New Spinning Technologies
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Lecture - 25
Compact spinning

So, today we will discuss about the Compact spinning. Now, we may wonder that what is there to compact the yarn. Anyway, this spun yarns are quite compact. But what it is that we need to compact it further? Actually, we do not need to compact the yarn. We have to compact the fleece of fibres which is emerging from the front roller nip in order to derive certain advantages.

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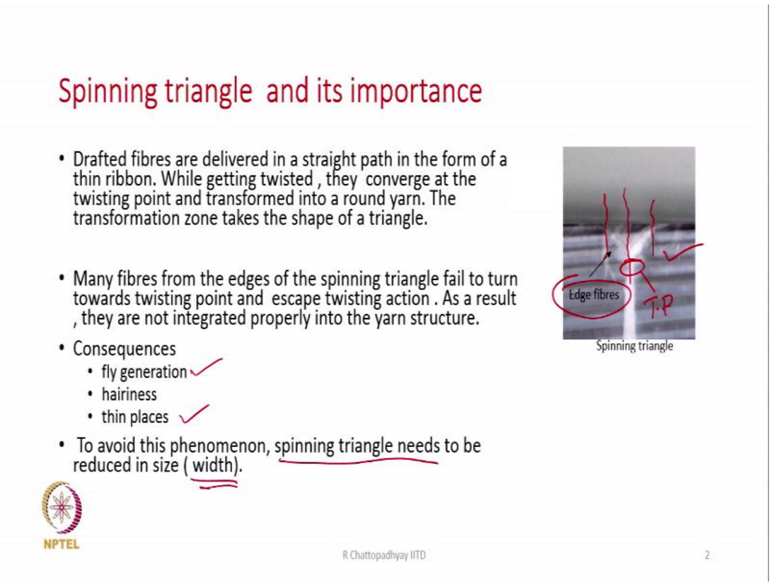

So, what we are showing it here on the right hand side, the image of a spinning triangle. Generally, this spinning triangle is so small in size that it is not really visible by our naked eyes. But if it can take a photograph of the spinning triangle zone, then we will see the picture as it is shown here.

Now, what we see here is that the transformation zone of the fleece of fibres to the yarn in this particular zone, the fibres are taking the form of a triangle and we call it spinning triangle. Now, in the spinning triangle, what we find that there are certain fibres as shown as edge fibres.

This could be on both sides of the triangle. This edge fibres are somehow not getting integrated into the yarn. As a result of this, these fibres will be simply move out from the front roller nip. And once they are out from the nip, they will start floating around. So, we will expect lot of fly generation. The other thing what will happen is that this removal of fibres from the edges of the triangle will can lead to generation of thin places also.

Because we do not have any control on the number of fibres which will be moving out from the spinning triangle and will start floating. So, they could be sometimes more in numbers, sometimes they could be less in numbers. So, when there are more in numbers, obviously, the mass of the yarn is going to be less. So, it can lead to a thin place generation. So, thin place generation of different intensities will be formed. The other thing would be that some of these fibres floating fibres may get caught by the yarn again.

Because the balloon is there, it is rotating at quite high speed in the case of ring spinning. This is the context of ring spinning only. And therefore, if these floating fibres get caught by the balloon, then it can get wrapped around the already formed yarn. And as a result, it can form naps. This is another problem that we can have that nap also can get formed. Because these floating fibres may get caught by the balloon and get start getting wrapped around the yarn.

The other thing is some of these fibres, edge fibres may be part of it may go inside the yarn and the rest of the part will be projecting out. As a result, it can lead to generation of hairiness also. So, it may so, happen that sometimes the front end of the fibre may not get caught properly at the twisting point which is here and the front end may be forming a projecting hair.

The rest of the part of the fibres may be may get caught properly and get transformed into a round shape yarn. So, all of these are happening because a thin ribbon of fibres which is basically a very thin film of fibres is getting transformed into a round shape yarn.

But while doing so, the fibres are made to actually change their path. All the fibres are getting delivered in a straight path by the front rollers. But the twisting point is located at the center. So, the fibres which are aligned with the twisting point like the fibres which is like going like this. These fibres will have no problem, whatever it will be getting caught at the twisting point and will be a part of the yarn.

But the fibres which are actually coming from the edges this side or right hand side or left hand side they are being delivered following a straight path and they have to turn back towards the twisting point. Where is the twisting point? This place is the we can write TP indicating Twisting Point. So, fibres from the edges have to turn by a certain angle in order to get caught at the twisting point and then getting transformed into yarn.

So, some of the fibres will always fail and these are the fibres which will ultimately lead to fly generation, thin places and hairiness and naps everything is possible. So, it means somehow the quality of the yarn is deteriorating. So, to avoid this phenomena we need to suppress the spinning triangle.

We have to reduce the size of the spinning triangle, especially the width of the triangle. So, solution is to suppress the spinning triangle is size and mostly it is the width part which will matter.

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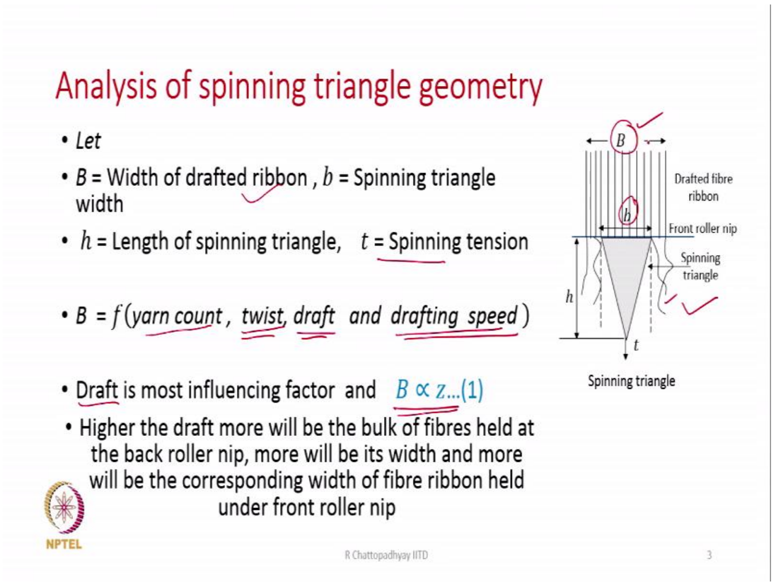

Now, we will have a little bit discussion on the spinning triangle geometry. Now, a sketch of the spinning triangle schematic view is given here. B is the width of the drafted ribbon and small b is the spinning triangle width. So, there is a difference between capital B and small b.

Small b is those fibres which are actually participating in the yarn formation and the fibres which are on the edges you see they are being shown as this these fibres they are likely to be floating fibres. h is the length of the spinning triangle or we can say height and t is the spinning tension.

