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ARRIVING RIGHT SIZE COMBINATION IN WINDER – A PROFIT CENTER OF A PAPER MILL

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ABSTRACT

In Mysore Paper Mills Limited, till the year 2009, the major production was Newsprint and the sizes of newsprint in India are more or less uniform. The sizes of newsprint have come down from early days from 82.5, 81.5, 79, 76, 70, 69, 68.5, 68, 63.5 38, 39.5, and 34.3 cm. The size changes in winder are rare phenomenon and it is carried out only in day time. Many a days only one size will run for days.

When the production of writing and printing started in Mysore Paper Mills, it is really a tough task to handle the sizes and size changes in winder. In the first instance how to get the required tonnage on reel size and how to arrive with so much of condition in place dictated by the winder parameter. Once the size and tonnage are matched second part is report which still more complicated and strenuous without modern package and tools. In many instance the machine was stopped for want of empty thumb roll.

KEYWORDS: GSM, Size, Tonnage, side cuts.

INTRODUCTION

All the paper mills make the roll in the machine of their own size of deckle of machine. The sizes are cut in different size based on the tonnage in winder. The size given by the customers are so complex and small quantities, adjusting them to exact tonnage is a really a daunting task. In general utilizing the maximum deckle in the winder based on the size given by the marketing is essential, other wise it increase the finishing loss and increase the dry broke generation and thus increase the cost of production. Using the dry broke (once formed paper) gives raise to different quality and addition of broke problem in furnish.

The real problem comes how to get the best out of marketing order and reduce the finishing loss, side cuts and dry broke generation. It is to be kept in mind particularly small size which could be judiciously used as side cuts.

With the advent of modern tools of size packages available in the market, the level of losses could be minimized to a great extent, however medium to small paper mills will not have the luxury of investing on soft ware packages and auto size change in winder. The size package is relevant if the order is in bulk and spread over a month or minimum fifteen days. In the manual adjustment of size it becomes still more problematic. More size change means, more idle time of winder for adjusting size and there by loss of production and productivity. In worst cause this is the bottle neck of the machine runnability itself.

To obviate this in house easy software programme can be developed by using the excel sheet, which comes more handy in solving this problem.

Before venturing into all the details some of minimum knowledge of each winder is required.
1. Diameter of reel made in the winder. (0.95 to 1.030 mts)
2. Minimum and maximum size that could be cut in the winder.
3. Minimum and maximum of trim on either side
4. Manual removal of trim / vaccum / blower removal of trim.
5. Maximum number of cuts that could be handled in the winder.
6. The main is the winder configuration, which is unique to each winder the adjustment for reel separation without reel getting overlapped.
7. The adjustment in place required after each size change.

From the time marketing order is received, normally the marketing person's gives the order based on gsm, size and tonnage. With the stiff competition in place, many customers give the size and tonnages based on their requirement and never match the machine / winder deckle. It is also true preference of the customers on shade and diameter requirement is specific and these sizes cannot be put with the other customers in matching the deckle in winder.

From the receipt of order from marketing section, it is must to programme the machine production, based on gsm. Machine production is depends on the machine runnability and other available parameters like pulp chemicals and back end pulp properties.

From the marketing order, based on size and tonnage, the size adjustment is made before that it is essential to formulate the order on the basis of number of reel required.

1. Number of reels required on each size on the ton ordered.
2. The size which can be adjusted on the winder based on reel requirement and set matched.
3. From the set of order given, it is possible to mix the order of one customer with other / the customer has given deckle match for their own order.
4. It is also essential to address the side cut for deckle match, in that case the side cut always means a single cut and this can be marketed / re- pulped.
5. It is also imperative to note that exact match on tonnage on size is more of coincidence. In general 5 % more or less of the marketing order on major tonnage is acceptable. However, the smaller tonnage need to be matched exact as far as possible or this form a big stock lot which is not fetching good return.

Having addressed the detailed description of the all the relevant parameters, it is now enter into the real calculation part for deckle matching, reducing the finishing loss.

The basic concept to arrive the weight of reel based on the size, gsm and length. The calculation is made for 1 meter diameter reel, of tension, Nip and torque control reel.

The reel weights vary from 3 to 5 kgs from front to back for the weight distribution 2σ in the range of 1.2 to 2. This is attributed for weight and moisture distribution across the width of the machine and roll build up. This is less for the short width machine.

The weight is absolute weight of the reel it does not include core pipe, plug, wrapper sheet and side disc. Normally packing materials and core pipe is 3 to 5 kgs depending upon number of round wrapper sheet is used for packing. GSM, size of the reel on diameter the weight can be calculated.

A sample excel work sheet which is given below, the functions and formulae used are all in built programme of the excel sheet. The simple functions like, countif, count, sum, multiplication and vlookup are used

The excel sheet is made for following condition of winder.

