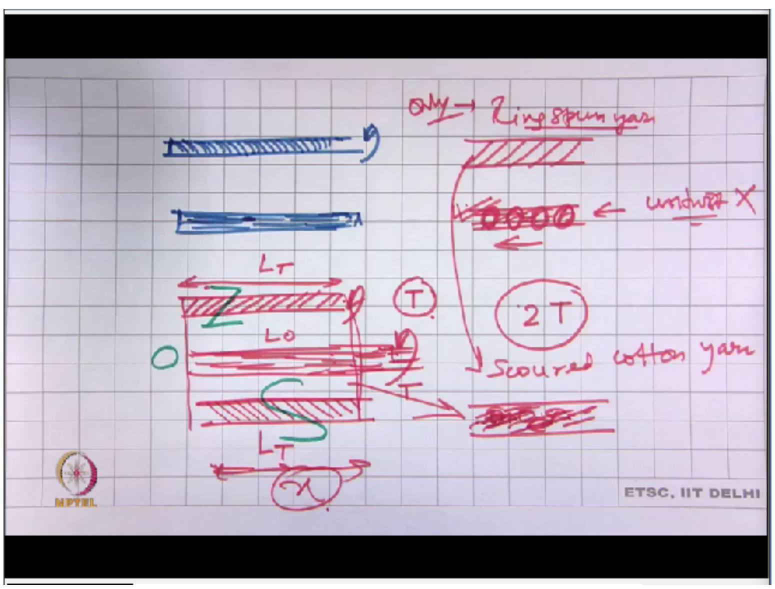

If we untwist this one at ultimately to the fibres will become twist less and will stop them. And then will have will actually insert some beam and eve the pin moves smoothly that is the point where will stop. And that we have to do by trial and error method and once the individual the pin moves then the non-rotatable the twist is removed by turning the rotatable clamp until it is possible to insert a needle between the individual fibres.

So, individual fibre between the individual fibre we have inserted the needle at the non-rotatable clamp. So, other side we have inserted and the traverse it across the rotatable clamp that we will try to traverse, if we it moves smoothly then there will be it will be twist less. In that then we can count the number of twist, so we can use a magnifying glass ok just to see the alignment of fibre it is for single yarn we need the magnifying glass just to see the fibre. But for double end we do not need because we can simply pass the needle ok.

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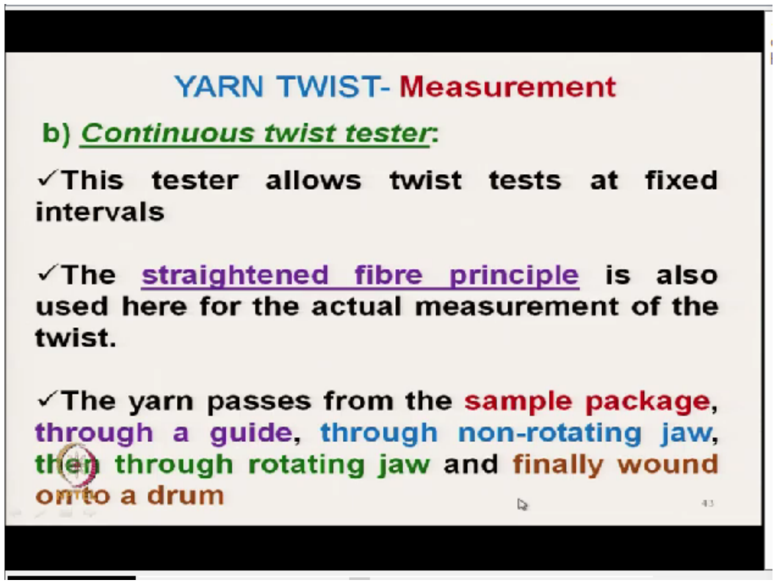

Next is that continuous twist tester, the principle is exactly same here. But the difference is that here the yarn directly from the package will be tested and it will be again after testing again it will be winding on the another package. It is a continuous forces but it is we cannot see continuous intermitted forces. But the strand of yarn is continuous, we do not take the cut yarn ok, the straightened fibre principle is also used here.

So, we use the same principle as we have used earlier. The yarn pass from it is passes from the same package through a guide, through a non-rotating jaw, through a rotating jaw and finally it is winding on a package on a drum.

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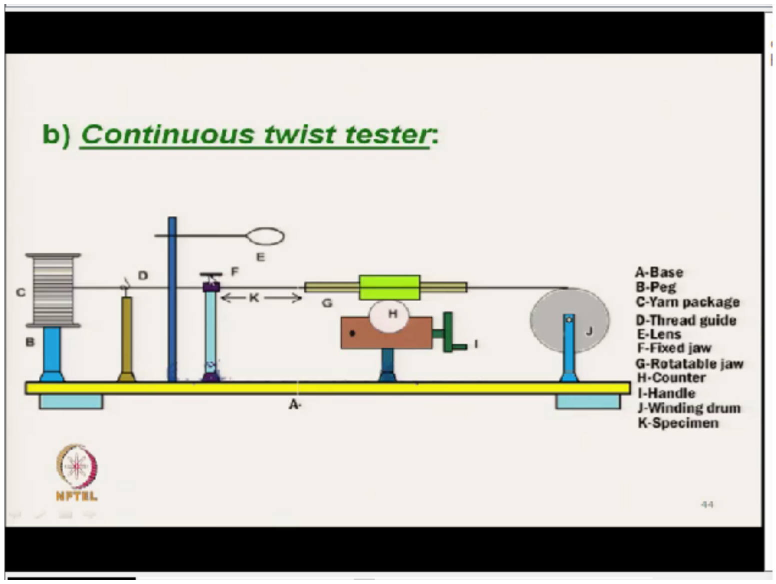

So, this is the principle here this A is the it is a base ok here it is a base of the instrument B is the peg on which we place the bobbin, C is the yarn package and this is the D is the guide yarn guide. E is the E here E is the lens magnifying lens we can see the whether it is a fibres are parallel or not and here F is the fixed jaw this is the fixed jaw here. Here the thing is that fixed when earlier case we have seen the fixed jaw can move laterally.