Now, the value of B that is the width of the drafted ribbon is a function of yarn count. Obviously, thicker the yarn larger with value of B it is very very obvious. It will also depend upon the twist, it will depend upon draft and it will also depend upon drafting speed. But the most important influencing factor is the draft and B is proportional to draft. Draft is z here representing draft by the letter z.

So, B is always proportional to draft. See there is a constant you know drive by the technologies or you can say the machine manufacturers to go for higher and higher draft in spinning. Why we try to go for higher draft? If we can go for higher draft or the ring frame, we will be able to feed a coarser roving. And if I want can feed a coarser roving the number of roving frame requirement will go down. So, that advantage we can have, number of machines roving frames will go down.

So, that will greatly help in terms of the cost of the production. So, people are trying to go for higher and higher draft, but with increase in draft the value of B is going to rise. So, higher draft means more with the bulk of fibres held at the back roller nip of the drafting system. That will obviously, mean that the width of the drafted ribbon is also going to increase that is capital B. So, capital B is the width of the drafted fleece of fibres which are held by the nip of the front pair of rollers.

Because the bulk has increased this is also going to bulk has increased. Therefore, the width has increased at the back roller nip and that will get translated also as a result this the width capital B is also going to increase.

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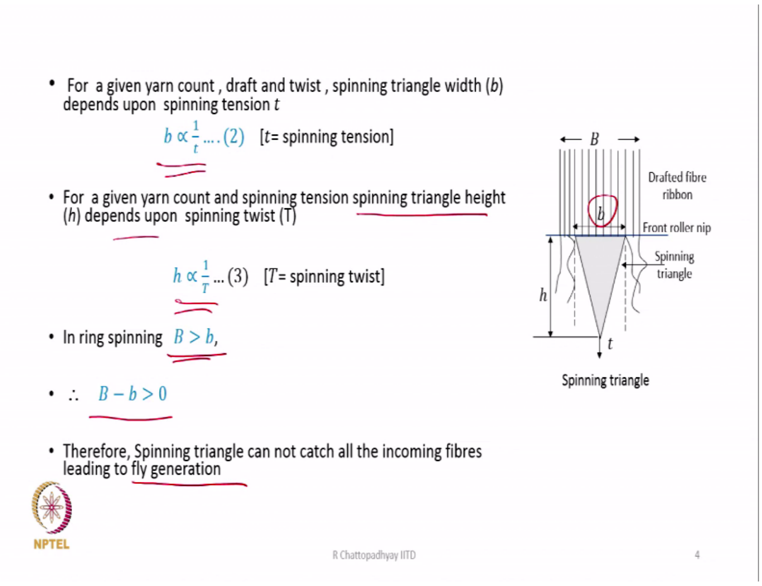

Now, for a given yarn count draft and fleece spinning triangle width that is small b is proportional to 1 upon spinning tension. That is the spinning tension is more the value of b will go down. And for a given yarn count the spinning and spinning tension spinning triangle height depends upon the spinning twist, that is h will be proportional to 1 upon capital T your T is indicating the spinning twist.

So, the geometrical parameters of the spinning triangle are related to some of the process parameters and the material parameter that we are feeding. In ring spinning generally capital B is more than small b which is also shown here. And as a result, B minus b will be always greater than 0; that means, there is always some fibres left at the edges which will be free after some time as they are moving forward and they will start floating.

And therefore, the fly generation is obvious. And we know that in the spinning we cannot avoid the generation of fly and therefore, we keep a you know a suction device in order to catch those flies. Otherwise, these flies are going to get some more problem they will settle down on the traveller.

So, they can slow the traveller, they will be fouling the surrounding environment also. So, all sort of problem we get because of this flies and these flies needs to be tackled. So, people are trying how to avoid generation of fly.

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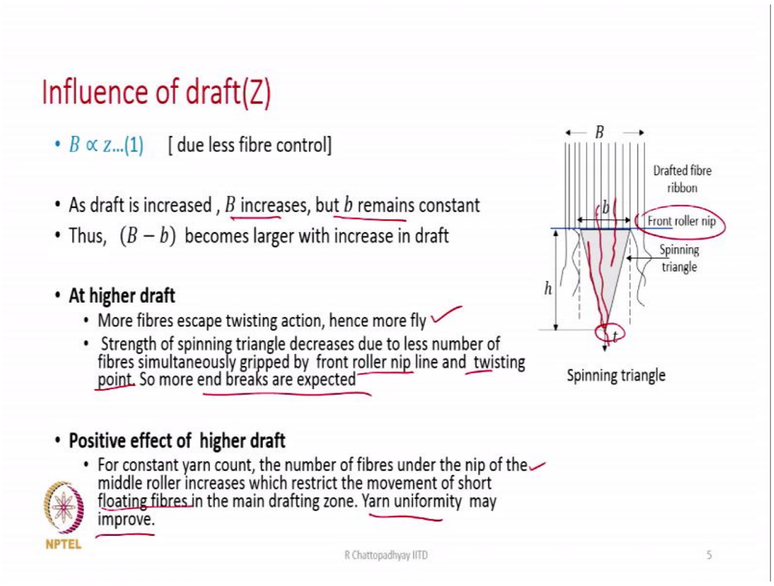

If we think of the influence of draft B is proportional to draft. As draft is increased B will increase, but small b remains constant we have already discussed about that. So, at high draft more fibres are going to escape twisting action hence more fly will be liberated. So, how can you go for higher draft? Because you will be generating more and more fly.

And therefore, chances of hairiness, chances of you know too many flies and thick and thin places in the yarns, naps are going to increase. At the same time strength of the spinning triangle decreases due to less number of fibre simultaneously gripped by the front roller nip line and twisting point. So, more end breaks are likely to happen. How many fibres are actually spanning from here to here at any given point of time.

So, this fibre gripped at the front roller nip on the blue line at the same time the other end is gripped at the twisting point. So, these fibres are actually basically going to take the load or they are going to basically resist the yarn breakage at the spinning triangle point. But, other fibres like fibres which are like here or the fibres which have gripped here, but the end is here they are not going to really participate in load bearing.

The other thing will be the positive effect of high draft is that for constant yarn count the number of fibres under the nip of the middle roller is going to increase which restricts the movement of short floating fibres. That movement we know that the drafting wave generation is because of the uncontrolled movement of the short fibres.

So, if we have a larger mass of fibres held under the grip of the middle roller then they will put some restriction to the out of turn movement of the short fibres in the main drafting zone. And therefore, we can expect that evenness of the yarn to improve. Therefore, not necessary that if we go for lower draft or ring frame the yarn quality also may suffer.

From a coarser roving if we try to spin a given count that could be a problem the yarn quality may suffer. And even if we go for too finer roving and try to spin the same yarn count even the quality may suffer.

