

AN INVESTIGATION OF AIR VORTEX YARN WITH DIFFERENT BLEND PROPORTION

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ABSTRACT

Innovation in the current scenario is not only focus on quality improvements, but also on economic way of producing a product. Air vortex yarn produced by MVS found to be slowly replacing conventional ring spun yarn. Now it becomes more difficult to produce Ring yarn due to scarcity of manpower, shortage of power and more supervision in many stages of process. The aim of the project work is to produce Air Vortex yarn & Ring yarn of Ne32/1 PC (18.45Tex) with various blend proportions such as PC-35/65, 65/35, 50/50, different air pressure such as 0.45 mPa, 0.55 mPa & 0.65mPa in Air vortex and compared their yarn properties.

Keyword: - Air vortex, Ring spun yarn, Blend properties

1. INTRODUCTION TO RING SPINNING

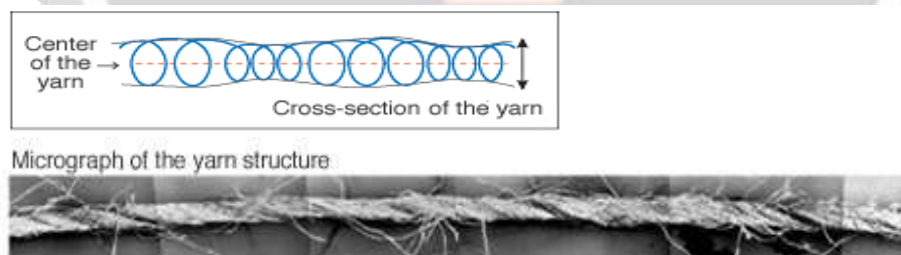


Figure.1 Ring spun yarn cross section & yarn structure

Ring spinning is a continuous spinning system in which twist is inserted into a yarn by a circulating traveller. The yarn twist insertion and winding action take place simultaneously by means of a rotating spindle. Ring spinning is the widely used spinning method because of improved yarn quality parameters, of using various fibers and the wide range of yarn counts. Drawbacks of ring spinning can be ordered as; lower production rates because of heat generation in the traveller at higher speeds, hairiness and yarn breakage due to spinning triangle and frictions. Because of these problems, new spinning methods gain importance nowadays.

1.1 AIR VORTEX SPINNING

Micrograph of the yarn structure

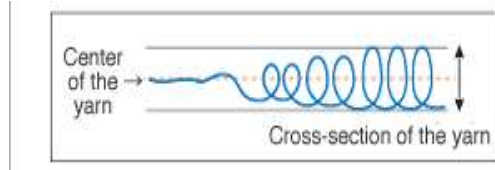
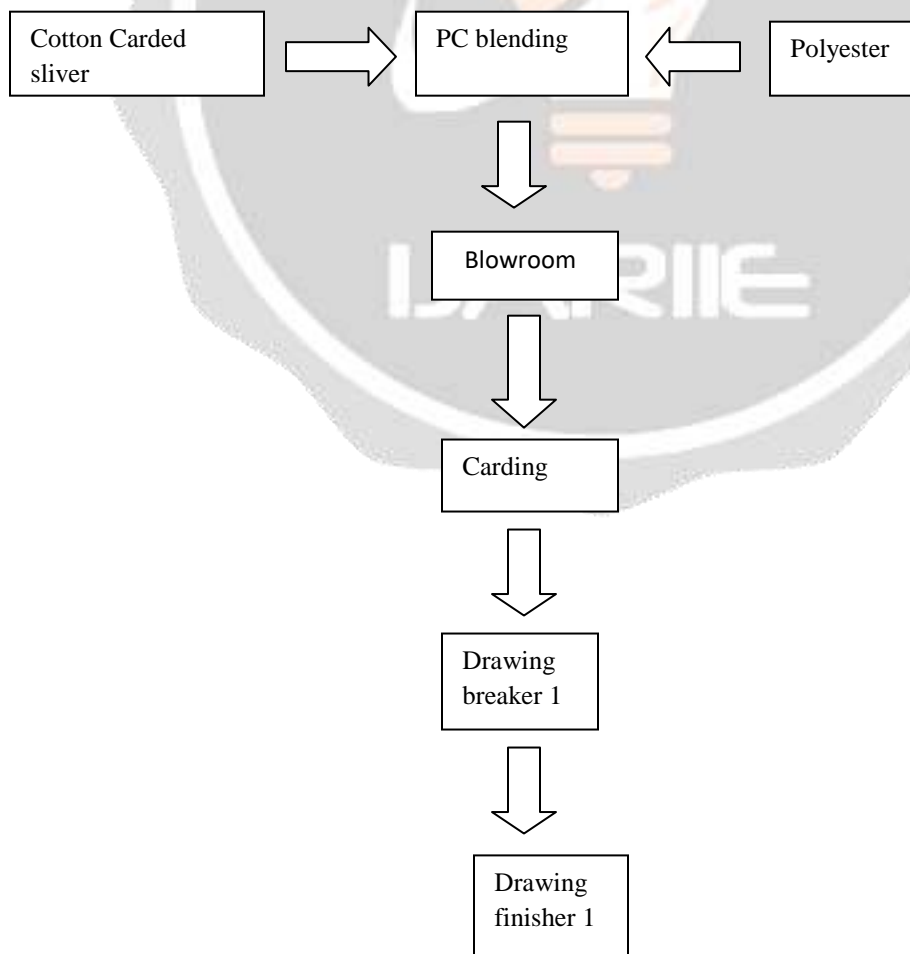


