

THE BOMBAY TEXTILE RESEARCH ASSOCIATION

**LIST OF SPONSORED PROJECTS UNDERTAKEN/COMPLETED
DURING THE LAST TEN YEARS – 1999-2009**

Sr. No.	Title of the Project	Starting Date	Date of Completion	Outcome of the Project / Benefits to the Industry
A.	Ministry of Textiles – CTI Section			
1.	Upgrading the quality of knitted goods through the use of combed rotor yarns	10.2.1999	9.8.2000	The knitted fabric produced from combed rotor yarn showed higher bursting strength than the corresponding fabric produced from carded rotor yarns. The use of long staple, low micronnaire, stronger cotton fibre for rotor spinning improved yarn and fabric quality considerably.
2.	Development and identification of high performance and multifunctional products and processes for value-added fabrics for export and for manufacture by decentralized sector	10.2.1999	9.2.2001	With respect to bio-scouring of cotton fabrics appropriate conditions for bio-scouring and peroxide bleaching have been standardized which in turn makes the process completely eco-friendly as compared with conventional alkaline scouring-peroxide bleaching. These results are transferred to process houses who are interested in switching over to bio-scouring and peroxide bleaching as such a process was beneficial with added advantage of saving in time, water and energy. (Technology transferred to M/s. Novozymes, Bangalore).
3.	Development of eco-friendly patchless stain remover with special reference to the needs of the export of textiles	10.2.1999	9.8.2000	An eco-friendly patchless stain remover has been developed which is highly concentrated, has low odour and is biodegradable. It contains ecological solvents that are free from chlorine derivatives. The product can be safely used without injuring/fraying the yarn or fibre as the process does not involve any rubbing and mopping. The product is being supplied to the user industry. (Technology Transferred to M/s. Rossari Biotech, Mumbai)
4.	Establishing norms for air consumption in spinning and weaving departments	10.2.1999	9.2.2001	This study – the first of its kind in the Indian Textile Industry – has helped in understanding the pattern of compressed air consumption rate (in cubic feet per minute) for spinning and weaving machines. The computed ratios of compressed air consumption (in cubic feet) per unit of production has helped in understanding the impact of compressed air usage on the cost of production. Based on this air consumption, norms were established for the industry.
5.	Measurement and control of dust level generated on modern weaving, preparatory machines and shuttleless looms	18.2.1999	17.8.2001	This study has created a good awareness among the mill management and technicians towards reducing air pollution and creating healthy work atmosphere.

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6.	Standardisation of wet processing conditions for water conservation vis-à-vis reduced water pollutional load	18.2.1999	17.5.2001	Shopfloor survey and evaluation of the consumption data, after part/full implementations of the recommendations for standardizing the processing conditions, in the participating units in woven, knitted and worsted mills showed, not only reduction of water consumption from 25 to 38 % for the similar production pattern, but also helped in reducing the cost of thermal and electrical energy. In addition, the measures suggested helped the mills to reduce the wet processing cost/unit production on colours and chemicals, improve consistency of results, lower reprocessing, load of pollutant in the discharged effluent stream, etc.
7.	Development of micro-control system to monitor productivity at powerloom sector	18.2.1999	17.5.2000	BTRA has developed and installed a prototype microprocessor-based on-line performance monitoring system on a loom. This system greatly enhances the productivity of the unit and improve the quality of its products. The system evaluates the performance of loom in terms of production, efficiency, stoppage rate, duration of stoppage and cottonwise loss of the efficiency of the loom, which assist in prompt follow-up action. Parameters evaluated, on comparison with manual observations, were found to be satisfactory.
8.	Dyeing lyocell fibre with different classes of reactive dyes	1.3.1999	31.5.2001	Lyocell fibre is a new type of regenerated cellulosic fibre. This fibre is completely manufactured by eco-friendly process. Further, Lyocell fibre offers several advantages as compared to viscose or other regenerated fibres Bi-functional dyed fabric, before or after enzyme treatment, showed lower fibrillation as compared to monofunctional dyed fabric. Information gathered from the studies has been transferred to technologists engaged in textile processing industry, both in the organized and decentralized sector through group discussions, presentation at All-India Conference and Seminars, exhibitions, etc.
9.	Development of an alternative and cost-effective route for heat-setting of different synthetic fibres/filaments/fabrics using microwave radiation technique	1.9.1999	31.3.2002	The project opened up new avenues for the use of microwave radiation technique in man-made fibre industry, especially for polyester. Efforts are made to develop high tenacity PET fibre by reducing molecular relaxation during microwave treatment. Effect of microwave radiations with different lossys on the surface of these fibres are studied and compared with conventionally heat set samples. (Patent Received).