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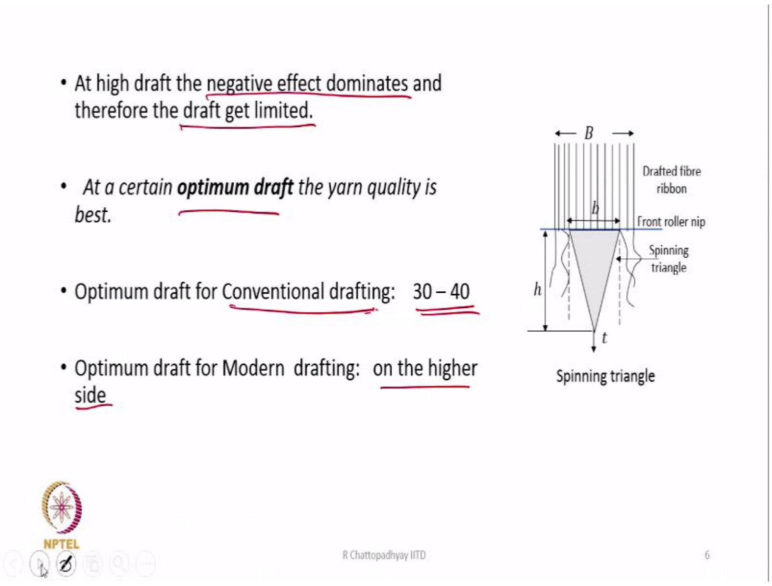

So, there is therefore, always an optimum draft or you can say optimum roving count for a given yarn count. At high draft the negative effect actually dominates and therefore, the draft get limited that how much draft we can apply for a given yarn count and for a given fibre there is a optimum level.

And that optimum draft for conventional drafting is around between 30 to 40. And if we go for high performance modern drafting systems it can go little on the higher side it could be may be 45 or 50 upto. So, higher draft may have an advantage, but the negative effect is much more than the positive effect. And therefore, keeping high draft or ring spinning is really a difficult.

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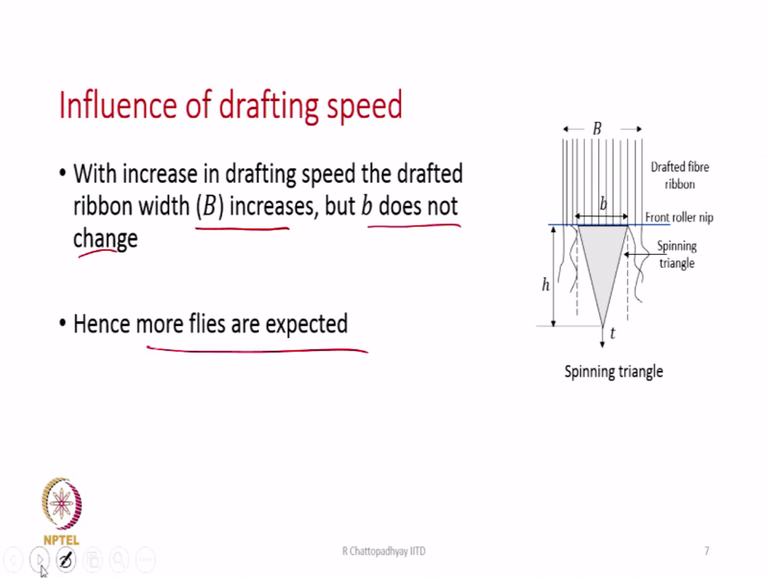

Drafting speed, we all know that higher the drafting speed the width of the drafting ribbon is going to increase. But b probably is not going to change. Hence more flies are expected if we go for high drafting speed.

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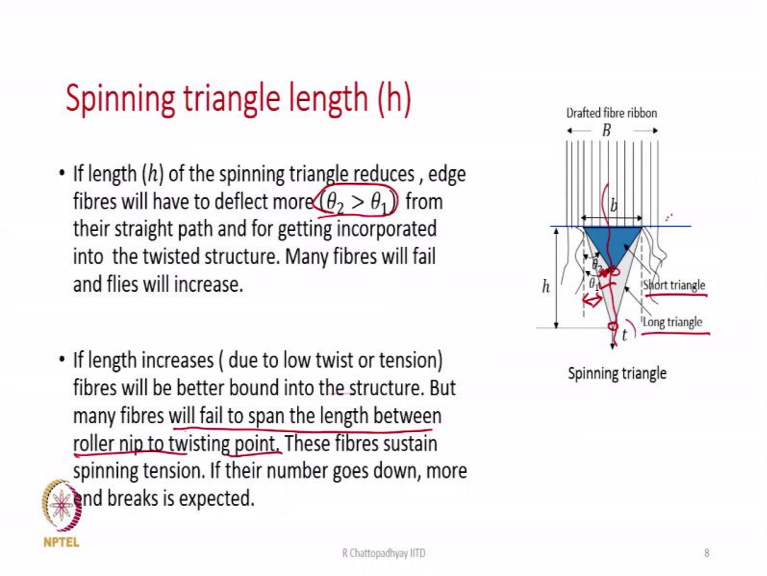

Spinning triangle length now, we are showing here two triangles one long triangle the other short triangle. Now if you look at the geometry of this, you look at the angle by which the yarn or the sorry the fibres have to turn especially from the edges.

If we look at that when the apex point is here the twist point or the apex point whatever we say the angle a fibre which is at the edge has to turn by angle θ_1 this much. But when the triangle has become shorter h has reduced this turning angle is becoming θ_2. So, which one is more? θ_2 is more than θ_1 that means, if the triangle height reduces fibres are made to turn by a larger angle and therefore, more failures will be expected.

When the triangle becomes smaller? Especially when twist is more triangle will be smaller and the other thing is when the spinning tension is low the angle the triangle is going to be larger. So, both of them will affects, what is the level of spinning tension and what is the level of twist.

So, we see that the simple reduction of the triangle height may not give the advantage in terms of reduction in the number of edge fibres which are moving out and ultimately forming flies. At the same time long spinning triangle, we will have another disadvantage that many fibres they will be failed to span the length between the roller nip and twisting point.

So, fibres how many fibres are going to span from here to there the entire length h it all depends upon what is the length of h for a given fibre length. So, the length h is larger longer spinning triangle. So, many fibres will not be able to span this length, those fibres which are spanning this length that is their nip at the front roller nip also gripped here they will be able to only sustain the spinning tension.

If more fibres are simultaneously gripped at any point of time, then the end breaks will be less that is less number of fibres are gripped end breaks will be more. So, longer spinning triangle may also lead to more end breaks because this total strength of the spinning triangle is going to reduce. Now, the θ_1 is actually from here to there and hence θ_2 is always more than θ_1.