1. Maximum deckle that can be cut in the winder 6.56 meters.
2. Maximum cut is 11 cut excluding both the side trim.
3. Minimum cut that can be introduced in the winder is 25.4 cm.

4. Maximum of minimum cut that can be introduced is 2 cuts of 25.4 cm.

5. Below 70 cm size 6 cuts at maximum can be put.

6. Both the edges preferably 70 and above can be put to avoid overlapping of reel.

7. Maximum speed achieved is 1100 mts in 90 second of winder starting.

8. Trim removal is blower in either side that can handle maximum of 14 cm each on either side.

9. The bulk of the paper is 1.35 to 1.40.

10. Full set size change is kept at minimum.

11. The size are adjusted in such a way by adjusting minimum 3 to 4 knife size change is effected.

12. The gsm range is 47 to 80 gsm.

A sample calculation for the 47 gsm and 50 gsm and is carried out on the basis of the marketing order and the result are self explanatory. In the first excel sheet based on the tonnage the size are adjusted to match the winder deckle. Once after matching the deckle the number of set in each size entered and it gives the exact / near to the tonnage.

Table – A adjusting the size based on the deckle

GSM	47	Constant	1.25	Value	Size calculation for the Month of April											02/05/2015	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Size in cm	71	63	76	80	82.5	90	93.5										
Order Ton	40	7	42	23	46	24	3										185
Weight/ Reel	417	370	447	470	485	529	549	0	0	0	0	0	0	0	0	0	
No.of Reel for ton	96	19	94	49	95	45	5										403.57
Reel Produced	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Required Reels	96	19	94	49	95	45	5										403.57
Ton	40	7	42	23	46	24	3										185

Ton/set	3.85	Front		Size Position in Winder					Back			Total	Enter Deckle		No of Sets		
Sl No	1	2	3	4	5	6	7	8	9	10	11		656	% Loss	Tentative	Completed	Remaining
1	76	76	76	80	80	80	90	90				648	8	1.22			0
2	76	76	71	71	71	71	71	71	71			649	7	1.07			0
3	82.5	82.5	82.5	82.5	82.5	63	76	93.5				645	11	1.68			0
4	82.5	82.5	82.5	82.5	82.5	63	76	90				641.5	14.5	2.21			0
5												0	656	100.00			0
6												0	656	100.00			0

Reels generation on the basis of size and number of set

Sets	71	63	76	80	82.5	90	93.5	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table – B – 47 GSM after entering the number of sets

GSM	47	Constant	1.25	Value	Size calculation for the Month of April												02/05/2015
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Size in cm	71	63	76	80	82.5	90	93.5										
Order Ton	40	7	42	23	46	24	3										185
Weight/ Reel	417	370	447	470	485	529	549	0	0	0	0	0	0	0	0	0	
No.of Reel for ton	96	19	94	49	95	45	5										403.57
Reel Produced	98	19	95	48	95	45	6	0	0	0	0	0	0	0	0	0	406
Ton	41	7	42	23	46	24	3	0	0	0	0	0	0	0	0	0	186.02
Required Reels	-2	0	-1	1	0	0	-1										-2.434
Ton	-1	0	0	0	0	0	0										-1.023

Ton/set	3.85	Front		Size Position in Winder				Back			Total	Enter Deckle		No of Sets		
Sl No	1	2	3	4	5	6	7	8	9	10	11	Total	656	% Loss	Tentative	Completed	Remaining
1	76	76	76	80	80	80	90	90				648	8	1.22	16		16
2	76	76	71	71	71	71	71	71	71			649	7	1.07	14		14
3	82.5	82.5	82.5	82.5	82.5	63	76	93.5				645	11	1.68	6		6
4	82.5	82.5	82.5	82.5	82.5	63	76	90				641.5	14.5	2.21	13		13
5												0	656	100.00			0
6												0	656	100.00			0

Reels generation on the basis of size and number of set

Sets	71	63	76	80	82.5	90	93.5	0	0	0	0	0	0	0	0	0	0
1	0	0	48	48	0	32	0	0	0	0	0	0	0	0	0	0	0
2	98	0	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	6	6	0	30	0	6	0	0	0	0	0	0	0	0	0	0
4	0	13	13	0	65	13	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table – A – 50 GSM adjusting the size based on the deckle

GSM	50	Constant	1.23	Value	Size calculation for the Month of April												02/05/2015
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Size in cm	62	73	122.5														
Order Ton	8	42	34														84
Weight/ Reel	381	449	753	0	0	0	0	0	0	0	0	0	0	0	0	0	
No.of Reel for ton	21	94	45														159.66
Reel Produced	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Required Reels	21	94	45														159.66
Ton	8	42	34														84

