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Class Wise - Classimate Faults and their Physical Properties

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Abstract —*This Trend has changed regarding the assessment of yarn quality from lower unevenness and imperfection to better workability of yarn on further processing machines and final fabric appearance in respect of objectionable faults. Today the customer of textile products is highly quality conscious. The machinery used for the production of the yarn to fabric are also being automated year after year. This requires minimum down time of the machine to get their maximum benefit in terms of production, efficiency and cost. Therefore, in view of the above, objectionable faults in the yarn have become a prime and burning problem of the day for the spinning industry. From whatever research work done until now, very little information is available on the level for the various classes of faults as per the count. Uster statistics 2001 does not provide any information on faults, while Uster statistics 1997 which provides information on faults does not give guideline on the level of various classes of faults for different counts. Moreover the publication of the last ten years, gives information about the sources of faults, there causes remedies and their effect on fabric appearance, there is however no publication available on the categorization of the various classes of faults under different class wise and their percent contribution.*

Keywords*- Yarn fault, classimat yarn fault, count, Uster classimat, Statimat – M, Thick , Thin, Slub, long thick, long thin*

I. INTRODUCTION

There is considerable literature available on the research work done on the effect of various categories of faults, mainly objectionable on the fabric appearance. Though it is documented in various papers that yarn faults (objectionable) not only affect fabric appearance but also causes end breakage in subsequent processes resulting in to low production and higher production cost with low efficiency, but this is not supported by any systematic study or data. No published information is available on the physical characteristic of the various faults according to classes, therefore the assessment of physical properties of the faults under different classes of faults to understand their effect on the further processes is necessary.

II. EXPERIMENTAL PLAN

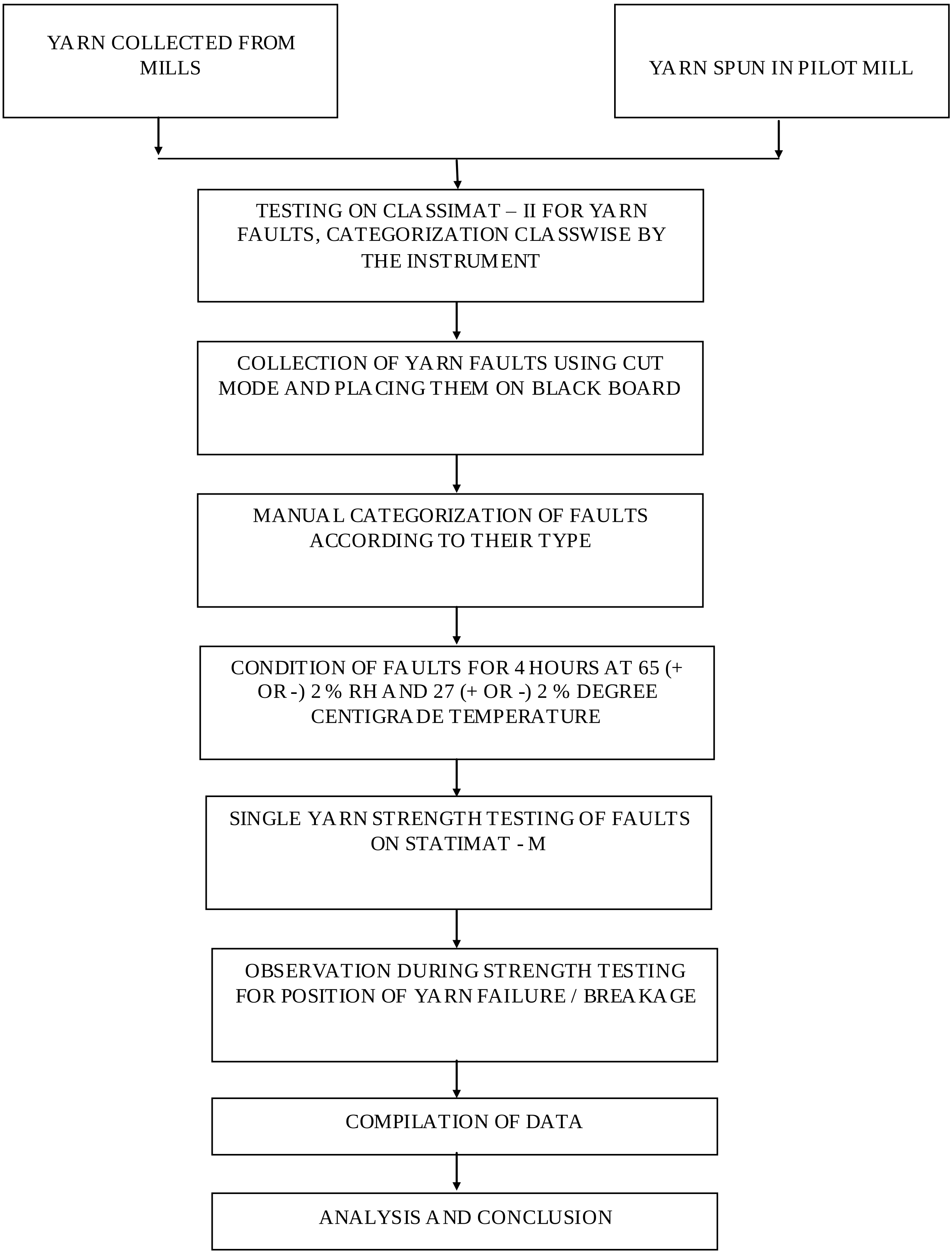
To cover the range of count from coarse to fine, samples of different counts were collected from mills while some of them were spun in the ATIRA pilot mill to get more number of faults so that the analysis is meaningful. The sample were then tested on Uster classimat–II on cut mode using the parameters given subsequently and the faults B4, C3, C4, D2, D3, D4 E, F, G, H1, H2, I1and I2 were collected on black sheet.

