

R & D PROJECTS FROM 1999-2000 To 2008-2009

GOVERNMENT SPONSORED PROJECTS

- 1. Title : Development of industrial yarn for specific end-uses (Sponsored by Ministry of Textiles, Govt. of India)**

Objectives:

- To develop industrial yarn for different end-uses
- To produce industrial fabric from the above
- Carrying out comparative studies to assess and amplify its relative advantages over the others

Research outcome:

- In this study, efforts were made for developing DREF spun yarn and to explore the possibilities for use of such yarn in diversified applications.
- The fabrics developed for such applications which were identified for the study have shown encouraging performance.
- In most of the cases, where comparisons were done, the experiment samples have shown superiority over the market samples. In general, the results show that due to structural composition of the yarn wherein the advantage of specific properties of individual fibre component are utilized to a greater extent, the tensile and abrasion properties of the fabrics are better than that of conventional fabrics.
- It can be further concluded that the DREF yarns are very innovative with adequate potential for developing speciality fabrics and can emerge as a future yarn for use in technical textiles.

- 2. Title : Development of indigenous instrument for scanning & separation of contaminants from Indian cotton (Sponsored by DST, Ministry of Science & Technology, Govt. of India)**

Objectives:

- Identification & classification of the contaminants to be separate out
- Developing suitable technology for scanning and separation of the contaminants under Indian condition
- Evaluation of the technology so developed to evaluate the suitability and strength of the indigenously developed technology in the instrument

Research outcome :

- A pilot model of the above instrument has been developed. It is based on to snap the image of the cotton without contaminants which will act as a reference image and then to grab the images of contaminated cotton continuously and record its difference from the reference image which would reveal the presence of contaminants.
- The snap operation and grab operation are implemented using programming language visual basic. The decision regarding the presence or absence of the

contaminants is obtained by using basic image processing operations and have the detection fast.

3. Title : Development of cost effective dyeing system for jute yarn in handloom (Sponsored by Ministry of Textiles, Govt. of India – SJDF Scheme)

Objectives:

- to develop cost effective dyeing system for jute yarn in handloom

Research outcome:

- This improved system will be suitable to give better colour fastness properties; better uniformity of heating, and better absorbency.
- Chemical cost of processing will be lower due to lower consumption.
- The quality consistency can be maintained.

4. Title : Identification, extraction and purification of natural dyes from indigenous plant species for textile application (Sponsored by Ministry of Textiles, Govt. of India)

Objectives:

- to identify plant species for extraction of natural dyes
- to optimize conditions for extraction
- assessment of purity of extracted natural dyestuffs and their textile application

Research outcome :

- A pilot plant model has also been developed for effective extraction of the dyestuff at the most techno-economic level using a counter current step extraction procedure.
- It shows pretreatment, extraction, membrane separation, evaporation and drying, the essential unit operations involved for enhancing purity of dyestuff and its yield.

5. Title : Development of MIS in textile wet processing for better decision making {Sponsored by Ministry of Information Technology (DST), Govt. of India}

Objectives:

- To study present method of recording system of process house with a view to apply such a software
- To develop suitable MIS for end users for effective decision making
- Implementation and performance evaluation of developed software in textile wet processing and modification if required

Research outcome:

- Implemented in one textile mill and they found it is useful.

- A demonstration was organized and several mills expressed their desire to have the system. The whole system is developed in window base and oracle software.

6. Title : Development of micro-encapsulated enzymes for bio-polishing of knitted fabrics (Sponsored by Ministry of Textiles, Govt. of India)

Objective:

- to develop micro-encapsulated enzymes for bio-polishing of knitted fabrics.

