

R & D PROJECTS – 2016-17

1. GOVERNMENT SPONSORED PROJECTS (Completed projects)

1.1 Completed project

- (i) **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
- Outcome** :
- Studies conducted by various researchers in the past have highlighted that productivity of Indian garment industry is much lower as compared to countries like Vietnam and China. A comprehensive study was conducted in 50 units/styles in four major garment manufacturing/export clusters namely NCR, Bengaluru, Tirupur and Ludhiana between January 2016 and December 2016. The study covered all major departments like fabrics, layering, cutting, sewing, finishing and packing.
 - In all the 4 clusters, significant variation in productivity and work practices was observed in all the departments.
 - Several innovative work practices in fabric stores, laying, fusing, sewing and finishing were observed in many garment units which will help in productivity/quality of various processes in a garment unit.
 - The study would help in finding ways and means to improve the performance of various departments of a garment unit by optimization of materials, human resources and better work practices.

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 to modify accordingly (if required)
 - To analyze smoothness properties of various fabrics using newly developed/fabricated apparatus.

- Patent is filed

- Progress of work** :
- Designing part of smooth-smoothness tester has been completed.
 - Verification of smoothness properties of various fabrics using newly developed / fabricated apparatus is under progress.
 - A new version of smoothness tester is also fabricated.
 - Patent has been filed.

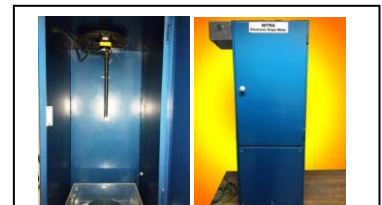


Smoothness Tester for Textile Sheeting Materials

- (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.



Electronic drape meter based on image analysis technique

- (iii) Project title** : Development of protective work wear for cement porters (Sponsored by 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

- Progress of work** :
- A survey was carried out in DMRC and NDMC and Some private constructions site by using well designed questionnaire to get first hand information about health hazards among cement workers.
 - Development and standardization of work wear materials are under progress. Four composite fabrics have been developed and their evaluation process is under progress.
 - One cement manufacturing unit is also surveyed to asses the actual practice followed by cement workers.
 - Fabric dust proof property analyzer is fabricated and patent is filed.
- (iv) Project title** : Development of multi layered flame & thermal resistant fabric for fire-fighter clothing (Sponsored by 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 used in developed country for their safety and physiochemical properties.
 - To identify gaps in the existing fire fighter suits being used in Indian fire fighters in comparison to fire fighter suits 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.
- Progress of work** :
- Physiochemical properties of existing fire fighter suit as per standard analyzed.
 - Gaps are identified in the existing fire fighter suits being used in the Indian fire fighters in comparison to fire fighter suits of developed countries
 - Development of outer layer and thermal layer are under progress.
 - Provisional patent is filed for thermal layer.
- (v) Project title** : Development of smart protective textiles for fire fighter, soldier and old-age people (Sponsored by 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.

Progress of work : • Various gadgets and accessories have been studied.
 • Developed conductive fabric from conductive steel yarn.
 • Different type of sensors are procured.
 • Evaluation of conductive fabric is under process.
 • Heart rate monitor (Sensitive) has been procured.
 • Protocol for communication from heart rate monitor to GSM module finalized

(vi) Project title : New Approaches to Reduce Water Consumption in Textile Wet Processing (Sponsored by Ministry of Textiles, Govt. of India)

Objectives : • To conduct preliminary trails to test suitability for various dyeing textile material.
 • Designing and fabrication of equipment for dyeing and standardization
 • Conducting dyeing trail on various types of textile materials
 • To compare dyed material out of new approach and conventional dyeing method in terms of quality and consumption of water.

Progress of work : • Study is carried out in 02 units and suggestions are given to the units for saving/reuse of water in wet processing.
 • Further work is under progress.

2. IN-HOUSE PROJECTS

2.1 Completed Project :

(i) Project title : De-colorization of cotton textile wet processing effluent through nano particles

Objectives : • Preparation and characterization of suitable nano-particles, 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.

- Research Outcome :**
- A suitable nanoparticle has been prepared and conditions for best particle preparation have been optimized.
 - The prepared nano-material is capable of removing reactive, disperse, vat and sulfur dyes from aqueous solutions.
 - It shows maximum adsorption capacity for reactive dyes.
 - Two hours contact is sufficient for removal of the dyes from solutions.
 - The nanoparticle can be used in the pH range of 3-10 and it is stable up to 60°C.
 - Presence of salts increases the efficiency for removal of dyes from aqueous solutions.
 - However, its efficiency decreases in the presence of surfactants.
 - Immobilization of nanoparticles has been done on a cation exchange resin to prepare columns.
 - The immobilized nanoparticles are capable of removing the dyes from aqueous solutions more efficiently.
 - The nanomaterial could be regenerated and reused for several cycles in removal of dyes from solutions.
 - The nanomaterial is capable of removing dyes from both simulated and actual dyeing effluents.
 - However, its efficiency for color removal from actual dyeing effluents decreases probably due to presence of some interfering constituents present in the effluent.

2.2 Ongoing Projects :

- (i) **Project title** : Extraction of textile fibres from pine needle and development of various products from it.

- Objectives** :
- To develop a method for extraction of fibers from pine needles.
 - To produce yarn with pure fibres and blends by optimising mechanical parameters.
 - To develop various kinds of fabric utilising these yarns
 - To develop final products i.e. home textile using these fabrics.

- Progress of Work** : • Preliminary study on extraction of fibre from pine needle is done.

- Extracted fibres are blended with other fibres for manufacturing of yarn.
- Few fabric samples are developed.
- The evaluation of these fabrics are under progress.

(ii) Project title : Development of work wear for electroplating workers

- 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.
 - Twenty fabric samples are manufactured and their analysis are under progress.

(iii) Project title : Treatment of khadi cotton fabric with herbal extract for developing reusable baby diapers

- Objectives** :
- To test the physical and functional properties of Khadi cotton fabric.
 - To treat this fabric with anti-odor, anti-microbial and mosquito repellent finishes obtained from herbal extracts.
 - To test the effect of these natural finishes on functional properties of the Khadi cotton fabric.
 - To use this Khadi cotton fabric to develop reusable diapers for babies.
 - To test the durability of these natural finishes on Khadi cotton fabric when it is in use.

- Progress of Work** :
- Microcapsules have been formed.
 - Application of finishes on fabric using pad dry cure method has been done.
 - Testing of finished fabrics are under progress.

(iv) 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 fibres have been converted into yarn. Fabrics and other products have been developed.
 - Evaluation of characteristics and other products are under progress.
- (v) 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.
 - 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 apply statistical tools and prepare mathematical models for predicting the functional behavior of corn blended material
- Progress of work** :
- To process the corn / cotton blends rotor spinning system has been taken for the experiments.
 - Following parameters are taken for the experiments during yarn manufacturing:
 - Rotor speed
 - Blend proportion
 - Rotor diameter
 - Opening roller speed
 - Yarn evenness, imperfection and strength were measured and the impact was assessed with the change in the process variables.
 - Preparation of fabric with the produced yarn is under progress.
 - Assessment of fabric performance will be done in terms of functional characteristics such as flammability, abrasion resistance, air-permeability, antimicrobial properties etc.