Performance study of Grey and Dyed Yarn in Weaving

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Abstract

The loom efficiency is important for the profitability of any mill, and it mostly depends upon its quality of weaver's beam which is prepared in preparatory department of warping and sizing. The quality of warping and sizing beam affected by the various process parameter in preparatory process such as speed tension, relative humidity, pressure of pressure drum, mechanical condition and is sizing are speed, temperature, squeezing roller pressure, viscosity, stretch etc. In the present study effect of various speed of warping and sizing machine and its impact on end breakage in loom shed was carried out, further the same study can be conducted for mention parameter and by making optimum setting to achieve the good efficiency in loom shed.

I. Introduction

The loom shed efficiency is mainly depends on the stoppage rate, time taken to mend a stop loom allocation and the percent time that the weaver spend on restart loom stoppage. The loom shed efficiency is very important in terms of profit of the textile mills. It means a small increase in productivity of a loom shed will result in to considerable reduction of manufacturing cost more importantly, an increase in productivity on a loom will bring in additional on the extra fabric available for a medium average mills, and an increase of loom shed productivity can increase the annual cash inflow by lakh or more. The scope of such a system can be identified by examining the contribution of various factors to the realization of the targets of production and quality in the loom shed. Unlike in winding, warping and sizing, where the emphasis is on quality of preparation in loomshed, both control of quality of fabrics as well as of productivity assume significant importance. Yarn breaks in the loom shed depend on the quality of yarn, efficacy of the preparatory processes, loom settings and atmospheric conditions in the loom shed. The weaving operation contribution by the largest proportion to the cost of conversion of the yarn into fabric .the cost of actual weaving operation in mills with conventional preparatory machine and non-automatic looms is about 85 % and in mills with modern preparatory machines and automatic looms about 65 % of the total cost of conversion of yarn into fabric. The simplest measure of machine productivity in weaving is the length of the cloth produced per unit time say per shift of 8 hrs. Minimizing the stoppage rate, optimum loom allocation should also be ensured for determining optimum loom allocation we will require a formula. Further it should be ensured that the organizational delays such as shortage of weft yarn. Weaver beam spare parts etc. do not reduce the loom efficiency and that the weaver works at stipulated level of operative efficiency.

II. Factor Affecting on the loom Efficiency

Various factors which affect the loom shed efficiency can be conveniently grouped in three major categories.

1) Material (yarn quality)
2) Man (related to weaver skill & work method)
3) Machine settings.
4) Moisture (atmospheric condition)

Such a classification will facilitate taking corrective action needed for improving loom efficiency these four categories their component causes and those controllable factors which have been commonly found to need attention for improving efficiency.

- **Yarn Quality**

Tension on the warp on a high speed shuttle less weaving machine is higher than that on conventional loom. Yarn should be more even and the following parameters of yarn are to be critically reviewed; C. V. of count, single thread strength, imperfections per 1000 meters such as thick places, thin places, and neps. Hairy yarn will not be suitable in air jet weaving as it will misdirect the weft insertion.

- **Man:** Man required for weaving is skilled with knowing all machine parts, process parameters and its setting, fast to mending the fault, etc. productivity is depend on the man and it machine handling skill.
- **Machine setting:** The quality of the fabric and productivity is depending on the machine setting. If any change in machine parameter it directly affecting on loom performance and quality of fabric.
- **Atmospheric condition:** The temperature and relative humidity of the weaving department and loom is affecting on breakage rate. The wet strength of cotton fabric is higher than dry. So maintain proper condition as per yarn quality to impure the loom performance.

III. Experimental work

Warping Section

This study is carried on the machine of Benninger direct warping machine.

Procedure:

1) As per the plan of work first selected the variable for which we have to study.
2) For the tension variation study each yarn tension is checked by tension meter.
3) For the end breakages study we are observed the impact of warping end breaks on loom performance.
4) When this beam loads on loom then collects there breakage rate.
5) Then compare the results and find out the conclusion.

IV. Result and Discussion

The breakage study was carried out on warping machine and loom machine for analyzing the performance of grey yarn and dyed yarn.

