

TECHNICAL BULLETIN



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TRI 1005

MAINTENANCE RECOMMENDATIONS FOR DRAWING

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INTRODUCTION

Cotton Incorporated presents in this bulletin recommendations for good draw frame maintenance procedures, quality standards, and troubleshooting guidelines for the production of a quality product. The purpose of this bulletin is to present a concise reference on the drawing process to maximize efficiency, performance, and profit.

THE DRAWING PROCESS

Drawing is the process of progressively feeding several parallel slivers through a series of drafting rolls, causing a reduction in the size of the total strand without breaking its continuity. The principle involved is called roller drafting, which is the action obtained by running the sets of rolls at progressively higher surface speeds. There are several types of roller drafting arrangements, four of which are shown in Figure 1. To produce a quality end product, these rolls must be adjusted to suit the length of fiber being processed.

The basic functions of the drawing process are to:

- A. Parallel or straighten fibers
- B. Blend fibers
- C. Improve uniformity of sliver
- D. Deliver a sliver of specified and consistent weight

The parallelization or straightening of the fibers is accomplished by drawing the fibers through each other by roller drafting. The blending of fibers results from doubling, which is the practice of feeding two or more slivers to one set of rolls and drafting these into one strand. The parallelization and blending of the staple fibers results in improved uniformity by reducing the variation in the drawn sliver.

The final objective of drawing is to supply to subsequent processes a sliver of sufficient quality for a specified end product. The quality produced at drawing is dependent on several factors, such as draft distributions, roll settings, and overall condition of the draw frames themselves. Due to the fact that draft distributions and rolls settings are dependent primarily on fiber properties and the optimum settings are generally determined by trial and error, this technical bulletin will deal with the third factor – draw frame condition and overall maintenance – which affects drawing sliver quality.

MAINTENANCE RECOMMENDATIONS

DAILY CLEANING AND INSPECTION

Drawing frames should be stopped and cleaned during each eight-hour shift. Cleaning may be done with an air hose and/or brush. The areas to be blown off and wiped clean include the drafting roll assembly, top and bottom clearers, calender roll assembly, tube gear and turntable, creel lifting rolls, sliver table or creel guides and sliver supports, and all gearing assemblies.

Note: It may be necessary to clean cushion top rolls and rubber type clearers with a solvent when buildup problems exist.

All stop motions should be checked during the eight-hour cleaning/inspection.

WEEKLY CLEANING AND INSPECTION

Draw frames should be stopped each week and the top drafting rolls should be removed, inspected and cleaned with cleaning fluid or solvent. Any cut or damaged rolls should be replaced. The eight-hour cleaning cycle should be performed prior to putting frame back into production.

GENERAL OVERHAULING

General overhauling frequency every six months.

1. Clean drawing machine.
2. Remove gearing, check and clean gears, wash and examine all studs carefully for excessive wear.
3. Check all keys and keyways.
4. Check all covers and hinges.
5. Take out top rolls, clean, buff, or REPLACE AS NEEDED.
6. Take out bottom steel rolls, check for run-out, clean or replace with new or reworked rolls as needed.
7. Clean all roll blocks. REPLACE AS NEEDED.
8. Remove calender rolls, clean and check rolls, bearings, and bushings. REPLACE AS NEEDED.
9. Check sliver trumpet for damage and hole size. REPLACE AS NEEDED.
10. Remove tube gear assembly, clean and check gear drive. REPLACE AS NEEDED.
11. Dismantle can table, clean and examine gearing and bearings. REPLACE AS NEEDED.
12. Assemble all components, making all settings according to manufacturer's recommendations.
13. Check and adjust top roll weighting system.
14. Check all stop motions for proper operating order.
15. Check all top and bottom clearers, making sure they are set properly.
16. Trumpets should be checked for wear with a trumpet gauge. Figure 2 illustrates the correct technique and also provides a guide for selecting the right bore diameter for a given weight sliver.
17. Oil and grease entire machine according to manufacturer's recommendations.
18. After machine is back in operation, sample sliver for weight and evenness. These should be within mill standards.

