

# Think R&DICAL

Think  
ATIRA



ANNUAL  
REPORT  
2021-22

## Radical thinking is a vital ingredient of transformative research.

For over 70 years now, ATIRA has been harnessing the power of scientific research to transform India's textile industry – making it more efficient, sustainable, and competitive. ATIRA's affordable pricing has democratised R&D and enhanced its accessibility even for SMEs.

Straddling both conventional and technical textile research, ATIRA has helped find wider avenues for textile use in fields like infrastructure, space, electric mobility, and drone technology.

While spearheading radical transformations with textiles, ATIRA is also transforming itself – branching out into new-age sectors, ramping up its testing infrastructure, strengthening its intellectual property, incubating innovative ideas, and providing comprehensive consultancy and training services. Together, these send a strong, singular message to all stakeholders and client organisations – if you

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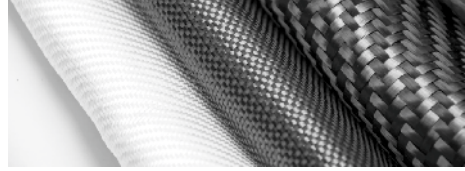
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At ATIRA, R&Dical Thinking stems from the confluence of scientific rigour and market pragmatism, resulting in research that leads to revenue.

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# ADVANCED TEXTILE RESEARCH TO ADVANCE INDUSTRY GROWTH



Research is the backbone of a business. It helps businesses gather necessary data, understand market needs, test or launch new products, find innovative processes, increase productivity, take major decisions, and run a successful business.

## LEGACY

In 1947, India was an independent but fledgling democracy. The Government of India wanted to promote industrial growth, and research organisations were identified as the growth engines. For the textile industry, the Government proposed to set up Regional Research Associations to be managed as a joint venture of the textile mills and the Government.

The visionary industrialists of Ahmedabad, under the leadership of Dr. Vikram Sarabhai and Mr. Kasturbhai Lalbhai, proactively rose to the occasion and registered Ahmedabad Textile Industry's Research Association (ATIRA) as a Society in December 1947. This unique private-public collaboration made scientific research accessible to all textile players and gave a major fillip to the industry.



The Council of Administration was formed with Mr. Kasturbhai Lalbhai as the first Chairman and Dr. Vikram Sarabhai as the Director, and the journey began.

## ABOUT ATIRA

Today, ATIRA is the nerve centre of research for the textile and its allied industry. Internationally renowned, completely autonomous, and stoutly non-profit, its activities cover all aspects from fibre to finished fabrics.

Be it traditional or technical textiles; improving shopfloor productivity or embedding wearable tech in fabrics, ATIRA is at the forefront of innovation and excellence.

**With 8 Science & Technology Divisions, 11 laboratories, 3 powerloom service centres and a Regional Centre at Indore, ATIRA is one of the largest Textile Research Associations (TRAs) in India.**



वस्त्र मंत्रालय  
MINISTRY OF  
TEXTILES



**AatmaNirbhar  
Bharat Abhiyan**



**#startupindia**

## ATIRA aims to be a key enabling institution for National Technical Textiles Mission, Aatmanirbhar Bharat, Make-in-India and Start-up-India programmes



The objectives of ATIRA continue to be in tune with national policies - to help the Indian textile and allied industries, especially ATIRA's member organisations become internationally competitive through:

- **Application-oriented scientific studies**
- **Promotion of professional approach and striving for the highest standards of excellence in technology, engineering and management**
- **Proactive initiatives to meet challenges and prepare for new frontiers**

This nation-building aspiration is reflected in its vision and mission.

### VISION

**To make Indian textile manufacturing competitive and sustainable in all possible ways**

### MISSION

**To service the textile industry efficiently and to provide innovative and sustainable solutions that enable the betterment of industry, economy and society**

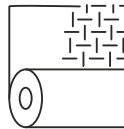


## FOCUS AREAS

In line with its vision and mission, ATIRA has cultivated four focus areas through which it provides a wide range of research, testing and consultancy services:

### 1 Research & Development

ATIRA is involved across the entire spectrum of textile R&D.