Warping Breakage Study

Grey Yarn	Dyed Yarn
Warp Count:- 40 Ne	Warp count:- 40 Ne
Weft count:- 40 Ne	Weft count:- 40 Ne
Length:- 15700 Mtr.	Length:- 5168 Mtr.
Total Beam :- 12	Total Section :- 25
Speed :- 700Mtr/Min.	Speed :- 600Mtr/Min.

Table No.1 Grey Yarn & Dyed Yarn Sort

Sr. No	Beam No.	Total Ends	Length	Gross wt.	Tare wt.	Net wt.	Breaks
1	1219	628	15700	486kg	240.5kg	145.5kg	14
2	1299	628	15700	481kg	236kg	145.9kg	10
3	1210	628	15700	413.9kg	268kg	145.2kg	8
4	1137	628	15700	405kg	260kg	145.9kg	8
5	2098	628	15700	402.5kg	257kg	145.5kg	11
6	1107	628	15700	390.9kg	245kg	145.9kg	12
7	1429	628	15700	397kg	252kg	145.5kg	15
8	1232	628	15700	395.5kg	250kg	145.5kg	12
9	1253	628	15700	402.5kg	257kg	145.2kg	18
10	2051	628	15700	394.5kg	249kg	145.5kg	16
11	2034	628	15700	400kg	255kg	145.9kg	14
12	1135	628	15700	387.9kg	242kg	145.5kg	10
Total		7536	188400	4758.6kg	3011.5kg	1747.1kg	148

Table no. 2 End Breakage Study

Grey yarn breakage study on direct warping

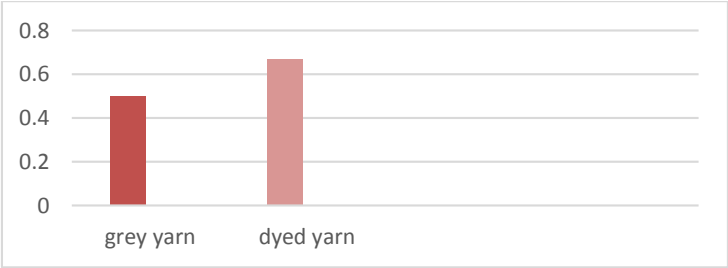
Breakage study = Total breaks x 400 x 1000 / Total length x TNE

= 148 x 400 x 1000 / 188400 x 628 = 0.50

Dyed yarn breakage study on sectional warping

Breakage study = Total breaks x 400 x 1000 / Total length x TNE

= 61 x 400 x 1000 / 5168 x 7020 = 0.67



Graph no.1 End breakage study

The graph no.1 shows the warping breakages as well as loom breakages. If increase the warping breakages its impact on reduced the loom breaks' and vice versa. Because in warping some type fault is removed by more

tension like thin, thick places, snarl, cut cone etc. the X axis shows the breaks per million and breaks per shift and Y axis shows the warping breakages and loom breakages.

Sizing Section

This all trials carried on the machine of benninger Ben-sizetech.

Procedure:

As per the plan of work firstly select the variable for which we have to study.

1) For the within beam pick up variation calculate the size pick up with three zone of weavers beam i.e. RHS, middle, LHS. By using below formula.
2) For the Moisture and beam hardness trails, make the changes on sizing machine and prepare the beam with the variable in parameters.
3) When this beam loads on loom then collects there breakage rate.
4) Then compare the results and find out the conclusion.
5) For lapper and migration study changes the some machine setting and improves the work skill and reduced the lapper and migration end.

Lapper and MigrationStandard Norms:

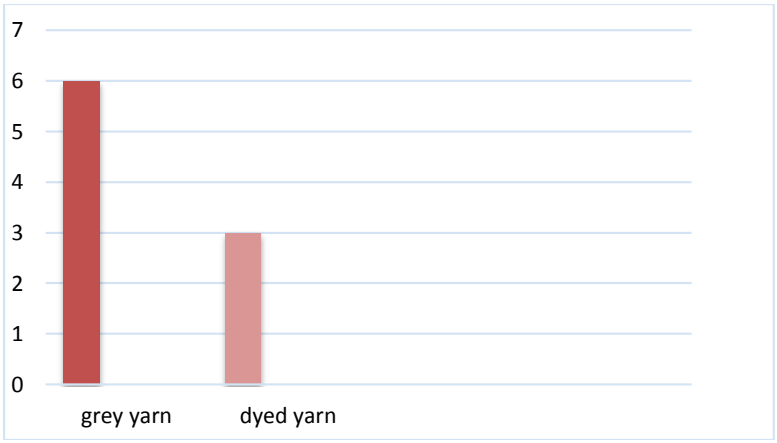
1) Norms for Lapper = 0.25 Brks. \ 3000 Ends \ 1000 Mtr.
2) Norms for Migration = 1.25 Brks. \ 3000 Ends \ 1000 Mtr.