But here the fixed jaw is a fixed it does not move laterally it, so this is the fixed jaw and the rotatable jaw. This all it can move laterally and also it rotates here. So, rotatable jaw is the this is the G, G is the rotatable jaw. H is the counter it counts the number of turns, H is the counter, I is the handle we can just rotate the untwisting take place. J is the winding drum and K is the specimen, this K length of K is actually adjusted by moving this movable jaw ok. It is movable as well as rotatable jaw.

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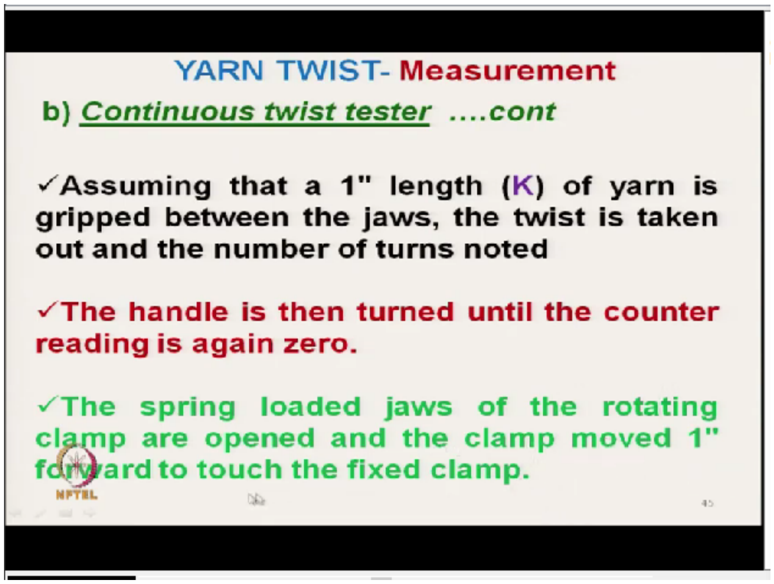

Assuming that 1 inch length k the yarn is gripped between the jaw the twist is taken out and the number of turns noted. So, if we test 1 inch length then simply by untwisting the directly the number of turns we can get the twist/inch. The handle is then turned until the counter reading is again zero ok then and, so after twisting then again we will have to bring it to 0 for the next test. The spring loaded jaws of the rotating clamps.

So, the clamps are spring loaded are opened and clamp move to the other clamp this rotating clamp move to forward to touch the fixed clamp. So, here the system is that this is actually it is moving yarn, so that it is earlier there was a testing was there. Then it is actually this clamp is moving towards the fixed jaw. And with the it is when once it is touching that will there is no yarn that in that case then we clamp it at the rotatable jaw.

An after clamping again we move **to** towards the right side, so that the required distance is there in between this jaws. And at during that time this jaw F this jaw it is loose, so that yarn is unknown from this package C. And the specified length K is once it is rest then we start this jaw the movable jaw. Then it is tighten the jaw is tighten spring loaded tighten and by the time once it is moving here.

The yarn is continuous yarn, so this there will be slackening yarn that is slackening we can manually wind again ok. So, after that winding that the specimen is ready for testing then we will start the unwinding and measure the twist.

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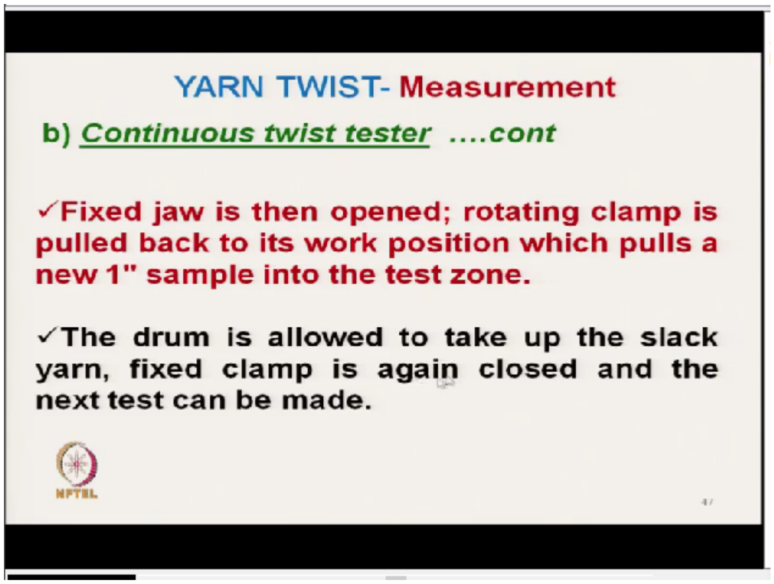

So, the fixed jaw is then opened rotating jaw clamp rotating clamp is pulled back to the working position with pull which pulls one inch new test sample. And the drum is allowed to take up the slack yarn ok fixed clamp is again closed which is now ready for the next test ok. So this way this continuous testing take place for say from one package we can test very quickly a number of test ok.