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10.	Fibre quality enhancement by process control at ginning	1.9.1999	31.1.2001	Under this project, studies were carried out to find out the effect of moisture level on the quality of ginned cotton by varying the moisture level in the kapas before ginning. Various varieties of cotton fibres ranging from short staple to extra long staple were studied. The results show that there is an improvement in 2.5 % span length and bundle strength of fibres when it is processed with medium(7-8%) and high moisture (10-12 %) level in the kapas.
11.	Use of 'Stroboscope' kit to estimate and optimize air consumption on air-jet loom and to explore the possibilities of modifying the assemblies of air media to enhance energy conservation	1.9.1999	30.11.2001	Consumption of compressed air, used in air-jet looms for weft insertion, was studied with the help of Stroboscope in a number of mills. Various makes of air-jet looms were observed for air consumption and air losses. After collecting required data and conducting different studies, controlled trials were taken to reduce air consumption and the results were encouraging. Also, studies were undertaken by using modified design of the relay nozzle and its effect on air consumption. Results show that there is a scope for enhancing production and reducing air consumption.
12.	Development of special eco-friendly friction reducing agent to minimize ring yarn hairiness to enhance textile exports	1.10.1999	31.3.2001	A low odour, unique eco-friendly ring lubricant has been developed which reduces co-efficient of friction between the ring and traveller and in turn hairiness. Shop-floor studies carried out showed 30 % reduction in hairiness in normal ring conditions without incurring much cost. Use of BTRA ring lubricant has brought about drastic reduction in hairiness, improved traveller life due to smooth running of the traveller and better fabric appearance. Many mills are successfully using this newly developed product.(Technology transferred to M/s. C & C Textiles Pvt.Ltd., Ahmedabad).
13.	Assessing the potential and formulating / suggesting measures for fuel saving in decentralized process house units	1.10.1999	30.9.2001	The study has helped in generating awareness and effecting fuel savings in the process house units to a greater extent. Many of these units have acknowledged the fuel savings achieved through BTRA's assistance.
14.	Development of shades on cellulosic yarns and fabrics meant for value added products manufactured by decentralized powerloom sector using trichromatic reactive dyes	12.2.2001	11.2.2003	Using trichromatic reactive dyes, various shades are developed on cellulosic yarns and fabrics (woven/knitted) meant for value added products manufactured by decentralized powerloom sector. Also, a database on the same is built that is useful in giving shade matching services to textile units.

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15.	Development of integrated system to improve and optimize the performance of stenters in processing the textile fabrics to save energy and improve quality	12.2.2001	11.2.2003	Integrated system for stenters using microcontroller and peripheral IC is successfully designed and developed by BTRA. The system is designed in such a manner that it can be retrofitted on any existing stenter machine. The stand alone system has all the facilities such as key board, alphanumeric display, battery back up, data retrieval facility, etc. to enable the operator to know the current status of all machine parameters. The data is continuously monitored by the system which can be communicated to central PC for long term data storage, analysis and report generation. The field trial has proved the reliability and trouble free operation of the system in mill conditions. It has improved machine performance and fabric quality.
16.	Eco-friendly finishing to natural dyed fabric with special reference to decentralized sector	12.2.2001	11.8.2002	Dyed fabrics (dyed with several natural dyes) were treated with conventionally used cross-linking agent (DMDHEU), very low formaldehyde (VLF) and no formaldehyde polycarboxylic acids. These finished fabrics were then evaluated for changes in shade and different physical properties.
17.	Development of test bench for testing at various pneumatic components, circuits and assemblies, used in textile manufacture	12.2.2001	11.2.2003	To develop a test bench for testing pneumatic components, BTRA has assembled a pneumatic test bench and prepared a comprehensive training package to train technicians for understanding the basic functions as well as assembling different pneumatic components / electro-pneumatic circuits. The testing methods to test various pneumatic components are prepared.
18.	Design and development of computer based training modules for total quality management in textile industry	16.7.2001	15.1.2003	Design and development of computer-based training modules for Total Quality Management (TQM) in textiles is done. The CD-ROM prepared covers various aspects such as concepts of TQM (like ISO 9000 / TPM / 5S / Kaizen), case studies in mills, self-learning, etc. and it can be used interactively.
19.	Improvisation of existing hank sizing process at decentralized powerloom sector to upgrade quality and fabric realization of value added yarn dyed sorts	1.9.2001	31.8.2002	A hank sizing machine was designed to overcome and eliminate the various shortcomings associated with the conventional hank sizing process. Based on the design, a prototype model of the machine was developed and sizing trials on the hanks were undertaken to study the efficacy of the machine. This machine is in operation in the Powerloom Service Centre at Malegaon.
20.	Development of auto bale plucker	1.9.2001	Terminated	-