TROUBLESHOOTING

DRAWING PROBLEMS

A. TOP ROLLS LAPPING

Probable Cause	Solution
1. Top roll dirty	1. Clean to roll.
2. Top clearer not set properly	2. Set top clearer to manufacturer's recommendation.
3. Top roll cut or damage	3. Replace top roll.
4. Contaminated stock	4. Check opening and picking for contamination.
5. Improper calender roll tension	5. Adjust calender roll tension as needed.
6. Humidity out of control	6. Regulate relative humidity in room as needed.

B. BOTTOM ROLLS LAPPING

1. Bottom clearers not set properly	1. Adjust bottom clearer as needed.
2. Bottom clearers worn or damaged	2. Replace bottom clearers as needed.
3. Bottom rolls dirty	3. Clean bottom rolls.
4. Bottom rolls bent or damaged	4. Replace bottom rolls as needed.
5. Improper calender roll tension	5. Adjust calender roll tension as needed.
6. Humidity out of standard	6. Correct humidity.

C. DRAW FRAME FAILS TO START

1. Main switch off	1. Check position of on/off switch; turn on.
2. Motor overheated	2. Check drawing mechanism to determine that all rotating parts turn freely, correcting any problem with parts or settings. Have input voltage checked.
3. Defective switch or wiring	3. Have a qualified electrician to check and repair.
4. Doors to cabinet open	4. Close doors securely.
5. Gear covers open	5. Close gear covers.
6. Stop motion sensing a false end down /lapup	6. Check stop motion and have problem corrected (see Section D).

D. FALSE STOP

1. Defective full package counter	1. Repair or replace counter.
2. Limit switch not set properly at calender rolls, tube gears, gear box covers and cabinet doors.	2. Check all limit switches, adjust as needed.
3. Worn calender roll bearing	3. Replace bearing and realign roll.

DRAWING PROBLEMS (Cont'd)

Probable Cause	Solution
4. Foreign object in rim of tube gear	4. Remove object and clean gear rim.
5. Foreign object between calender rolls	5. Remove object and check rolls for damage.
6. Eccentric drafting roll	6. Locate, replace roll.
7. Defective drafting roll bearing	7. Replace drafting roll bearing as needed.
8. Foreign object between drafting rolls	8. Remove object and check rolls for damage.
9. Top roll stop motion not set properly	9. Reset top roll stop motion.
10. Thick or thin places in sliver being fed	10. Correction must be made at prior process.
11. Defective creel lifting roll	11. Repair or replace as needed.

E. DRAW FRAME FAILS TO STOP WHEN CAN IN FULL

1. Counter not set properly	1. Instruct operator always to reset counter properly when doffing.
2. Defective counter	2. Repair or replace limit switch. Clean and tighten wiring connections.

F. DRAW FRAME FAILS TO STOP WHEN CALENDER ROLL LAPS UP

1. Calender roll limit switch not set properly	1. Reset calender limit switch to manufacturer's recommendation.
2. Defective limit switch or wiring	2. Repair or replace limit switch. Clean and tighten wiring connections.

G. TUBE GEAR CHOKES (FRAME FAILS TO STOP)

1. Tube sticking	1. Clean pin, contact surfaces and stop motion lever.
2. Accumulation of lint in rim of tube gear	2. Clean tube gear.
3. Defective limit switch or wiring	3. Repair or replace switch. Clean and tighten wiring connections.
4. Too much tension on tube latch	4. Replace spring. Reduce friction between contacting surfaces.

H. DRAFTING ROLL LAP-UP (FRAME DOES NOT STOP)

1. Broken weighting plunger or spring	1. Replace plunger or spring (Correct cause of breakage.)
2. Lint deposit insulates contacts	2. Clean all contact points.
3. Defective limit switch or wiring	3. Repair or replace switch. Clean and tighten connection. Check insulation.

DRAWING PROBLEMS (Cont'd)

I. SLIVER BREAKS AT CREEL (FRAME DOES NOT STOP)

Probable cause	Solution
1. Accumulation of lint on lifter rolls	1. Clean top and bottom lifter rolls.
2. Defective limit switch or wiring	2. Repair or replace switch. Clean and tighten connections.
3. Top lifter roll sticking	3. Repair or replace roll as needed.

