

# Productivity Culprits in Spinning PV Dyed Yarns

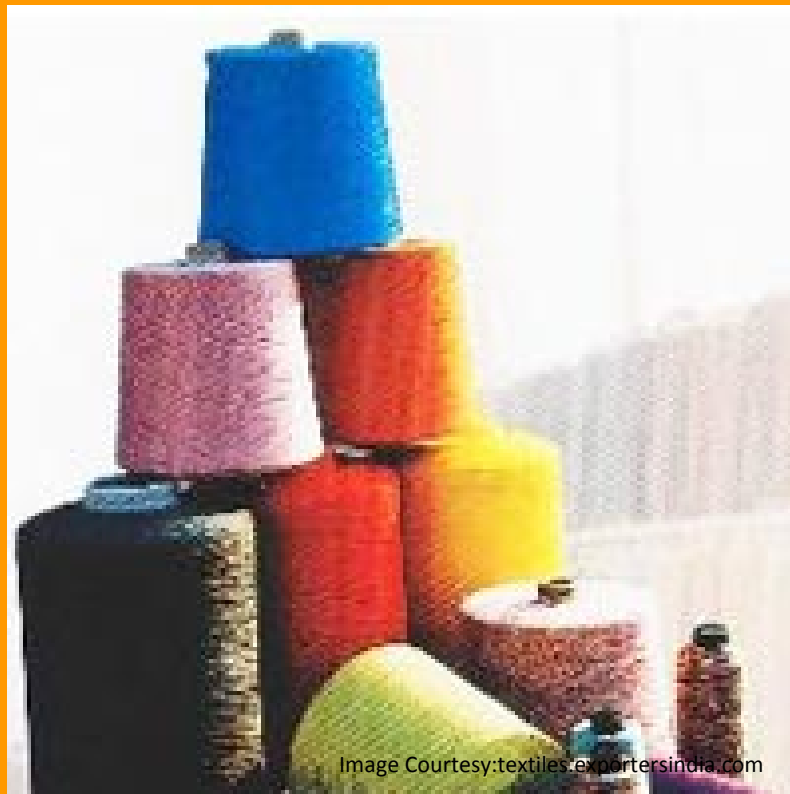


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**By: M.M.Biradar**

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The productivity increase is one of the major function of manufacturing company because it reduces cost of manufacturing. In spite of having lot of difficulties, organizations are always putting its wholehearted effort in increasing productivity, but there are few factors all the time troubling you for achieving your goal of increasing production. Those few factors are discussed here.

**1) Tradition of Higher Twist Multiplier:** The viscose is made by wood pulp and quality of viscose depends on cultivation of wood pulp under type of geographical condition of the atmosphere. As there is a wide variability in atmosphere, viscose is not left from the influence of this variation of wood pulp. The increase in neps in PV dyed yarn is due to viscose only to a great extent. With normal TM of PV yarn is not sufficient to spin yarn for premium quality high cost fabrics, the higher twist multiplier is required. The higher twist reduces the production as the twist comes in denominator in calculating production. This loss in production can be recovered by increasing spindle speed. The about 11 to 15% higher twist multipliers are required for premium quality fabric manufacturers depending on the blends, specialty fibers, single weft /double yarns and count than normally used twist multipliers of around 3 for grey yarns and other regular PV dyed yarn spinners selling yarn in domestic market.

### Count Wise TPI & TM for PV Fiber Dyed Yarns

Count (Ne)	Twist Per Inch	Twist Multiplier
15Ne	12	3.10
20Ne	14	3.13
29Ne Single Weft	24	4.45
33Ne	20	3.48
40Ne	22	3.48
40Ne Viscose Rich	25	3.53
40Ne Ceramic blend	25	3.95
50Ne	25	3.95

The premium quality yarns require higher TM by 0.5 to get better appearance & imperfections in yarns.

**2) Culture of Smaller Lot Sizes:** The lot size is a great concern in PV dyed spinning and results into too many difficulties on the shop floor. The major issues faced in managing shop floor are: Segregation of light/medium/dark shades to make contamination free yarn, Cleaning of machines during change of lots, Tagging of lots on day to day based on priority, Maintaining huge number of records for tracking the movement of lots through different sections, Wasting huge productive time in lot change in each section, Huge number of inspections to avoid lot/shade mix-ups, Shortages / excess lot wise quantity in delivery, Higher wastage and testing work of material etc. Many times, it has been observed that the actual machine run time for production is less than the time spent in changing the lots and cleaning the

machine. Apart from this, the capacity required in preparatory and post spinning area is higher to take care of delivery in committed period. After switching over from grey to dyed, there is drastic reduction in lot size from few tons to few kgs as given below. The lot size details are given below in table.