Figure. 2. Air vortex cross section & yarn structure

One of the newest spinning methods is air-vortex spinning. The tip of the fiber is focused to the center of the yarn by the vortex of compressed air so that the center of the yarn is always made straight without twisted. The other tip forms the outer layer that twines another fiber. Since air-vortex spun yarn has the least hairiness as an advantage among all the types of spun yarn, air-vortex enables to create textiles with characteristics such as anti-pilling and anti-abrasion performance. Air-vortex’s fiber structure itself is superior in moisture absorption and diffusion rate thus provides refreshing comfortableness (1). This method is the fastest method than other spinning methods. Spinning speed is quite high because there is no mechanical twist insertion device. And this yarn is directly spun from draw frame sliver and it is very flexible that various types of fibers can be spun at any fineness.

2. METHODS



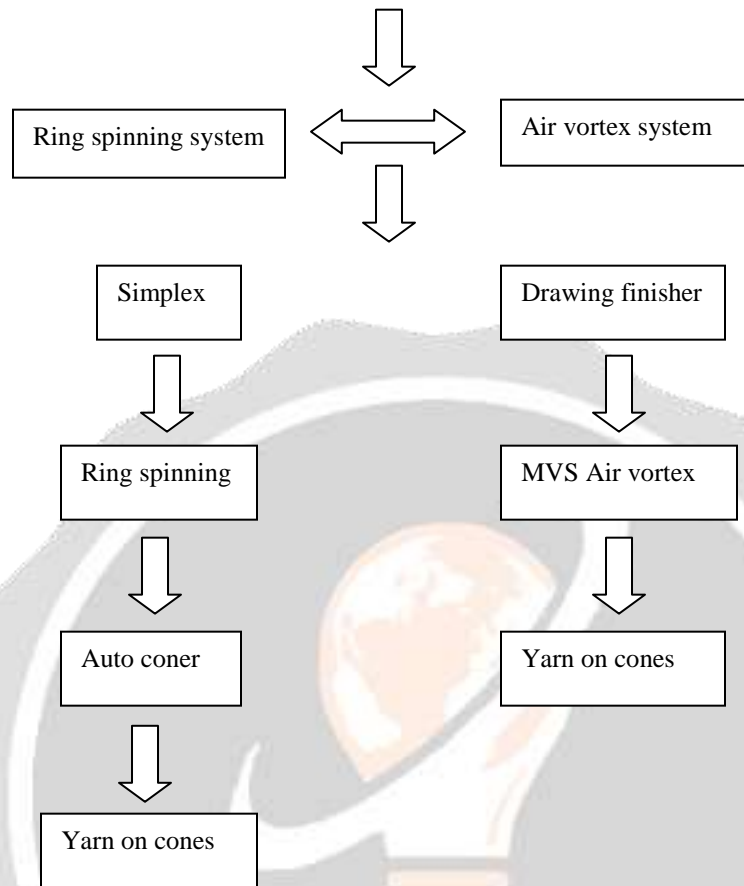


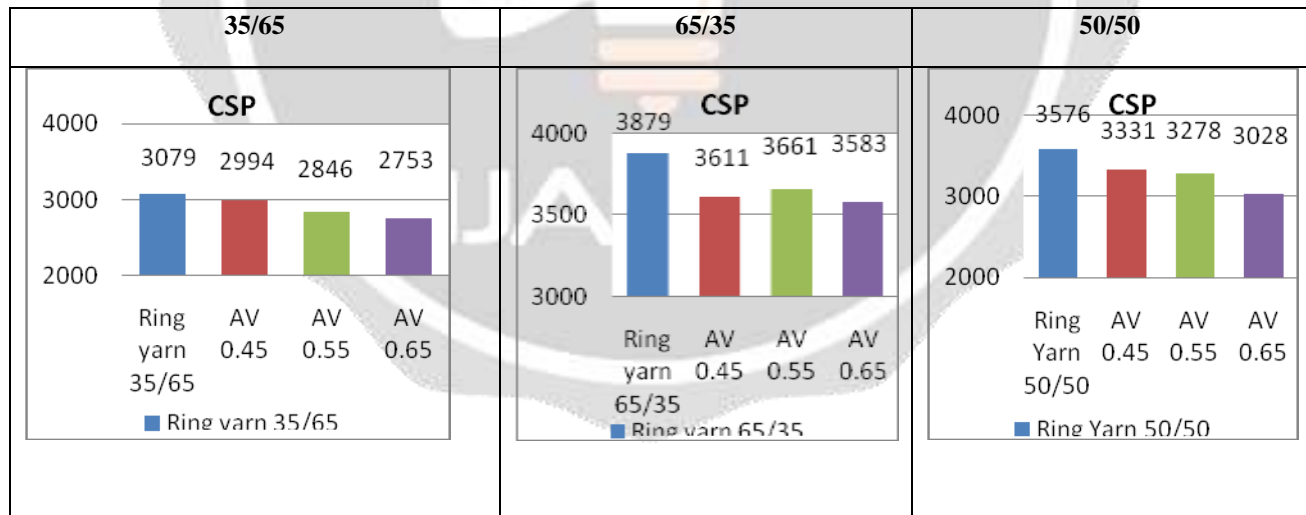