J. CHOKE AT CONDENSER (FRAME DOES NOT STOP)

1. Defective limit switch or wiring	1. Repair or replace switch. Clean and tighten connections.
2. Gatherer plate hinge sticking	2. Remove and clean pin. Replace if needed.

K. SLIVER BREAKING BETWEEN CALENDER ROLL AND CAN

1. Trumpet bore too small	1. Ream trumpet to proper size.
2. Wrong calender tension change gear	2. Select and change to correct gear.
3. Obstruction in tube	3. Clean tube. Check for damage.
4. Burrs on tube or tube gear	4. Remove burrs, polish with crocus cloth.
5. Turntable not level	5. Level turntable.
6. Defective sliver can	6. Repair or replace sliver can.

L. SLIVER BREAK IN DRAFTING ELEMENT

1. Draft distribution between draft zones incorrect.	1. Reapportion draft between zones.
2. Rolls sticking	2. Lubricate roll bearings. Check for wear.
3. Defective rolls or roll bearings	3. Repair or replace rolls or bearings as needed.

M. SLIVER BREAK AT CREEL

1. Wrong creel tension change gear	1. Select and install correct change gear.
2. Cans not positioned correctly at creel	2. Reposition cans to correct the problem.
3. Rough edge on can rim	3. Remove roughness with emery cloth.
4. Tangled sliver	4. Check coiler of prior process.
5. Top lifting roll sticking	5. Repair or replace roll as needed.
6. Eccentric or rough sliver guide	6. Realign guide. Smooth with emery cloth.

DRAWING PROBLEMS (Cont'd)

N. *UNEVEN SLIVER (ONE DELIVERY)*

Probable Cause	Solution
1. Defective drafting roll	1. Repair or replace roll.
2. Roll weighting incorrect	2. Install spring with correct tension.
3. Wrong bore in trumpet or condenser	3. Replace or rebore trumpet or condenser.

O. *UNEVEN SLIVER (ALL DELIVERIES)*

1. Eccentric shafting or stud	1. Replace defective shaft or stud.
2. Defective gear	2. Replace defective gears as needed.
3. Sticking shaft or bearing	3. Clean shaft and bearings.
4. Foreign object between gear teeth	4. Remove object and check for damage.
5. Drive belt slipping	5. Clean belt and pulleys. Tighten belt if needed.
6. Wrong tension gear	6. Select and install correct gear.
7. Defective bearing	7. Replace bearing.

P. *DRAWING FRAME STOPS TOO SLOWLY*

1. Brake rheostat set too low	1. Reset rheostat.
2. Accumulation of lint on braking surfaces	2. Clean braking surfaces with quick-drying solvent.
3. Worn brake contact surfaces	3. Replace friction ring.
4. Magnet set too far from armature	4. Reset magnet to armature.

Q. *REDUCED AIR SUCTION AROUND DRAFTING ZONE*

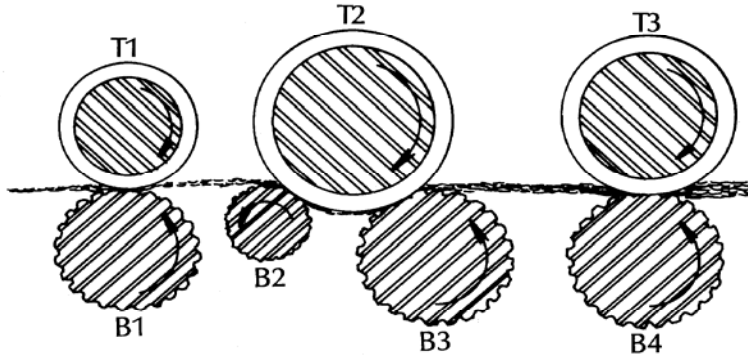
1. Clogged plenum (air passage)	1. Remove waste from plenum (air passage). Remove any burrs or rough edges.
2. Collector unit full	2. Empty collector unit.
3. Screen clogged	3. Clean screen.
4. Fan blades dirty	4. Clean fan blades.