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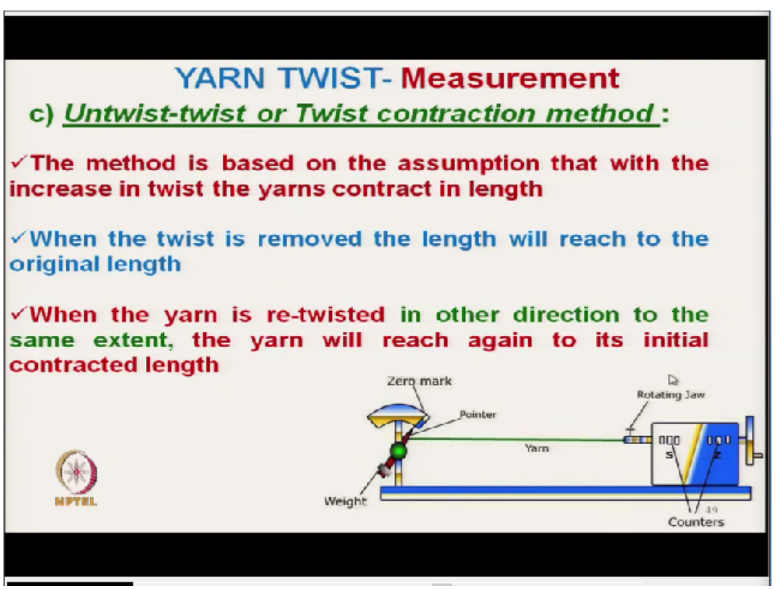

Next principle is it is called untwist-twist method, so untwist-twist method or another term is it is called twist contraction method. So, this is the system where the knowledge of twist contraction is being used, because here the principle is that initially the yarn is twisted. And it is assume that yarn whatever length of yarn twisted length of yarn LT it is less than that of the untwisted yarn. Now once we untwist the yarn, the yarn becomes fibres become parallel the yarn length is (()) (29:21).

So, L0 zero twisted length, now after this zero twisted length it has become zero twist then will not stop here will keep rotating that jaw. And the yarn will be twisted in other direction. So suppose this was in this twist was in Z direction, here it is a zero twisted no twist and here then it will be S direction will keep continuing the twist twisting till the initial length is reached. So this was the higher length initial length this length is same length.

So, this is become LT, so what happened here the assumption is that the twist the during untwisting the length is in twist. And suppose you are giving the twist T here, so we are rotating it is to have, so T turns we are rotating here. And if we rotate the same turn T the yarn will contract again to the same extent, that is the assumption here this is actually for most of the stable yarn.

This is this works basically because here the during twisting in other direction it again gets contracted ok. So that means what we are doing we are imparting the double the twist 2T twist where imparting 2T turn we are imparting. And then we can do calculation to get the twist, so if we know the length say x length. So, for x length, so this total turn we are if we know and if we divided by 2 that will give as the actual turns per unit length ok.

So here the system is that this is the pointer, pointer with certain minimum load of tensioning and the pointer is in the yarn length is selected in such a fashion that this is the length here that the pointer it the yarn is pooled. The point has being poled by the yarn, so that it comes to the zero segment zero position it is a zero mark it has rest, pointed is inclined and the yarn is under tension of that this dead weight some minimum load is there ok.

Now what happened if we start untwisting the yarn then the yarn gets extended then pointer will be vertical. Pointer will never come in other direction because the yarn is slack and this is the condition here and in between when the pointer is straight after that may be certain at a certain point may not be immediately after a certain point steel if the twist is there.

The yarn will become slacken here then will start will continue rotating this handle in the same direction. And after that after zero twisting when the here we will not be able to actually point out the zero twist condition. But if we continue after it crosses the zero twist condition then yarn will again start contracting. So and we will continue rotating it till the pointer rest to the zero position which actually shows the initial length.

It has rest to the initial length LT as we have seen, so this method is based on the assumption that with the increase in twist the yarn contract in length. When the twist is removed the length will reach to the original length ok, so origin zero twisted length. And when the yarn is again re-twisted in the other direction that means we will continue rotating in that other direction to the same extent the yarn will reach again to its initial contracted length that is the contract assumption.

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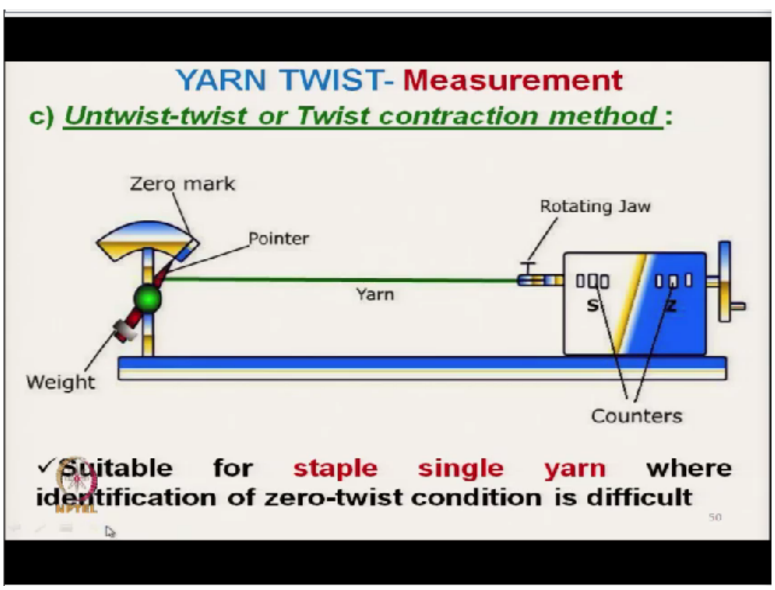

And suitable for staple yarn, so we normally do not use for filament yarn because filament yarn twist is very simple measurement we can use the first method. We can actually get the direct twist zero twist condition because here zero twist condition identification is very difficult ok that is why we use this one.