Ton/set	4.03	Front		Size Position in Winder					Back			Total	Enter Deckle		No of Sets		
Sl No	1	2	3	4	5	6	7	8	9	10	11		656	% Loss	Tentative	Completed	Remaining
1	73	73	73	122.5	122.5	62	122.5					648.5	7.5	1.14			0
2	73	73	73	73	73	73	62	73	73			646	10	1.52			0
3												0	656	100.00			0
4												0	656	100.00			0
5												0	656	100.00			0
6												0	656	100.00			0

Reels generation on the basis of size and number of set

Sets	62	73	122.5	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table – B – 50 gsm after entering the number of sets

GSM	50	Constant	1.23	Value	Size calculation for the Month of April											02/05/2015	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Size in cm	62	73	122.5														
Order Ton	8	42	34														84
Weight/ Reel	381	449	753	0	0	0	0	0	0	0	0	0	0	0	0	0	
No.of Reel for ton	21	94	45														159.66
Reel Produced	21	93	45	0	0	0	0	0	0	0	0	0	0	0	0	0	159
Ton	8	42	34	0	0	0	0	0	0	0	0	0	0	0	0	0	83.662
Required Reels	0	1	0														0.6627
Ton	0	0	0														0.3385

Ton/set	4.03	Front		Size Position in Winder					Back			Total	Enter Deckle		No of Sets		
Sl No	1	2	3	4	5	6	7	8	9	10	11		656	% Loss	Tentative	Completed	Remaining
1	73	73	73	122.5	122.5	62	122.5					648.5	7.5	1.14	15		15
2	73	73	73	73	73	73	62	73	73			646	10	1.52	6		6
3												0	656	100.00			0
4												0	656	100.00			0
5												0	656	100.00			0
6												0	656	100.00			0

Reels generation on the basis of size and number of set																	
Sets	62	73	122.5	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	15	45	45	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	6	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

After arriving the right combination and number of set on desk top it is time for execution of the programme in the winder. Where the actual size and number of set to be cut in each gsm need to be addressed and effectively communicated to the shop floor. The size change can come at any point of time in the day like in morning, afternoon, mid night and early hours of morning, the winder crew also prepared to effect the change of size at the appropriate time. This can be done by giving them the size chart and the order of size change. When ever multiple size changes are effected on the single major size, it is always advisable to have the maximum deckle size in the first instance and subsequently the reduced size. So that the size adjustment need not be repeated for the shortage of trim on either side. A sample work sheet of size change in excels worksheet which will be given to winder crew for easy operation and application.

16:05:12		For the month of												05/05/2015				
Sl No	Front			Size Position in Winder					Back			Total	656	% of Loss	Number of sets			
	1	2	3	4	5	6	7	8	9	10	11				Tentative	Completed	Remaining	Ton	Ton /set
47 GSM CREAM WOVE ELEGANT																			3.8
1	76	76	76	80	80	80	90	90				648	8	1.2	16		16	61	
2	76	76	71	71	71	71	71	71	71			649	7	1.1	14		14	53	
3	82.5	82.5	82.5	82.5	82.5	63	76	93.5				645	11	1.7	6		6	23	
4	82.5	82.5	82.5	82.5	82.5	63	76	90							13				
50 GSM CREAM WOVE ELEGANT																			3.7
1	73	73	73	122.5	122.5	62	122.5					648.5	7.5	1.1	15		15	56	
2	73	73	73	73	73	73	62	73	73			646	10	1.5	6		6	22	
3												0	656	100			0	0	
52 GSM CREAM WOVE ELEGANT																			4
1	85	85	85	85	85	85	59	85				654	2	0.3	41		41	164	
2	85	85	85	85	85	49	59	59	59			651	5	0.8	10		10	40	
3												0	656	100			0	0	
54 GSM CREAM WOVE ELEGANT																			3.8
1	73	73	76	76	76	61	50	74	89			648	8	1.2	1		1	4	
2	73	73	76	76	76	61	50	74	89			648	8	1.2	5		5	19	
3	73	73	76	76	76	50	55	53	56	56		644	12	1.8	9		9	34	
4	73	76	76	74	74	74	55	55	93			650	6	0.9	12		12	46	
58 GSM CREAM WOVE ELEGANT																			3.8
1	76	76	76	76	76	56	56	76	76			644	12	1.8	9		9	34	
2	73	73	73	73	73	56	56	56	56	56		645	11	1.7	14		14	53	
3																Total Ton		609	

CONCLUSION

Size adjustment based on tonnage and size is one of difficult task and any extra production in any particular size will not be accepted to the marketing and it will stay in the go down as dead stock. These odd size reels problem is more if the mill only produce the only reel order. In case of sheet order it can be converted to sheet and processed there by reducing the loss. A well thought out plan and getting order well in advance will partly solve the problem. However with the stiff marketing condition and ever reducing size of writing and printing customers it is really a daunting task. With the modern tools like computer and size package, the losses can be reduced to a maximum extent. Ultimately the customer is king and has to get what they wanted.