These sheets along with the faults were conditioned for four hours in standard temperature of 27 ± 2•C and 65 ± 2 % R.H. in the physical testing laboratory of ATIRA. These were then tested on Statimat – M with parameters given subsequently, for testing the physical properties in terms of single yarn strength and elongation and compare them with results of normal yarn, also tested that were on the same instrument. During the strength testing, observation was made, whether the yarn broke from the fault region or elsewhere. Thus data bank has been prepared count wise and class wise comparing the physical properties of the faults with the normal yarn (physical properties value) and efforts has been made to identify the value and trade for the physical properties of the yarn faults count wise.

The counts used in the study are 20s K, 24s K, 30s K, 40s K, 40s C, 50s C, 60s K, 60s C, 80s K, 80s C, 95s C, 105s K, and 105s C. Thus in this project a total of 112 samples of the various counts collected and tested and prepared data bank count wise and class wise.

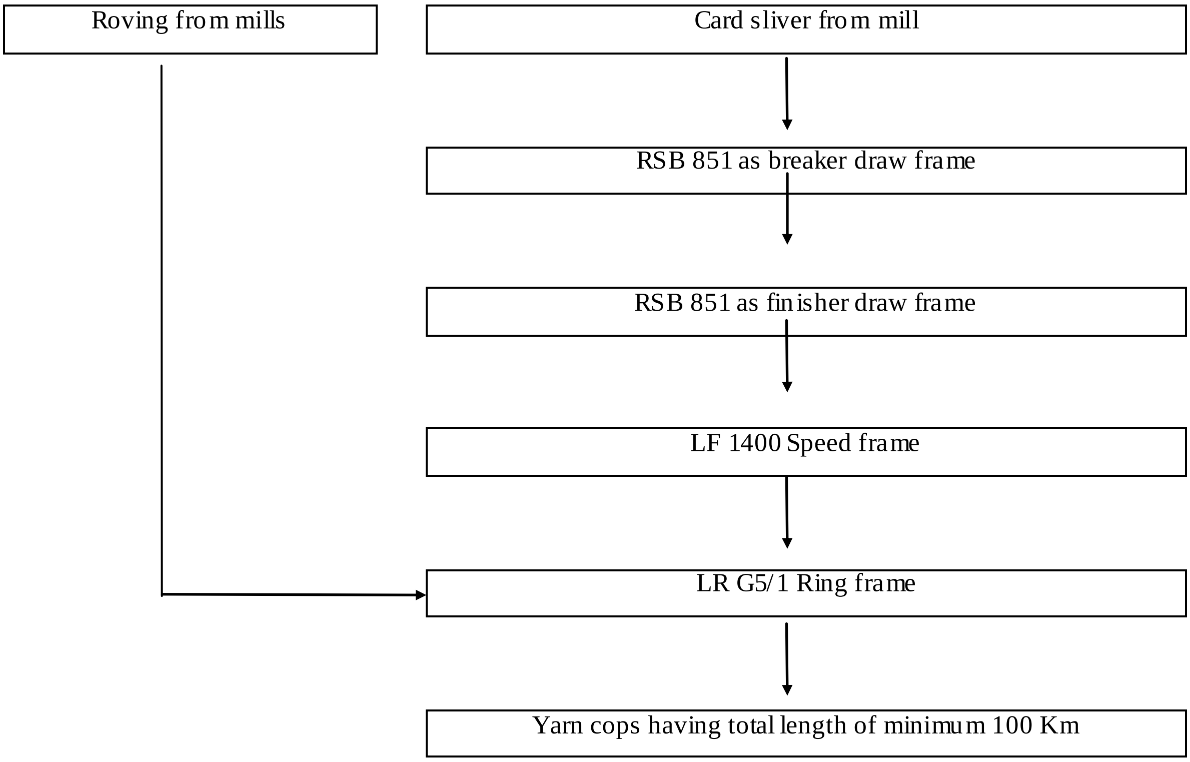
The process flow of the experiment and Process parameters are given subsequently. The level of classimat faults categorized class wise by instrument for all sample tested along with count wise average value is taken.