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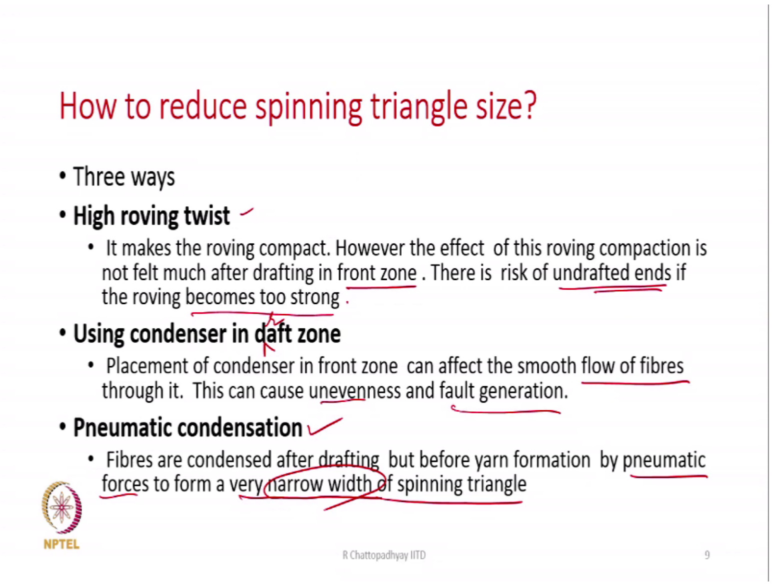

Now, how to reduce the spinning triangle size? So, one way is to go for high roving twist it makes the roving compact. However, the effect of this roving compaction is not felt much after drafting in the front zone of the ring spinning. At the same time there is a risk of undrafted ends if the roving becomes too strong that danger is always there. Therefore, this is not a very you know useful way to reduce the spinning triangle size.

The other one is the using the condenser in the draft zone, placement of condenser in the front zone can affect the smooth flow of fibres the draft is more in the front zone. So, if you want to keep a condenser there is a chance that the condenser is a static you know static body and fibres are moving.

And hence there is a chance that it will interrupt the smooth flow of fibre because fibres will come to contact with the static surface of the condenser and there is a possibility that the smooth flow of the fibres will be somehow interrupted. And this can lead to unevenness and fault in the yarn.

So, this was also tried, but these are the difficulties. And the third one is pneumatic condensation that is fibres are condensed after drafting, but before yarn formation by pneumatic forces to form a very narrow width of the spinning triangle. So, out of the three possibilities first and second one are not really practically feasible and therefore, the pneumatic condensation was developed by the machine manufacturers.

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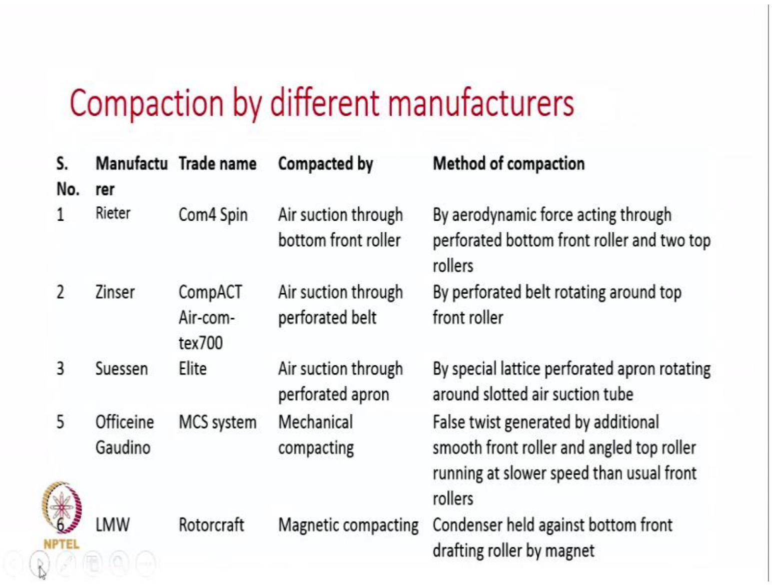

Compaction by different manufacturers

S. No.	Manufacturer	Trade name	Compacted by	Method of compaction
1	Rieter	Com4 Spin	Air suction through bottom front roller	By aerodynamic force acting through perforated bottom front roller and two top rollers
2	Zinser	CompACT Air-com-tex700	Air suction through perforated belt	By perforated belt rotating around top front roller
3	Suessen	Elite	Air suction through perforated apron	By special lattice perforated apron rotating around slotted air suction tube
5	Officeine Gaudino	MCS system	Mechanical compacting	False twist generated by additional smooth front roller and angled top roller running at slower speed than usual front rollers
6	LMW	Rotorcraft	Magnetic compacting	Condenser held against bottom front drafting roller by magnet

And here is a you know table that gives the different manufacturers and the compaction process method of compaction. So, mostly it is air suction that is pneumatic means and in the case of LMW we have magnetic compacting.

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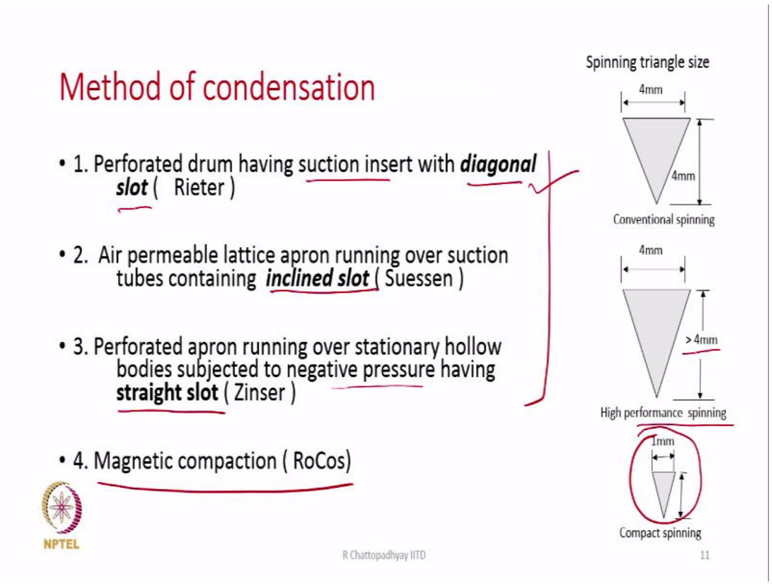

So, we will now discuss about them how it is done. The method of condensation by pneumatic means is one is by having a perforated drum with a suction insert with diagonal slot. We will discuss about them in details now. Other one is air permeable lattice apron running over a suction tube containing inclined slot that is by Suessen, perforated apron running over stationary hollow bodies subjected to negative pressure that is suction having straight slot.