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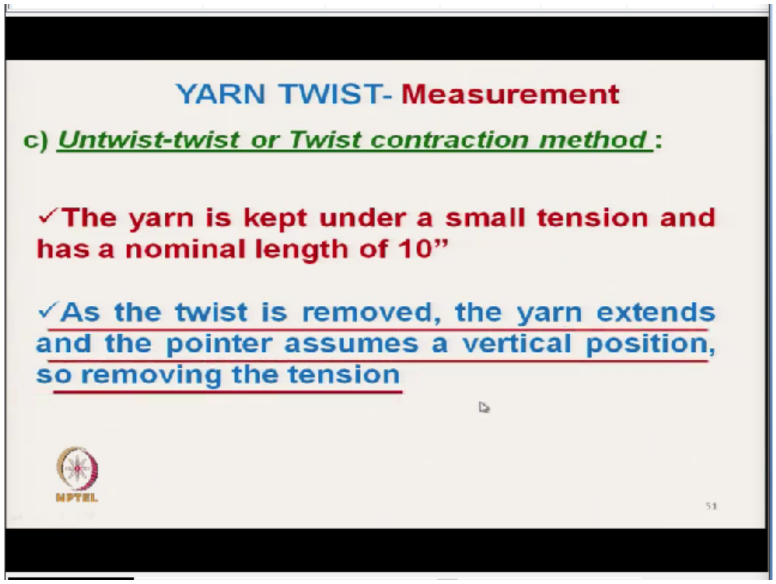

The yarn is kept under the same tension it is a small tension we measure and the tension is this tension is normally constant ok for set of yarn. And has a nominal length 10 inch, 10 inch length we keep as the twist removed the yarn extends and pointer assume vertical position and so removing tension is there.

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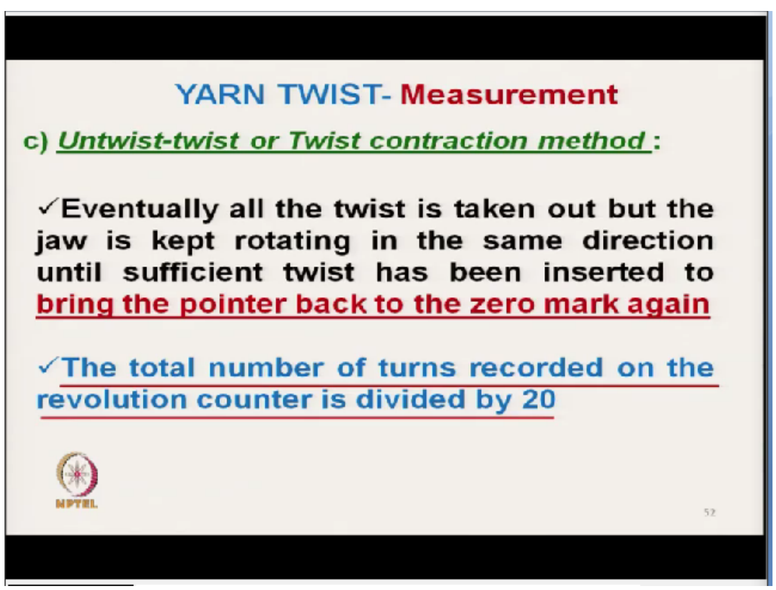

Eventually all twist is taken out but the jaw is kept rotating and the same direction bring the pointer back to its original zero mark again. And the total length of the yarn was 10 inch if we assume, then the total number of turns recorded the bringing to zero mark. If we divide it by 20 will directly get twist per inch. So that is the because we have to divide by 2 times of that. Because it is a 2 multiplied by 10 because it is a rotated in 2 times.

Now there is a limitation here limitation is that it is a this is not useful this is will we cannot use for all the staple yarn. We can use for mainly for ring spun yarn and that to for only grey yarn not even we should not use for just covered or processed yarn and bleached yarn. And only ring spun yarn is it gives the correct result very close result accurate result it gives. But if we try to use other yarn say rotor spun yarn.

Rotor spun yarn main problem is that it has got typical structure with the fibre rapper fibre as it has rapper fibre the untwisting is a problem. If we it does not get untwisted and once it is not getting untwisted, so we cannot it cannot actually extend it does not extend or even the zero twist condition it is not possible. So effectively rotor yarn is the extreme example we cannot normally measure measuring twist in rotor spun yarn is difficult.

But we can take example of scoured cotton yarn, in scoured cotton yarn the thing what it is happens the during scouring the fibres get little bit distorted in the structure. And the whatever the wax material this materials comes out from the fibre surface and fibre to fibre friction increases and there may be some clustering occurring ok. So fibre gets stick together and if we try to use this method of untwisting twisting that proper extension of proper removable of twist may not be there.

Zero twist condition may not be there because there have the some entanglement, some clustering of fibres. So this may give some wrong result when we use some processed yarn. This is only this will correct result when we measure the fibres which are easily separable ok. Now this problem is there, there are many yarns not only this like wollen yarn wollen some processed yarn. So fibres sometime gets actually they have some have stick together or they have some high friction some clustering takes place.

So, for this type of yarn we cannot use untwist-twist method, but there is another method which is known as multiple untwist-twist method where the errors at different stages get actually even out, so, that multiple twist-twist method.

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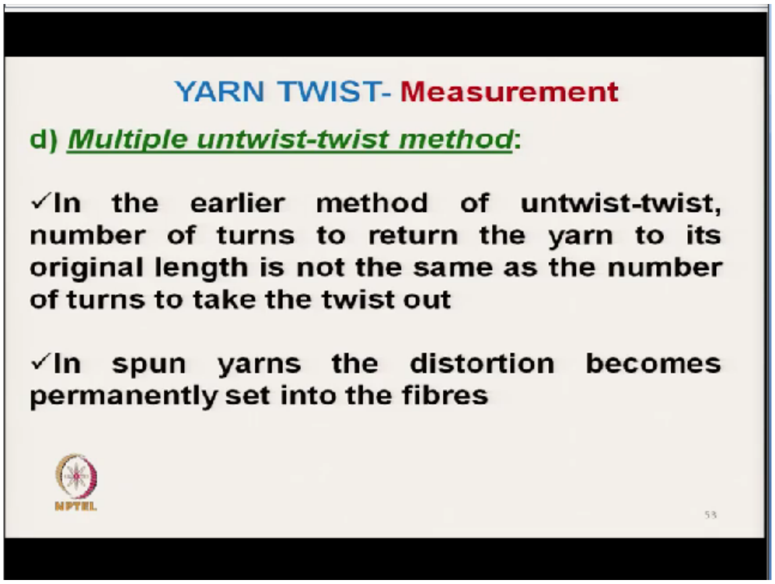

In the earlier method of untwist-twist the number of turns to return the yarn to its original length is not the same as the number of turns to take the twist out. So that is the possible mainly for different types of yarn. But even for raw cotton yarn also this type of errors takes place, so it has been observed that number of turns or defend that is due to the reversal of the twist, so this actually generate some error in the reading.