Grey yarn sizing

Lapper calculation = Total break x 400 x 1000 / Total ends x Total length
= 6 x 400 x 1000 / 7536 x 15800
= 0.0201

Dyed yarn sizing

Lapper calculation = Total break x 400 x 1000 / Total ends x Total length
= 3 x 400 x1000 / 7020 x 5168
= 0.030

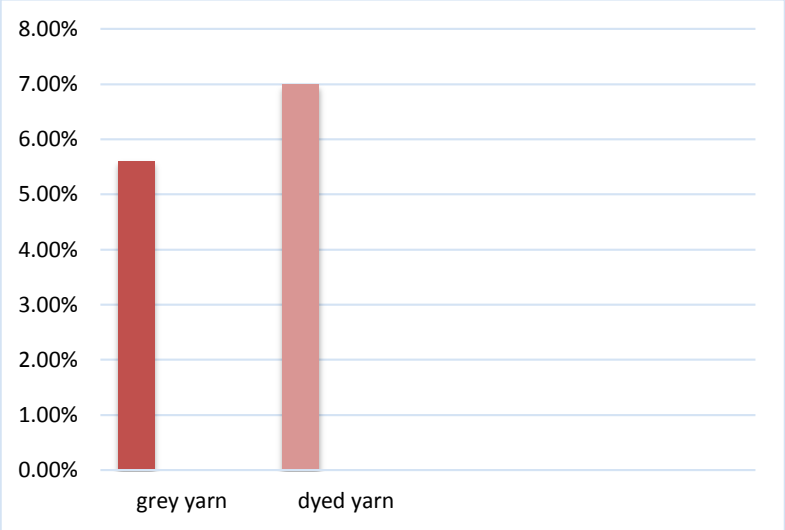


Graph no. 2 No of lapper

Moisture Percentage in Grey and Dyed Yarn

Sr. no	Check point	Grey yarn	Dyed yarn
	count	40Ne	40Ne
1	Drying temp. ^{O}C	140- 120	140-100
2	Speed Mtr/Min.	85	70
3	Moisture %	4.6%	7%

Table no.2 Moisture % in grey and dyed yarn



Graph no. 3 Moisture % in grey and dyed yarn

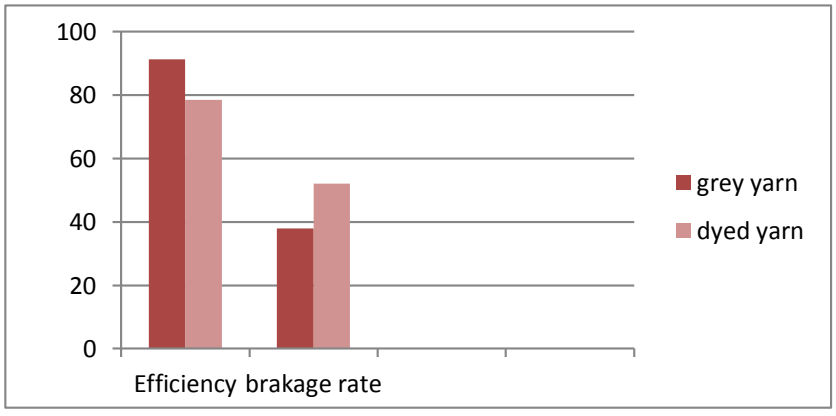
After sizing the moisture % of both yarns is changes, the grey and dyed yarn having 5.60% and 7% moisture % respectively. The impact of this change in moisture % is studied on loom shed by checking the breakage rate of both yarns on loom.