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21.	Exploration of new avenues in application of biotechnology in textile processing with respect to quality improvement and source reduction in stream pollution	1.1.2002	31.12.2003	Desizing of cotton fabrics(sized with starch-based composition) and weight reduction of polyester (to improve quality) in a process house lead to discharge of effluent stream with high pollutational load. Under this project, application of enzymes in these processes was studied for reduction in pollutational load of effluent stream as well as for changes in physical properties of fabric quality.
22.	Design and development of reeling-cum-twisting and spinning machines for non-mulberry silk	1.9.2005	31.3.2008	Achievements were made against the target by developing reasonably productive and quality oriented miniature silk fibre processing machinery in the non-mulberry sector by BTRA. The productivity turns around 20-25 % on higher level against the latest machinery available in this sector. The mechanical stability of the machines is so sound that the machine efficiency has gone up to an encouraging level. Hence the achievements made under the project have been commendable. With this development, there will be an end for all primitive and health hazardous practices presently adapted in silk yarn manufacturing of non-mulberry silk sector. The results need to be scaled up.
B.	Department of Electronics, (Ministry of Information Technology), Government of India, New Delhi			
23.	Development of microcontroller based automatic system for rapid selection and mounting of samples in lots for quality analysis of tensile properties of textile yarns	1.11.1997	31.10.1999	An electronically controlled system for rapid selection and mounting of samples on the tensile machine has been developed. It has been integrated with the strength elongation testing machine. Prototype model has been fabricated. Extensive trials of the system are undertaken in the mills and after the trials, units are installed in the mills.

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24.	Development of microprocessor based instrument system for the package dyeing machines to automate the dyeing process for uniform and optimum dyeing of yarns in textile mills	26.2.1998	30.6.2001	An instrument has been developed which can be used with minimum programme changes for automating and retrofitting on the existing machine to execute automatically all the different types of yarn dyeing methods in mills and improve uniformity of dyeing. Chemical metering and dosing system has been incorporated in the system for stepwise addition of dyes and salts in the dyeing vessel. Software has been designed to process the outputs of transducers and control the various parameters, viz., level, temperature and pressure. Total operation is fully automated which ensures that the dyeing process proceeds smoothly according to the set sequences in a programmed manner. The technology has been transferred to M/s. Uday Engineering Works, Thane.
25.	Development of IT-Production manager system to monitor and transmit production activities data to central computer for management information and corrective action to improve production and maintain cost effectiveness of the product in textile mills	15.2.2001	31.5.2003	BTRA developed micro-controller based data modules which could monitor the energy consumption and rate of production for any running machine in textile mills. The data modules are capable of being retrofitted on any working machine and continuously store the data regarding production rate and energy consumed on timely basis. The interface facility is designed and incorporated in each data module. Software is developed to enable the data transmission from each data module to central computer with identification of the machine. The software enables the management to identify the faulty processes and take corrective actions to improve the machine operations for better productivity. The software is designed to acquire various cost related data, its analysis and communication. Reliable data transmission was established successfully to transmit the monitored data to the central PC for report generation.
C.	Dept.of Science &Technology, Ministry of Science and Technology, Government of India, New Delhi			
26.	Development of a dedicated system for estimation, monitor and control of energy consumption at different stages of spinning of yarns in mills	25.3.1998	24.9.2000	BTRA developed a powerspin system which is a on-line information system for efficient energy management in mills. The system uses a microprocessor that provides visual display of data, printouts, etc. This unique system gives information in real time basis about the energy consumed and corresponding production of yarn that assists the managers to take timely corrective measures and thereby control cost of production and improves productivity.