QUALITY CONTROL TESTING PROGRAM

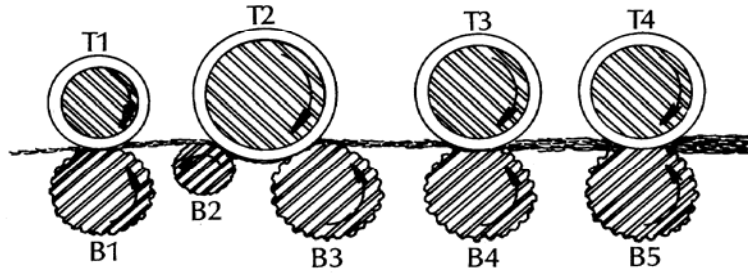
Process	Test	Frequency of Testing	Sampling Plan	Typical Testing Results	
				Standard	Tolerance
PREP DRAWING	Sliver Weight Grains/Yd	All Frames Daily	Five 1-Yd Lengths or One 5-Yd Length/ Delivery	42 gr.	± 1.0
	Grains/Yd Weight CV	Weekly	Calculate From Daily Weights	2.0 CV	2.0-2.5
	Sliver Uster CV/ Periodic Defects	All Frames Twice/ Week	Test 2.5 min. @ 25 ypm	3.5 CV	3.5-4.5
BREAKER DRAWING	Sliver Weight Grains/Yd	All Frames Daily	Five 1-Yd Lengths or One 5-Yd Length Delivery	66 gr.	± 1.0
	Grains/Yd Weight CV	Weekly	Calculate From Daily Weights	2.0 CV	2.0-2.5
	Sliver Uster CV/ Periodic Defects	All Frames Twice/ Week	Test 2.5 min. @ 25 ypm	3.5 CV	3.5-4.5
FINISHER DRAWING	Sliver Weight Grains/Yd	All Frames Daily	Five 1-Yd Lengths or One 5-Yd Length/ Delivery	60 gr.	± 1.0
	Grains/Yd Weight CV	Weekly	Calculate From Daily Weights	1.5 CV	1.5-2.0
	Sliver Uster CV/ Periodic Defects	All Frames Daily	Test 2.5 min. @ 25 ypm	3.0 CV	3.0-4.5
	Micronaire of Sliver	Weekly	One Sample From Each Delivery	4.2	± 0.3
	CV of Micronaire	Weekly	Calculate From Weekly Data	2.5 CV	2.5-4.0

