R & D PROJECTS - 2012-13

1. GOVERNMENT SPONSORED PROJECTS

1.1 Completed projects:

(i) Project title : Development of cut resistant & abrasion resistant protective textile by using composite metallic yarn (Sponsored by Ministry of Textiles, Govt. of India)

Objectives :

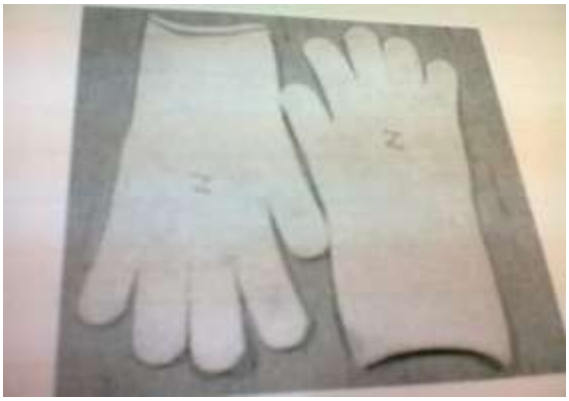
- To produce a composite yarn with combination of metallic and non metallic fibers or yarn.
- To develop the different combinations of composite yarn with metallic (stainless steel) and non metallic fibers or yarn (i.e. nylon, cotton, polyester, etc.)
- Evaluation of physical properties of developed yarn and fabrics.
- To optimize the process parameters at different stages of process from yarn manufacturing to finishing.
- To develop various products applicable for different end uses.
- To develop various end products for protective garments rom knitting and weaving and to study the comparative performance of developed product with conventional product.
- To conduct commercial trials and overall optimization at commercial scale
- To work out the techno economic viability of the developed products

Research outcome :

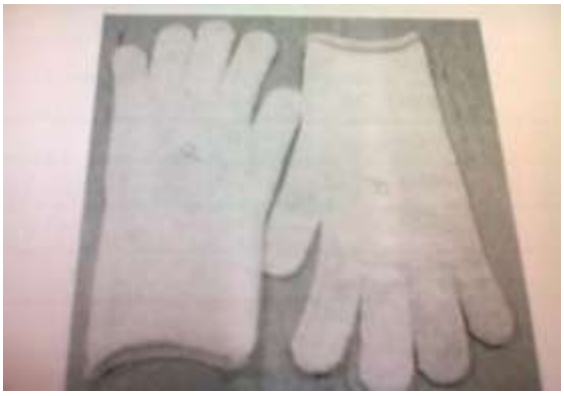
- The knitted gloves prepared using 2/10s composite metallic yarns of nylon, polyester & cotton were compared for various physical properties and the results are mentioned below :

TEST PARAMETERS	TEST METHODS	Test Results of hand glove		
		Nylon /Steel	Polyester/Steel	Cotton/Steel
GSM	IS:1964-01 (RA 2006)	481.54	507.60	534.5
Course/Inch Wales/Inch	IS:3330	11 11	11 10	11 11
Length, cm	IS:1954-90 (RA 2007)	29.17	29.8	30.4
Tear Strength, N	EN 388 (Single tongue tear			

Warp Weft	method)	(level 5) 104.46 (level 4) 95.08	(level 4) 77.85 (level 3) 60.08	(level 4) 91.4 (level 4) 73.29
Abrasion Resistance, Cycles	EN 388	(level 3) 1000	(level2) 500	(level 1) 200
Puncture Resistance, N	EN 388	(level 2) 33.97	(level 2) 35.38	(level 2) 22.77
Blade Cut resistance	ISO 13997: 1999	(level 4) 18.6	(level 4) 17.6	(level 4) 18.0



Cut resistant glove from Nylon/Steel composite Metallic Yarn



Cut resistant glove from Polyester/Steel composite Metallic Yarn

Cut resistant glove from Cotton/Steel composite Metallic Yarn

- The fabric for industrial apron has been prepared using 2/10s composite metallic yarns of nylon & polyester. Woven fabrics developed from Nylon/SS, Polyester/SS composite metallic yarns were compared for various physical properties and the results are mentioned below :

