R & D PROJECTS – 2013-14

1. GOVERNMENT SPONSORED PROJECTS

1.1 Completed projects

(i) Project title : To explore the possibility of application of Cornhusks in textiles (Sponsored by Ministry of Textiles, Govt. of India)

Objectives :

- To extract and compare the composition and physio-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 applicable on cellulosics and evaluate 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 :

- Corn husk fibers are successfully extracted from corn husk
- Blended yarn of cornhusk with polyester, acrylic and wool are manufactured using ring spinning and hand spinning technologies.
- Fabrics from various blended yarns of cornhusk fibre are developed on shuttle less loom.
- Finally garments (kidswear and outerwear) are developed.
- The work is Nominated for the “Parivartan Awards”

(ii) Project title : Development of special functional fabric for bedding and sports wear for providing extraordinary comfort with excellent micro climate. (Sponsored by Ministry of Textiles, Govt. of India)

Objectives :

- To study the properties of hollow polyester fiber in terms of its compatibility in spinning with other fibers
- Optimisation of blend proportion of hollow polyester with polyester fiber with a view to achieve better comfort properties at low cost
- To optimize the process parameters at different stages of process from yarn manufacturing to finishing
- To develop various end products for home textiles especially for bedding and sports wear and to study the comparative performance of developed product with conventional product
- To work out the techno economic viability of the developed products

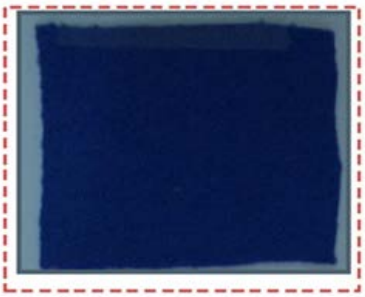
Research outcome :

- Hollow polyester (HP)/cotton fabrics showed high Thermal resistance and low water vapour resistance as compared to normal polyester/cotton and polyester/hollow polyester fabrics. This trend was observed in both woven and knitted fabrics.

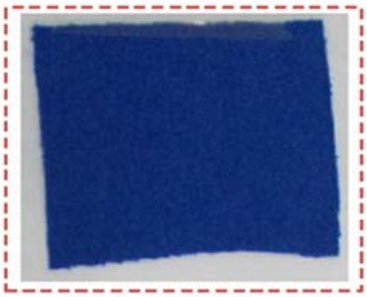
- Tensile Strength was found higher in polyester/cotton and polyester/hollow polyester (HP) fabrics as compared to hollow polyester/cotton fabrics.
- Tear Strength was found higher in polyester/cotton and polyester/hollow polyester fabrics as compared to hollow polyester/cotton fabrics.
- All fabrics showed no hole formation up to 1000 cycles when tested for abrasion resistance (taber).
- Air permeability was found lower in hollow polyester/ cotton fabrics as compared to polyester/cotton and polyester/hollow polyester fabrics. It was observed that polyester fabric had significantly higher Air permeability than Hollow Polyester fabric. This trend was observed in both woven and knitted fabrics.
- Dyed woven hollow polyester fabric had significantly higher K/S value as compared to polyester fabric. However, both the fabrics were found to have same colour fastness to washing, rubbing, and light.
- Wicking was found better in hollow polyester/cotton fabrics as compared to polyester cotton and polyester/hollow polyester fabrics.
- Absorbency was found higher in hollow polyester/cotton fabrics as compared to polyester/cotton and polyester/ hollow polyester fabrics.
- Bed Sheet made of Hollow Polyester fabric would be costlier by 49.94% than made of Polyester fabric. Polo T- Shirt made of Hollow Polyester fabric would be costlier by 31.41% than made of Polyester fabric.

Finally from the study it was concluded that use of Hollow Polyester/Cotton blends can provide added advantage in the development of bedding and sportswear for extreme climatic conditions as compared to Polyester Cotton and Polyester/ Hollow Polyester blends. However, Hollow Polyester/Cotton blends are costlier because of non-availability of HP fibre in India.

Total 14 blended fabrics using polyester/cotton/hollow polyester fibres were developed. Photographs of two blended fabrics (polyester cotton 80/20 and hollow polyester cotton 80/20) are shown below :



Polyester Cotton 80/20



Hollow Polyester Cotton 80.20

(iii) Project title **:** Development of an apparatus to determine heat and light cutting ability of curtain (Sponsored by Ministry of Textiles, Govt. of India)

Objectives :

- To design the apparatus as per the requirement
- To develop/fabricate the apparatus as per the design
- To take preliminary trials on the developed/fabricated apparatus to verify/optimise the suitability of design and if require to modify accordingly

- To analyse light cutting and heat insulation characteristics of various curtains using newly developed/fabricated apparatus.

