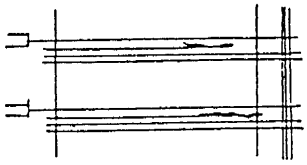
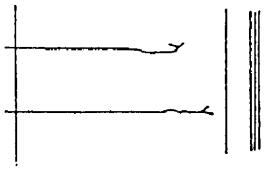
Section T.1
Weaving Technology

T.1 Weaving Technology

T.1.1 End Tangle

[1] Phenomenon

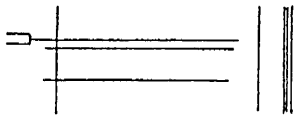
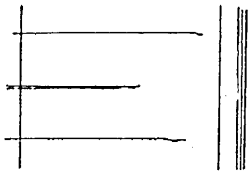
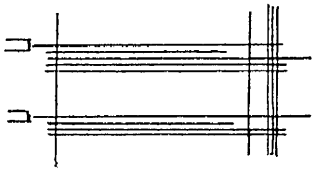
Condition of weft insertion defect		
End tangle		The weft end tangles and is woven as illustrated.
Irregular cut		The weft end turns back or kinks if the weft is not properly cut because of insufficient gripping by the gripper or poor cutting by LH cutter. When this phenomenon cannot be judged to be kink or end tangle at a glance, check the end filaments. If they are split, this defect may be called irregular cut.

[2] Causes and Actions

No.	Cause	Action
1	Improper jet direction The weft insertion is hindered as the weft end touches the upper or lower warp yarns.	Correct the jet direction. (See Section 5.1 “Picking Motion”)
2	Insufficient lead angle The prejetting is not enough to straighten the weft end lashed back from the nozzle, and the weft is inserted as it is turned back.	Correct the lead angle. (See Section 5.1 “Picking Motion”)
3	Improper timings related to weft insertion When the jet start timing or the close-shed timing of the warp or the LH leno motion is far different from the standard timing, the weft end touches the reed or the warp yarns, causing tangles.	Correct the weft insertion and related timings. (See Section 5.1 “Picking Motion”)
4	Defective cutting This is due to poor (worn) cutter blade or poor setting position of the cutter. One or two filaments are not cut but teared off by jet pressure.	Check and correct the cutter blade. (See Section 3.6 “Weft Cutter”)
5	Poor shedding of warp ends or leno yarns When the warp ends or the leno yarns are fluffed or slackened, it balks the weft yarn.	Correct: • Warp fluffs • Warp slack • Leno spring tension

T.1.2 Short Pick

[1] Phenomenon

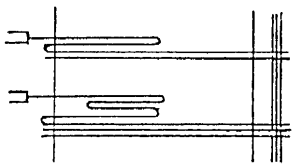
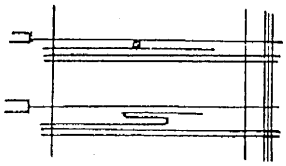
Condition of weft insertion defect		
Short measuring		The measuring length is set a little short initially. The weft fails to reach the right end of the cloth or the CC yarns.
Poor flying		The weft does not reach the right end of the cloth once in a while.
Measuring fluctuation		Sometimes, a longer or shorter pick is followed by a shorter or a longer pick, respectively.

[2] Causes and Actions

No.	Cause	Action
1	Yarn measuring length does not match the reed draw-in width.	Secure the proper yarn length based on the calculation of the yarn measuring length described in Chapter 5.
2	Poor functioning of pump Oily matter or foreign matter, if any in the pump cylinder, causes stick slip of the plunger. This results in the short pick due to turbulent jet.	Disassemble and clean the pump.
3	Poor functioning of pump valve When the pump valve is worn, the ball does not seat correctly against the valve seat, causing a partial reverse flow of water which drops the water pressure.	Replace the valve.
4	Insufficient flying angle When the flying angle is not enough, the weft cannot fly through in a given time, causing the short pick.	Correct the flying angle.
5	Pump mixed with bubbles When bubbles get into the pump, the water is reduced by that amount, accordingly reducing the required water amount. Bubbles which defuses at once when jetted also worsen the jet concentration, causing short pick.	Check the inlet tube for cracks and the tie bands for looseness. Replace or repair the problem part.
6	Excessive resistance to gripper Foreign matter adhesion on the gripper disc, movable disc looseness or yarn guide position error may bring the weft yarn into contact with the disc to cause gripping defect or friction, resulting in short pick.	Check the gripper clearance.
7	Dirt on the measuring roller surface and slippage of the roller If oily matter or water adheres to the measuring roller surface, slippage occurs between the roller and the feed roller, resulting in short pick. Damage to the bearing can also be a cause of short pick.	Clean the measuring roller. Replace the bearing.
8	Dirt on drum and blow box Dust and monomer inside the factory can be a resistance to the weft travel, resulting in short pick.	Clean the drum and block box with dry cloth.

