

## R&D PROJECTS - 2010-11

### 1. GOVERNMENT SPONSORED PROJECTS

#### 1.1 Completed projects

(i) **Project title:** Development of NYCO fabric for paramilitary and military combat uniforms (Sponsored by Ministry of Textiles, Govt. of India)

**Objectives:**

- A critical study on the various combat uniforms being used by military and paramilitary forces in terms of fibre blends, design and colour
- To identify various shortcomings of the present combat uniforms
- To study Nylon 66 fibre properties in terms of its compatibility with cotton fibres in spinning
- Optimisation of blend proportion of Nylon 66 fibre with cotton fibre as per the requirement of the end product
- Optimisation dyeing and printing of Nylon 66 and cotton blended fabric
- To finish developed fabric to impart wrinkle free, flame retardant etc. properties
- To develop combat uniforms

**Research outcome :**

The finished NYCO fabric samples were evaluated for various properties. Results revealed that -

- the wear life of NYCO fabric is better than the P/C fabric as indicated by abrasion property (Taber).
- In the case of NYCO fabric there is no hole formation up to 1000 cycles while in the case of P/C fabric, hole formation is observed at 750 cycles.
- the comfort property of the NYCO fabric is found to be better than P/C fabric as the water vapour permeability and air permeability of the NYCO fabric are higher when compared with the P/C fabric properties.
- the combat uniforms which are having heat or flame resistance properties are essential in the present day context. The presence of synthetic material such as polyester if exposed to heat or flame melts and sticks to skin causing severe burns. It is clear from the Table that FR property of NYCO fabric is better than P/C fabric as there is no hole formation and no melting and dripping was observed in the NYCO fabric.

(ii) **Project title** : Development of Functional Fabric using Bamboo Fiber to provide Bacterial and Ultraviolet Protection to the Skin. (Sponsored by Ministry of Textiles, Govt. of India)

**Objectives:**

- To produce knitted fabrics from 100% bamboo yarn, bamboo /cotton blended yarns and 100% cotton yarn.

- To analyze the comfort properties, anti bacterial and ultraviolet protection properties of the 100% bamboo, bamboo/cotton blended and 100% cotton fabrics to be used for inner garments/sports-wear.

**Research outcome:**

The developed fabric was evaluated and test results revealed following:

- The assessments of various fabric properties endorse manufacturers' claims about the comfort properties of bamboo fabrics.
- The study further reveals that the manufactures' claims about the inherent antibacterial property in bamboo fiber may be true for original natural bamboo fiber (mechanically processed) but not for bamboo pulp fiber which is chemically processed.
- There is a value addition in bamboo and its blended fabrics due to the better comfort properties. Therefore, in spite of 5-10% higher cost than the good quality cotton inner garments, people may prefer to buy inner garments made out of bamboo and its blended fabrics as they are more comfortable.

**(iii) Project title** : Optimization of process parameters to produce extra soft knitted fabrics for innerwear/kids-wear by using high performance MODAL fibre (Sponsored by Ministry of Textiles, Govt. of India)

**Objectives:**

- To prepare the knitted fabrics with different blend ratio of modal and cotton fibres.
- To study the characteristics of various yarns and knitted fabrics.
- To evaluate and optimize the blend ratios of modal and cotton fibres.
- To study the economics of fabrics produced.

**Research outcome:**

- Based on test results the optimum blend ratio of both innerwear and kids wear are decided.
- The permeability to water vapour and moisture vapour are found to be nearly same for the two blends of modal/cotton – 65:35 and 50:50. While the durability appears to be higher in 50:50 blend than that of 65:35 blend.
- Further, the former is cheaper than the latter blend ratio. Therefore it may be concluded that the optimum blend ratio for inner wear may be taken as 50:50 modal : cotton. To decide the optimum blend ratio for kids-wear only the comfort factor and cost are taken into consideration. From the test results, it can be said that the kids will have the maximum comfort if their garments are made of either a blend of 65:35 modal : cotton or fabric made of 100% modal.

**(iv) Project title** : Development of Personal Protective Textile Using Novel fibres

**Objectives:**

- To study the properties of Crabyon fibre and X-static fibre in terms of their resistance to microbial and bacteria
- To study the compatibility of these fibres in spinning with other fibres
- Optimisation of blend proportion of crabyon fibre X-static fibre with cotton and other conventional fibres with a view to achieve desired antimicrobial properties
- Optimisation the process parameters at different stages of process from yarn manufacturing to finishing
- Development of various end products for medical applications and to study the comparative performance of developed product with conventional product
- Conducting commercial trials and overall optimization at commercial scale
- Working out the techno economic viability of the developed products

**Research outcome:**

Considering the findings of the study, it can be concluded that

- the products manufactured out of the blends of novel fibres i.e. crabyon fibre and silver coated nylon fibre, are very useful for medical workers as these are able to provide prolonged protection from bacteria up to 99.9% at the nominal cost.

**(v) Project title** : Waste Minimisation in Shuttleless Loom (Sponsored by Ministry of Textiles, Govt. of India)

**Objective:**

- To reduce hard waste level of rapier loom shed.

