

## R & D PROJECTS – 2015-16

### 1. GOVERNMENT SPONSORED PROJECTS

#### 1.1 Completed projects

(i) **Project title** : Designing a compressed air monitoring system to optimize energy consumption in a textile mills (Sponsored by Ministry of Textiles, Govt. of India)

**Objectives** :

- To quantify the losses occurred due to compressed air leakage
- To assess the real-time performance of the compressors
- Development of the software for identification of compressed air losses

**Research outcome:**

- Compressed air monitoring system has been designed and as a pilot trial, it has been installed at NITRA for further studies. Designed system installed at NITRA pilot plant.

#### **Features of Central Compressed Air Monitoring System :**

- Collects data from all the stations, where it is installed.
- The data is logged into a database at regular intervals
- Provision to set alarm limits of each parameter.
- Every alarm event is logged into database.
- Report generation.

#### **Software Features :**

- Datalogging interval – 1 ~ 99mins
- Real time data of all the stations shall be displayed on computer screen.
- Reports can be generated date wise for all the stations or for individual station.
- Reports can be generated in excel data sheet which can be utilized for further analysis.

(ii) **Project title** : Development of specialty embroidery yarn for application in stretchable fabrics, like knitted fabrics (Sponsored by Ministry of Textiles, Govt. of India)

**Objectives** :

- To develop multi-component embroidery thread for stretch fabric.
- To produce multi-component embroidery thread using elastane filament, water soluble PVA fiber and polyester or viscose as sheath fiber on DREF-3 m/c.

- To carry out various types of embroidery with multi-component thread and normal embroidery thread on knitted fabrics.
- To compare how multi-component embroidery thread and normal embroidery thread affects the stretchability of the fabric.

- Research outcome :**
- Hand Embroidery and Machine Embroidery was carried out on stretchable knitted fabric using developed stretchable embroidery thread and normal embroidery thread. The embroidery samples were washed and evaluated for their stretch ability at the embroidery area.
  - There is a gain of about 16 - 18 % in stretch ability at the portion of embroidery in Wales wise direction and about 13 - 15% in Course wise direction using developed multi-component embroidery thread as compared to normal embroidery thread.
  - The performance of the developed embroidery thread at machine embroidery (high speed multi-head embroidery machine) is not very much satisfactory (higher breakages) as compared to normal embroidery thread because of lower strength and higher unevenness and imperfections due to the use of friction spinning technology. The developed embroidery thread was given surface finish with silicon oil, which slightly reduces the breakage rate at embroidery machine.
  - In case of hand embroidery the performance of developed embroidery thread given surface finish with silicon oil was satisfactory and almost at par with the normal embroidery thread.
  - Therefore, the developed multi-component embroidery thread may be beneficial for embroidering stretchable body-fit garments, especially where the stress and strains are more likely at the embroidery areas.

## 1.2 Ongoing projects

- (i) **Project title** : Development of fabric smoothness tester (Sponsored by Ministry of Textiles, Govt. of India)
- Objectives** :
- To design the apparatus as per the requirement of the concept
  - To take preliminary trials on the developed/fabricated apparatus to verify/optimize the suitability of design and if require to modify accordingly (if required)

- To analyse smoothness properties of various fabrics using newly developed/fabricated apparatus.
- Progress of work** :
- Designing part of smoothness tester has been completed.
  - Verification of smoothness properties of various fabrics using newly developed/fabricated apparatus.
- (ii) Project title** :
- Development of electronic drape meter based on image analysis technique (Sponsored by Department of Science & Technology, Govt. of India)
- Objectives** :
- To develop an instrument to measure fabric drape using image analysis principle
  - To measure the accuracy of the developed instrument
- Progress of work** :
- Initial design of the instrument has been drawn. The experimental rig has been manufactured.
  - Optimization of design parameters is under progress.
- (iii) Project title** :
- Study to Enhance Indian Apparel Exports (Sponsored by Ministry of Textiles, Govt. of India)
- Objectives** :
- To reduce spreading loss and improve cutting efficiency
  - To develop process-wise benchmarks for sewing operations
  - To suggest techniques for waste minimization and improve efficiency of various departments
- Progress of Work** :
- Technical studies have been completed in about 20 garment export units in Delhi, NCR, Tirupur, Chennai and Bengaluru.

## 2. IN-HOUSE PROJECTS

### 2.1 Completed projects

- (i) Project title** :
- Development of suitable work-wear for workers of oil and gas industry.
- Objectives** :
- To analyse the suitability of existing work-wear to withstand potential hazard like heat & flame in oil and gas industry.
  - To develop suitable fabric compositions for workers

**Research outcome** : • Various types of fibres including Nylon 66, p-aramid, m-aramid, modacrylic, hollow polyester & FR viscose etc. were collected. These fibres were blended in different proportions and converted into yarn. Fabric samples were manufactured using these yarns. Testing of these fabrics have been completed. Project completed successfully.

**(ii) Project title** : To explore the possibility and application of the corn husk in textiles

**Objectives** : • To extract and compare the composition and physico-chemical properties of cornhusk fibres with other cellulosic fibres.  
• To explore the possibility of development of yarns using any suitable yarn manufacturing technology either using 100% cornhusk or its blends.  
• To optimize the dyeing process of cornhusk fibres using various classes of dyes and evaluating their physical and chemical properties.  
• To finish developed material to impart softness and other required properties.  
• To design and develop a product line using corn husks and their blends

**Research Outcome** : • The corn husk fibres were dyed using various classes of dyes and their physico-chemical properties were evaluated.  
• The blended yarns were woven in to various types of fabrics. These fabric samples were successfully dyed and finished with softener to impart softness and smooth feel.  
• The garments and upholstery product lines were successfully developed.