#### Process Control

Leading to better quality, cost reduction and export promotion

#### Development

New products and processes, design of equipment and machinery with emphasis on industry/user collaboration/sponsorship

#### Supportive Studies

Related to environmental pollution, management practices and policy aspects

#### Testing

Backed up by sophisticated infrastructure and specialist staff, ATIRA's testing spans a wide spectrum while ensuring authenticity, accuracy and confidentiality

In the last 10 years

**113** projects undertaken

**1** million+ samples tested

### 2 Idea Incubation & MSME Support



ATIRA helps incubate start-ups and supports MSMEs in becoming more productive and environmentally sustainable, and in scaling new heights regionally, nationally and globally. Whether it is helping them develop new ideas into prototypes, preparing them to understand the technical feasibility or assisting them for the product launch, ATIRA helps them at every stage of the incubation.

It also hosts seminars, conferences, workshops and training programmes to disseminate a wide array of information and best practices.



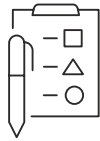
Periodicals published  
**ACT | UPDATIRA**

**ATIRA is recognised by the Department of Scientific and Industrial Research (DSIR) under the Ministry of Science and Technology, Government of India.**

### 3 Consultancy & Environment Audit

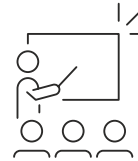
Leveraging its decades-long experience and expertise, ATIRA provides consultancy services to the textile-allied industry in technical and managerial areas – ranging from mechanical processes like spinning, weaving, instrumentation, and machine design, to chemical processing, energy conservation, and pollution control; from management services, financial analysis, modernisation viability and profitability studies, to inter-firm comparisons, business environment scanning, etc.

**500+** consulting assignments in the last 10 years



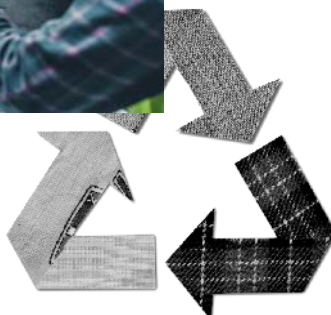
### 4 Training & Skill Development

ATIRA's skill development programmes cut across the organisational hierarchy from workers to top management. The programmes can be general and applicable to a wider audience, or they can be tailor-made to specific requirements. They are delivered either in-house or at client locations.



**53,000** people trained in the last 10 years

Training programmes range from a day to a month



# CUTTING-EDGE CAPABILITIES TO PROVIDE CUTTING-EDGE ADVANTAGE TO INDIAN TEXTILE INDUSTRY

ATIRA gains a definitive edge in providing world-class R&D, testing, and consultancy services, due to certain inherent advantages.

## Infrastructure AdvantEDGE

For 75 years now, ATIRA has advanced scientific and technological breakthroughs in the Indian textile industry. This ability stems from an extensive and comprehensive infrastructure including NABL-approved testing labs for cotton, yarn and fabric, ultra-modern Geotextile laboratories, modern composite material testing labs, a calibration lab, an environmental engineering lab, workshops and a pilot mill for prototype developments.

## Talent AdvantEDGE

ATIRA is powered by the intellect and spirit of its people. It has an experienced and multi-disciplinary team of 100 people which includes technical as well as non-technical staff. The team derives expertise from diverse areas like textile technology, chemical technology, composites, environmental engineering, nano technology, quality, textile testing, powerlooms, etc. and has accomplished many prestigious assignments.

## Management AdvantEDGE

To ensure that it stays true to its vision and mission, and further enhances its various areas of influence, ATIRA has a robust and well-defined governance body. The Council of Administration (CoA) has representation from the Government, Industry, Textile Mill Association, scientists and Directors of TRAs. This diverse group of professionals ensures that ATIRA provides scientific solutions to pressing industry problems while staying in alignment with national goals.

## ACHIEVEMENTS

ATIRA's cutting-edge capabilities have resulted in it being part of several landmark projects (sponsored and self-financed), garnering prestigious clientele, and winning numerous awards and recognitions.

