Stop Mark in Weaving and Prevention Methods

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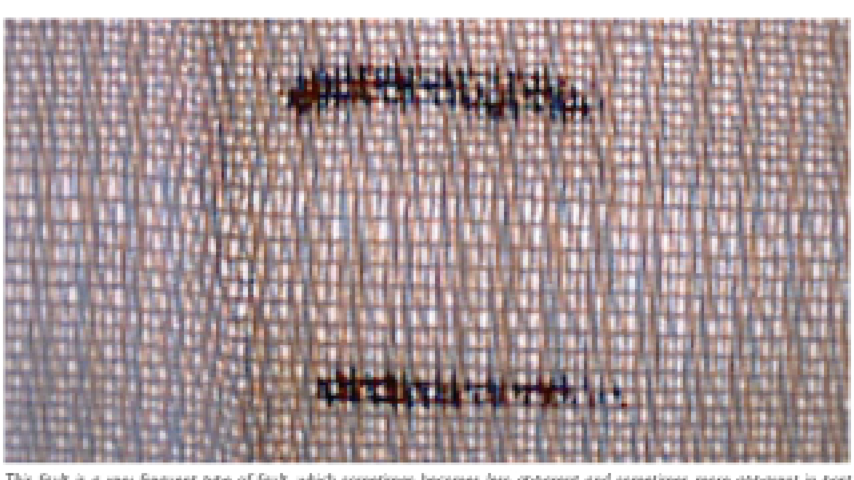
This is a type of fault that is encountered because of weaving machine stop due to any reason and that takes place in especially sensitive fabrics in view of construction. This fault is a very frequent type of fault, which sometimes becomes less apparent and sometimes more apparent in post processes and which is not eliminated generally. It occurs in each stop of the weaving machine and in the form of slackness or tightness. The reason for this is due to the formation of the fabric formation line backward or forward from the place in operation of the loom.

Loom manufacturers continue their efforts to manufacture machinery that minimize stop marks as parallel to the technological developments. The use of sumo motors in the last generation machinery and the better control of fabric drawing and warp let-off equipment via electronic sensitive devices and micro processors decrease stop marks. It will be helpful to know the reasons of this fault in order to prevent stop mark fault and to make a suitable intervention. Otherwise, time losses will be great in weaving plants and unobserved faults will be encountered after garment-making. We, who have to weave difficult constructions in short times, don't have time to loose in our facilities. Within this connection, we have to obtain right information for right diagnosis and apply this in the shortest time. We can collect stop mark faults under three main titles. As we have mentioned before, stop marks may occur at different times and due to different reasons within a specific organization of each plant.

However, they occur basically due to three reasons given below. The first one is due to the fact that the first sley strike may be weaker than sley strike at normal machine revolution. The second one is the place change of fabric formation line due to the variation of warp yarns, which wait in tight form during loom stop, related to fiber type, viscoelastic characteristics, elasticity and stop period. The third reason is the incorrect operation of the loom elements and systems, leading to incorrect warp let-off and fabric drawing process.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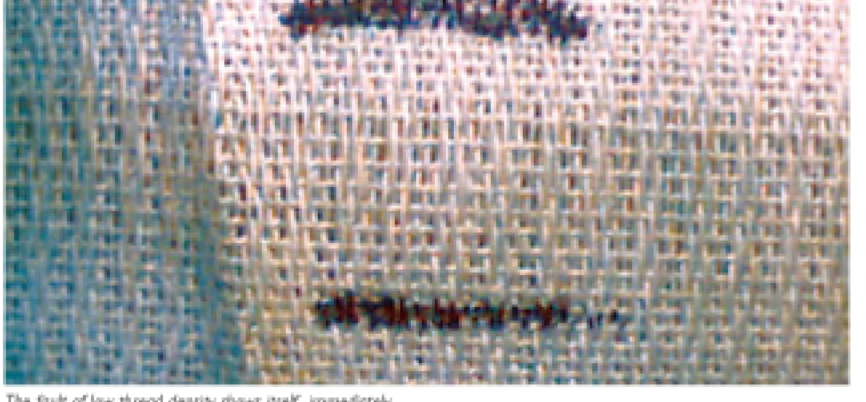
If we want to focus on weak sley strike, this generally occurs in looms that have a clutch type of brake. In these looms, the motor works in moment of stop and the flywheel rotates. The motor stops after a certain time of machine stop. When the loom starts to operate again, first the motor starts, the flywheel rotates and the clutch operates. Meanwhile, the sley strike force at normal operation speed of the machine cannot be reached due to the sliding at clutch and it is weaker in comparison with normal strikes. As this strike loss is due to the sliding in the clutch, the clutch settings change according to machine revolution and the wear of clutch wear. Therefore, the distinctness of the stop mark fault change according to these factors. The periodical maintenance of weaving machinery has to be not neglected. Also, the operation personnel have to be informed about machine settings and they have to be trained periodically. Because, all reasons combine and they occur in the form of stop mark type of fault. In order to diagnose weak sley strike, it will be helpful to stop the machine and start without waiting. If the loom makes stop mark in this condition, the fault is generally due to weak sley strike based on clutch and the fault is in the form of low thread density, because the reed cannot integrate the weft to the fabric as a result of weak sley strike. The operation speed also has an indirect role on the formation of the fault as it decreases or increases the sliding in the clutch. Some looms may make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this fault in the plant while some others may not. Therefore, the reason for this may be the difference in rotations between the looms.