Research outcome :

- Designing of the instrument has been done.
- Instrument has been fabricated and is being used at NITRA laboratory for commercial testing
- Patent has been applied through application no. 180/Del/2012 dt. 20.01.12
- Three customers approached for technology transfer.
- Test standard of the instrument is developed and submitted to BIS for including as a standard test method. Refer Fig.1.

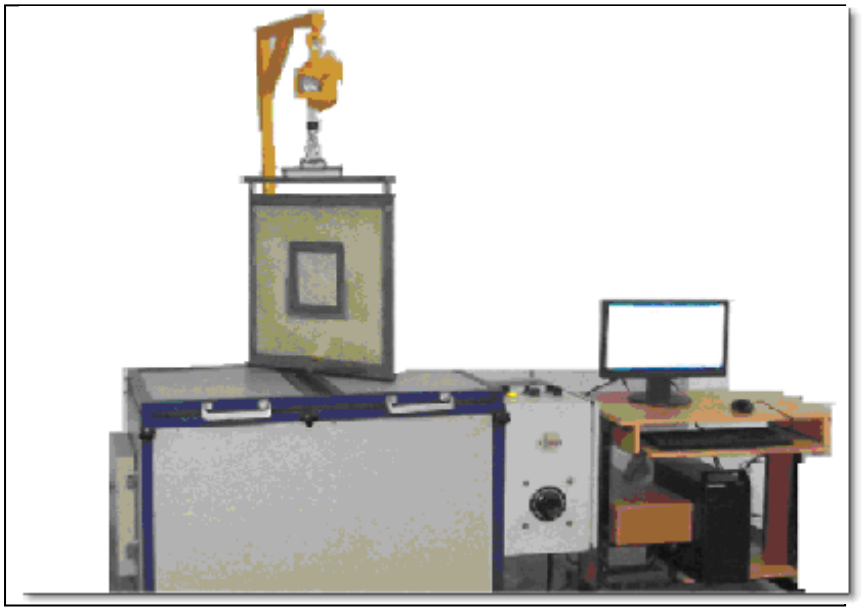


Fig.1 : Light & Heat Cutting Tester

(iv) Project title : Exploring the possibility of replacing texturized nylon filament yarn with eco-friendly high twist cellulose yarns by doing slack mercerization (Sponsored by Ministry of Textiles, Govt. of India)

Objectives :

- Literature survey
- Development of high twist yarns from cellulose fibres
- Development of fabrics
- Evaluation of the yarns and fabrics for their elastic properties

Research outcome :

- Development of high twist yarns from cellulose fibres has been done.
- Slack mercerization, fabric development have been completed. Evaluation of properties is done.

1.2 In-house Projects

(i) Project title : Ultrasonic cleaning of carpets

Objectives :

- To explore the use of ultrasonic cleaning technique to clean the carpet instead of drycleaning and washing.

Research outcome :

- Various types of carpet samples were taken and soiled using synthetic soil. These carpet samples were cleaned using dry cleaning, washing as well as ultrasonic cleaning technique. It was found that the samples cleaned using ultrasonic cleaning is comparable to the other two processes of cleaning. The process of ultrasonic cleaning was found to be environmental friendly compared to others as there was less consumption of water and also no other organic solvent required for the cleaning purpose.

(ii) Project title : Effect of relative humidity on colour fastness properties of cellulose, polyester and their blends

Objectives :

- To see the effect of conditioning especially relative humidity on the various colour fastness properties of various dyed fabric

Research outcome :

- Various types of dyed fabrics were tested for colour fastness properties such as washing, rubbing, light, perspiration and dry heat under different relative humidity conditions keeping temperature constant and vise versa.

- It was found that at high humidity, dyed fabric absorbs moisture, which on visual or spectrophotometer analysis give different results of colour value when compared to the fabric analyzed under standard RH and temperature.

(iii) Project title : Preparation of composite with corn husk fibres

Objectives :

- To explore application of corn husk fibre in developing composite. Jute is currently being used in composites

Research outcome:

- Corn husk fibres have been extracted from corn husk.
- Composite samples have been developed in the laboratory.
- These samples were evaluated for various properties. The outcome was very encouraging.