Research outcome :

- Micro-encapsulated enzymes were prepared by phase separation method and parameters to prepare micro-encapsulated enzyme were standardized
- Bio-polishing of knitted fabrics using both micro-encapsulated and enzyme as such, was possible. Bio-polishing effect was observed by properties like weight loss, strength loss, gain in air permeability, bending length and whiteness index
- The conditions for bio-polishing of knitted fabrics using micro encapsulated enzyme were standardized

7. Title : To develop a suitable device to control the power quality parameters to achieve better yarn and fabric quality (Sponsored by Ministry of Textiles, Govt. of India)

Objectives:

- To study the effect of power quality on spinning performance
- To study the effect of voltage and frequency variation on the yarn quality
- To study the losses due to variable power quality parameters
- Study the effect of power quality on warp and weft breakages on different type of looms
- Study the productivity gain or losses due to variable power parameters.
- Study the variable frequency and voltage on loom cycle and to determine how these parameters effecting the fabric productivity and quality.
- To decode the variation in RPH due to play in the loom and give the signal to the devices to ensure constant RPM.

Research outcome:

- Under this project NITRA has developed a power quality controller which can be installed in a ring-frame and measure the power quality parameters & control the same.
- This instrument can be a useful tool for the textile mills to make an in-depth study and analysis of the effect of power quality on quality of spinning yarn.

8. Title : I.T. survey in power loom sector (Sponsored by Ministry of Textiles, Govt. of India)

Objective:

- There was a need to find out the possibilities of inducing IT in powerloom sector.

Research outcome:

NITRA surveyed Northern India in the following clusters:-

- Tanda, Jalalpur, Kanpur, Meerut, Panipat, Bhilwara, Jaipur and Ludhiana have submitted our report to Ministry of Textiles. This was the first phase of our survey. Our aim was to help powerloom sector, export their product to various countries.
- Analysing the first phase we could conclude that there is not much scope in this sector. However, in some of the areas like Panipat, Ludhiana and Bhilwara response from entrepreneurs was quite positive.

9. Title : An approach towards separation of contaminants from Indian kapas through indigenously developed instrument (Sponsored by Ministry of Textiles, Govt. of India)

Objective:

- Need was felt to indigenously develop an instrument which can help ginners in separating the contaminants.

Research outcome:

- The results show that out of the two types of contaminants the developed instrument achieved the elimination of heavier contaminants to the extent of 83.4%.
- However, some of the above particles which are mainly vegetable in nature and are tightly adhered to the cotton balls, are not separated out from the main stream of material.
- The results also show that the elimination of the lighter contaminants in this instrument is achieved upto 61.2% which seems to be not that efficient as compared to the elimination of heavier contaminants.
- The attempts which are made in this work developed an indigenous device become successful in achieving the elimination of contaminants to a satisfactory level which is about 80%.
- It is also observed that effectiveness of elimination of heavier contaminants is more than compared to the contaminants which is due to certain limiting conditions of developed mechanism.

10. Title : Design and development of indigenous low cost rotor for rotor spinning (Sponsored by Ministry of Textiles, Govt. of India)

Objectives

- To design and develop low cost rotor for rotor machine
- Evaluation of rotors so developed w.r. to improve rotors

Research outcome:

- The two fabricated rotors, rotor A (Groove depth 1.5mm) and rotor B (groove depth 3.0mm) with reduced groove angle provides better results in terms of quality and shall be cost effective in comparison to imported rotors available in the market.
- In this study metallurgical aspects of the rotor are studied for material specification, hardness, tolerance, and accuracy.
- From the study it can be concluded that Yarn strength improves in both cotton & polyester yarns when the angle of rotor groove is reduced, indicating that compactness is more in lower groove angle rotors.
- When the depth is increased from 1.5mm to 3.0mm the yarn strength is improved in case of polyester yarns, but there is no significant impact on cotton yarns.
- Increase in depth significantly improves the yarn quality both in cotton & polyester. Thus more depth of groove improves the uniformity.
- Imperfections have considerably reduced in both rotors. Thus better yarn can result with improved design.

11. Title : Development of a ginning machine with improved technology to ensure high quality ginning (Sponsored by Ministry of Textiles, Govt. of India)

Objectives

- To study the existing ginning technology & practices with a view to identify the short comings and limitations
- To develop a suitable ginning machine for high quality ginned lint
- Evaluate the newly developed machine and to compare it with the existing technology

Research outcome :

- During the process of optimization, it is noticed that the effective elimination of seeds from the ginning zone is not taking place as and when the rate of production is taken up.
- It is further noticed that crushing of seeds during the above process due to the delay is also deteriorating the quality of ginning. The above observations are the major bottleneck and fresh thought is required to make further headway in this work.