Also, if the rotations in the first wefts in the loom can be measured, it has been observed that the desired rotations can be reached after the 5th and 6th wefts in looms that have problem in their clutch. This number can be as high as 8th, 9th or 10th weft in looms with old clutches. Therefore, less weft is inserted and more warp let-off until the loom recovers. The fault of low thread density shows itself immediately.

Sumo motors have begun to be used in latest generation of looms. Almost all motions in the loom can be achieved due to these motors. Therefore, it is possible to control them separately. As warp let-off takes movement from another motor, fabric draw from another motor and all frames from another motor and as the synchronization between them is achieved via micro processors, the problems in looms with clutch are eliminated partially.

Because the loom can draw fabric after 1-2 wefts if needed. This command can be given to the loom automatically and stabilized. Also in this type of looms, the values measured in the loom during stop can be recorded and the warp becomes loosens during stop. When the machine is given start, the machine returns to the shed angle and values and begins to operate in that form. Therefore, the chance of stop mark formation in the form of low or high thread density decreases. In the same way, as the frame settings can be controlled like this, quick settings can be made.

When we consider stop marks that are due to tension of warp yarns and therefore that occur related to yarn type, elasticity, viscoelastic properties and machine stop time; today's high-speed weaving machinery operate on the principle of closed shed system. Eccentrics, electronic dobbies (closed shed can be made during stops if desired) work with open shed, while electronic jacquards work with half open sheds. So, shed is present during stop and this condition keeps the tension in warp yarns close to the maximum value according to the shed angle. When the tension on the yarns is considered during shedding, it is seen that this force is sinusoidal. There is an incorrect belief that there is maximum force on the yarns when the shed is completely open. However, the biggest force is obtained when the shed is completely closed and when the yarns are in the same line. After this, tension decreases in warp yarns in heddles and harnesses during place change.