So, we have diagonal slot or inclined slot basically meaning same. The other one is straight slot, but in all the three the common element is suction. And then we have the other one which is magnetic compaction or mechanical compaction. Right hand side some idea has been given about the spinning triangle size, conventional spinning typically 4 by 4 mm. High performance spinning on the speed is quite high it could be 4 mm, but the length can increase greater than 4 mm it could be 6 mm 7 mm.

And compact spinning we are trying to compact the width. The width compaction may come to the level of 1 mm. So, level of 1 mm. So, there is lot of compaction here that is what we achieve. So, almost we can say the width of the triangle becomes negligible hardly 1 milli meter. So, that is a big change. And if we do it with the help of pneumatic means possibilities of fibres getting damaged will be very very minimum.

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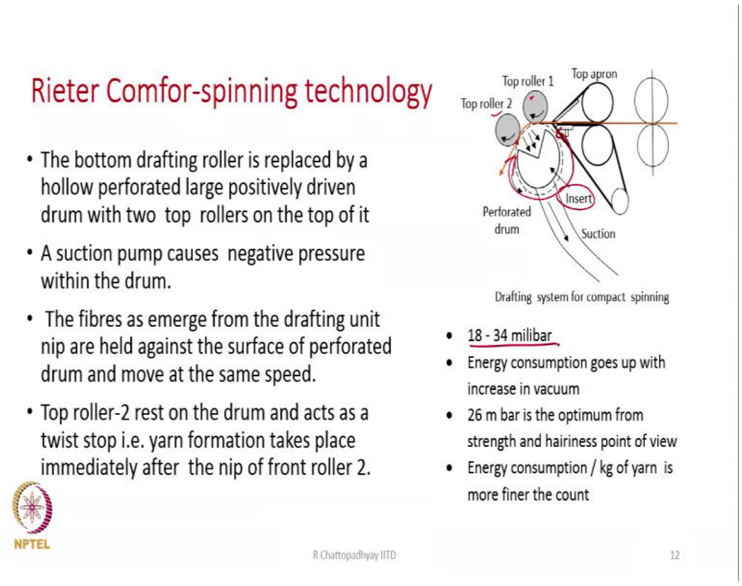

Now, in the case of Rieter Comfor-spinning technology what we have is the diagram is shown on the right hand side. The drafting system is there the front roller of the drafting unit. What is shown here is there is a perforated drum and there is a suction insert inside. So, the front roller is little bigger, but it has a perforated drum on the top of it we have 2 rollers top roller 1, top roller 2. And this drum itself is connected to a suction pump.

So, we have a negative pressure inside it. So, since from here to there that is from here to all the way there all these perforations are blocked by the insert. So, the air is bound to enter through perforations which are in between the top roller 1 and top roller 2. So, as soon as the fibres are made to pass over this zone which is between top roller 1, top roller 2 the perforations are there the air from the environment is trying to enter in perforations and the fibres are there in between.

So, the fibres will be compressed. So, the zone between top roller 1 and top roller 2 is the zone where the compression is going to take place, all will depend upon the width of the slot. If we keep the slot with very narrow the compaction will be similar to the width of the slot.

And top roller 2 obviously, after top roller 2 that narrow band of fibres will be transformed into yarn, they will get the twisting is done by the ring and traveller. So, there is no change here ring and traveller is still there doing the job of twisting, but twist will reach the nip of top roller 2. And at that point we have already compacted the fleece of fibres. So, some data about the negative pressure is given here.

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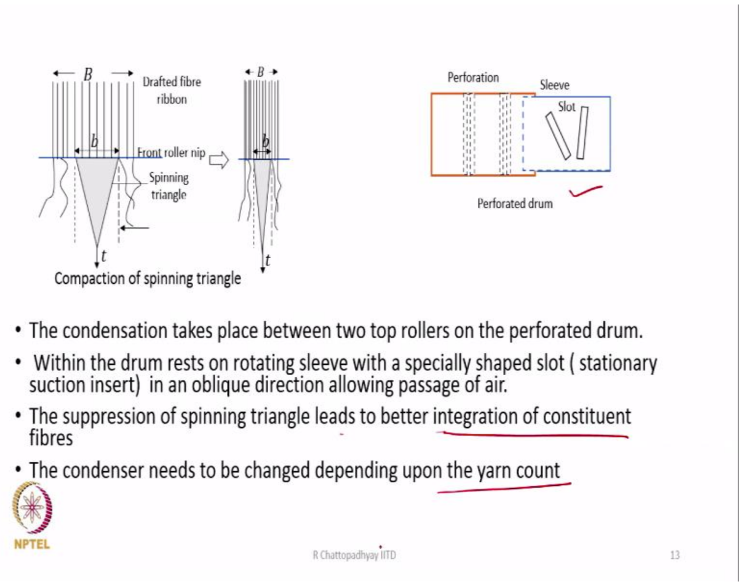

So, the perforations and the you know it is the same thing whatever I have stated is stated you know the surface of the drum and the sleeve these are shown here the detailing part of it. And the suppression of spinning triangle leads better integration of constituent fibres.

The condenser needs to be changed depending upon the yarn count. Because if I want to produce a thicker count because we can generally the count range can vary from 20 to 60's. So, 60 's Ne count is very fine, but is 20's Ne count is relatively much coarser. So, you cannot have the same slot for all the counts. So, depending upon the count that at 3 different slot size coarser medium and finer. So, accordingly you have to choose the slot.

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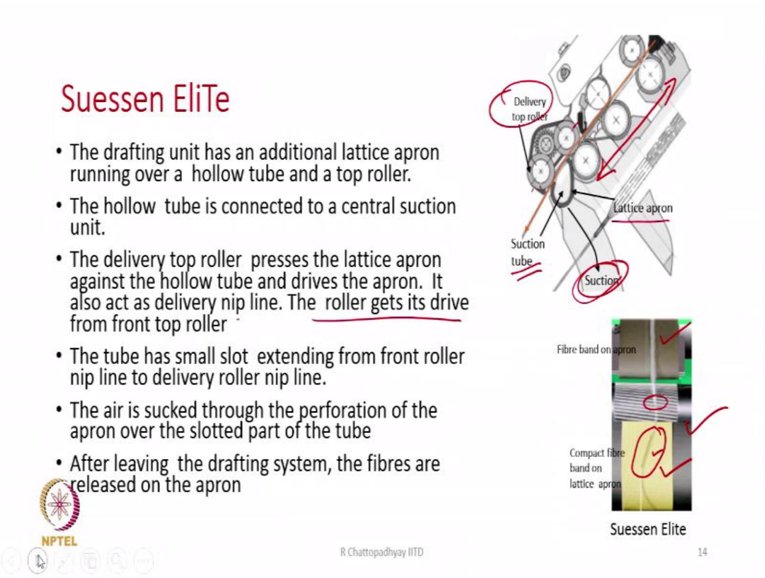

In Suessen EliTe system the principle is same drafting system is there from here to there. Now, in front of the drafting system there is an attachment where there is a suction tube and on the suction tube runs what is called lattice apron. So, suction tube obviously, is connected to a suction and it is in the form of a tube, but not really a circular tube.