### Milestone Projects

- Development of **more than 70 components for space applications for SAC-ISRO**
- Development of **nano electrospun filtration material with DRDO** that resulted in 99.9% efficiency masks for COVID-19 application
- Collaboration with Ministry of Textiles for R&D projects including **sustainable dyeing methods, high-strength core-sheath ropes, textiles for protection against electromagnetic radiations and extra-duty industrial belt/webbing**
- Partnering for Geotextile projects under the Ministry of Textiles including **solution design using woven/non-woven Geotextiles**. This resulted in construction of a 75 km road with retaining walls in the North-East, and lining of 10 water reservoirs totalling 43,000 sq. km





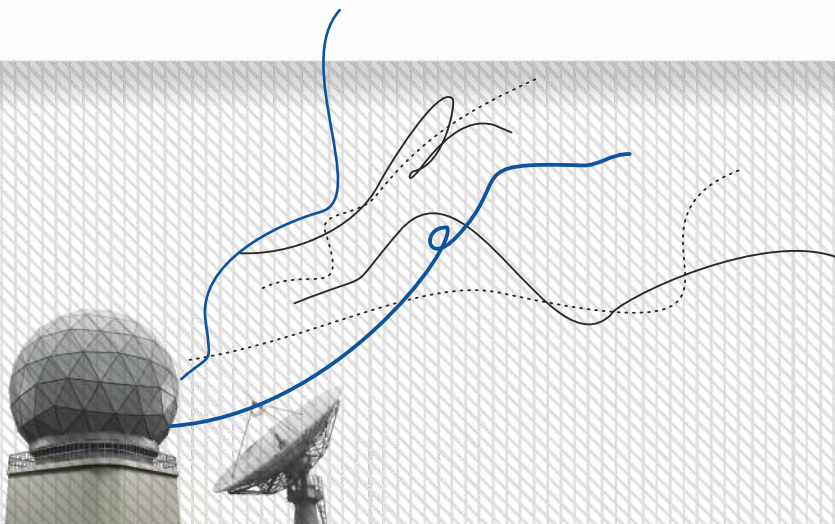


# TAKING INNOVATION TO THE NEXT ORBIT FOR SAC-ISRO

CoE-Composites has collaborated with SAC (Space Application Centre) and ISRO to address the existing challenges of satellite payload components and develop light-weight technologies for their future projects. We focussed towards reducing the structural expense of satellite through reduction of weight by implementing composites.

Also, communications satellites are using increasingly higher frequencies that require increasingly precise antenna reflectors for use in space as well as on the ground.

**ATIRA in collaboration with SAC and ISRO developed reflectors, antennas and radomes for space as well as ground applications.**



## ON-GOING PROJECTS

We have a number of on-going projects with the National Jute Board as well as the Ministry of Textiles, Government of India:

### Strengthening the Prosthetic Leg National Jute Board

Artificial limbs are required for a variety of reasons including diseases, accidents, and congenital defects. As the human body changes over time, the artificial limbs must be changed and adjusted periodically. This constant need for change or adjustment may become costly if the material used is expensive.

This research project, in collaboration with H. N. B. Garhwal University (Srinagar), NILD and Blind School Association Ahmedabad, is focussed on the socket part of the prosthetic leg as it is often changed and will try to replace the material with natural fibre-based composites, especially Jute fibre.

### Nano-fibres based Filtration Ministry of Textiles, Govt. of India

We are currently involved in two Nanotechnology Projects with the MoT. Both utilise the unique capabilities of nano-fibres as effective filter media.

- PTFE Nano-fibre based filter media for corrosive/high temperature application
- Nano-filter for pure drinking water



### Naturally fortifying the Porta Cabin National Jute Board

Fibres extracted from natural sources hold a wide set of advantages such as negligible cost, significant mechanical characteristics, low density, high strength-to-weight ratio, environment-friendliness, recyclability, etc.

In structural and infrastructure applications, fibre composites are used to rehabilitate existing structures such as bridges and buildings. Due to the need for more environment-friendly materials, natural fibre composites are regaining the attention that earlier shifted to synthetic products. In this project, a collaboration with MNIT Jaipur, AB Composites and Eskay International, jute composite based light sandwich panel has been proposed to develop Porta Cabins.