Figure. 3 Process sequence of Ring spinning & Air Vortex Spinning

3. COMPARISON OF RING SPINNING vs AIR VORTEX

PARTICULARS	RING YARN			AIRVORTEX								
	35/65	65/35	50/50	35/65			65/35			50/50		
				0.45	0.55	0.65	0.45	0.55	0.65	0.45	0.55	0.65
AVE. COUNT	31.57	33.3	31.04	31.52	31.37	30.9	30.47	30.53	30.52	30.98	30.72	30.64
CSP	3079	3879	3576	2994	2846	2753	3611	3661	3583	3331	3278	3028
U%	12.01	11	11.23	11.86	11.95	12.1	10.85	11.02	11.15	11.29	11.54	11.54
Imp/KM (-50%)	13	1	2	14	21	20	5	5	4	6	12	11

THICK/KM(+50%)	232	128	176	97	120	123	56	62	67	86	91	98
NEPS/KM(+200%)	407	315	375	255	302	335	132	172	185	195	212	272
TOTAL IMPS/KM	652	444	553	366	443	478	193	239	256	287	315	381
S3 VALUE	447.4	229	355.6	6	2.4	2	3.8	3	2.6	12.2	2.2	3.2
%ELONGATION	8.16	9.6	9.22	7.58	7.51	7.43	9.59	9.47	9.33	8.68	8.53	8.31
RKM	19.52	23.3	21.93	17.48	16.81	16.72	22.6	22.07	21.44	19.62	19.22	19.01
SH.THICK(A1+B1+C1+D1)	297	324	385	491	521	507	305	296	268	290	236	248
LONG THICK(E+F+G)	5	2	5	0	0	0	0	0	0	0	0	2
LONG (H1+I1)	173	57	216	43	61	17	14	10	4	17	25	25