This cross-sectional shape we can see it here little elongated shape and on the top of it a lattice is running, but the lattice is having perforations. And here also the roller gets its drive from the top. Now, point is there is additional pair of roller here delivery top roller that is this is the roller. This roller is driven and is driven is drive is taken from the front of roller. From here they are connected by some drive is there so that we can drive the delivery top roller and the drive is coming from the front drafting roller.

And this delivery top roller is actually running the lattice apron. Lattice apron is not giving any there is no source of drive to lattice apron. It is turning because the delivery top roller is pressed against the lattice apron and it is moving the lattice apron continuously.

The tube has a slot the same this place is shown here also in this diagram and you see this is the lattice apron, on the lattice apron there is a slot, the slot is not shown here. But you see this this band of fibres if we trace the path on the main apron, it is quite thick. And then on the front roller it has become thinner because there lot of draft, after that it is passing over the lattice apron. The lattice apron from here to there you see there is a inclined the fibres are inclined.

Why they are inclined? Because the slot here itself is inclined the slot is below the apron and it is inclined and there is a reason why it is inclined. Now, the portion this the air is sucked. So, this is the place where the air will be able to enter the proportions are there. So, the fibres will be packed here itself and everything will depend upon the size of the slot through which we are sucking air that means, this one is connected to the suction.

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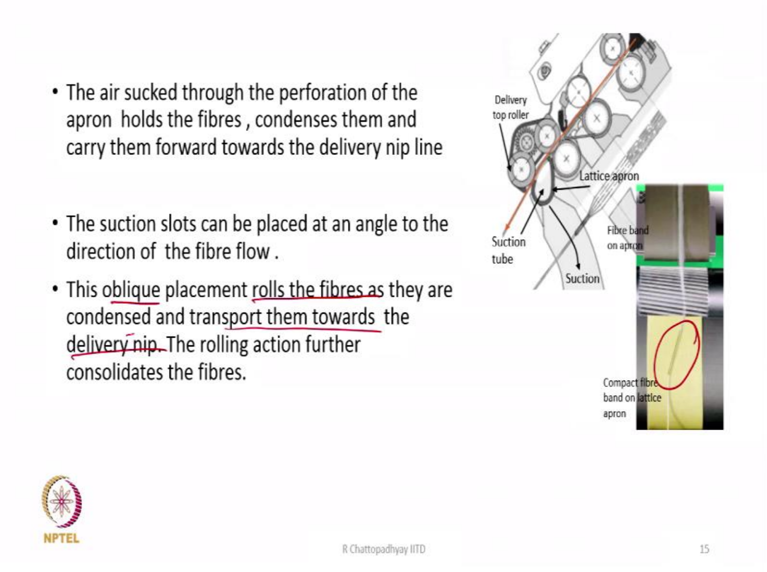

Now, the purpose of this inclined slot is to roll will come to that. The oblique placement of this slot is to roll the fibres as they are condensed and then transport them towards the delivery nip. So, there is a possibility of rolling the fibres, the fibres get rolled a little bit of twist which will be there and that will further compact the drafted ribbon of fibres. So, this will be give additional compaction to the fibres because of the rolling actions.

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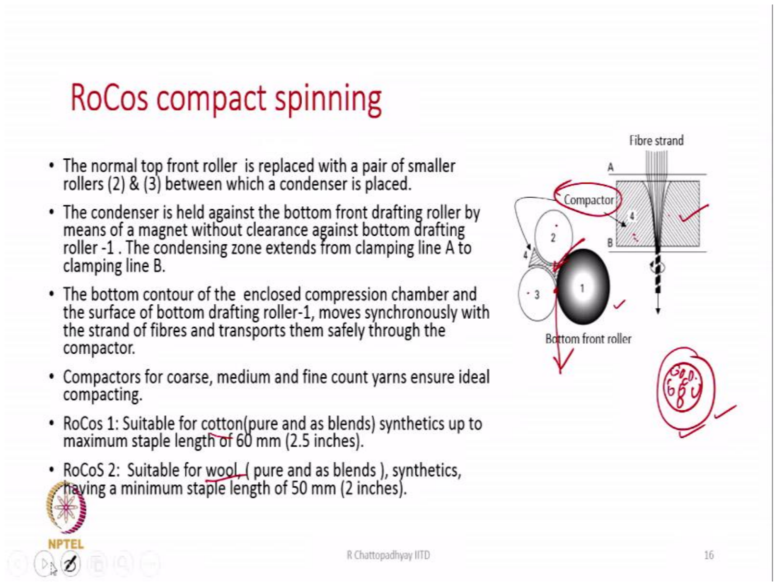

And then comes the RoCo system where it is basically mechanical and the system is shown over here. Here on the bottom front roller, we find 2 rollers 2 and 3. And in between the rollers there is a compactor that is number 4 which is shown here in the diagram is basically a compactor is another view is here, the fibre strand drafted fleece of fibres from here they are going this side.

And from here it will move down, in between 2 and 3 rollers the compactor is placed. And the compactor you see gradually it is become narrower and narrower. And all the fibres which are made to pass through this compactor it is a basically narrow groove and you force the fibres to pass through this grooves and therefore, they get compacted.

Now, this is pressed again this bottom roller by magnetic force that is why it is magnetic compaction. So, the compression chamber is this one and the compactor is basically pressed again the surface of the bottom front roller. And the fibres will be passing through this compaction zone and they will get they will become very very narrow in terms of its width.

And now after once they are come out from this zone the twisting action is there and therefore, the entire you know all the fibres compacted fibres will be now twisted. So, by all these three different means of compactions the spinning triangle is no more you can say triangular in nature.

The width of the triangle has gone down to almost 1 milli meter and you have basically a group of fibres which is almost round. So, round group of fibres are then twisted whereas, in the case of normal ring spinning a thin two dimensional film of fibres are twisted.

So, that these are the difference. Now, what will be the consequence of this? When a triangular band of fibres is twisted then that leads to what we call migration of fibres in the yarn. So, the migration is because of the tension differences between the fibres as they are getting transformed into a yarn.

These tension differences will depend upon where the fibre is located in the spinning triangle. The fibres which is at the center of the spinning triangle that may not migrate at all, they will remain at the center, unless maybe they may be pushed back by some other fibres which are under high level of tension.

But the fibres which are coming from the from the center point onwards towards the edges each and every fibre will be having a different level of tensions. And these tension variations actually leads to migration of fibres within this spun yarn. And that migration of fibres creates an interlock structure of this spun yarn and that is why this spun yarn is strong. Is the migration which makes the yarn strong?