## PRESTIGIOUS CLIENTS

Due to its legacy, credibility and capabilities, ATIRA is preferred by numerous prestigious clients. Some of these include:



### Major Textile Mills

## AWARDS & RECOGNITIONS

- ATIRA has been designated as a Centre of Excellence in Composites by the Government of India
- Conferred with 'Special Recognition in Textile Sector Award' in the category of Technical Textile by the Ministry of Textiles, Government of India in 2019
- All the laboratories are accredited by NABL
- Appointed as the primary and independent assayer for cotton testing on two of the largest platforms - MCXCCL and BSE/ICCL

For more information on our awards and recognitions, please refer to <https://atira.in/awards-and-accolades/>

## PATENTS

Our patents enable us to provide better R&D access to a wider cross section of industries. Over the years, ATIRA has added a number of patents to its credit. This track record remained consistent during the reporting period as well. The CoE-Composites was granted two patents during the year:

### Thermoset Jute Composites Composition and Process Thereof

Patent No.: 370067

This invention provides thermoset jute composite with improved mechanical properties in particular impact strength and improved aesthetics and method for producing the same.

### Pallets made of Corrugated Paper/Foam

Patent No.: 374007

ATIRA was granted a patent on development of novel and inventive lightweight and cost-effective pallet which overcomes drawbacks of prior known pallets.

### Other Patents Applied

- A structural panel and a method of manufacturing the same
- Modular toilet
- Nano-fibre based antimicrobial face mask for protection against viruses and a process of preparing face mask thereof
- Nano-fibre membrane layered filter media
- An oil recovery process from seeds and system thereof
- Cationizing agent
- Enhancement of oil recovery from cotton seed
- Method for enzymatic preparation of Textiles



# NEW-AGE APPLICATIONS TO DEVELOP NEW-AGE GROWTH AREAS

## R&D Services

ATIRA takes pride in supporting the growth of the Indian economy by helping various industries - textiles, roads & buildings, infrastructure, material science, environmental protection, defence, aerospace, and agriculture, by conducting cutting-edge R&D in these areas.

## CENTRES OF EXCELLENCE

For streamlining the R&D activities, ATIRA boast of three Centres of Excellence (CoEs): **Composites | Geotextiles | Nanospinning**

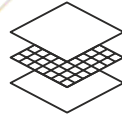
These CoEs were created with funding support from the Ministry of Textiles, Government of India, and the Government of Gujarat, and have state-of-the-art facilities for product development, testing and quality control. Along with industries, CoEs are also involved in important national projects.



In addition to the CoEs, ATIRA also has an **Incubation Centre for Technical Textiles** and a **Focus Incubation Centre for Composites**.



# 1 Composites



To provide sustainable solutions from composite materials, ATIRA established India's first-of-its-kind Centre of Excellence (CoE) for Composites at Ahmedabad, Gujarat. The focus areas include the development of lightweight and sustainable composite materials for the aerospace, defence and mobility sectors. Some of the key activities the CoE pursued in 2021-22 include:

- Exploration of newer materials and development of composite materials suitable for specific applications
- Analysis, review, establishment and modification in the composite processing technology for carrying out R&D activities
- Prototype development using newly developed materials and production processes to establish new applications

In November 2021, SAC (Space Application Centre), ISRO and ATIRA joined hands to address the existing challenges of satellite payload components and developing lightweight technologies for future projects. In collaboration, we have developed reflectors, antennas and radomes for space as well as ground applications.

## Other Research Projects

- Hybrid jute composite modification and subsequent development of Porta Cabin
- Development of jute composite for application in prosthetic legs
- Hydrogen vessel manufacturing using textile-based composites

## New Products Developed

- Pultruded profile - developed Z profile using the pultrusion process
- Glass fibre epoxy resin laminated for electrical insulation application

## Composite Lab

Established almost a decade back, the Composite Lab does the testing of various composite materials and fulfilling the requirements of different sectors. The year 2021-22 was special with two breakthroughs in mass transportation:

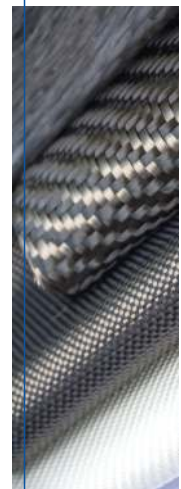
- Research Design Standards Organisation (RDSO) **panelment of ATIRA for heat and flame testing**
- Successful completion with National High-Speed Rail Corporation Limited (NHSRCL) for phase 1 of '**Developing supply chain of upholstery for Bullet Trains**'. The major focus in this phase was on heat and flame testing of seat cover and cushion



## Glass Fibre Epoxy Resin Laminated for electrical insulation application

Non-metallic structural materials that act as an electrical insulation are needed for electric equipment and heavy electric machinery. One of the extensively utilised materials is Glass Fibre Reinforced Resins (GFRR), which may also be known as GFRP and FRP. They are created from glass fibre cloth that is impregnated with an epoxy resin under pressure and heat.