In spun yarn the distortion becomes permanently set into the fibre. So sometime it what happened, so in cotton yarn if we actually set the twist by steaming or some other treatment due to twist setting not only cotton yarn but or say synthetic yarn we normally set twist. So the fibres get actually permanently set in the distorted condition. And untwisting becomes actually problem and the elongation due to untwisting and re-twisting contraction due to re-twisting it is not same. It actually add some error.

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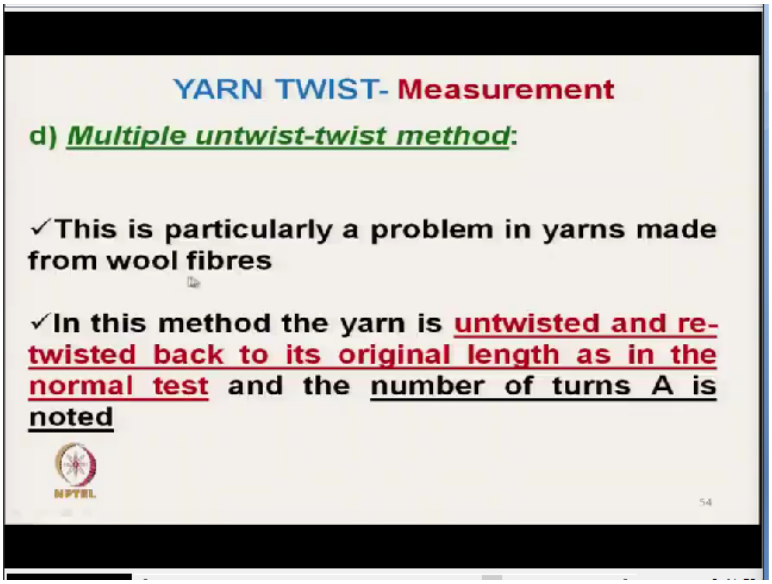

This is particularly problem in yarn made of wool fibre. So, that in case of wool fibre we cannot use earlier method, in this method the yarn is untwisted and re-twisted back to its original length as in the normal test and the number of turn A is noted, so that is done just like earlier test.

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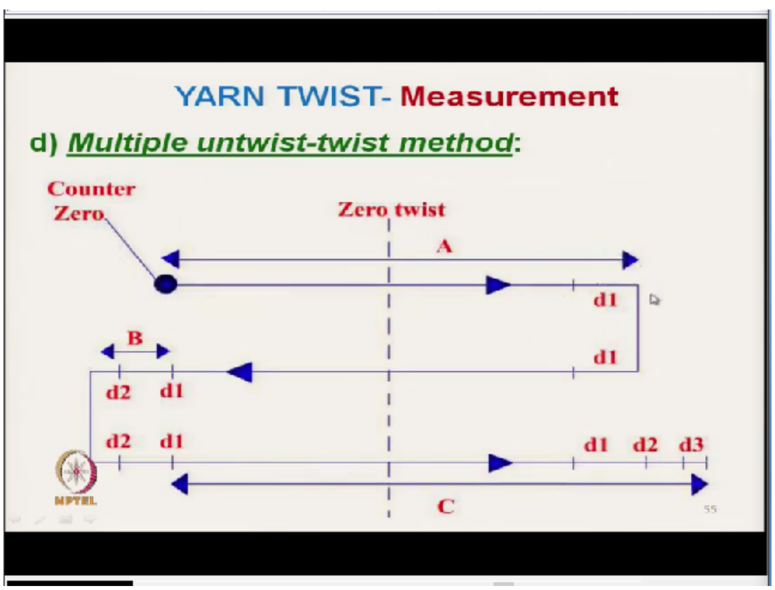

And this twist is number of turns is noted this is untwisted expected zero twist end and then again we are continuing re-twist this is A ok.

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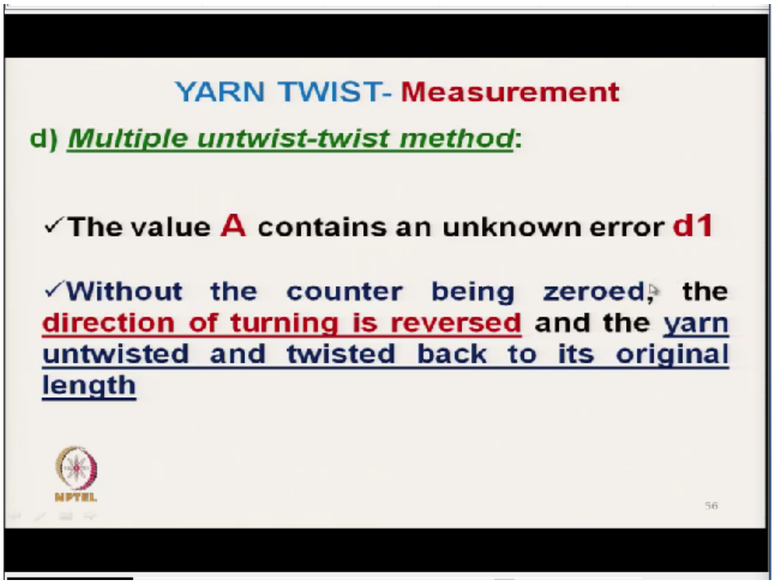

Now after that the value A contains an unknown error d, this is the d which is unknown we do not know the error value unknown error without the counter being zeroed. We are not zeroing the counter the direction of turn is reversed, so we have rest to the extreme point. Then we are reversing it again and the yarn untwisted-twisted back to its original length again ok. So, this again we are doing the same process oaky untwisting and twisting back again and it is adding another error d2, so if we it adds d1 d2 it has become B, B is the error ok.