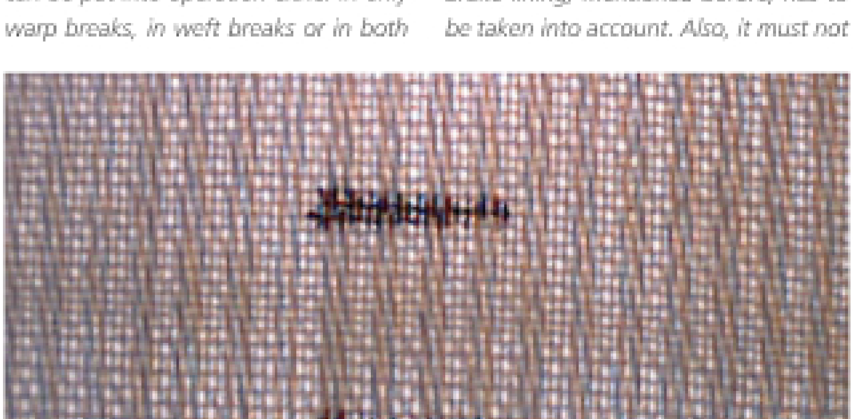
In order to be able to make a good weaving, the shed has to be opened correctly. This is a must to work efficiently in latest generation high-revolution looms. The plants refer to various ways in order to obtain a good warp beam. They use fully synthetic sizes with high adhesion power and relatively low viscosity. As the film elasticity of synthetic sizes is high, they can adapt to the mentioned forces in the best way. The warp yarns in the loom have to have a certain tension for a good shed and for good insertion of the weft yarns to the fabric. This tension is usually determined according to the weight of warp threads. If this case is not considered, stop marks may occur. The warp tension, calculated every time for every type, must be taken as a basis, and the best warp tension must be obtained by following warp breaks and weft stops. Before the machine starts to operate, first the stop marks controls must be made and start must be given then. Tensions given to the yarns range between 20-80 g/thread. These values may be higher in technical weaves. These given tensions cause threads to elongate due to their elastic structure, depending on yarn type and loom stop time. When the tensions are released, the yarns recover to a certain extent though they do not return to their original condition. So they are a little bit elongated. Therefore, fabric formation line comes forward. Today, different types of yarns can be used in the warp. In this way, the effect of these yarns, having different elongation and elasticity, on the fabric formation line is different. In these conditions, when the fabric takes start from the stop, the fabric formation line generally comes forward and stop marks in the from of low thread density occur. The plants ex-

perience this on Monday morning when the looms first operate, after a week-end without operation.

Regarding the faults due to looms, these are faults that do not occur periodically. To give an example, if the bearing rods of the warp bridge are abraded, the warp roller loosens the warp yarns when it comes to the abraded part. In this condition, fault in the form of thread density occurs. Any fault in the microprocessor of the warp let-off mechanism strains the yarns to a great or small extent. In this instance, faults in the form of tightness or slackness take place. Also, stop mark fault may form as a result of the fabric escape with the wear of the rubber on the fabric drawing roller. Fabric draw and warp let-off mechanisms and all related elements have to be considered in periodical maintenance of the looms.

Loom manufacturers have developed various methods to eliminate stop marks. They use the method of increased start cycle to increase sley strike force. In this system, as the first sley strike force approximates normal sley strike force, the stop mark that occurs due to this reason can be eliminated. This system is optional in weaving looms. They can be put into operation either in only warp breaks, in weft breaks or in both of them. The reason is that the system forces the brake linings and wear them before its time. They can be used optionally regarding costs. The operation principle of the system is as such: The first start cycle is between 100-120% of the normal operation cycle. That means the revolution in the first weft is not below 20% of the normal revolution. When the start button is pushed after the stop, the motor first passes to revolution increase rapidly. For example, when a loom, operating with a motor cycle of 400 rev./min, is started, the system gets active and the motor reaches 480 rev/min. rapidly. When clutching is realized, the electricity given to the motor is cut. The loom continues to operate with the force given to the flywheel and the number of revolution decreases. When the cycle drops to 105% of the normal cycle, the condensers will begin to operate and continue to work the loom with 400 rev/min, which is the normal cycle. Therefore, the weak sley strikes, which arise from low cycle, will be eliminated.