CoE-Composites, ATIRA developed the GFRP laminated as per NEMA G-10 & G-11, and FR4 standards with excellent electrical insulation performance, moisture resistance, dimensional stability, chemical resistance, and adhesion properties.



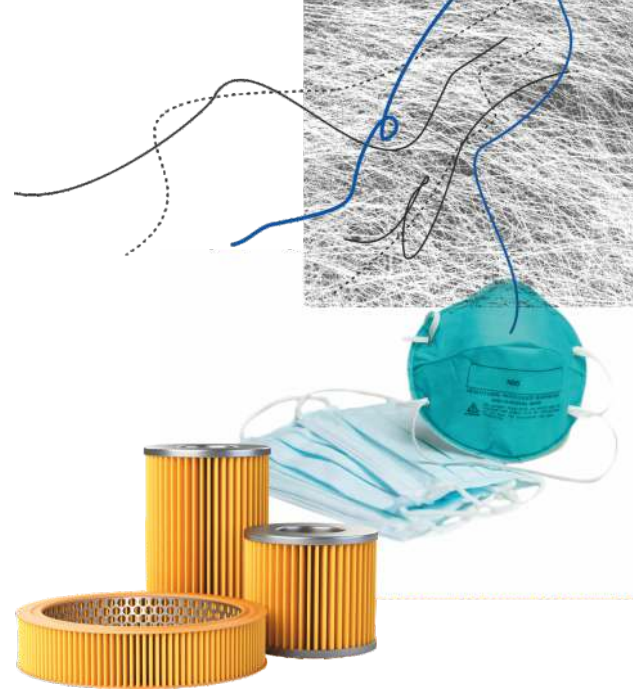
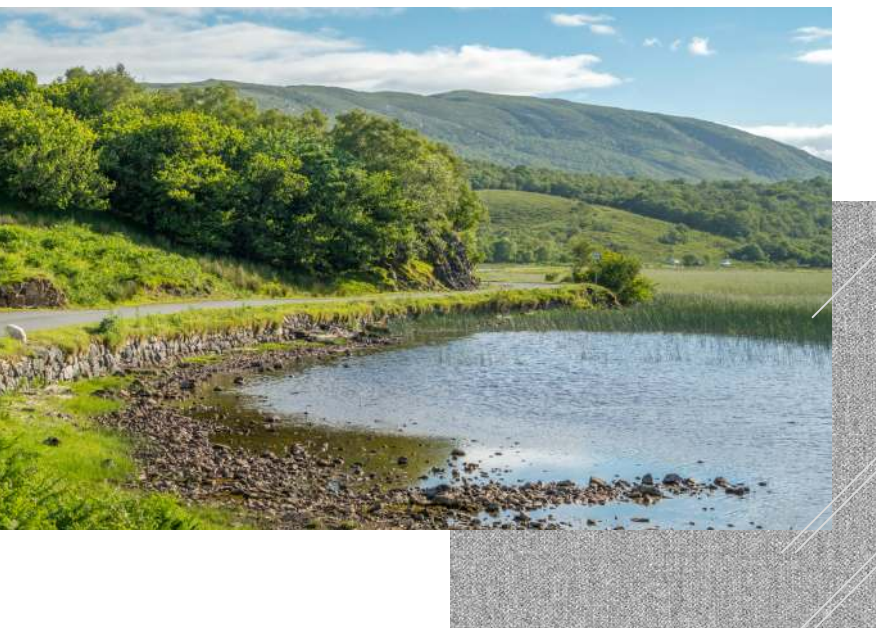
## 2 Geotextiles

Geotextiles are gaining increasing acceptability, both in the domestic and international markets, because of their special attributes such as drapability, inertial strength, ecological efficiency, low maintenance, customisability, fineness, low extensibility, commercial advantages like easy availability of customised fabric and comparative economy.