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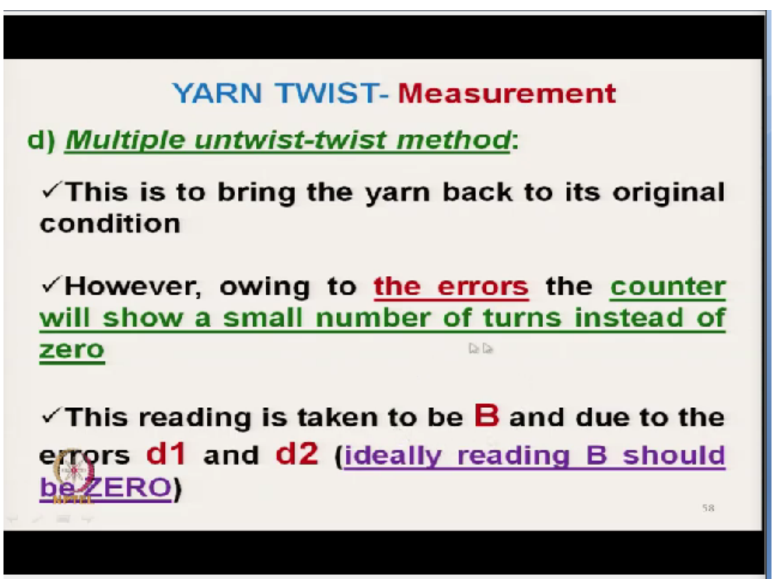

Now we will repeat the same process again part time this is to bring back the yarn back to its original condition. However owing to the errors the counter will show a small number of turns instead, so after reaching there. So, counter will not so zero it will so some value ok which is actually error. And this reading is taken as B ok which is the due to the errors d1 and d2 ok, ideally this should be zero. So, that is why so this error is there.

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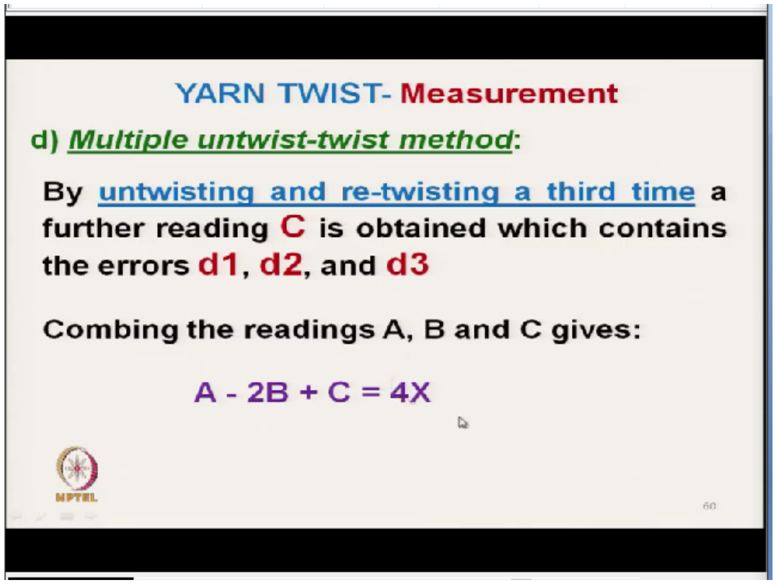

And then by untwisting and re-twisting a third time the counter reading is C that you have reached after which contains the errors d1 and d2 and d3. So C has reached, so the formula which gives the A-2B+ equal= 4X where X is the number of turns in the length of the yarn total length of the yarn what is the number of turn?.

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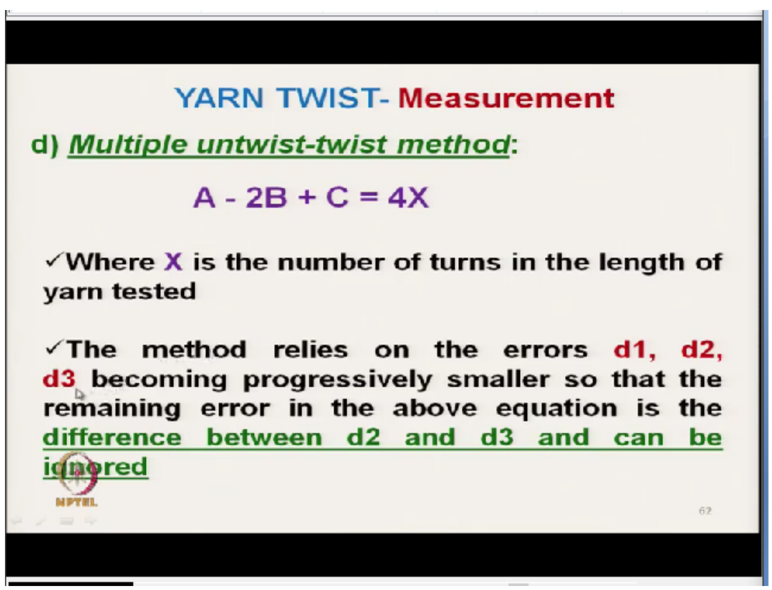

The method relies on the error d1, d2 and d3 becoming progressively smaller. So that it d1 is larger than d2 is smaller it will become smaller. So, that the remaining errors in the above equation is the difference between d2 and d3 which can be ignored. So, that is ignored, so in this way we can test the yarn where the just to actually eliminate any error due to the fibres set, set of the yarn ok.