Figure 1. TYPES OF ROLLER DRAFTING ARRANGEMENTS

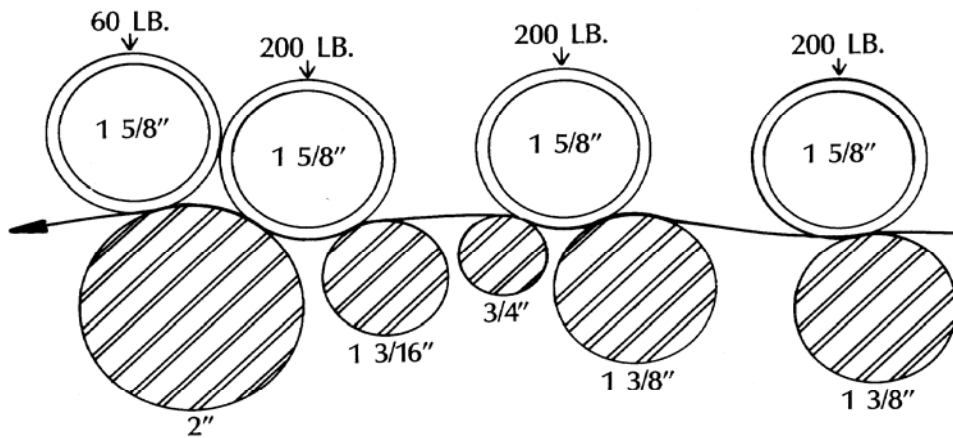
THREE-OVER-FOUR ROLL ARRANGEMENT



FOUR-OVER-FIVE ROLL ARRANGEMENT WITH THREE DRAFT ZONES



FOUR-OVER-FIVE ROLL ARRANGEMENT WITH TWO DRAFT ZONES



FOUR-OVER-FOUR METALLIC ROLL ARRANGEMENT

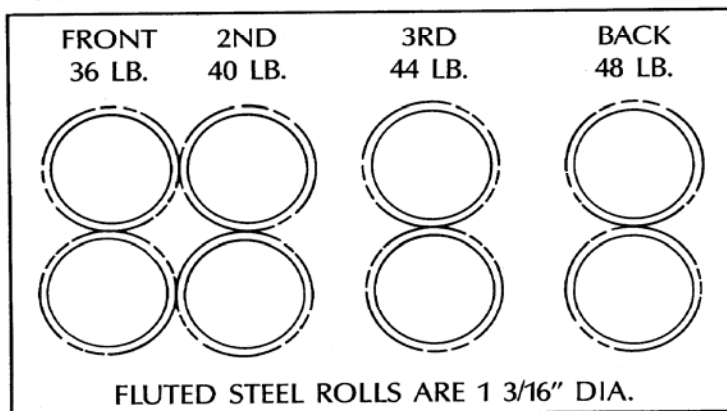
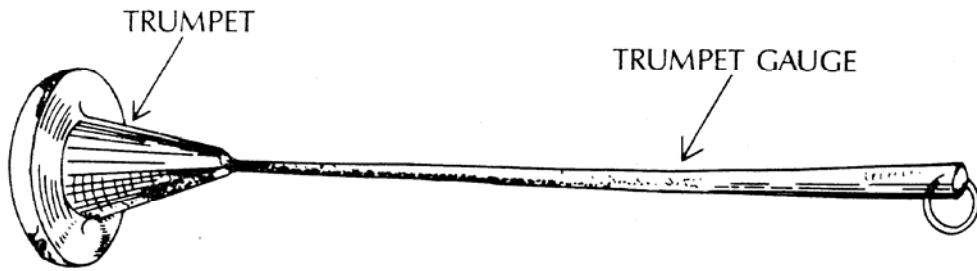


Figure 2. TRUMPET SELECTION



TRUMPET AND TRUMPET GAUGE

GUIDE FOR TRUMPET SIZES

Sliver Weight (Grains per Yard)	Bore Diameter (Inches)
40	.1160
45	.1200
50	.1285
55	.1360
60	.1400
65	.1440
70	.1470
75	.1495
80	.1520

RESEARCH AND TECHNICAL SERVICES

Cotton Incorporated is a research and promotion company representing cotton worldwide. Through research and technical services, our company has the capability to develop, evaluate, and then commercialize the latest technology to benefit cotton.

- Agricultural research leads to improved agronomic practices, pest control, and fiber variants with properties required by the most modern textile processes and consumer preferences. Ginning development provides efficient and effective machines for preservation of fiber characteristics. Cottonseed value is enhanced with biotechnology research to improve nutritional qualities and expand the animal food market.
- Research in fiber quality leads to improved fiber testing methodology and seasonal fiber analyses to bring better value both to growers and then mill customers.
- Computerized fiber management techniques result from in-depth fiber processing research.
- Product Development and Implementation operates programs leading to the commercialization of new finishes and improved energy and water conserving dyeing and finishing systems. New cotton fabrics are engineered -- wovens, circular knits, warp knits, and nonwovens -- that meet today's standards for performance.
- Technology Implementation provides comprehensive and customized professional assistance to the cotton industry and its customers -- textile mills and manufacturers.
- A fiber-to-yarn pilot spinning center allows full exploration of alternative methods of producing yarn for various products from cotton with specific fiber profiles.
- The Company operates its own dyeing and finishing laboratory, knitting laboratory, and a laboratory for physical testing of yarn, fabric, and fiber properties including High Volume Instrument testing capable of measuring micronaire, staple length, strength, uniformity, color, and trash content.

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