Process Flow Chart



2.1 - SPINNING PARAMETERS

Spinning have been done in ATIRA pilot mill for different counts. Process parameters for a given count have been kept constant. The process flow is as given below:



The major parameters kept at different stages are given below:

2.1.1DRAW FRAME

1. *Breaker draw frame*

Parameters	Count 60^s	Count 105^s and 80^s
Model	RSB 851	RSB 851
Speed	350 mts/min	350 mts/min
Auto leveler	Off	Off
Break draft	1.16	1.21
Hank	0.15	0.2
Trumpet	3.2 mm	2.8 mm
Gauge	36-40	40-45

2. *Finisher draw frame*

Parameters	Count 60^s	Count 105^s and 80^s
Model	RSB 851	RSB 851
Speed	350 mts/min	350 mts/min
Auto leveler	ON	ON
Break draft	1.16	1.21
Hank	0.15	0.2
Trumpet	3.2 mm	2.8 mm
Gauge	36-40	40-45

2.1.2 SPEED FRAME

Parameters	Count 60s	Count 105s and 80s
Model	LF 1400	LF 1400
Speed	850 RPM	850 RPM
Hank	1.6	2.0
T.M.	1.3	1.15
Spacer	5.0 mm	4.5 mm
Gauge	44-49	45-50

2.1.3 RING FRAME

Parameters	Count 20s	Count 30s	Count 40s	Count 50s	Count 60s	Count 80s	Count 105s
Model	LR G5/1	LR G5/1	LR G5/1	LR G5/1	LR G5/1	LR G5/1	LR G5/1
Speed	16500 RPM	16500 RPM	16500 RPM	16500 RPM	16500 RPM	16500 RPM	16500 RPM
Hank	0.9	1.1	1.3	1.3	1.6	2.0	2.0
Break draft	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Draft	25.65	25.0	28.48	28.78	38.06	30.62	42.24
T.P.I	20.15	22.75	26.59	29.93	30.76	34.09	38.49
Spacer	3.25mm	3.25mm	3.25mm	2.75mm	2.75 mm	2.5mm	2.5 mm
Ring traveler	2/0	3/0	6/0	10/0	10/0	18/0	18/0

2.2 TESTING PARAMETERS

2.2.1. Classimat-II

Speed	700mts/min
RH	65 % ± 2 %
Temperature	25°C ± 2°C
Yarn length	100 Km
Mode	Cut mode

2.2.2 Single yarn strength tester

Model	Statimat – M
Speed	5 mts/ min
Gauge length	50 cm
Load cell	10 N
Pre load	0.5 CN / tex
RH	65 % ± 2 %
Temperature	25°C ± 2°C

III. RESULTS AND DISCUSSION

One of the major purpose of the present study is to analyze the classimat faults and their physical properties. To analyze properly, the data generated during this study, the discussion has been divided in to 4 parts as follows.

1) Analysis of level of classimat faults categorized class wise by the instrument for different counts and mills.
2) Analysis of level of short thick objectionable faults class wise.
3) Analysis of class wise and count wise fault failure rate.
4) Analysis of class wise short thick objectionable faults for their Strength, Elongation and B-work for different counts

3.1. Analysis of level of classimat faults categorized class wise by the instrument for different counts and mills.

A All the yarns collected or spun were tested on the classimat for determining the level of yarn fault. The values expressed for 100 km. of yarn are given in Appendix 2 the data, as can be seen is huge, and therefore we have averaged the result and presented it count wise in table 3.1. They have also been segregated as carded and combed. It was observed that, Though the no. of sample tested in each count are large and sufficient but the number of mill covered in the study are very limited to draw conclusion on the level of fault existing in yarn spun from Indian mills therefore,The classimat faults for various counts are averaged mill wise and tabulated in table 3.1. This has been done basically because the house keeping, the maintenance schedules of a particular mill is likely to remain almost very similar for the different counts being spun. To a great extend it can also be assumed that the quality of mixing in a particular mill for different count will be almost same in the sense that if the mill management has a tendency to use superior, inferior or normal mixing for one count, it would also do so for rest of the count that are being spun in the mill.