Loom Breakage Study

- **Trail - 1**

Loom breakage study		
	Grey Yarn	Dyed Yarn
Loom No	174	1641
Rpm	750	760
Efficiency	91.29%	78.5%
Warp Break/ Shift	15	24
Weft Break/ Shift	20	24
Other/ Shift	3	4
Total/ Shift	38	52

Table no.3 Loom Breakage Study

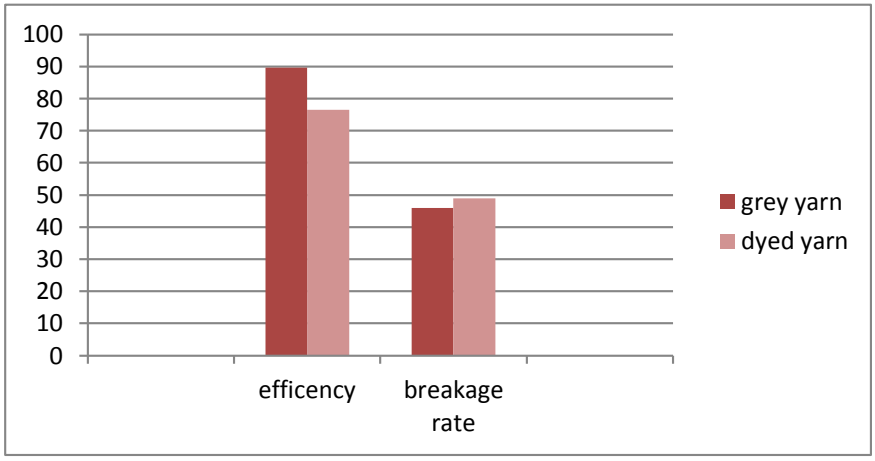


Graph no. 4 Loom Breakage Study

- **Trail - 2**

Loom breakage study		
	Grey Yarn	**Dyed Yarn**
Loom No	174	1641
Rpm	750	760
Efficiency	89.70%	76.57%
Warp Break/ Shift	18	26
Weft Break/ Shift	25	20
Other/ Shift	3	3
Total/ Shift	46	49

Table no.4 Loom Breakage Study

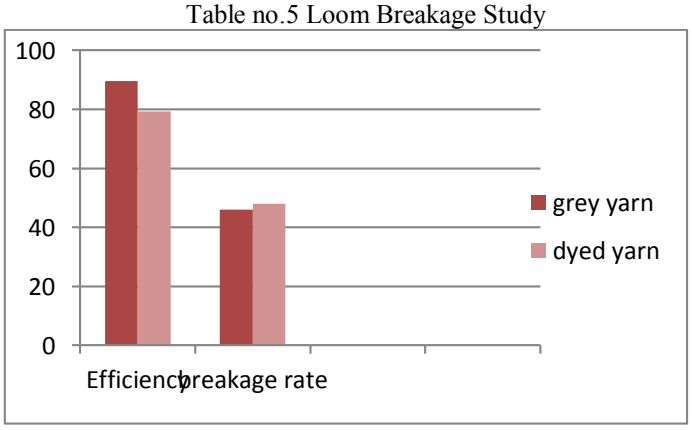


Graph no. 5 Loom Breakage Study

Trail - 3

Loom breakage study		
	Grey Yarn	**Dyed Yarn**
Loom No	174	1641
Rpm	750	760
Efficiency	89.57%	79.30%
Warp Break/ Shift	21	24
Weft Break/ Shift	22	20
Other/ Shift	3	4
Total/ Shift	46	48

Table no.5 Loom Breakage Study



Graph no. 6 Loom Breakage Study

	Grey Yarn	**Dyed Yarn**

Trail-1	91.29%	87.57%
Trail- 2	89.70%	84.57%
Trail-3	89.57%	82.30%
Average Efficiency	**90.18%**	**84.81%**

Table no. 6: Loom Efficiency

V. Conclusion

In loom shed department, there are lots and lots of reasons for efficiency loss due to higher grey yarn strength and comparatively dyed yarn is having low strength. The Data shows that the Highest Efficiency is of grey yarn as having 90.18% efficiency because of lower breakage rate. While in case of dyed yarn hanving 84.81% efficiency because of its higher breakage rate.

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