TEST PARAMETERS	TEST METHODS	Test Results of Apron fabric	
		Nylon /Steel	Polyester/Steel
Tensile Strength, N (5x20 Cm strips) Warp Weft	IS:1969-85 (RA 2006)	 828.15 657.25	 1069.60 808.30
Tear Strength, N Warp Weft	EN 388 (Single tongue tear method)	(level 3) 61.26 (level 2) 37.75	(level 3) 54.11 (level 2) 48.22
Abrasion Resistance, Cycles	EN 388	(level 4) 5165	(level3) 1500
Pilling Grade	ASTM D 4970	3	3
Air Permeability, cc/sec/cm^2	IS:11056-1984 RA 06	5.95	13.54
Puncture Resistance, N	EN 388	(level 3) 82.33	(level 3) 74.85
Blade Cut Resistance	ISO 13997: 1999	(level 5) 24.8	(level 5) 25.1

Apron fabric from nylon/steel and polyester/steel composite metallic yarns

From the above results, it is concluded that -

- The nylon/steel knitted glove has better tear strength and higher abrasion resistance than polyester/steel and cotton/steel knitted glove.
- All the knitted gloves are at similar level of cut resistance, i.e. 4. This is better than the commercially acceptable cut resistance level 3, required for protection against sharp objects.
- Both the woven fabrics for industrial aprons have reasonably good tear strength and abrasion & puncture resistance.
- Both the industrial apron fabrics also have very good blade cut resistance level, i.e.5.
- All knitted gloves and industrial apron fabrics have reasonable good cut resistance level and may be commercially acceptable for use in steel, glass manufacturing and meat cutting industries.

(ii) Project title : Development of technology to produce seamless low cost jute carry bags using modified power loom (Sponsored by National Jute Board, Kolkata)

Objectives :
- To popularize jute bags for packaging by introducing the technology to produce seamless jute bags.

Research outcome: Following are the outcome of the project:

- Modified powerlooms

(a) Single Shuttle Leno Powerloom

(b) Double Shuttle (Double Plush) Loom

- Jute Bags

(a) Jute Leno Bag

(b) Unfinished Jute Shopping Bag

Single Shuttle Leno Loom Double Shuttle Loom

Jute Leno Bag

Unfinished Jute

2 IN-HOUSE PROJECTS

2.1 Completed projects

(i) Project title : Development of natural adsorbent for removal of hazardous dyestuff from textile waste water

Objectives :

- To develop an adsorbent material from a natural material, selective for hazardous dyestuff
- Application of the adsorbent material in removal of hazardous dyes from textile waste water

Research outcome :

- In this project an adsorbent material has been developed from Cynodon Dactylon, which is selective for a range of reactive dyes.
- The developed adsorbent material has very good adsorption capacity for Drimarene Green HE4BD (Dye).

- The adsorption of Drimarene Green HE4BD (Dye) on Cynodon Dactylon was thoroughly investigated.
- The adsorbent was characterized by studying its moisture content, volatile matter, fixed carbon, water regain, chemical and thermal stabilities, adsorption capacity etc.
- The process parameters were optimized by studying the effect of various parameters like pH, time, temperature, concentration of dye, size of adsorbent etc.
- It was found that Cynodon Dactylon is a good adsorbent for the removal of the dye from aqueous media even in the presence of sodium chloride.
- Optimum conditions for the removal of Drimarene Green HE4BD with Cynodon dactylon are: 0.2 g of adsorbent, dye concentration 40 ppm, at 60°C, with 24 hours contact time and at pH 7.0.

ii) Project title : Cost of internal failures & its implications in garment unit

Objectives :

- To calculate the Rework & Rejection % (Internal Failure) Failure) of styles covered under study
- To calculate loss in Production efficiency due to rework
- Suggest measures to reduce Internal Failure Cost

Research outcome :

- Internal failure % lies between 12-17.5%
- Finishing Rework contributes 45-50% of total rework in garment.
- Rejection % varies from 11-28% in Internal Failure.
- Operator/staff training in sewing/finishing with standard operative procedures may reduce Internal Failure %.
- Proper documentation of rework in each department is important for better control.