The following is the analysis of the table

3.1.1. If yarn is spun from same mixing to count using optimum parameters, the level of classimat faults increases with fine count seen in the case of mill C.

3.1.2. Same finding of classimat faults increasing with fine count hold true in case of mill B and D also were the mixing for both the count is not same but used approximately according to the count. This implies that Uster Statistics which has so far been publishing common level of classimat faults for different counts needs to be reviewed since classimat faults increase with count.

3.1.3. For the data studied, the increase in total classimat faults with the fineness of count increasing by about 20 units, is of order of 100 to 200 % while the increase in short thick objectionable faults is correspondingly very less 60 to 80 %. This implies that short thick objectionable faults in the yarn are less dependent on the mixing and process parameters as compare to the total faults. (from mill B and mill D)

3.1.4. In the mills studied, the increase in long thin faults in all cases with increase in fineness of count by about 20 units has been considerably high around 180 to 300 % while in case of increase in count by about 40 units, the increase in long thin faults has been observed to be 400 %. (mill B and mill D)

Table 3.1 Average level of classimat faults categorized class wise by the instruments mill wise for different counts.

Fault class	Mill A	Mill B		Mill C				
	24 K	**40 C**	**60 C**	**20 K**	**40 C**	**50 C**	**60 C**	**60 k**
A1	442.87	144.67	533.00	121.50	855.00	252.0	301.00	2871.00
A2	93.97	34.52	87.43	25.15	105.00	57.0	47.28	165.10
A3	23.96	8.29	13.59	3.82	17.90	12.3	7.48	9.20
A4	7.6	5.09	7.56	1.87	4.60	2.7	1.75	0.70
A	**568.4**	**192.56**	**641.57**	**152.33**	**982.50**	**324.0**	**357.50**	**3046.00**
B1	14.53	13.72	21.57	25.92	31.00	13.0	11.50	76.00
B2	14.05	12.84	30.57	10.60	29.50	24.0	12.50	34.00
B3	7.83	5.74	14.99	5.15	8.75	5.7	7.05	6.30
B4	5.34	5.19	9.59	2.00	4.75	6.3	4.20	0.70
B	**41.75**	**37.48**	**76.71**	**43.67**	**74.00**	**49.0**	**35.25**	**117.00**
C1	2.98	5.02	4.74	15.83	18.40	6.0	9.75	14.00
C2	3.51	2.58	6.21	7.33	9.10	3.7	2.75	10.10
C3	2.37	2.34	5.19	1.67	1.70	3.6	5.48	4.20
C4	2.51	3.03	6.03	1.13	0.80	2.7	4.78	0.70
C	**11.37**	**12.97**	**22.17**	**25.97**	**30.00**	**16.0**	**22.75**	**29.00**
D1	0.99	2.94	1.57	7.48	5.70	5.5	5.73	7.50
D2	0.4	0.50	0.91	6.15	4.35	2.7	1.30	2.80
D3	0.36	0.40	0.26	1.78	0.00	0.0	0.78	0.00
D4	0.75	0.76	1.34	0.30	0.50	1.8	0.70	0.70
D	**2.5**	**4.60**	**4.09**	**15.72**	**10.55**	**10.0**	**8.50**	**11.00**
E	2.31	1.83	2.99	9.87	11.55	1.8	2.53	1.40
F	2.32	2.61	4.26	21.28	15.70	10.0	6.03	16.00
G	1.59	1.34	2.74	4.08	2.20	0.0	0.23	3.50
H1	83.88	46.59	130.99	107.62	205.65	5.4	8.85	406.00
H2	1.43	0.31	0.73	5.72	3.35	0.9	1.55	7.00
I1	0.71	0.53	1.44	3.97	1.00	0.0	0.00	2.80
I2	1.22	0.58	2.06	4.97	3.55	0.0	0.75	1.40
Total fault	**717.48**	**301.40**	**889.74**	**395.18**	**1340.05**	**417.1**	**443.93**	**3641.10**
16class fault	**624.02**	**247.62**	**744.54**	**237.68**	**1097.05**	**399.0**	**424.00**	**3203.00**
Obj. fault	**18.93**	**16.80**	**29.96**	**8.75**	**12.35**	**17.1**	**17.68**	**7.00**
Long thick	**6.22**	**5.76**	**9.99**	**35.23**	**29.45**	**11.8**	**8.78**	**20.90**
long thin	**87.24**	**48.01**	**135.21**	**122.27**	**213.55**	**6.3**	**11.15**	**417.20**
Tested Length	**1000 Km**	**4100 Km**	**700 Km**	**600 Km**	**200 Km**	**100 Km**	**300 Km**	**100 Km**