**Research outcome :**

- An attachment is developed which can be fitted on rapier loom at picking side. This attachment eliminates formation of picking side false selvage and thus reduces hard waste generation.
- It has been estimated that depending upon the width of the loom the modified system helps increasing yarn realization upto 1.5%. Loom run successfully without picking side selvage

**(vi) Project title** : Development of format of 'Baseline Energy Audit in Textile industry' under Perform Achieve and Trade (PAT) Scheme (Sponsored by Bureau of Energy Efficiency, Ministry of Power, Govt. of India)

**Objectives:**

- Complete review of energy consumption data as reported by BEE
- Energy performance assessment of sub-system sub-processes, major equipment & comparison with designed data or performance guaranteed data/report.
- Preparation of a detailed report specifying facts and figures, analysis, if any, technology status and energy consumption trends etc. It should also highlight the

possible improvements in energy savings based on the best available technologies.

**Research outcome :**

- NITRA has reviewed the energy consumption data of 85 Textiles Mills, assessed the sub-process and major equipment and prepared a detailed baseline energy audit questionnaire.
- Baseline Energy Audit Questionnaire and baseline audit methodology for textile have been developed.

**(vii) Project title** : Energy Audit Manual & Energy Conservation Study for Textile Units (Sponsored by Petroleum Conservation & Research Association, Ministry of Petroleum, Govt. of India & Energy Conservation Committee, Japan)

**Objectives:**

- Program guidance and preliminary lectures.
- Detailed Energy Audit of 2 factories.
- Interim analysis and report of energy audit carried out in two model units
- To setup steering committee and task force team as an actual implementing entity
- Identifying the energy conservation areas in textile industry
- Formation of energy audit manual for textile industry
- Capacity building of engineers, establishment of Trainers bank and dispatch service of expert for industries

**Research out come :**

- Detailed energy audit has been carried out in two textile industries.
- Different areas of energy conservation have been identified and a detailed energy audit report has been submitted to PCRA.
- Developed an Energy Audit Manual for Textile Industry.

## **2. INDUSTRY SPONSORED PROJECTS**

### **2.1 Completed projects**

**(i) Project title** : Indian Textile Supply Chain Energy-GHG-Water Study 2010, India (Sponsored by cKinetic, New Delhi)

**Objectives:**

- Evaluate the existing Energy & water consumption level
- Identify the scope for reducing energy& water consumption level & thereby carbon footprints in the factories.
- Most importantly suggesting various energy conservation measures to individual firm to achieve standard Energy & Water consumption level & thereby reducing Carbon Footprint.

- Map the Textile Supply chain for various Products like Garments, Home Furnishing Items & other textile made-ups.

**Research outcome:**

- Data from the 35 leading textile industry has been collected.
- A detailed analysis of the energy and water consumption has been carried out.
- Various energy conservation measures have been identified for individual firm to achieve standard Energy & Water consumption level & thereby reducing Carbon Footprint.

### 3. IN-HOUSE PROJECTS

#### 3.1 Completed projects

- (i) **Project title** : Development of effluent treatment scheme for removal of reappeared color in treated effluent generated from Nylon Dyeing of a Flocking Plant

**Objectives:**

- To find out the reason for reappearance of color in the treated effluent of Nylon dyeing carried in a flocking plant
- To develop a suitable treatment scheme for the removal of color so that it can meet effluent discharge norms.

**Research outcome :**

- Simulated effluent was prepared by using acid dyes and chemicals used in actual dye bath preparation.
- Experiments were conducted by removing major color by physico-chemical treatment method followed by aeration of treated effluent.
- At this stage light color reappeared. Tried several methods for removal of reappeared color but could not remove by combination of powdered activated carbon and a polyelectrolyte. Optimized dose and tested for reappearance of color. Finally re-appearance of the colour could be eliminated by powdered activated carbon.

- (ii) **Project title** : Dyeability of Corn Husk Fibres

**Objectives:**

- To dye the corn husk fibers with different classes of dyes (vat, sulphur, reactive and natural).
- To compare the dyeability (K/S) of corn husk fibers with other cellulosic fibers (cotton, milkweed).
- To determine the color fastness properties of dyed fibres

**Research outcome:**

It could be concluded from the results that

- corn husk fibers exhibit better dye ability with all classes of dyes i.e. sulphur (blue, black and olive green), corazol reactive (violet, red & blue), vat (brown, blue and green) and natural (pacific and rhime) in comparison to cotton and milkweed fibers.
- The three shades of vat dyes, i.e. brown, blue and green showed best results on corn husk fibers. The results of fastness properties were also good for all the classes of dyes.

**(iii) Project title** : Study on Apparels Manufactured from Delicate Fabrics  
: Attempt of an Intervention

**Objectives:**

- To understand the manufacturing techniques and machinery involved in processing of garments made of delicate fabrics
- To identify the problems involved at various levels in garment industry dealing with delicate fabrics
- To analyze the most suitable techniques and equipment used during handling and finishing of seven different types of delicate fabrics
- To prepare a catalogue explaining the best method for dealing and caring of different types of delicate fabrics
- To analyze the acceptability and impact of the prepared catalogue on production and quality of garments with such fabrics

**Research outcome:**

- Various combinations of garment construction parameters were tried out.
- Variables like Needle (FG point 7, 9, 11), Types of pressure foot (simple, roller and teflon coated with rings), Types of feed dog (simple and teflon coated), Angle of feed dog (straight and front up) and Types of throat plate (12 no. and 14 no.) were optimized to reduce the incidence of seam puckering & seam slippage.