12. Title : Protective clothing from jute {Sponsored by Ministry of Textiles (SDJ)}

Objective:

- Producing textiles to combat with scorching sun-rays, heat and heavy wind for apparels & furnishing fabrics.

Research outcome :

- It has been found that due to the presence of lignin, SPF values are higher even after scouring. Study was also conducted to see the effect of depth of shade, cover factor, effect of dye class, humidity & optical brightner. The values of SPF increased upto sufficient level.

13. Title : Standardization scientific evaluation & development of protective clothing using eco-friendly chemicals (Sponsored by Ministry of Textiles, Govt. of India)

Objectives:

- To develop eco-friendly breathable water/oil repellent fabric based protective clothing
- To develop formulation based on non-carcinogenic chemicals
- Optimisation of the developed formulation on various substrates at different conditions, compatibility of finish chemicals etc.
- Physico-chemicals, eco parameters and comfort properties of the substrate as per need of end uses
- Effect of these formulations on dyed ground for tonal or change of depth
- Semi and bulk scale industrial trial
- Technology transfer to the industry

Research outcome :

- The results are found satisfactory in terms of comfortness and protection.

14. Title : To develop antimicrobial fabrics for their use as protective clothing especially in operating rooms for covering of patients (Sponsored by Ministry of Textiles, Govt. of India)

Objectives :

- Identification and application of various chemicals and auxiliaries having the potential to kill pathogens in the operation theatre and other hospital premises
- Development of technology to impart antimicrobial properties to various types of fabrics such as gowns, covering & apparels

Research outcome :

- Antimicrobial and water repellent cotton and polyester cotton blended fabrics have been prepared.

- The treated and cured fabrics alongwith untreated fabrics have been characterized for their anti-bacterial and anti-fungal properties, water/blood repellent properties, tensile strength, bending length, tearing strength, crease recovery, air permeability, DSC and FTIR.
- Antimicrobial testing of treated fabrics against staphylococcus aureus and aspergillus niger reveals that reduction of 99% of both the organisms have been achieved within one hour, while a reduction of only 7-14% micro-organisms has been observed for untreated fabrics.
- Water and blood repellent testing was carried out by spray method and treated fabrics have been found water/blood repellent.
- Wash fastness studies show that even after 10 washings, the antibacterial properties are retained (99%). However, reduction in the count of fungi has been achieved upto 92% after washings. Treated fabrics show water/blood repellent properties after 10 washings.
- Tensile and tearing strength show decrease after treatment. However, wrinkle recovery angle and bending length show an increasing trend.
- Anti-microbial and water/blood repellent cotton and polyester cotton blended fabrics prepared have also wrinkle free properties.
- Based on the standardized conditions achieved in the laboratory, trials were taken in industry to prepare antimicrobial and water/blood repellent fabrics. Gowns for doctors and patients have been prepared from these fabrics and trials in hospital were taken.

15. Title: Development of solar yarn drying machine for drying of textile yarn (Sponsored by Ministry of Textiles, Govt. of India)

Objectives:

- Use of solar energy application for textile drying purpose
- Reduction of cost of yarn drying by use of solar energy
- Reduce the dependence on conventional fuels and minimize air pollution problems
- To develop a user friendly software for solar yarn drying machine design

Research out come:

- The project has been completed successfully.
- The solar yarn dryer of 50 kg. capacity has been installed at Sheena Exports, Panipat.
- Exhaustive trials for assessing the performance of the machine has also been taken. The rate of drying is 3 to 3.5 hrs., which is almost equal to conventional drying system.
- Under the project, a software on “Solar yarn drying machine design” has been successfully completed.

16. Title : Industrial application of developed adsorbent column technology for removal of color from textile waste water (Sponsored by Ministry of Textiles, Govt. of India)

Objectives :

- Scale up of the technology to pilot plant level and its industrial trial
- Development of a facility for bulk scale production of adsorbent
- Trials on the pilot plant using actual effluents from cotton process house
- Optimization of process parameters
- Investigation on reuse of water and recovered chemicals and dyes in to the process stream

Research outcome :

- A suitable adsorbent material possessing some desirable ionic characteristics has been developed in the laboratory.
- The material shows high adsorption capacity for reactive dyes, which are anionic in nature.
- A laboratory scale model for preparation of the adsorbent material has been designed and installed in the environmental laboratory.