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27.	Design and development of electronic controls for creel of warping machine to produce quality beam with even tension warp sheet, highly required for shuttleless looms	30.3.1998	29.11.2001	Electro-mechanical sensors have been developed and their performance trials were taken on a creel of Barber Colman Warping in a mill. A microcontroller unit, fitted near the machine, apart from generating logic for the stop motion also indicates the location of yarn break, counts the number of breaks in each hour, idle time of the machine and total run time. A print out of the status can also be obtained by connecting a printer with the instrument. Full scale trials have also been taken to assess the performance by end break stop motion. Sensors have been mounted on full length of a creel and their performance assessed.
28.	Eco-friendly and user-friendly machines for hank processing cottage industry	1.11.2007	31.10.2009	BTRA developed prototype model of hank dyeing machine has served its purpose of being "user-friendly". As hank movement is partially mechanized, dyeing operations on the hank dyeing machine has minimized the exposure to the hot liquor, hanks, chemicals, etc. In the weft pirn sizing machine, features like guiding path inside the sizing trough, squeezing rolls has minimized the handling of material and size bath chemicals. The productivity of the pirn sizing operation has increased 2-4 times with the pirn sizing machine. Colour fastness testing of samples on hank dyeing machine showed comparable and better results for wash, light and rubbing fastness than that for conventionally dyed samples. As the configuration of this model is very simple, it can be modified as per the production and process requirement.
29.	CP-STIO – Visit of Dr. A.N. Netravali, U.S.A., in connection with implementation of the collaborative project entitled "Surface modification of high strength fibres/fabrics using plasma technology for enhancing the formation of advanced composites and energy/water saving during textile manufacturing	26.12.2007 8.12.2008 14.12.2009	9.1.2008 26.12.2008 31.12.2009	The project was carried out jointly between BTRA and Prof. A.N. Netravali from Cornell University, Ithaca, USA. Accordingly, Prof. Netravali visited BTRA on three occasions (December 2007, December 2008 and December 2009) each for duration of two weeks. It was demonstrated that plasma processing can be used for textile fabrics to get desizing and improving dyeing behaviour. In addition, the hydrophobic coating can be deposited on the fabric to get hydrophobic properties. Detailed calculation showed that there will be substantial saving in water and energy and also reduction in pollution during processing. Plasma treatment of fibres/fabrics also improved the bonding between fibres and resins to yield better quality of composite materials. Not only glass fibres but also carbon and natural fibres could be used for forming "green composites".

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D.	Ministry of Social Justice and Empowerment, Government of India, New Delhi			
30.	Low cost modification of handloom so as to be operated by a disabled person	8.5.2003	27.12.2004	<p>Handloom weaving is distinctly a manual process. The technology does not need electric energy to drive the loom and hence can be pursued in remote villages without any hassles. The technology is maintenance and accident free. The weaving operations on handloom are carried out by human using body parts, viz., eyes, hands and legs namely (i) shedding motion operation by legs (ii) picking motion operation by right hand and (iii) beating up motion operation by left hand. Hence, disabled person especially who has lost two legs or one hand will not be able to operate very simple handloom. Taking into account the said facts, BTRA has made certain modifications in existing loom mechanism. Thereby disabled persons who have lost two legs or one hand can operate handloom and gain employment opportunity. Two modified handlooms were developed for different types of disabled persons. Also training was imparted to some disabled persons. This development has been awarded twice. The publications have been brought out on technical report and training guide.</p>
31.	Low cost modification of crutches so as to enable a disabled person to rest while walking	22.5.2006	30.6.2007	<p>The present types of crutches available in the market have a lacuna in the sense that the person, who uses them while walking, does not get rest in between before reaching the destination and experience fatigue. These crutches provide only a supporting aid for walking. Therefore, BTRA formed a project proposal to provide a resting unit inbuilt in the existing crutches by making suitable modifications at a low cost as well as of light weight. After modification work, BTRA developed successfully a low cost modification to crutches so as to enable a disabled person to rest while walking.</p>