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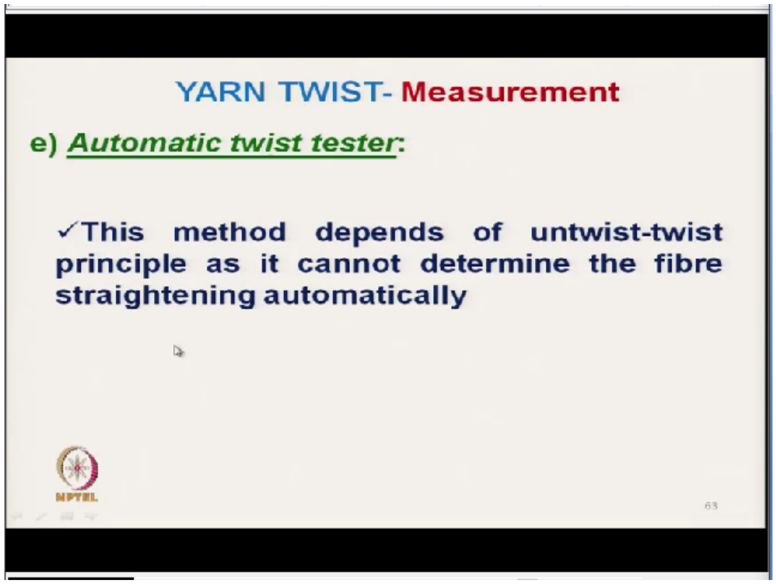

Another test is which is automatic test twist tester this is simple like other techniques just automatic. This method depends on the untwisting-twisting principle and as it cannot determine the fibres straightening automatically. So, it is only earlier method is manual this is automatic method now twist in the plied yarn ok.

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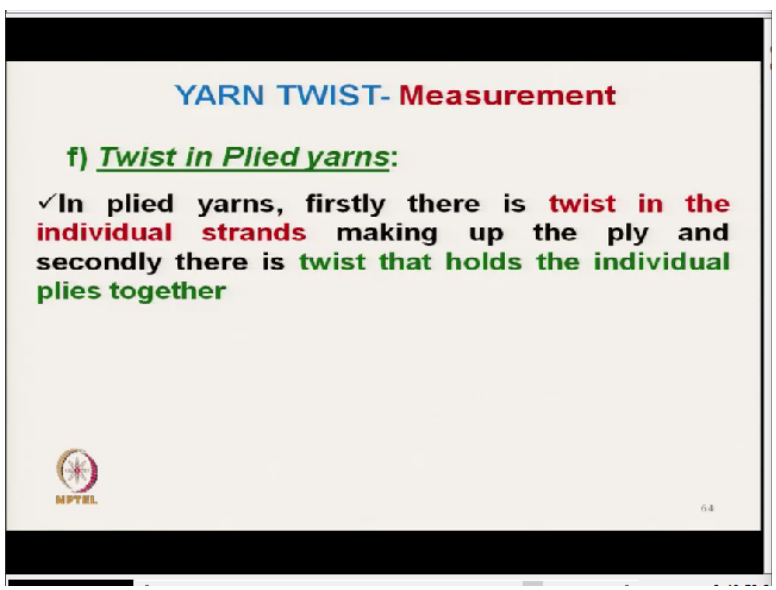

So, in plied yarn measurement of twist is very simple, we use simple counter to untwist the ply and we can use the pin just to once it is passing through then it is a we can count the number of twist. But the concept of plying is little bit tricky ok, in plied yarn first there is twist in the individual yarn. And making of the ply and the secondly there is a twist in that holds the individual plies together.

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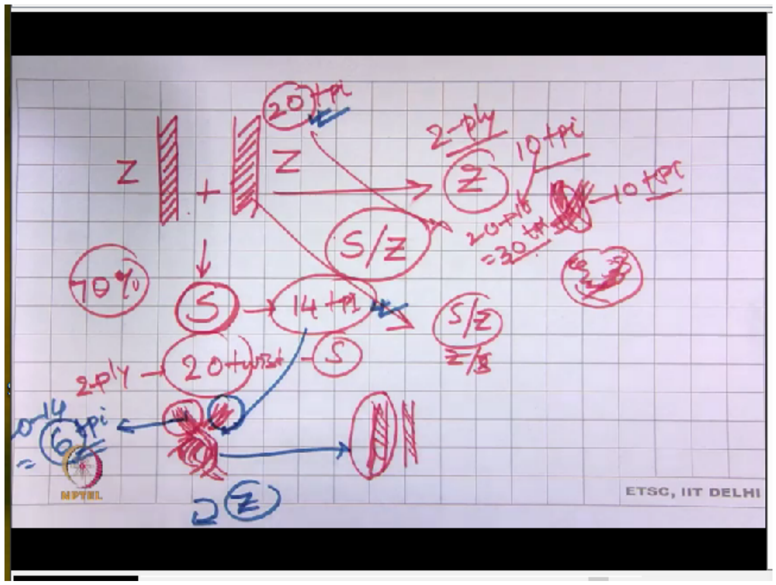

Now here it is that this is individual yarn ok, this is some Z twisted. Now we are plying this 2 yarn to form say 2 ply yarn the where if we ply this yarn in S direction. This will be called as S over Z and once we impart twist in S direction suppose in Z direction the twist is say twist/unit length is say 20 ok. In S direction when we start twisting in the S direction, so per twist per one twist there will be a reduction of twist in single yarn.

So ideally if we apply 20 twist in 2 ply, 2 ply twist 20 in S direction then what will happen ideally the fibres in the individual yarn will be look like this, this is 2 ply yarn what does not show?, the fibres are parallel it should be ideally parallel that means one twist in other direction in plying will actually reduce one twist in the single direction. So normally we do not go up to this point, in normal application we use typically around say 70% of the single yarn twist.