T.1.3 Folding Back

[1] Phenomenon

Condition of folding back		
Folding back		The previous pick is not cut at the left side, and folded back in the middle of the cloth and woven, as shown in the drawing.
		Since the weft hits the warp or warp fluff, it is folded back and woven.

[2] Causes and Actions

No.	Cause	Action
1	Deviation of jet direction The weft yarn comes into contact with the upper or lower warp yarn at the shed, and flies with its leading edge bent backward.	Correct the jet direction
2	Maladjustment of advance angle Since the advance angle is smaller than required, the weft is jetted with its end bent.	Correct the gripper angle.

T.1.4 Causes and Actions of Rough, Tight, or Broken Selvage

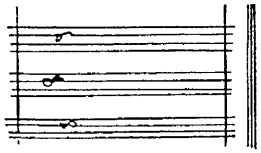
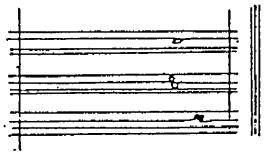
No.	Cause	Action
1	Rough selvage (collapsed selvage) 1 The fringe is too short. (Poor adjustment of cutter sideways) 2 Poor warping (high or broken selvage on warped yarn beam)	 Correct the cutter position. Replace the warp beam.
2	Broken selvage 1 Improper bobbin winding. (Poor adjustment of leno winder) 2 Excessive winding tension of selvage.	 Readjust the leno winder. Replace the leno bobbin.
3	Tight selvage 1 Improper selvage construction (especially in case of poly- ester yarn). 2 Improper temple position.	 Change the selvage. Readjust the temple position.

T.1.5 Causes and Loose Selvage

No.	Cause	Action
1	Poor adjustment of leno motion or leno winder 1 Excessive play in leno bobbin or planetary gear. 2 Poor adjustment of leno spring. 3 Tension difference in a pair of leno yarns. 4 Fatigue in leno spring. 5 Poor winding on leno bobbin (Poor adjustment of leno winder.) 6 Improper leno timing.	 Replace the bush. Readjust the spring. Replace the bobbin. Replace the spring. Readjust the leno winder. Correct the timing.
2	Poor adjustment of gripper 1 Insufficient gripping force. 2 The fixed/movable disk of the gripper is not flat. 3 Excessive lift of movable disk. (Poor gripping)	 Check the electrical system and also check nut loosening. Check the bush and the shaft. Correct the lift.
3	Improper weft insertion (RH selvage) 1 Since the end of the weft does not reach the CC (catch cord system), it is not always caught by the CC.	 Correct weft insertion.
4	Poor grip by CC yarns 1 Poor adjustment of CC tension spring and adjust spring. 2 Fatigue in CC tension spring and adjust spring. 3 Yarn draw-in method by CC may be wrong.	 Correct the spring. Replace the spring. Correct the draw-in method.
5	Related to yarn 1 Improper fineness of leno yarn. (Larger as compared with ground yarn.) 2 Poor warping (Warp ends near the beam flange are wound high or collapsed.) 3 Improper selvage construction (Especially in case of polyester.)	 Change the leno yarn. Replace the beam. Change the selvage construction.
6	Poor adjustment of temple 1 Improper positioning. 2 Not smooth rotation of ring roller, etc. 3 Improper selection of temple.	 Correct the position. Dismantle, clean and adjust the temple. Change the temple.

T.1.6 Weft Knot (Snarl, Nep, Kink)

[1] Phenomenon

Condition of weft insertion defect		
Snarl at nozzle side	Nozzle side RH end 	The weft is woven before being stretched. This mainly occurs at the LH side of the cloth.
Snarl at RH side		This is similar to the snarl at the nozzle side, and occurs almost same position at the RH side of the cloth.