#### Month Wise Number of Lots and Their Average Size

Months	Number of Lots	Blend Quantity	Average Lot Size
August,10	255	116352	456
September,10	286	123832	432
October,10	207	80127	387
November,10	288	120796	419
December,10	413	132780	322
January,11	363	126641	348
February,11	376	123300	328
March,11	416	143874	346
April,11	314	133634	426
June,11	341	131690	386
Average	326	123292	385

The lot size reduced from few tons to few Kgs after switching over from grey to dyed spinning

**3) Habit of Frequent Count Change Over:** In small capacity of 10848 spindle and speeds almost twice the speeds of worsted spinning, we are spinning the counts: 15,20,33,40,50,40,29 High Twist Single Weft, 40 Viscose Rich & Ceramic Polyester blend as well as Reverse Twist in each of these counts. The management of roving stock and allocation of ring frames for all these varieties of counts much more challenging task on the shop floor in spite of having 3 blow room lines, 14 cards,4 D/F lines,6 speed frames in preparatory section. Apart from all these difficulties, there will be high fluctuation in the program and ultimately results into number of count changes. The stoppages of machines are increasing with increasing number of count changes. The conversions details given below in table.

#### Month Wise Count Changes in Shifts and During Maintenance Cleaning

Months	Changes in Maintenance Cleaning	Changes in Shifts	Total Changes
December,10	21	7	29
January,11	21	9	30
February,11	21	7	28
March,11	21	14	35
April,11	19	13	32
June,11	26	11	37
Average /Month	22	11	32

The number of count changes further increased by 50% due to fluctuations in programs

**4) Focusing on Flow of Material:** The organization manufacturing the products against orders that means selling products before manufacturing physically and committing the delivery to customers

within a specified period. The managing commitment of individual customers when you are getting smaller and smaller orders. The organization has to focus all activities on flow of material, not on production to maintain and deliver the goods in commitment period i.e Lead or Manufacturing time. The lead time/spread time are to be monitored and followed to meet customer requirement of goods in that time period. The spread time is the number days required from the day the first shade enters in department to the day on which the last shade of the order goes out from your department and the lead time is the number of days required from the day the last shade enters in your department to the day on which the last shade of the order goes out from the department. The focus on flow of material will have some negative effect on production, but delivery in time to customers.

### Month Wise Spread and Lead Time Analysis

Months	Spread Time (days)	Lead Time (days)
November,10	16.90	12.79
December,10	17.40	11.70
January,11	16.00	11.00
February,11	20.89	9.89
March,11	17.00	11.49
April,11	17.20	13.20
May,11	16.10	14.30
June,11	16.00	13.10
Average	17.10	12.18

The spread & lead time reduced from 22 & 18 days to 17 & 12 days respectively by focusing on flow.

**5) Fluctuating Trend in Average Spinning Count :** The fluctuation in spinning average count not only imbalances the process, but also decides the throughput of the complete process. Hence count fluctuation is not good sign for spinners as they loose production. The fluctuation of count creates big IR issues, if the process is linked to production allowance in the wage agreement. The shortage roving to ring frame when change is from coarse to fine count. This is because the faster run out of ring frames than output rate roving & vice versa. Fluctuation in count increases count conversions and almost 50% conversions are being done in shifts.

**Given below is the details the efficiency of PV Spinning for the period January,2011 to April,2011.**

Months	Installed Efficiency	Average Count	Average Lot Size	Count Conversions
January,2011	87.29%	63.96Nm	348Kg	30
February,2011	84.69%	61.58Nm	328Kg	28
March,2011	83.80%	57.6Nm	346Kg	35
April,2011	81.13%	59.39Nm	426Kg	32

The count fluctuations in the period from January,2011 to April,2011 are as under.

Months	Count Fluctuations
January,2011	Min : 57.83Nm Max : 67.4Nm Average :63.96Nm
February,2011	Min : 57.07Nm Max : 66.95Nm Average : 61.58Nm
March,2011	Min : 54.62Nm Max : 65.01Nm Average : 57.60Nm
April,2011	Min : 52.92Nm Max : 62.65 Average : 59.39Nm

The average count in April is very coarse from beginning of the month ranging from 52.92Nm to 62.65Nm .The installed efficiency in 1<sup>st</sup> week was 77.60% ( Nm 52.92 to 54.95), in 2<sup>nd</sup> Week efficiency was 80.28%(Nm 52.92 to 59.02), in 3<sup>rd</sup> week the efficiency was 81.59% ( Nm 59.06 to 67.77) and in last week the efficiency has gradually picked up to 85% (Nm 62.85 to 67.49) due to count change over from coarse to fine. You will observe the direct co-relation between the count and the efficiency. Finer the count the efficiency is better. It is imperative that some tweaking needs to be done (Keeping the sanctity of Vector in mind) during the release of coarse count. Even though the average lot size is 426 kg the overall efficiency for the month is 81.13%. Since the last three months the Production Allowance has come down because of drop in efficiency.