Objectionable faults = A4+B4+C3+C4+D3+D4

Fault Class	Mill C				Mill E	Mill F	Mill D		
	80 C	80 K	105 C	105 K	50 C	95 C	40 C	80 C	105 C
A1	228.00	1122.00	541.00	2945.00	209.0	853.00	133.00	224.09	423.83
A2	55.00	108.00	97.50	219.00	45.0	154.50	28.93	46.43	96.75
A3	10.70	11.70	21.20	24.30	11.6	16.50	6.30	8.90	15.09
A4	3.30	2.30	8.30	2.70	5.4	2.50	2.77	5.22	7.86
A	**297.00**	**1244.00**	**668.00**	**3191.00**	**271.00**	**1026.50**	**171.00**	**284.64**	**543.53**
B1	17.00	21.00	30.00	75.00	14.0	39.50	4.53	13.36	18.65
B2	24.30	23.90	43.00	43.00	24.0	61.00	6.03	19.45	32.13
B3	3.40	4.60	17.10	12.20	6.2	24.60	3.23	8.05	17.70
B4	3.30	3.50	6.90	6.80	3.8	6.40	1.70	6.68	6.62
B	**48.00**	**53.00**	**97.00**	**137.00**	**48.00**	**131.50**	**15.50**	**47.55**	**75.10**
C1	6.00	3.00	8.30	14.00	3.8	8.00	0.23	1.60	4.20
C2	5.10	5.00	8.20	16.00	2.4	20.00	1.30	4.70	9.01
C3	3.40	1.20	9.60	6.90	0.7	18.55	1.57	2.77	7.13
C4	4.50	5.80	6.90	4.10	2.3	8.95	1.53	3.36	6.41
C	**19.00**	**15.00**	**33.00**	**41.00**	**9.20**	**55.50**	**4.63**	**12.44**	**26.75**
D1	4.50	1.20	3.00	7.40	1.5	3.20	0.87	0.11	0.15
D2	3.40	3.50	2.60	5.50	0.0	1.90	0.33	0.42	1.08
D3	1.10	1.20	2.70	1.40	1.5	3.50	0.17	0.21	1.00
D4	0.00	1.10	3.70	2.70	0.0	3.75	0.33	0.77	2.01
D	**9.00**	**7.00**	**12.00**	**17.00**	**3.00**	**12.35**	**1.70**	**1.51**	**4.23**
E	1.10	1.10	4.15	2.70	3.0	0.80	0.50	0.76	2.08
F	5.60	9.30	13.50	22.00	7.7	9.15	2.47	2.42	3.27
G	0.00	0.00	0.30	5.50	2.3	1.65	0.90	0.35	1.08
H1	35.00	287.70	413.55	986.00	12.9	92.80	2.93	26.85	109.60
H2	0.00	2.30	0.95	19.00	6.1	1.20	0.50	0.60	1.29
I1	0.00	0.00	0.30	1.30	0.0	0.85	0.77	0.25	1.07
I2	1.10	1.10	2.75	5.50	4.6	3.90	0.67	0.87	2.81
Total fault	**415.80**	**1620.50**	**1245.50**	**4428.00**	**367.80**	**1336.20**	**201.57**	**378.24**	**770.81**
16class fault	**373.00**	**1319.00**	**810.00**	**3386.00**	**331.20**	**1225.85**	**192.83**	**346.13**	**649.62**
Obj. fault	**15.60**	**15.10**	**38.10**	**24.60**	**13.70**	**43.65**	**8.07**	**19.02**	**31.03**
Long thick	**6.70**	**10.40**	**17.95**	**30.20**	**13.00**	**11.60**	**3.87**	**3.54**	**6.43**
Long thin	**36.10**	**291.10**	**417.55**	**1011.80**	**23.60**	**98.75**	**4.87**	**28.57**	**114.77**
Tested Length	**100 Km**	**100 Km**	**200 Km**	**100 Km**	**300 Km**	**1300 Km**	**1300 Km**	**100 Km**	**200 Km**

3.2. Analysis of level of short thick objectionable faults class wise.

So far all the data has been categorized and analyzed as per the type of fault, however in practical mill condition it is difficult and time consuming for the mill to categorize various faults as per their types. Mills have class wise data of faults with them as obtained from the testing instrument therefore we have redesigned the table as per the classes obtained and analyzed accordingly for their ease and convenience.