[2] Causes and Actions

No.	Cause	Action
1	Improper jet direction The weft touches the upper or lower warp ends, resulting in short pick.	Correct the jet direction.
2	Water shortage 1 If the selected nozzle is larger, the water is cut before the weft is fully stretched. If smaller, the conveying capacity lowers, and the weft is not fully stretched. 2 If the pump spring is too strong, the jetting time decreases, and the weft is not fully stretched. 3 A smaller pump cannot jet enough water, and fails to fully stretch the weft. The same phenomenon occurs when the pump cam stroke is too short.	1 Select an adequate nozzle size. 2 Select a pump spring with an adequate force. 3 Select a pump and a pump cam of adequate size.
3	Maladjustment of advance angle If the advance angle is too large, the weft is not fully stretch- ed. If smaller, the weft turns back.	Correct the advance angle.
4	Improper grip by gripper When there is a foreign matter such as monomer, or the gripper yarn guide position is improper, the weft is not gripped firmly and tends to cause snarls.	• Remove foreign matters • Correct the yarn guide position.

T.1.7 Causes and Actions of Temple Mark

No.	Cause	Action
1	Improper temple position	Correct the position.
2	Abnormal rotation of temple ring	Dismantle, clean or replace the temple.
3	Damaged temple barred	Replace the roller with new one.
4	Too tight temple guide pressure	Adjust the pressure.

T.1.8 Barre (Mechanical Weft Bar)

Seizure (Poor lubric.)	Poor adjustment	Wear, fatigue
Take-up motion 1 Press roller shaft 2 Surface roller shaft 3 CC take-up shaft 4 Cloth roller shaft 5 Take-up drive pinion shaft	1 Poor alignment of sprocket 2 Slippage of the take-up roller brake 3 Improper gearing of the change gears. 4 Uneven pressing force between the RH and LH sides of the press roller.	1 Wear at the take-up brake. 2 Insufficient pressing force of the take-up brake spring. 3 Wear at the take-up disk.
Let-off motion 1 Let-off gearbox (Improper lubricant) 2 Back roller 3 Electronic let-off motion	1 Excessive oil contamination 2 Defective bearing at each back roller and tension roller shaft 3 Incorrect servo amplifier input data	1 Wear at worm shaft and bearing 2 Looseness of yarn beam 3 Servo amplifier defect 4 Servomotor defect

T.1.9 Stop Mark

Poor adjustment	Wear, fatigue
Drive unit 1 Improper tension of V belt (Slackened) 2 Poor adjustment of brake (Incorrect stop position)	Wear at brake disc
Take-up motion Uneven pressing force at both sides of press roller.	Wear at the strip-belt.
Let-off motion Servo amplifier input error	Data correction and check

NOTE: Besides the above mechanical factors, there is the close or open set mark due to mismatching of the cloth fell.

T.1.10 Inspection and Maintenance

Inspection item		Inspection and maintenance	Interval		
			Daily	Weekly	Warp-out
NOZZLE	Set position	Jet water should strike the reed front face though it varies with the jet timing. (Generally at 265° to 270°)			●
	Jet direction	The weft touches the reed at 275°	●		
	Needle adjustment	Screw in the needle clockwise as far as it will go, and fix it.			●
	Dirt, breakage, O-ring wear	There should not be abnormal leak from the nozzle.		●	
PUMP	Dimension K	Adjust depending on the yarn type.			●
	Clearance btw. the cam and roller	Secure the clearance of at least 0.1 mm. Adjust the clearance by locating the cam roller to the cam mark position. (When maximum amount of water is used.)			●
	Plunger sliding	Smooth or not as compared with other looms.			●
	Wear or damage at valve	Check the flattering condition of the weft end.		●	
		Check the inlet and outlet tubes for abnormal vibration.	●		
		Frequency of loom stop due to short pick or false stop.	●		
	Loosened cylinder	Water leak from the pump drain tube.		●	
		Abnormal noise in the pump.	●		
	Pump spring	Check by pumping the foot pedal. (Especially for broken spring.)			●
GRIPPER	Timing (Lead angle, flying angle)	Depens on the fabric specifications.			●
	Gripping force (Dirt, wear)	Gripping force when closed.			●
		Check the length of the weft waste caught by the CC yarns.			●
		Check the cutting condition of the LH cutter.	●		
	Yarn guide	The weft should run at a little inside of the disk contact surface center. (Prevent running out)			●
		When the gripper is open, the yarn should run along disk clearancce.			●
SHED	Timing	350° (Leno: LH 280°, RH 20°)			●
	Heald frame height	(See Chapter 4 “SHEDDING MOTION”.)			●
	Heald	When abnormal shedding is observed, check its heald.		●	
MEAS	Dirt on feed roller, meas. roller, meas. drum, or traverse yarn guide	Remove the dirt. (check the slip at starting.)		●	
	Feed roller	Check pressing force (Prevent slip.)			●
SUCTION	Suct. Force	Remove the sludge from the dehydration tank.			●
		Remove sludge from the drain cylinder.			●
CC	No. of yarns and tension	4 CC yarns.	●		
		CC springs of the same deflection.		●	
	Threading position	Threading in sequence, Yarn/dent		●	
		Arrange each CC yarn in a same vert. Plane with heald and twister.			●
	CC spindle	Rotation: lockwise when viewed from loom front.		●	
	CC take-up	To be smooth and stabilized.		●	
	CC heald	No scratch.			●
	Guide plate	At the height of cloth closed shed.			●