17. Title : Recycling of effluent of textile industry for zero effluent discharge (Sponsored by Ministry of Textiles, Govt. of India)

Objectives :

- Abatement and minimization of environmental pollution
- Conservation of water by recycling

Research outcome :

- An explorative search has been accomplished on development of a suitable technology for recovery of water from textile wet processing effluent with subsequent mode of water replenishment for recycling the same in the process house without any adverse effect on the product quality.
- The scheme has been successfully tested and implemented in a large process house in Ghaziabad where 50% of water is being recycled. The second industrial project with a stiff challenge of 65% water recycling in an International textile unit at Panipat is installed.

18. Title : Review of environment statement for textile industries (Sponsored by CPCB, Delhi, Ministry of Environment & Forest, Govt. of India)

Objectives:

- To assess the status of environmental management in composite textile industries
- To draw an action program for improvement in environmental management

Research out come:

- Thorough study has been conducted considering various textile substrates based on analysis of data received from various states. The data has been analyzed in terms of specific water consumption and the corresponding effluent generation.
- The study concludes with the remedial steps to eliminate the present lacuna/shortcomings of data reporting for better environmental management.

19. Title : Development of cost effective rotor yarn based knitted fabrics by surface modification (Sponsored by Ministry of Textiles, Govt. of India)

Objective:

- to develop knitted fabric which in cost effective and rotor yarn base.

Research outcome:

- Under this project a technique is suggested to use rotor yarn in knitting.
- Various experiments were carried out to select suitable yarn structure out of rotor technique. After selection of suitable structure, it was used in knitting.
- Knitted fabric was then treated with various chemicals and softener and compared with the conventionally used same count ring yarn. Results were encouraging.

20. Title : To explore application of naturally coloured cotton in textile products (Sponsored by Ministry of Textiles, Govt. of India)

Objectives:

- to promote application of naturally coloured cotton in textile products.

Research outcome:

- Under this project various yarn samples of natural coloured cotton with different composition and fiber properties were prepared and tested for physico-chemical properties.
- These yarn samples were used as weft during weaving process while grey cotton yarn was taken as warp.
- Finally, various products like kids wear, garments, toys, caps, curtains, non-woven fabric etc. were developed and demonstrated in various forum to popularize the application natural coloured cotton.

21. Title : A project on design and development of an instrument for measuring objectively the fabric hand {Sponsored by Ministry of Non-conventional Energy sources (MNES), Govt. of India}

Objectives :

- To develop a suitable & low cost instrument more or less comparable of existing KES (Kawabata Evaluation System) which is an import substitute
- To measure the fabric hand (softness) of apparel fabrics using an extraction force principle

- Hand values objectively measured by this instrument simultaneously reflect the physical and surface properties of the fabric that are important in determining overall hand
- To correlate the fabric hand using this method and the existing method i.e. the (KES) and fabric assurance by simple testing (FAST)

Research outcome :

- Instrument is developed and the response is quite encouraging from some of the renowned industries.

22. Title : Development & standardization of technology for improving aesthetic & comfort for operation on terry towel (Sponsored by Ministry of Textiles, Govt. of India)

Objective:

- to improve aesthetic and comfort properties of towels produced in decentralized sector.

Research outcome :

- Under this project various towel samples were collected from decentralized and organized sector and evaluated for physical & chemical properties.
- Reasons of poor quality of decentralized towels were investigated and finally ways and means were suggested to improve upon various properties.