If the migration is absent the yarn will not be strong at all, the yarn will simply slip, it is not the yarn will slip sorry, the fibres will slip when the yarns are stretched. So, there is a advantage in transforming a triangular band of fibres into a round shaped yarn because that helps to develop migration between the fibres where if the fibres are round in shape at the point of twisting, then the migration is likely to be less. So, that could be seen in the migration parameters of the compact yarn if they are studied.

So, migration for some people have already shown also that migration parameters especially the RMS deviation is on the lower side. However, by having this there are lot of advantage we get there is no edge fibres which can float which can escape twisting actions.

So, all the fibres will somehow get integrated into the yarn structure there is no loss of fibres no possibilities of hairiness also will be less. So, that the advantage we get. And

RoCo's you know this technique is also suitable for cotton and wool both the other processes also know they are suitable also for cotton and wool fibres or their blends.

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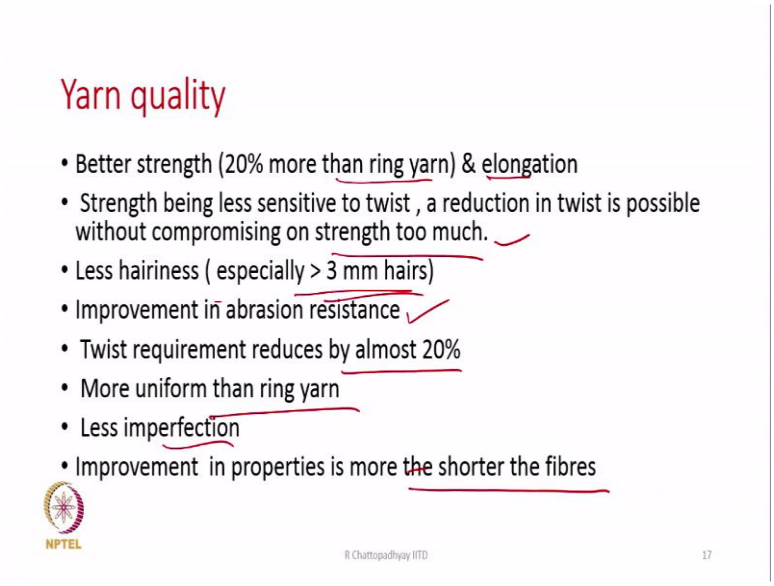

So, the advantages that we get one is better strength and elongation in comparison to ring yarn because most all the fibres will be most of the fibres will be actually participating in sharing the load when the yarn is stretched. So, fibre length utilization is also better even though migration may be little less.

But still overall there is an improvement in strength. And strength being less sensitive to twist a reduction in twist is possible without compromising on strength too much and reduction in twist automatically means an increase in productivity. There is less hairiness especially long hairs, is not that hairiness is going to be 0, but long hairs will be much less in number.

Improvement in abrasion resistance will be there that has been shown also by some people. Twist requirement can be brought down by 20 percent and we can have the same level of strength in the yarn and therefore, we take the advantage of productivity. More uniform than ring yarn, less number of products also there because fibres are not escaping the twisting zone in an uncontrolled manner and have imperfection also will be less.

Improvement in properties is more especially for shorter the fibres, more shorter the fibres are the improvement will be more and more or you can say that in the coarser count rank probably the advantage will be more.

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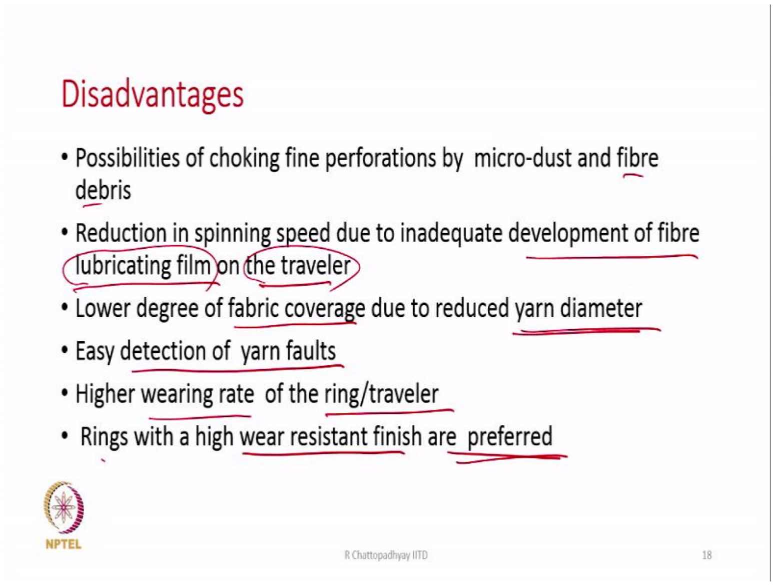

What are the disadvantages? One is possibilities of choking; choking of fine perforations by micro dust and fibre debris. This possibility cannot be avoided whenever cotton is there micro dust will be there. So, some fibrous dust could be there even with synthetic fibres there are certain amount of you know spin finish related dust particles could be there, these can be always choke these perforations.

And therefore, we may need to clean them at some interval depending upon how much micro dust is there in the feed material or how much you know fibre debris is getting generated earlier in the sliver all of them. Some spin finish can also get deposited on the perforations and they can block the perforations. The perforations are blocked their suction will be low fibre compression will be less compactness will be less.

Reduction is spinning speed due to inadequate development of fibre lubricating film on the traveler. This is something which has been also shown that we will not be run the machine at a spindle speed at which the ring frames are running. That is because lubricating films that develop on the traveler is because of the hairiness of the yarns.

He hairs get crushed between the traveler and the ring the projecting hairs of the spun yarn. And this crushed hair ultimately form a film on the ring. And once the film gets developed the traveler can run at higher speed. So, in the case of cotton we need not to really you know lubricate the ring.

The lubrication is done by the natural wax of cotton from the fibres or the continuous abrasion between the yarn surface and the traveler the wax is scraped out. And these wax material is actually ultimately depositing on the ring and a beautiful layer of lubricating film get develops.

And once this film get develop then only traveler can be run at a very high speed otherwise with a new ring we cannot run this spindle at a high speed. So, rings have to be running in the industry then only once the lubricating film gets develop then we actually go for little higher speed of the spindle.

So, this lubricating film development will be slower and therefore, the speed that we can attain will be less otherwise the traveler burning will be there, quick burning of travelers. Lower degree of fabric coverage because yarn diameter is less it will be much more compact yarn packing coefficient will be high diameter will be less. Easy detection of yarn faults because the yarns are much more regular.

So, the faults which are there in the yarn when you convert this you know compact yarn into a fabric our eye can catch the faults which are there in the yarn when actually when this converted into fabric because the yarns are too uniform in comparison to ring yarn. So, detection of faults become easy.