If it is 20 twist per inch, so we imparts say 14 twist per inch, so that we get the proper feel proper material ok, one can always get this value.

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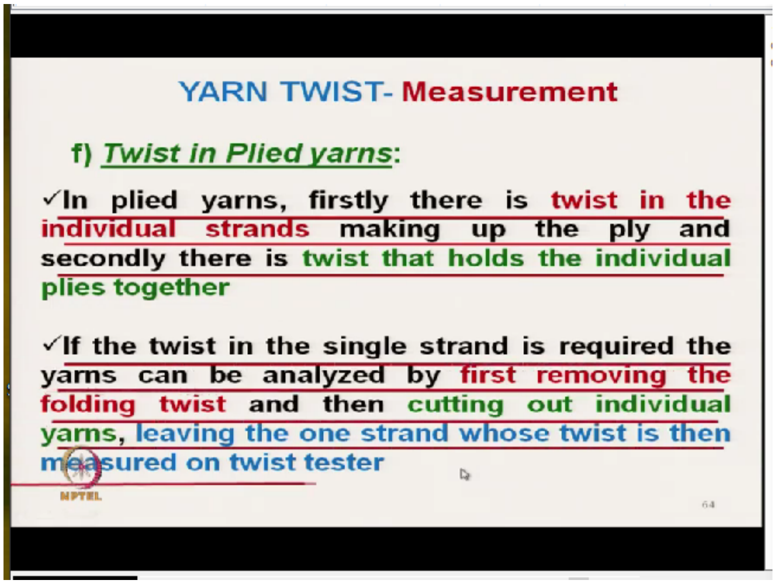

So, by controlling by adjusting ply twist we can control the characteristics of the yarn ok. In ply yarn firstly there is twist in the individual strands making up the ply. And secondly the twist in the ply condition which holds the strength together ok. If the twist in the single strand is required to be measure now how to measure the twist. Now here in the single strand ideally if it is 20 twist and 2 ply if we impart 14 twist.

So in 2ply it is become 14 twist but single ply the twist is here it is a say 6 twist 20-14 6 twist per inch. This 6 twist per inch is there but if we want to measure the twist in the single yarn here, how do you measure?. So this 6 will not be there again, again if we untwist once we untwist then if every twist-untwist one twist will be added again to the because we will be untwisting in the again in the Z direction **o** the 2 ply yarn.

Once we try to untwist, so it will keep on adding the twist in the single thread. And once this plied yarn becomes parallel, so the once there is no twist then we can take out the strand and holding. And then we test the individual yarn twist again, so here although untwisting is taking place but once we are trying to take out the yarn individual yarn again we are imparting the same twist.

So, if the twist in the single strand is required the yarn can be analyzed by first removing the folding twist then cutting out the individual yarn leaving the one strand whose twist is to be measured ok that is strand we can twist.

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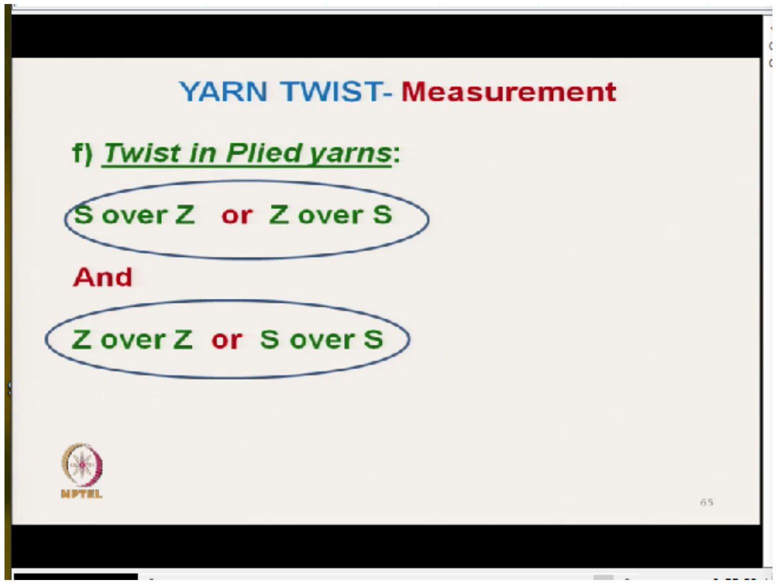

Now there are 2 types of twists are there one is just reverse ordered twist which is more common in nature like S over Z or Z over S. Because here if we have say S over Z or Z over S the advent is that the individual yarn twist gets reduced, so yarn becomes balanced, balanced means that there will not be any red residual torque present in the yarn. But for some special application what we do Z and Z then we apply Z twist again on this yarn.

If we apply Z twist again in 2ply, in 2ply condition in that case what we will get will keep and suppose 2ply **k** condition what will we are applying is 10 twist per inch what will happen?. The single thread single strand will have very high twist of 20 this 20+10 of single yarn. So 30 twist per inch will be there in single strand but in the say in double strand it there will be 10 tpi ply. So this will give a yarn of very special characteristics single yarn has got very high twist.

This will start having some great effect, some great effect and this will give us a special effect in a fabric. And there are various applications where we use this type of effect in the yarn. Because the application of very high twist in single thread sometime creates problem in one test suppose we one to impart or twist 30 tpi or 40 tpi in ring frame. The impact is that first is that it is productivity of ring frame will go down drastically.

And also the yarn will have so snarling tendency we cannot actually process the yarn in next process in winding or twisting it is not possible. So the technique is that if we want to have a crape like effect we and in 2 ply we must go for this technique Z over Z or S over S that is the normal technique used in the industry to get different effect. We do not apply twist in first way in ring frame ok or in spinning process.

Because of the 2 reasons one is productivity another is handling the yarn in high it will be highly twist slightly ok. So we will stop here, we have completed the twist measurement section and in next class we will start new topic, till then thank you.