23. Title : Study on apron slippage in ring-frame & its effect on yarn quality and to develop systems to reduce it to improve yarn quality (Sponsored by Ministry of Textiles, Govt. of India)

Objectives:

- To establish the phenomenon of apron slippage in ring-frame
- To study the effect of different factors on the extent of apron slippage
- To study the effect of apron slippage on quality of different types of yarn
- To develop systems to reduce the apron slippage for better yarn quality

Research outcome:

- NITRA developed a new type of apron i.e. "Anti-Slip Apron".
- The use of anti-alip apron in place of normal apron shows a total elimination of apron-to-apron slippage due to positive means of motion transmission from bottom to top aprons. As there is no apron-to-apron slippage in case of anti-slip apron, it can control the movement of floating fibres in a better way. Thus the use of anti-slip aprons improves the yarn quality.

24. Title: Treatability on complete biodegradation of textile waste water through aerobic cum anaerobic route (Sponsored by Ministry of Textiles, Govt. of India)

Objectives:

- Identification and development of a suitable microbial strain for the degradation of textile dyestuff
- Design and development of a bioreactor
- Analysis of textile chemicals and their biodegradability
- Evaluation of process parameters
- Techno-economic evaluation of the project and field trials

Research outcome:

- Bio-degradation of textile effluents for handling erratic effluent flow preferably by using Up-flow Anaerobic Sludge Blanket Reactor (UASB) is an attractive method of treatment because of its superiority in terms of energy, expenditure, recovery and low sludge generation. Special strains of microbes are being investigated and explored for their adaptability in Indian conditions. The anaerobic system has been preferentially chosen for the study as it is cost effective and would generate biogas in return.
- An industrial plant to the tune of 2500 liter/day has been erected in the National Capital Region, which is working satisfactorily. The plant operates smoothly on the principle of up flow anaerobic sludge blanket reactor after slashing down the rudimentary color intensity through physico-chemical technique. This plant brings down COD value from 16000 mg/l to less than 250 mg/l as the anaerobic treatment is supposed to carry out reductive cleavage of reactive dyestuff during the treatment. NITRA has also set up a pilot plant to enlarge the periphery of application while treating the effluent with moderate level of COD/BOD load.

25. Title : Supply & installation of model ETP (Sponsored by Ministry of Textiles, Govt. of India)

Objectives:

- Design and fabrication of two model effluent treatment plants having the following features :
 - Design capacity = 1 m³/hour
 - M.O.C. = mild steel
 - Suitable for intermittent process operations
 - Portable type/size of plant \approx 3 x 4 m²
 - Very low operation/recurring cost
- Supply and installation of model ETP at -
 - M/s. Chenkumar Weavers and Handloom Society, Chennimalai
 - M/s. Sambalpuri Bastralaya Coop. Handloom Society, Bargarh

Research outcome :

- Two model effluent treatment plants have been designed, fabricated and commissioned at the respective sites. The beauty of the effluent treatment plant designed for M/s. Chenkumar Society, Chennimalai is developed of on-line mixer eliminating the conventional system for the total de-colorization of textile effluent with simultaneous reduction in COD/BOD load. The residual BOD, COD load has been removed by using submerged Aeration Fixed Film (SAFF) Technology.
- The fixed film model would also help for the growth of a consortium of bacteria after necessary acclimatization period for the decomposition of complex molecules and residual dye-stuff if any escaped during the primary treatment. This needs future assessment of the plant within a year subject to continuous operation of ETP as per operation manual without any break. Investment cost of plant inclusive of transportation and consultancy charges is Rs.6.0 lacs only and treatment cost is Rs.3-4 per M3 (or KL) of effluent. The model ETP at M/s. Sambalpuri Bastralaya Coop. Handloom Society, Bargarh has been designed on similar principle.

26. Title : Integrating organization information to meet out international business environment for the textile mills in next millennium (Sponsored by Ministry of Textiles, Govt. of India)**Objectives:**

- to bridge the existing gap in the field of Information Technology.
- to develop a need based ERP system for textile mills through designing and developing a user friendly software.
- to integrate different levels of information for achieving goals and objectives of the organisation. It also uses information systems to plan, organize and control work with spirit to meet business objectives and achieve success in fierce competitive environment.

Research out come:

- Under this project, different modules of software on MIS for spinning mills have been developed.
- The area of different modules comprises of material management, manufacturing process, sales, production planning, costing and HRM. A spinning mill from Northern India is taken as industrial partner to work on this project.
- Modules that have been developed currently comprises of maintenance management, quality assurance, engineering for spinning mills and dye-house. Various modules have been integrated to make one full fledged software.