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E.	Petroleum Conservation Research Association, Ministry of Petroleum & Natural Gas, Government of India, New Delhi			
32.	Educating and reskilling of decentralized powerloom owners/jobbers/workers in better lubricant handling technique and also develop a centralized lubrication system suitable for powerloom	26.6.2004	31.3.2006	Survey was conducted in 4 states in India and it was noticed that oil consumption varies from 10 to 20 litres per powerloom per year. BTRA developed centralized lubrication system for powerloom and the same was installed at 16 places @ 4 in each state. Training programmes and shop-floor demonstrations were conducted at 8 places @ 2 in each state. Audio-visual aid is developed for educating owners/jobbers/oilers of the powerloom industry. It shows various oiling/greasing points of powerloom, bad operating practices which lead to the wastage of lubricants, proper handling/distribution systems and benefits of the tailor-made centralized BTRA developed lubrication system. Seminars @ one in each state is conducted.
33.	Energy saving in decentralized powerloom sector of textile industry by developing an energy saver unit for specific type of looms having limitations in their drive path	1.12.2005	31.10.2006	In Cimmco type of auto looms, the motor drive system is through V-belt and cone clutch. In Ruti-B type of auto looms, it is through motor pinion and gear wheel. These drive systems are such that when loom stops for any reason, the electric motor keeps on running. The population of these types of auto looms are around 1.50 lakhs in India. The electrical consumption of these looms (having a motor capacity of 1.5 or 1.75 hp) is 12 units per loom per day. The average efficiency of these looms is ranging from 65 to 70 %, thus 30 to 35 % idle motor running occurs which results in a loss of 3.5 to 4 units per loom per day. To overcome this drawback and conserve electrical energy, BTRA has developed an "Energy Saver Unit" as an attachment on these looms. Field trials are conducted on 200 looms situated in decentralized powerloom clusters such as Ichalkaranji, Solapur and Madhavnagar and established its utility. Prepared audio-visual aid to highlight the drawback in the motor drive, installation of energy saver unit, functioning of the unit, its utility and improvement in life of various loom parts of motor drive mechanism. Conducted 3 workshops at Ichalkaranji, Solapur and Madhavnagar and the number of participants attended was around 120. The product is licensed to two parties for the manufacture and supply.

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F.	Department of Atomic Energy, Board of Research in Nuclear Sciences, Government of India			
34.	Interaction of radiation with conducting polymeric composites : Charge dynamics, coloration and their uses for sensors and dosimetry	4.10.2001	31.3.2005	The main aim of the project was the investigation of the interaction of γ -rays, electrons and ions on conducting polymeric composites with a view to find changes in the electrical conduction, coloration and to use such modified materials for the development of sensors and dosimeters. An assembly called as "Vibrating Electrode System" for the measurement of static charge was set up. The changes in the parameters were successfully correlated to the total dose received by the sample. It is then possible to use these changes for the evaluation of unknown dose. GPC studies were confirmed in order to access the molecular weights and the changes therein as a result of irradiation by γ -rays. ESR is a valuable tool for detection of unpaired electrons. The technique of ESCA is a very useful for determining the pressure of certain elements and the valance state in terms of their co-ordination or immediate neighbors. In case of polymeric samples, it is useful to study the bond energy of carbon, oxygen, nitrogen, etc.
G.	University Grant Commission, New Delhi			
35.	Conducting polymers for the development of molecular electronics devices	28.11.2002	27.11.2005	Composites of polypyrrole, polyaniline and polythiophene with PVA and PVC have been prepared. Ferric chloride and ammonium persulphate are used as catalyst. These films were further irradiated with ions of Na and Cl. Irradiation using γ -rays was also done. The electrical conductivity of the composites has been studied in detail. A six channel multiplexer with PC and related hardware, software has been assembled. The materials developed are very suitable, cheap and reproducible. Cotton fabrics modified by polypyrrole and polyaniline are being used for the integrated heater, smart apparel and EMI shielding. A heating pad using Ppy doped cotton fabric has been developed and tested.

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H.	Council of Scientific and Industrial Research, Extramural Research Division, New Delhi			
36.	Development of anti-flammable, anti-bacterial, electrically conducting fabrics and their use in textile and electronic industries	26.4.2002	31.1.2007	Since most of the textile materials are polymeric in nature, they are insulating in nature and create problems like static charge generation, which are not favourable in electronic industry, aviation and petrochemical industry. The problem is minimized by making the fabrics electrically conductive by various methods. In this study, various polymeric materials like polyaniline, polythiophene, polypyrol were synthesized. Their applications at various levels were studied on cotton and polyester fabrics. It has been demonstrated that the fabric can be used for heating pads integrated in apparels. Conducting fabric can be used in EMI shielding, gas and heat-sensors. Blending of these materials at small levels with polyester improves the antistatic property. Advantages of these fabrics are that they are light weight, flexible, foldable and durable. Apart from the conducting behaviour, some products have shown good antibacterial activity. Some products using nano-particles of zinc, titanium dioxide and polypyrol are also proposed.

RPD/-
20.2.2010.