The point to pat attention here is the value of given revolution increase. This value has to be adjusted by considering the fault in woven fabric. The wear of brake lining, mentioned before, has to be taken into account. Also, it must not be permitted to change low thread density stop mark to high thread density by keeping the value high.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The change of start angle also has an important role in preventing stop mark fault. In heavy fabrics with high weft density and construction, the last weft gets a little bit backwards by separating from fabric formation line also with the effect of warp tension. In one meaning, the place of fabric formation line changes. When the machine is restarted, the fault occurs in case that the increased start cycle function is not in operation. For this, the machine must insert this weft to the fabric and then take the first weft after the start. This condition is achieved by changing the start angle. Normally, the start angle of the machines is recommended as 40 degrees. However, in electronically color-selecting machinery, this adjustment limit can be as low as 324 degrees. This degree is closed shed degree. Approximating the start angle to 0 degrees is good to increase the sley strike force in the first weft. If this angle is taken as 324, the machine will pass from 0 degrees after the last angle of automatic movements to operate, so it will insert the last weft slowly. Then it will take start and the sley will strike and insert the weft, followed by new weft insertion. The loom will continue to operate in this way. In this way, the last weft will be placed into the fabric with three sley strikes. In fabrics with high weft thread density, it will be useful to use this method. Another method used in eliminating stop mark faults in weaving is weight synchronization method. The operation principle of the system is to decrease warp tension in machine stops. This is generally possible in weaving looms with electronic dobby. Electronic dobby equalizes the heddles as independent of the weave type with automatic movements after the machi-


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ne stops. The loom waits for the weaver in this way. The warp yarns show less tendency of elongation if suitable warp tension is given. In this condition, the possibility of making stop marks also decreases. It is possible to use this system in weft stops, warp stops, manual stops or all. In operation with weft break, in shed closing position, after shed search button is pressed, only the shed opens before weft search function is realized. In warp break/manual stop operation, the shed opens again automatically after start buttons or weft search button is pressed.

In cases where weight synchronization is not sufficient, warp let-off system can be used after the stop. The operation principle of the system is simply as follows. When the machine stops, it makes let-off motion from the warp or fabric or from both. The point to be paid attention here is that the values have to be entered considering weft thread density. To give an example, in a style with a weft thread density of 20 threads/cm, if we enter the value as 20, a let-off of 1 cm will be achieved. If we enter the value as 20 in a style with a weft density of 10 threads/cm, the let-off will take place as 2 cm. The let-off quantity must be as low as it will prevent stop mark.

If let-off is in excess of needed, the other settings of the loom may be effected. We can consider here the problems in temple region and the related unevenness problem due to slack weaving of the edges. When this system is effective, the machine waits as let-off during stop. When the start button is presses, these let-off are taken back and returned to the normal position.

Then the weaving machine starts to work. One stop mark eliminating function is correction at the start. In looms with this function, the dimension of the fault has to be identified and action must be taken accordingly.

The entered value after stop in this program is the weft value. As a difference, the loom moves backward and forward as the entered weft number. In this case, the thing to be paid attention is to enter the smallest possible values by considering weft thread density. The warp thread can be worked both forward and backward as the given weft value in both warp let-off and fabric draw. The weaving loom works as follows: The machine takes stop signal, the machine stops; it makes automatic movements and waits for the weaver. When the weaver makes the necessary interventions and presses on the start button, the loom makes the movements in the program and then starts to operate. If operation with missing weft is selected in the start, first it goes back one weft in shed search function, then works, inserts one missing weft and then continues to work with normal weft. Here, just like in changing of start angle, the last weft is sleyed 1 at low speed and 2 at high speed. The decisions have to be made very properly when operating at this program. The fault have to be analyzed very well and its type and amount have to be identified and the intervention has to be made accordingly. We haven't considered stop time until here. There is a great difference between stop time being 2 minutes or being 15 minutes. It is very important that the interventions made to the loom are made at a very early stage. Stop marks may not be eliminated even after all these functions and extra treatments.

In this case, the factors that will help minimum dwell of the loom have to be improved. Faultless beams coming out of a good weaving preparation room, experienced and trainable staff, use of quality materials, periodical maintenance will be helpful in coping with stop marks. Servo motors and microprocessors in last generation machines open new horizons for loom users in fighting against stop marks.

But, as it will not be possible to renew the loom and machinery park every time, available resources and technology usually constrain weaving staff. Loom manufacturers try to eliminate such problems with new software and technological developments. However, when we look at the styles woven in Turkey, we usually meet with types having low meter, heavy construction and cover factor. It is apparent that these types will probably cause stop marks. In this article, we tried to explain the things that can be done to prevent stop marks. The target is always faultless weaving.