27. Title : Development of process to incorporate elastane yarn (lycra) in a fabric to get body fit effect (Sponsored by Ministry of Textiles, Govt. of India)**Objectives :**

- To develop a indigenous device to be attached on conventional ring-frame for manufacturing of elastane yarn

- To develop an elastane core yarn count measuring instrument

Research out come:

- Elastane core yarn attachment for ring-frame has been developed
- An instrument for count determination of elastane yarn has been developed

28. Title : Development of U.V. resistant fabric (Sponsored by Ministry of Textiles, Govt. of India)

Objective:

- To protect the body from harmful UV rays of sunlight by developing suitable fabrics using chemicals, fibres and dyes.

Research out come :

- Optical brightening agents and UV absorbers considerably improve the ultra-violet protection factor (UPF) of the fabric.
- Dyes also play major role in providing UV resistant properties of the fabric. Darker shade dyes impart higher protection against UV rays compared to lighter ones. UV absorber does not affect light fastness and colour strength property of dyed fabrics. UV absorber can be used with reactive dye and effect on colour strength, light fastness and UV protection factor (UPF) is the same when UV absorber is used separately.
- UPF of dyed fabrics is not affected by exposure to light. Even after ten washings, dyed fabrics and UV absorbers treated fabrics have retained sun protection property.
- However, treatment of optical brighteners has not retained the sun protection property after washings. Fabric after treatment of UV absorber, retains mechanical properties like tensile strength, tear strength, crease recovery, air permeability and bending length.

29. Title : Design, development and installation of model effluent treatment plant for handling erratic discharge from handloom processor at Weavers Complex, Delhi (Sponsored by Office of D.C. for Handlooms, Ministry of Textiles, Govt. of India)

Objectives :

- Standardization of the effluent from cotton processing in handloom sector
- To design and develop low cost energy efficient treatment plant for handling small volume of handloom processing effluent with erratic flow.
- Installation of the model effluent treatment plant in handloom processing unit at Weavers Service Centre, New Delhi

Research outcome :

- All the effluent parameters were found within the permissible limits for disposal of textile effluents.

30. Title : Development of cost effective and eco-friendly bleaching of natural textile fibre using advanced oxidation technique (Sponsored by Deptt. of Science & Technology)

Objective:

- To develop an eco-friendly bleaching of natural fibers with minimum damage to the fibres and also to reduce the process cost of bleaching.

Research outcome :

- A semi continuous ozone bleaching machine was developed. Machine was used to bleach natural fibres such as cotton, wool and jute.
- The fading effect on Denim fabric was also created. A MOU was signed with M/s. Sara Elgi, Chennai for the development of continuous ozone bleaching machine.

31. Title : Development of combined sizing and sectional warping for fine counts/single yarn for producing high priced cotton fabric for decentralized power loom sector (Sponsored by Deptt. of Science & Technology)

Objectives :

- To study the existing practices of sizing in decentralized sector
- To study the practices of sectional warping machine
- To develop a combined sizing and sectional warping system
- To test physico-chemical properties of sized yarn
- To study the performance of sized yarn on loom
- To study the economic feasibility of the developed machinery at the shop floor
- Training at the shop floor
- Transfer of the technology to the machine manufacturers

Research outcome :

- Sizing machine has been developed and installed at Tanda, U.P.

32. Title: Development of spray mist dyeing technology for hanks (Sponsored by Ministry of Textiles, Govt. of India)

Objective:

- To develop a semi-continuous low liquor hank dyeing machine where dye will be applied in the form of spray/mist on hank yarn.

Research outcome :

- Machine is fabricated.

33. Title : Industrial potential of milkweed fibre (Sponsored by Ministry of Textiles, Govt. of India)

Objective:

- To assess the physical & chemical changes in surface characteristics of milk weed fibre after having modified by treatment of different types of chemicals and optimize dyeing properties.

Research outcome:

- Preparation of various types of blended yarns with milkweed fibre is done.