3.2.1. As expected, the percent contribution of B4 category of faults to the total short thick objectionable fault has been found to be highest of order of 41 % ranging from 30 to 50 %. (Can be seen from Table 4.1.1)

3.2.2. The C category fault which included C3 and C4 together contribute about 47 % of the total short thick objectionable fault. The percent contribution in both category was found to be 26 and 21 % respectively. (Table 4.1.3)

3.2.3. D category faults contribute to about 12 % of the total short thick objectionable faults with the contribution of each category ranging between 3 to 5 %. (As shown in Table 4.1.3)

Table-3.2.1 Total level of short thick objectionable faults categorized by their class for all carded counts tested.

Count	20^{s} K		24^{s} K		60^{s} K		80^{s} K		105^{s} K		Total	
	TF	%	TF	%	TF	%	TF	%	TF	%	TF	%
B4	7	18	64	56	-	-	2	22	5	31	78	41
C3	8	20	18	16	6	50	1	11	3	19	36	19
C4	3	8	22	19	1	8	5	56	3	19	34	18
D2	15	38	2	2	3	25	1	11	3	19	24	13
D3	5	13	2	2	-	-	-	-	1	6	8	4
D4	1	3	6	5	2	17	-	-	1	6	10	5
TOTAL	**39**		**114**		**12**		**9**		**16**		**190**	

TF=Total Faults Tested

Table-3.2.2 Total level of short thick objectionable faults categorized by their class for all combed counts tested.

Count	40^{s} C		60^{s} C		80^{s} C		105^{s} C		Total	
	TF	%	TF	%	TF	%	TF	%	TF	%
B4	238	48	115	44	55	53	79	28	487	43
C3	95	19	68	26	27	26	97	34	287	25
C4	106	21	59	23	18	17	68	24	251	22
D2	24	5	6	2	1	1	15	5	46	4
D3	14	3	4	2	1	1	11	4	30	3
D4	19	4	9	3	1	1	14	5	43	4
TOTAL	**496**		**261**		**103**		**284**		**1144**	

TF=Total Faults Tested

Table-3.2.3 Total level of short thick objectionable faults categorized by their class for major carded and combed counts tested.

Count	20^{s} K		24^{s} K		40^{s} C		60^{s} K		80^{s} K		105^{s} K		Total	
	TF	%	TF	%	TF	%	TF	%	TF	%	TF	%	TF	%
B4	7	18	64	56	238	48	115	42	57	51	84	28	565	41
C3	8	20	18	16	95	19	74	27	28	25	100	33	354	26
C4	3	8	22	19	106	21	60	22	23	21	71	24	285	21
D2	15	38	2	2	24	5	9	3	2	2	18	6	70	5
D3	5	13	2	2	14	3	4	1	1	1	12	4	38	3
D4	1	3	6	5	19	4	11	4	1	1	15	5	53	4
TOTAL	**39**		**114**		**496**		**273**		**112**		**300**		**1365**	

TF=Total Faults Tested

Table-3.2.4 Total level of short thick objectionable faults categorized by their class for different counts group

Count	B4		C3		C4		D2		D3		D4		Total	
	TF	%	TF	%	TF	%	TF	%	TF	%	TF	%	TF	%
Coarse	71	46	26	17	25	16	17	11	7	5	7	5	153	11
Medium	353	46	169	22	166	22	33	4	18	2	30	4	769	58
Fine	141	34	128	31	94	23	20	5	13	3	16	4	412	31

TF=Total Faults Tested

3.3. Analysis of class wise and count wise fault failure rate.

Like type wise analysis, class wise analysis of the yarn failure rate at the fault region has been compiled and given in table 3.3.1 – 3.3.4. The analysis has been done separately for carded as well as combed count yarns.

3.3.1. Yarn failure rate of the collected faults in combed count for all categories is around 30 to 50 % while in carded count it is around 60 to 75 %. (From Table 3.3.1 and Table 3.3.2)

3.3.2. In carded count the failure at the fault region showed trend in the sense 58 % of B4 and C3 category yarn broke while the percentage steadily increase from 65 to 75 % as the length and diameter of the fault increased. (Can be seen from Table 3.3.1)

3.3.3. In combed count we could not observed any specific trend of yarn failure rate at the fault region with respect to length and / or diameter of the fault. (Table 3.3.2)

TABLE – 3.3.1 Fault failure rate of short thick objectionable faults as per their type for carded yarns.