Inspection item		Inspection and maintenance	Interval		
			Daily	Weekly	Warp-out
TEMPLE	Temple position	Not to be stepped sideways.			●
		Selvage be inside of temple base.			●
		Cloth fell position.			●
CUT	Cut timing	LH : 0° - 10° RH : Set the angle so that 2 or 3 yarns are left uncut.			●
	Sharpness	Check if the fringe is cut clearly.	●		
DRIVE	Reed protector	Remove foreign matters.	●		
	Main brake	Reed to stop at 180° ± 20°			●
	Stripbelt	Check wear or separation (especially at both ends) of the strip belt for the surface and press rollers.			●
REED	Scratches	Check reed side member scratches due to weft yarn.			●
		Check reed dent wear due to warp ends.			●
WARP	Faulty warp	Check broken or slackened ends upon false stops or short picks.	●		
	Defective twill of the warp	Correct the twill.	●		
FILL	Faulty weft	Firmly tie the yarn, shorten the knot. Pick- tail be firm and short.	●		
	Package stand	Check the package centering position.	●		

T.1.11 Data Sheet

The loom should be operated continuously without stopping. For this purpose, it is necessary to adjust the machine, closely examine the yarn, and select the machine setup conditions. Therefore, it is necessary to adjust the machine, closely examine the yarn, and select the machine setup conditions. However, since the loom usually stops due to various causes on the way of operation, it is important to check the stop condition to locate the exact cause and take adequate actions.

To improve the operating efficiency for the more stable operation, it is effective to remove these stop causes from the ones that occur more frequently. For this purpose, it is recommended to analyze the stop cause frequencies loom by loom. Referring to the example on the next page, make a format of the stop cause analysis most suitable to your mill, and make good use of it for your mill management.

Also record the machine setup conditions by fabric style so that it can be referred to for an efficient start-up when weaving the same or a similar fabric style in the future. [2] “LW Weaving Data Sheet” shows an example of the machine setup table.

TOP CAUSE ANALYSIS TABLE

Date: Month Day Time: From to

Inspector: Page

Item \ Loom No.		001	002	003	004	005	006	007	008	009	010	011	012	013	014	015
Fabric style																
WARP	Warp fluff															
	Broken warp															
WEFT	Short pick															
	End tangle															
	Out of CC															
	Turn back															
	Miscut															
	False stop															
OTHER	CC yarn															
	Leno yarn															
	Others															
Total																
Remarks																

Check stop causes for more than 2 hours.

[2] LW Weaving Data Sheet

LW WEAVING DATA SHEET

×
yarns/cm × yarns/cm

No.