The CoE for Technical Textiles was established in 2015. It has fully equipped labs at Ahmedabad, Gujarat and Guwahati, Assam for Geotextile product testing. Some of the initiatives include:

- **Solution design using woven/non-woven Geo-tex**
- **Construction of a 75 km road with retaining walls in the Northeast**
- **The lining of 10 water reservoirs (43,000 sq. km)**

**The Geotextile office at Guwahati, Assam is engaged in sustainable infrastructure development in the Northeastern region.**



## 3 Nanospinning

The market demand for products from electro-spun nano fibre webs is increasing. It presents a unique advantage as it can be engineered as per desired porous structure with a range of polymers. The Elmarco make Nanospider™ NS 3A 1000U machine is one such technology installed at the ATIRA Incubation Centre which uses electrospinning process for nanofibre formation. The machine can transform many types of polymers into nanofibres using a high electrical voltage supply. Some of the initiatives undertaken by the CoE in 2021-22 include:

- **Development of PTFE nanofibre from emulsion on the base of glass fabric which is used in the filtration industry**
- **Development of nanofibre from Griffin and PVA solution, which is an application for medical textile**
- **Application of PUR adhesive in polyester woven fabric which is used in the automotive industry**



## TEXTILE & CALIBRATION TESTING LABORATORY

ATIRA has well-equipped analysis and testing facilities. The testing services cover fibres, yarns, fabrics, garments, technical textiles, high visibility clothing, geotextile, chemicals, solid fuels, effluents, drinking water (both chemical and biological), biological parameters of textiles and trace analysis of toxic substances. It continues to grow as:

### Key Assayer

Due to its faster turnaround time and accuracy of results, ATIRA has been chosen as the primary assayer of Multi Commodity Exchange (MCX) for their cotton testing. For all the warehouse service providers, ATIRA was the preferred assayer and captured more than 90% of the MCX testing business within the third year of its empanelment.

### Technical Partner

ATIRA partners with various organisations to help with their textile procurement. It helps organisations and Government agencies in setting up specifications for the procurement of their textile products. Its technical strength in textile testing and its neutrality are the major reasons for being the chosen one.

During 2021-22, some organisations for which specifications were made include:

- Gujarat Sports Authority
- Readymade uniform specs for Aanganwadi boys and girls
- Gujarat Medical Services Corporation Ltd. for sanitary napkin
- Gujarat MSCL for its uniform procurement
- OPAL for its uniform procurement
- Worked with a fire suit manufacturer to develop a light, high-quality suit
- Capability in paper testing increased covering all needs for Universities, etc.



There is a continuous improvement in the number of tests and test methods. In 2021-22, more than 15 special testings were carried out for the first time, some of which includes testing of sleeping bags and food delivery bags, testing for the Air Force and paper testing.

ATIRA also has a state-of-the-art lab for calibration of various parameters required for the industry in production, quality control and testing, providing single-window calibration/testing service at the lab as well as at the customer's site. It has NABL accreditation for the calibration of mechanical, thermal and electro-technical discipline-based instruments. Currently, it is calibrating various parameters-based instruments such as dimension and mass metrology.

**Around 89,000 samples were tested, and 1,645 instruments were calibrated during this year.**



## POWERLOOM SERVICE CENTRES

Powerloom Service Centres are involved in various activities like training, testing, consultation, and organising workshops/awareness programmes/seminars on various schemes by the Ministry of Textiles for the benefit of powerloom units. ATIRA's three powerloom service centres are located in Ahmedabad, Dholka and Indore.

During the year, all three centres organised various awareness programmes and tested samples. Training programmes were organised in-house as well as on-site. Nearby business units were consulted for quality, development and mechanical issues.