Count	B4			C3			C4			D2			D3			D4			Total		
	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%
20^s K	7	1	14	8	2	25	3	3	100	15	10	67	5	4	80	1	1	100	39	21	54
24^s K	64	40	63	18	16	89	22	13	59	2	1	50	2	2	100	6	4	67	114	76	67
60^s K	-	-	-	6	1	17	1	1	100	3	1	33	-	-	-	2	1	50	12	4	13
80^s K	2	1	50	1	0	0	5	3	60	1	1	100	-	-	-	-	-	-	9	5	56
105^s K	5	3	60	3	2	67	3	2	67	3	3	100	1	0	0	1	1	100	16	11	69
Total	**78**	**45**	**58**	**36**	**21**	**58**	**34**	**22**	**65**	**24**	**16**	**67**	**8**	**6**	**75**	**10**	**7**	**70**	**178**	**111**	**62**

TF - Total Faults Tested

B - Yarn Broken from fault region

TABLE – 3.3.2 Fault failure rate of short thick objectionable faults as per their type for combed yarns.

Count	B4			C3			C4			D2			D3			D4			Total		
	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%
40^s C	238	110	46	95	23	24	106	53	52	24	15	13	14	5	36	19	6	32	496	214	43
60^s C	115	58	50	68	25	37	59	35	59	6	1	1	4	0	0	9	5	56	261	124	148
80^s C	55	17	31	27	6	22	18	2	11	3	2	67	1	1	100	1	1	100	105	29	28
105^s C	79	34	43	97	27	28	68	34	50	15	7	47	11	5	45	14	8	57	284	115	40
Total	**487**	**219**	**45**	**287**	**81**	**28**	**251**	**126**	**50**	**48**	**25**	**52**	**30**	**11**	**37**	**43**	**20**	**47**	**1146**	**482**	**42**

TF - Total Faults Tested

B - Yarn Broken from fault region

TABLE – 3.3.3 Fault failure rate of short thick objectionable faults as per their type for carded and combed yarns.

Count	B4			C3			C4			D2			D3			D4			Total		
	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%
20^s K	7	1	14	8	2	25	3	3	100	15	10	67	5	4	80	1	1	100	39	21	54
24^s K	64	40	63	18	16	89	22	13	59	2	1	50	2	2	100	6	4	67	114	76	67
40^s C	238	110	46	95	23	24	106	53	52	24	15	13	14	5	36	19	6	32	496	214	43
60^s C	115	58	50	74	26	35	60	36	60	9	2	22	4	0	0	11	6	55	273	128	47
80^s C	57	18	32	28	6	21	23	5	22	4	3	0	1	1	100	1	1	100	114	34	30
105^s C	84	37	44	100	29	29	71	36	51	18	10	56	12	5	42	15	9	60	300	126	42
Total	**565**	**264**	**47**	**323**	**102**	**32**	**285**	**146**	**51**	**72**	**41**	**57**	**38**	**17**	**45**	**53**	**27**	**51**	**1336**	**599**	**45**

TF - Total Faults Tested

B - Yarn Broken from fault region

TABLE – 3.3.4 Fault failure rate of short thick objectionable faults as per their type for different counts group.

Count	B4			C3			C4			D2			D3			D4			Total		
	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%	TF	B	%
Coarse	71	41	58	26	18	69	25	16	64	17	11	65	7	6	86	7	5	71	153	97	63
Medium	353	168	48	169	49	29	166	91	55	33	17	52	18	5	28	30	12	40	769	342	44
Fine	141	44	39	128	35	27	94	41	44	22	13	59	13	6	46	16	10	63	412	156	38

TF - Total Faults Tested

B - Yarn Broken from fault region

3.4. Analysis of class wise short thick objectionable faults for their Strength, Elongation and B-work for different counts

The faults that have been broken from the fault region, their strength, elongation and B- work values has been compared to the normal yarn and expressed in percentage.

- It has been found that on and average

B4	Faults have	69	Strength	77	Elongation	61	B.work of normal yarn
C3		78		84		72	
C4		72		85		70	
D2		77		80		70	
D3		67		68		61	
D4		77		91		66	

Table-3.4.1 Ratio of different class of faults broken from the fault region to normal yarn expressed in percentage for RKm, Elongation and B-work. (Carded Counts)

Count	B4			C3			C4			D2			D3			D4		
	R	E	B	R	E	B	R	E	B	R	E	B	R	E	B	R	E	B
20^s K	72	76	56	81	83	73	76	87	71	69	76	59	44	46	25	72	89	66
24^s K	63	78	-	72	82	-	54	68	-	53	127	-	83	81	-	73	127	-
60^s K	-	-	-	76	111	72	89	127	90	99	75	72	-	-	-	63	44	23
80^s K	59	67	39	-	-	-	82	150	112	83	83	71	-	-	-	-	-	-
105^s K	53	90	86	47	82	70	51	85	74	44	74	61	-	-	-	58	110	113
Avg.	**62**	**68**	**60**	**69**	**90**	**72**	**70**	**103**	**87**	**70**	**87**	**66**	**64**	**64**	**25**	**67**	**93**	**67**