1	REGION/COUNTRY NAME		26	SHEDDING UNIT TYPE	CRANK, DOBBY( ), CAM( )
2	DATE OF INSPECTION		27	SHEDDING TIMING	deg.
3	CUSTOMER CODE	(-)	28	SHEDDING FRAME HEIGHT	#1 #2 #3 #4
4	LOOM MODEL		29	SHEDDING AMOUNT	#1 #2 #3 #4
5	FABRIC PRODUCT TYPE		30	REED STROKE	mm
6	FABRIC STRUCTURE		31	REED TOP AND BOTTOM	INSIDE OUTSIDE TOP
7	WARP TYPE		32	HEALD TYPE	si.du , STD. REINFORCED, mm
8	WARP DENSITY	yarns/cm. in.	33	TAKE-UP CHANGE GEAR	(A) × (B) × (C)
9	TOTAL NUMBER OF WARPS	WARPS	34	TEMPLE SPECIFICATIONS	
10	WEAVING WIDTH	DRAWING-IN WIDTH WOVEN WIDTH cm		TYPE, QUANTITY	BARREL RING
11	NUMBER OF FRAMES	CLOTH SELVAGE CC	35	WARP TENSION SETTING	kg
12	NUMBER OF DRAWN-IN YARNS	CLOTH SELVAGE SELVAGE STRUCTURE	36	EASING TYPE	NEGATIVE (ø WINDING) POSITIVE (AMOUNT mm deg.)
13	REED DENSITY	fluffs/cm. in.	37	CUT TIMING	LEFT deg. RIGHT deg.
14	WEFT TYPE (A)		38	LENO TIMING	LEFT deg. RIGHT deg.
	WEFT TYPE (B)		39	PUMP SIZE ø	
15	WEFT DENSITY	wefts/cm. in.	40	SPRING STRENGTH	kg
16	WEFT SETTING CONDITION	TEMP.: °C TIME: min.	41	PUMP CAM TYPE	mm
17	BOBBIN SIZE	ø	42	K DIMENSION	mm
18	KINKY THREAD INHIBITOR TYPE	FILAMENT No. LOOP	43	WATER AMOUNT CUT	mm, deg.
19	DISTANCE BETWEEN BOBBIN AND Y/G	mm	44	VALVE TYPE	STOPPER : BALL:
20	SELVAGE YARN TYPE		45	CC PULLEY DIAMETER	
21	C.C YARN TYPE		46	NOZZLE TYPE	NEEDLE: BODY:
22	MEASURING DEVICE NAME		47	NOZZLE NUT SIZE	A: B:
23	SPEED	rpm PULLEY DIAMETER ø	48	NOZZLE FRONT/REAR POSITION	SIDE A deg.
24	POWER SUPPLY, FREQUENCY	V, 50 : 60 Hz	49	CC GD PLATE	STD FOR THICK YARN
25	BLOWER	kW			

50	WATER JET START	(TIMING WHEN WATER IS JETTED 1 CM FROM NOZZLE B TIP)	A	deg.	B	deg.
51	WATER JET END	(TIMING WHEN PUMP CAM LEVER CONTACTS STOPPER)	A	deg.	B	deg.
52	WATER CC REACH	(TIMING WHEN WATER END REACHES 1 CM OF CC)	A	deg.	B	deg.
53	YARN CC REACH	(TIMING WHEN YARN END REACHES 1 CM OF CC)	A	deg.	B	deg.
54	MAXIMUM STRETCH	(TIMING WHEN YARN END BEGINS TO SHRINK)	A	deg.	B	deg.
55	YARN REED CONTACT	(TIMING WHEN YARN AND LEAD TOUCH)	A	deg.	B	deg.
56	ELECTROMAGNETIC PIN	(ACTUAL YARN RELEASE TIMING)	A	deg.	B	deg.
57	GRIPPER OPEN	(ACTUAL PICK START TIMING)	A	deg.	B	deg.
58	REMAINING YARN LENGTH	(AVERAGE OF AT LEAST 10 TO 20 YARNS)	A	mm	B	mm
59	DRUM END	(TIMING WHEN DRUM YARN IS DRAWN 100%)	A	deg.	B	deg.

60	HOOK ON	A B	F.PICK HOOK ON	A	B
	HOOK OFF	A B	F.PICK HOOK OFF	A	B
61	GRIP ON	A B	F.PICK GRIP ON	A	B
	GRIP OFF	A B	F.PICK GRIP OFF	A	B
62	COLOR PATTERN	A B	REPEAT		
63	RPM SET SPEED				
64	STOP LEVEL	TIMES/HOUR	RECORDED BY		