High wearing rate of the ring and traveler because of the lubricating film is not adequate enough. And therefore, rings with higher wear resistant finish are preferred and used also. So, specific rings have been developed where better wear resistant finish are given and such kind of rings are available and that is mostly used for compact spinning.

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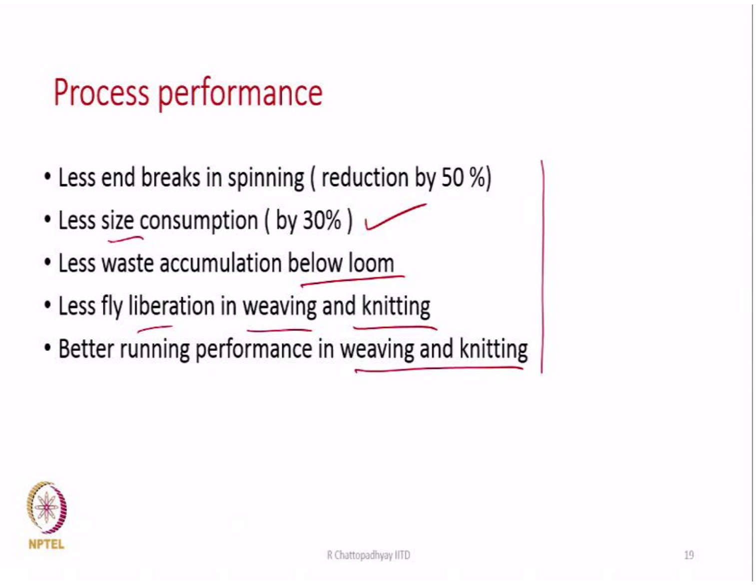

So, disadvantage also are there. The process performance wise less end breaks during spinning because thin places are not getting generated and the yarn the spinning triangle is solow that almost all fibres even the smaller fibres so shorter fibres also will also be you know spanning the length that is between the front roller nip and the twisting point they will span. And therefore, they will also you know you know they will also participate in sharing the load or sharing the spinning tension.

So, the there is hardly any breakage of the end breakage at the spinning triangle point. In the case of normal ring spinning many breaks happens at the spinning triangle point, but here this spinning triangle point almost has just vanished. That basically means fibre irrespective of length even very short fibres of 10 mm or 8 mm even they will also be able to participate in load sharing during spinning operations.

Less size consumptions because the yarns are little stronger. Less waste accumulation below the loom because hairiness is not there. So, during loom operation also lot of fibres get you know the yarns are abrading against the heald eye. And therefore, lot of fibres will be moving out of the yarn surface and they actually fall down and they get they accumulate below the loom.

So, that waste accumulation below the loom is going to be less because hairiness is less. Less fly liberation in weaving and knitting also because hairiness is low, better running performance in weaving and knitting. So, just because the hairs are much less in number yarn is regular and it is stronger, we get advantage during spinning of the yarn and in post spinning operations also.

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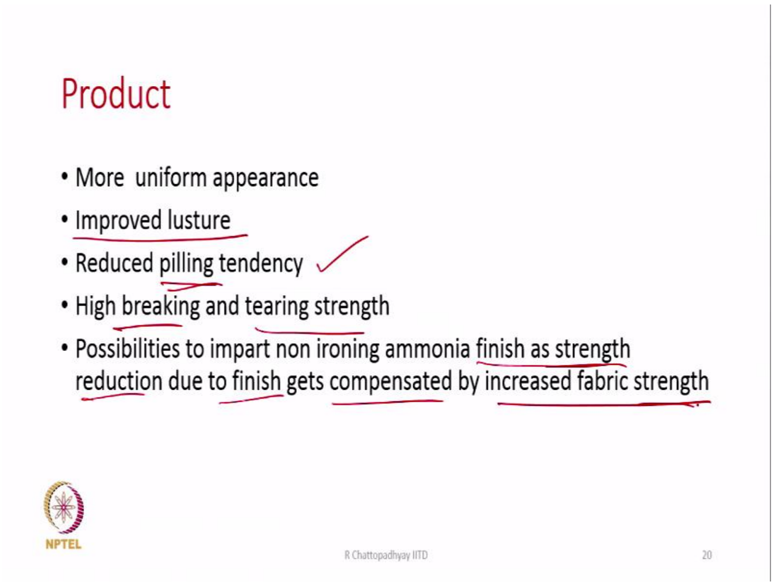

Product will be more uniform in appearance and the lot of improvement will be there in the lusture of the fabric. Hairiness the hairs actually makes the yarn rough in appearance and there will lot of diffraction of the light when it falls on the fabric and there are lot of diffusion of light. And therefore, the fabric surface does not look so lusturious with normal ring spun yarn.

The moment we get rid of hairiness there is improvement in lusture. So, here hairs being less fabric made with compact spunyarn will look much lusturer and brighter. So, its commercial value is going to increase, reduce pilling tendency the reason is hairiness is one of the source of initiating pilling.

So, with the hairs are small short sorry, long hairs are not there then pilling possibility of will also be less. Because this is the long hairs which are pulled during abrasion and it starts forming a pill and this is more true in the case of synthetic fibres. We all know that cotton has no possibility of pilling in the case of cotton.

But with one polyester cotton is there or poly viscose is there or some other fibres were using which could be tencel fibres with mixed with polyester or mixed with some other fibre cotton pilling is possibilities are there what will be less. High breaking and tearing strength of the product will be there, yarn itself is better that is why and possibilities to impart non ironing ammonia finish as strength reduction due to finish gets compensated by increased fabric strength.

So, some some finish treatments reduces the fabric strength. So, because here the fabrics anyway will be stronger. So, some compensation one can get because the fabric to start will be stronger in comparison to in ring yarn fabric. And with that we close today's you know this session. So, we have discussed about the reason for compaction.

We have discussed the spinning triangle and how the geometrical parameter of the triangle spinning triangle is affected by spinning tension by draft or by twist. And what are the various means people attempted to make the make a compact yarn. And finally,it has been you know proved by quite a few manufacturers that a pneumatic compaction is the only means through which every you know a good compact yarn can be made.

The principles of compaction is same, the methods are little bit different by different machine manufacturers. And there is one machine manufacturers we have to gone for mechanical compactions. And all the processes are all types of compactions are actually you know almost commercially successful, and they are running in the industry.

And the compact spun yarns are superior in many respect in comparison to ring spun yarns. And therefore, compact spinning is gaining lot of popularity in the industry. Because it is giving you a better quality yarn in comparison to rings spun yarn. And we get a better utilization of fibre, you know fibre length or fibre strength. We can say better utilization of raw material. So, these are the advantages of the compact spinning and that is why it is running in the industry. With this we close.

Thank you.