R- RKm
E - Elongation
B – B-work

Table-3.4.2 **Ratio of different class of faults broken from the fault region to normal yarn expressed in percentage for RKm, Elongation and B-work. (Combed Counts)**

Count	B4			C3			C4			D2			D3			D4		
	R	E	B	R	E	B	R	E	B	R	E	B	R	E	B	R	E	B
40s C	72	83	63	89	92	80	82	94	75	91	87	81	98	108	124	78	114	79
60s C	67	68	60	71	81	74	70	80	64	-	-	-	-	-	-	71	71	51
80s C	67	80	60	77	84	67	77	84	67	49	57	34	24	108	22	83	65	59
105s C	77	79	67	75	73	67	74	82	63	101	88	99	88	89	73	86	82	76
Avg.	**71**	**78**	**63**	**78**	**83**	**72**	**76**	**85**	**67**	**80**	**77**	**71**	**70**	**101**	**73**	**80**	**83**	**66**

R- RKm
E - Elongation
B – B-work

Table-3.4.3 **Ratio of different class of faults broken from the fault region to normal yarn expressed in percentage for RKm, Elongation and B-work. (Carded and Combed Counts)**

Count	B4			C3			C4			D2			D3			D4		
	R	E	B	R	E	B	R	E	B	R	E	B	R	E	B	R	E	B
20s K	72	76	56	81	83	73	76	87	71	69	76	59	44	46	25	72	89	66
24s K	63	78	-	72	82	-	54	68	-	53	127	-	83	81	-	73	127	-
40s C	72	83	63	89	92	80	82	94	75	91	87	81	98	108	124	78	114	79
60s C	67	65	59	72	88	74	70	81	64	99	75	72	-	-	-	69	68	147
80s C	67	81	59	77	84	67	78	102	78	59	66	46	24	108	22	83	65	59
105s C	75	79	68	76	75	66	74	82	63	89	46	92	88	89	73	84	84	79
Avg.	**69**	**77**	**61**	**78**	**84**	**72**	**72**	**85**	**70**	**77**	**80**	**70**	**67**	**68**	**61**	**77**	**91**	**66**

R- RKm
E - Elongation
B – B-work

Table-3.4.4 **Ratio of different class of faults broken from the fault region to normal yarn expressed in percentage for RKm, Elongation and B-work. (For different counts group)**

Count	B4			B3			C4			D2			D3			D4			Total		
	R	E	B	R	E	B	R	E	B	R	E	B	R	E	B	R	E	B	R	E	B
Coarse	68	77	56	77	83	73	65	78	71	61	101	59	64	64	25	73	108	66	68	85	58
Medium	70	74	61	81	90	77	76	88	70	95	81	77	98	108	124	74	91	63	82	89	79
Fine	71	80	64	77	80	67	76	92	71	89	86	92	88	89	73	84	84	79	81	85	74

R- RKm
E - Elongation
B – B-work

IV. CONCLUSION

From the result of the investigation reported, the following conclusions have been drawn

1. Level of classimat fault increases with finer count.
2. Increase in total classimat fault with the fineness of count increasing by about 20 units, is of order of 100 to 200 %. While the increase in the short thick objectionable fault is correspondingly very less 60 to 80 %.
3. Short thick objectionable faults in the yarn are less dependent on the mixing and process parameters as compared to the total faults.
4. Long thin faults increase with fine count.
5. The percent contribution of B4 category of faults in the short thick objectionable fault has been found to be highest of the order at 41 % ranging from 30 to 50 %.

6. The C category of faults which include C3 and C4 contribute about 47 % of the total short thick objectionable faults.
7. D category faults contribute to about 12 % of the total short thick objectionable faults.
8. The yarn failure rate in combed count is around 30 to 50 % while in carded counts it is around 60 to 75 %.
9. About 58 % B4 and C3 categories yarn fault broke while percentage steadily increased from 65 to 95 % as the length and diameter of faults increased.
10. In case of carded counts 62 % faults break at the fault region and 42 % in case of the combed yarn.
11. The failure rate from the fault region in carded yarn is much more than in combed yarn.
12. The probability of the yarn breaking from fault region low as the count becomes finer.
13. If the B-work of fault is around 50 to 55% of normal yarn, then about 75 to 85 % of such faults are likely to break.
14. If B-work is above 70 % the possibility of yarn failure from fault region is around 20 to 25 %.

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