6) **Forcibly Stopped Spindles Between Shades to Control Contamination** : The following table shows the percentage of spindles stopped in ring frames and speed frames between different shades running on the same machine on account of arresting contamination which flows from one shade to another shades running side by side on the same machine. The loss of utilization on ring frame and speed frame are 1.17% and 5.38% respectively. These utilization losses are still higher with increasing number of shades and increase in number of shades on same machine. While setting-up new plant, spinner has to add these percentage of spindles to installed spindle capacity of mill apart from spindles of maintenance allowance. The mills who have production allowance system for workers, they are compensating these spindles in efficiency and wage calculation. The details of spindles stopped is given blow in the table.

#### Number of Spindles Stopped for Contamination and Their Percentage

Dates	Ring Frame		Speed Frame	
	Idle Spindles	%	Idle Spindles	%
5 <sup>th</sup> July	390	1.19	88	4.61
6 <sup>th</sup> July	412	1.26	88	4.61
7 <sup>th</sup> July	394	1.21	102	5.34
8 <sup>th</sup> July	424	1.30	76	3.98
9 <sup>th</sup> July	316	0.97	94	4.92
10 <sup>th</sup> July	336	1.03	88	4.61
11 <sup>th</sup> July	359	1.10	132	6.91

12 <sup>th</sup> July	399	1.22	120	6.28
13 <sup>th</sup> July	405	1.24	82	4.29
14 <sup>th</sup> July	347	1.06	110	5.76
15 <sup>th</sup> July	329	1.01	110	5.76
16 <sup>th</sup> July	433	1.33	142	7.44
17 <sup>th</sup> July	437	1.34	104	5.45
Average	383	1.17	103	5.38
The additional utilization loss in Ring Frame & Speed Frame are 1.17% & 5.38% respectively in dyed only				

7)**Super Long Ring Frames** : In PV dyed spinning, use of super long ring frames having spindles 1200 Or 1600 spindles per machine is not advisable. The utilization losses will be more because of handling of small spindle capacity with high speed, smaller lots, more counts, higher number of conversions, coarse counts, fluctuation spinning average count, varieties of shades, similar and same shade in different counts etc. Hence use of small ring frames of 480 spindles each is better option for better utilization.

In the PV section of Spinning was initially established for the purpose of spinning white yarn with super long ring frames of 960 spindles each and later on switched over to spinning only dyed yarns, with counts ranging from 15Ne to 50Ne. These long ring frames were equipped with auto-doffing units and auto doffing was not supported by M/s LMW since it was outdated. The efficiency loss was high due to detention of machine. When the lot sizes of dyed yarn becoming smaller, many a times we were unable to load the ring frame to its full capacity we were forced to run shades from very light to dark in the same count on the same machine leading to increase in fiber contamination. The qualities of some of the counts were not large enough to feed one full ring frame. When these yarns are run simultaneously, we were forced to block at least 960 spindles per count resulting into loss of capacity utilization on account of partial running of ring frame. To get rid of all these constraints, we went to replacement of these long frames by small ring frames of 480 spindles each. With new small ring frames, increased efficiency from 79.61% to 85.46% and speed from 12000 rpm to 17500rpm enable us to give the same output of 7680 spindles in 6720 spindles. The process has become flexible for handling more counts and smaller lots with reduced contamination level. The efficiency & Production increase is shown below.

#### Installed Efficiency with Super Long and Super Short Ring Frames

Installed Efficiency With Super long Ring Frames		Installed Efficiency with Super Short Ring Frames	
Financial Year	Installed Efficiency %	Financial Year	Installed Efficiency %
2000-2001	79.47	2005-2006	83.89
2001-2002	82.46	2006-2007	86.17
2002-2003	78.80	2007-2008	86.80
2003-2004	77.71	2008-2009	84.98
Average Efficiency	79.61	Average Efficiency	85.46
The jump in installed efficiency is from 79.61% to 85.46% after changing to short length ring frames.			

### Production with Super Long & Super Short Ring Frames

Production of Super Long Ring Frames		Production of Super Short Ring frames	
Financial Year	Production (Kg)	Financial Year	Production (Kg)
2000-2001	970308.90	2005-2006	1391536.17
2001-2002	1124541.61	2006-2007	1146375.85
2002-2003	1034040.06	2007-2008	1014375.39
2003-2004	943677.38	2008-2009	1008106.65
Average	1018141.98	Average	1140098.51
The jump in production is from 1018 ton to 1140 ton /year after installing super short Ring Frames			

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