Table-1: Comparison between Ring Yarn & Air vortex Yarn





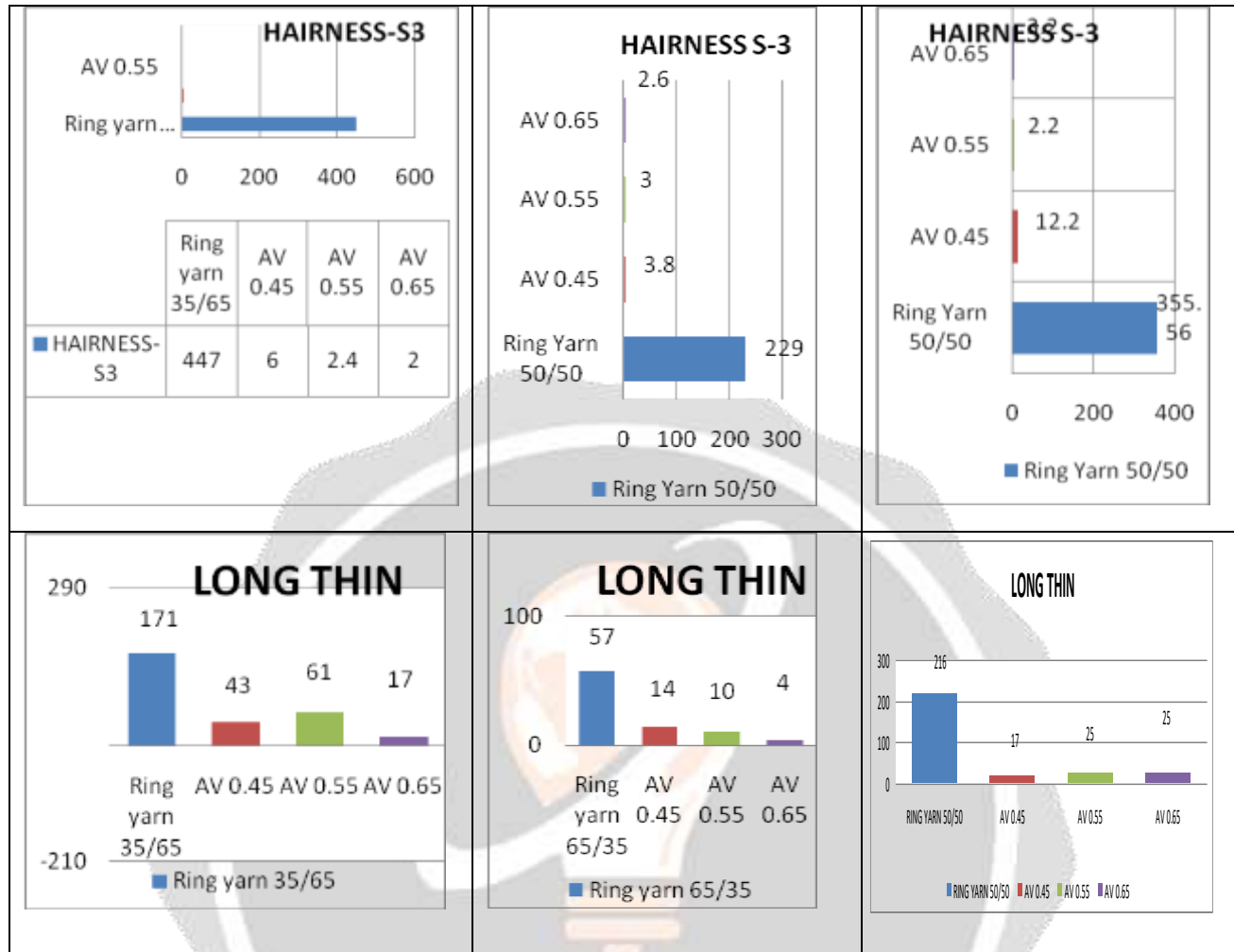


Figure.4 Inference in graphical representation – ring vs. Air vortex

4. CONCLUSIONS

- In Air Vortex, with all three PC blends (35/65,65/35&50/50) air pressure value of 0.45 MPA (4.5 bar) gives optimum results in case of yarn quality attributes. Increased pressure results in over twisting, disturbing yarn formation.
- Air Vortex yarn shows lower strength and elongation by about 10% than ring yarn. Maybe due to lesser cohesion and parallel.
- Air vortex shows lower imperfection the ring yarn considerably. May be due to better drafting and reduced sequence of process.
- In case of Classimat faults it is comparable with ring yarn at 65/35 and 50/50 when blends whereas 35/65 blends show 30% higher Classimat faults than ring yarn. It may be due to setting kept for polyester fiber in cotton predominant (35/65).

- However, in all blends Classimat long thin place is predominantly reduced by about 65% than ring yarn. Due to, lesser sequence of process, low stretch in creel, it may be due to lesser material handling by man and by machine.
- There is no hairiness that means Air vortex yarn shows 99% lower hairiness value S3 value than ring yarn. In hairiness point of view, S3 hairiness value may be even better than compact yarn. It may be due to the limited influence of air disturbance, better fiber alignment of fiber and other factor.
- Among the three chosen blends, 65/35 blend Air Vortex Yarn shows better results than other two blends as well it is comparable with ring yarn of same blend in term of CSP, RKM, IPI. Maybe due to process optimized for Polyester.
- It is better than Ring Yarn in terms of Hairiness & Classimat faults. All fibers are parallel to next fibers and twisted.

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