## 2.2 On-going Projects

**(i) Project title** : A study on extraction and application of sugarcane fibres in textiles.

**Objectives** : • To explore extraction of fibres from the sugarcane bagasse and develop pure and blended sugarcane yarns using natural man-made fibres.

**Progress of Work** : • Fibres have been extracted & treated with various chemicals & enzymes to get finer & smooth fibres.

- Extracted fibre has been converted into yarn. Fabric manufacturing is under progress.

**(ii) Project title**

- Objectives** :
- To study and analyze the work–wear clothing of workers in the plating industry and comparing it with the recommended standards to identify gaps if any.
  - To develop suitable fabric for work – wear using various fibre compositions, weave structures and finishing treatments followed by analysis to understand whether the fabric is meeting the requirement as per recommended standards.
  - To design and develop work – wear clothing to meet the safety and comfort requirements of the workers.

- Progress of work** :
- Present work wear used by workers have been collected and physico – chemical properties have been analyzed. Rest work is under progress.

**(iii) Project title** : Experimental Investigation of Strengthening of Bassalt fibre Reinforcement Polymer Composite Bars.

- Objectives** :
- Main objective of the present study is to develop Bassalt fibre based reinforced polymer composite to be used in construction.

- Progress of work** :
- Various Composite materials developed. Testing of these materials are under progress.

**(iv) Project title** : Investigation on process variables on functional properties of cotton/corn blended fabric.

- Objectives** :
- To have critical study of the properties of corn fibres
  - Based on the study of fibre properties, to identify the processing and functional characteristics which may be influenced by process variables
  - To produce yarn samples using corn fibres with different manufacturing process variables
  - To produce fabric using yarn samples produced from corn fibres using different parameters
  - To have detailed investigation on the behavior of the process variables on the functional characteristics of the fabric
  - To explore the possibility of enhancing the flame retardant properties of the developed material, using flame retardant chemicals
  - To apply statistical tools and prepare mathematical models for predicting the functional behavior of corn blended material

- Progress of work** : • Yarn & fabric samples (preliminary trial) have been developed with cotton and corn blends  
 • Various fabric parameters are to be tested to assess the functional characteristics such as flammability, abrasion resistance, air-permeability, & antimicrobial properties
- (v) Project title** : De-colorization of cotton textile wet processing effluent through nano particles
- Objectives** : • Preparation and characterization of suitable nanoparticles, optimization of conditions for best particles preparation.  
 • Study on dye removal efficiency using simulated and actual effluent generated from the dyeing of cotton and its blend with reactive, disperse, vat and sulfur class of dyestuff.  
 • Immobilization of nanoparticles on a suitable substrate and their decolorization efficiency estimation.  
 • Column studies for color removal using simulated and actual effluent from cotton textile processing industry.
- Progress of work** : • A suitable nanoparticle has been prepared and conditions for best particle preparation have been optimized.  
 • Studies on dye removal efficiency using simulated effluent containing reactive disperse, vat and sulfur dyes have been carried out.  
 • Effect of various salts and auxiliary chemicals on dye removal efficiency has been carried out.  
 • Removal of color from a cotton textile processing effluent has been carried out.  
 • Immobilization of nanoparticles on a suitable substrate and studies on its color removal efficiency has been carried out.  
 • Regeneration of immobilized nanoparticle and its reuse in removal of color from simulated effluent is in progress.

### 3. PROJECTS GOI RECENTLY SANCTIONED

- (i) Project title** : Development of protective work wear for cement porters

**Name of sponsoring Agency**: Ministry of Textiles, Govt. of India

- Objectives** : • To determine the magnitude of occupational health hazards among cement porters  
 • To design and standardize dustproof and comfortable material such as gloves, socks and workwear for cement porters which can suit the climatic and working conditions  
 • To evaluate effectiveness of the developed material in actual practice and standardization of test methods

**(ii) Project title** : Development of multi layered flame & thermal resistant fabric for fire-fighter clothing

**Name of sponsoring Agency** : Ministry of Textiles, Govt. of India

**Objectives** :

- To study existing fire fighter clothing/suit being used in India for their suitability related to safety and other physiochemical properties.
- To study fire fighter/clothing suit use in developed country for their safety and physiochemical properties.
- To identify gaps in the existing fire fighter suit being used in Indian fire fighters in comparison of fire fighter suit of developed country.
- Development of multilayered fabrics using various weaves structure, fibres composition and finishing applications in the manufacturing of fibre fighter suit.
- To evaluate multilayered fabrics for its performance, for safety and other physiochemical properties as per standard.
- Development of fire fighter clothing/suit

**(iii) Project title** : Development of smart protective textiles for fire fighter, soldier and old-age people (alongwith SITRA)

**Name of sponsoring agency** : Ministry of Textiles, Govt. of India

**Objectives** :

- To develop smart/intelligent textiles to be used by fire fighters and soldiers
- To develop smart textiles for old age people for continuously monitoring their health condition from distance.
- To assess the performance of those garments at laboratory level.
- To take field trial with real fighters, soldiers & old age people.