

'SOLAR CHARKHA YARN' A YARN OF FUTURE: A SCIENTIFIC STUDY

1Dr. PriyadarshiJaruhar, ²Advocate VaishaliWalchale

¹Principal, ²Owner V J Apparel Khadi, Washim-444505

¹Sanmati Engineering College, Washim

Abstract : Power, Pollution and Poverty are the measure concern of in developing countries. The Khadi yarn produced by solar powered charkha (compact spinning machine) has immense potential to resolve the problems related to these national issues.

In this present study, fundamental yarn properties and power consumption factors of and mechanized convention cotton ring spun yarn are compared with solar Charkha cotton yarn of same count 28 Ne. Apart from yarn properties power saving (due to favored of solar irradiance i.e. more than 4-7 Kwh/ m²/day in India) has also been studied. The current research revealed that quality of Solar yarn is comparable as far as lea strength is concerned, and in case of imperfections, the yarn is found to be more even with high IPI but more lustrous perhaps due to more open ness. The power saving in this case is found considerable.

IndexTerms - Solarcompact spinning, solar irradiance, yarn strength, yarn count.

I. INTRODUCTION

Khadi yarn is spun on Charkha (spinning wheels) since time immortal it has roots in the Indus valley civilization in in modern times it was used as a freedom fabric during freedom movements of India. But manufacturing yarn on charkha requires a lot of manual work with a limited scope of production. Now days every one requires support of power, and automation. Solar charkha is one of most appropriate machine designed which run on free solar energy to produced un mechanized spun yarn the production is four times more as compared to manual charkha and quality is reported to be better. Wile if brand for solar charkha yarn is established in near future among environment fashion conscious youths it will be in great demand. In this experiment NHH 44 cotton fibre roving of 1 count was used produced yarn of 40Nm on solar charkha of 20 gear ratio and the same specification cotton rove was utilized to spin the same count of yarn on the G5/1 ring frame of LMW. The idea is promote and adopt this indigenous green technology to save nature and irradiate poverty with a power full inspirational fashion fabric.

1.1 Solar Charkha as an alternative to mechanized spinning

.In present context mechanized spinning mills requires huge investment, besides this power and labour bill of spinning section is always been a challenge to the breakeven. It is possible to convert cotton in to yarn through a rural cottage industry setup based of solar charkha preferably in a cotton producing area with high solar irradiance, will utilize free solar power and rural in-house labour-time Spindle capacity, yarn production and labour employability can be increase to many folds. This will reduce the dependence on imported technology and finance.

1.2 Solar Charkha as a change engine to socio-economic structure

Solar energy operated charkha can eliminate altogether the hardship involve in manual operation of charkha and also enhance the wage earning capacity at their door steps by increasing productivity and quality of yarn produced. Especially it has potential to do miracles in women empowerment through bringing financial independence. These socioeconomic activities can be promoted through solar charkha clusters which will work as facilitator for elimination of poverty. Through many innovative interventions of these clusters transforming information and communication with the use of Information and communication Technologies (ICT) tool, so that qualitative shift for their own empowerment special for women for learning digital learning resources. ICTs strategy for community, radio, community videos, telecentre, revival and encouragement and promotion of folk and festival songs and dances, collection of village stories and displaced village information, village cultural empowerment by social-economic changes by providing platform. Solar Cluster will also act as an agent for capacity building of women folk for participation in local and political level institutions.

1.3 Yarn production through pollution free green energy

In a mechanized spinning mill 221.1kWh energy is consumed for per 1000 spindles, out of which 69 % is consumed in ring frame section and air conditioning section. At the same time the amount of energy needed for ring yarn changes between 3.49-3.62 kWh/kg. A large part of this energy can be saved through solar charkha spinning system by use of solar grid and solar hot water and condition systems. Very low power consumptions is required to operate the solar charkha for more than eight hours during the day, higher cost effectiveness with better returns on investment. Retrofitted component design of the solar panel for directly on the existing eight spindle NM charkha has made possible convert exist hand driven to solar driven to cut down the size of investment.

II. EXPERIMENTAL PLAN

2.1 Yarn preparation

Cotton yarn samples of 35Nm were prepared on different spinning systems, viz. manual improved Charkha, Solar Improved Charkha and in Cotton grower's Cooperative spinning mill with given particular shown in table no 1.

2.2 Fabric preparation & dyeing

Fabric samples are prepared on handloom through weaving process, outof thekhadi dyed yarns in Kolhapur handloom cluster by courtesy of V. J Apparels, Khadi, Washim

2.3 Sample Testing:

Yarn and fabrics were tested in in- house laboratory and in the textile testing laboratory of JDIET, Yawatmal, (M.S).shown in table 2.

III. RESULT AND DISCUSSION

Table 1: study of quality parameters of Charkha Khadi, Solar CharhkaKhadi& Mill spun yarn

1	2	3	4	5	6	7
S.No	Parameters	8 spindle hand operated improved charkha	12 –spindle improved Solar charkha	Ring spun mechanized yarn (Mill yarn)	Textile Research Association Norms	Khadi norms Manual on Quality assurance for Khadi MGRI, Wardha
1	Yarn count Nm/ Ne at 95% conf. (Carded)	35/20.6	35/20.6	35/20.6	35/20.6	35/20.6
	Count CV	12	8	2.2	2	10
2	Twist per Inch	14	14	18	17	11
3	Twist direction	S	S	Z	-	-
3	Roving sliver U%	7.5	7.5	7.5	7.5	7.5
4	U%	18.5	17	14	12.5-16	22
5	Thin places/km	1005	960	400	100	1600
6	Thick places/km	2300	1700	340	350	1600
7	Neps/km	1300	800	310	400	2450
8	Total imperfections (IPI)/km	4605	3460	1050	850	4450
9	CSPNmX kg	1200	1250	1320	1400	1320
10	Elongation %					
11	Yarn Grade (Appearance)	D	C	C	C + /B	D
12	Moisture content	10-11	9-10	8	7-8	-
13	Bonda waste	0.1	0.2	0.6	0.6	-
14	Hard waste	0.2	0.2	0.5	0.5	-
15	Speed of spindles in rpm	4500	6500	14500	16000	4000

Table 2: Khadi dyed fashion fabric testing reports

Sr. no.	Sample Code Khadi	Average Tearing Strength (Warp Way) in Kg	Average Tearing Strength (Weft Way) in Kg	Average Tensile Strength load (Warp way) in kg	Average Tensile Strength load (Weft way) In kg	Washing Fastness Scale 1 to 5		Shrinkage Test %
						Colour Change/Staining	Warp/ weft wise	
1	Golden	3.536	3.808	41.25	34.25	5	5	43
2	Gray	3.536	3.200	23.75	21	4/5	4/5	22

IV. CONCLUSION

After reviewing the comparative results and their analysis it has been concluded Solar khadi yarn has potential of gaining international and upper segment fashion market with its appropriate ecofriendly and cost effective product mix. It can provide raw material for future fashion garment, which will be in turn act as a catalytic agent for bringing women empowerment, power elimination in rural, human comfort, self-confidence, national pride, power saver, carbon print saver in developing populous countries.

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