## Other Specialised Services

There are many allied services which we cater to other than research. These services help organisations create a competitive edge by development of people and processes. Some of these services include:

### CHEMICAL TECHNOLOGY DIVISION

This entails customer services in the area of defect analysis with qualitative and quantitative approach. Some of the areas covered are fabric defect analysis, certification of cloth samples for customs department, performance and testing of the processing chemicals, testing of dyestuffs for exports, and preparation of composite soiled stripe, etc. In the year 2021-22, some of the initiatives undertaken were:

- General industry issues of tendering of cotton fabrics - started analysing by three universally established qualitative methods
- Started fluidity measurement through cupra-ammonium solution methods as per AATCC protocol. This test is on request by customer for specific reasons
- Commercialisation of pre-treatment testing kit - a very useful tool for shopfloor quality management by spot test online
- Renovated & serviced two old bowl horizontal dyeing padder for cold pad batch dyeing
- Cold oxidative cracking method developed
- Started analysing qualitative test for various performance chemicals/auxiliaries used in processing
- Analysis of sizing ingredients
- Performance evaluation of single shot sizing/water soluble sizing
- Introduced scour ability test for knitting lubricating oil for selection criteria in circular knitting machine
- Hydrogen peroxide evaluation & analysis
- Added the testing and identification of glass fibres in composite form by introducing Glass Fibre Dissolution Test
- Initiated printing of reactive dye through sodium alginate thickener
- Started cold pad batch dyeing for evaluation of single dye strength in fixation along the time for vinyl sulphone/MCT/hetro bi-functional dyestuffs
- Consultation job for piece dyeing in one of the leading process houses
- Jointly prepared MoU for manufacturing alpha amylase enzyme with microbiology experts
- Started testing purity percentage by FTIR data analysis through outside source, whereby reliable comparison data are instant and handy
- Initiated indigo dye percentage purity testing and performance evaluation of indigo colour dyeing to judge final shade development
- Sustainable textile processing initiatives







## ENVIRONMENT SERVICES

Various environmental engineering services provided to the industries by ATIRA include:

- Environment audit
- Treatability, soil and groundwater study
- Environment management system adequacy certification
- Sampling, monitoring and analysis of water, wastewater, gaseous emissions, and process as well as flue gases, hazardous waste
- Monthly monitoring as well as industrial survey for different industries
- Training given to industrial operators for ETP up-gradation & modification
- Environment legal clearances

## MANAGEMENT SERVICES

ATIRA provides a host of management services:

- Technical viability studies for spinning, composite, and processing units
- Assessing/vetting modernisation proposal for textile mills/financial institutions
- Policy research
- Scientific selection and recruitment of textile operatives
- Valuation of materials, assets
- Mandatory certification, e.g., solar energy, technical textiles, etc.
- GI registration
- All kinds of management studies/consultancy and research

## TRAINING PROGRAMMES

Continuous enhancement in skills and knowledge increases the capabilities of an individual as well as the organisation. When done right, skills development can reduce unemployment and underemployment, increase productivity and future-preparedness, and improve the standard of living of the community.

For an organisation, the development of skills can contribute to structural transformation and economic growth by enhancing employability and labour productivity and helping countries to become more competitive.



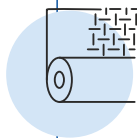
ATIRA helps develop general as well as technical abilities by organising training sessions which range from a day to a month. Some of the key areas covered this year include:

- CSR sponsored operator training programme on Rotary Screen Printing - during the year 2021-22, eight such training programmes were held which benefitted 160 trainees
- Technical training programme for young entrepreneurs/professionals - a 15-day programme attended by 34 participants covered comprehensive technical overview of textile sectors
- Composites Skill Development - a one-month online industrial training programme on 'Fibre Reinforced Composite Materials' was conducted



# FUTURE FOCUS

In all its four areas of influence, ATIRA plans to step up its initiatives to further help individuals, institutions, and the industry to go forward.



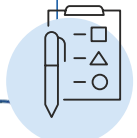
## Research & Development

Development of aerospace and defence products



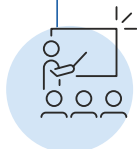
## Idea Incubation & MSME Support

Incubator for composite material used in drones and electric vehicles



## Consultancy & Environment Audit

Next-generation testing and certification services



## Training & Skill Development

Collaborate with universities with a set target to train 5,000 individuals every year

Some of the other future initiatives include:

- Upgrading our facility infrastructure - set up of expanded clean-room, autoclave and carbon composite manufacturing equipment
- Augment CoE-Composites as well as development, incubation, testing & training programmes to become an attractive partner to the emerging segments of the industry
- Pursue ideas with a viable business case and identified industry partners/collaborators

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