

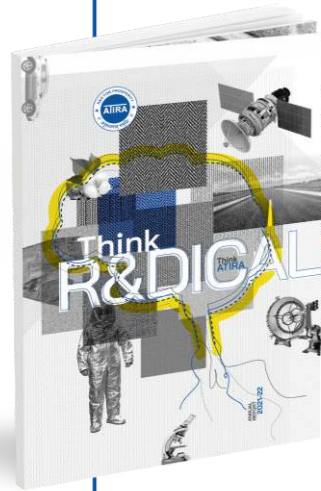


# R&DICAL GROWTH

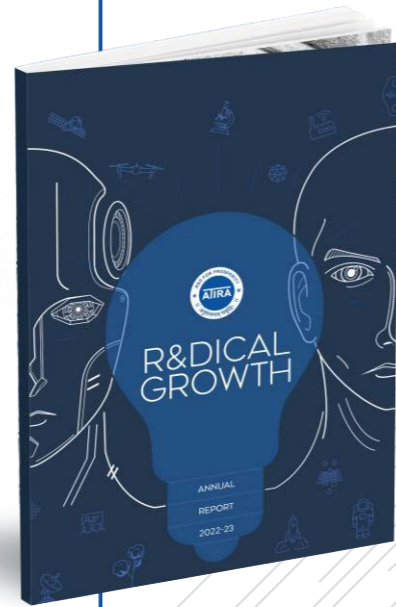
ANNUAL

REPORT

2022-23



R&Dical thinking serves as the catalyst for envisioning new possibilities, challenging the status quo, and identifying opportunities for change and improvement. It involves pushing the boundaries of conventional wisdom, questioning established norms, and imagining alternative paths to progress.



R&Dical growth is the transformation of these visionary ideas into tangible reality. While R&Dical thinking laid the foundation at ATIRA, R&Dical growth that we are witnessing is the outcome of a series of deliberate actions and strategic execution.

At ATIRA, these last few years have been a period of walking a new path, fostering a culture of innovation, and building a strong network. By turning innovative concepts into practical strategies, projects, and initiatives, we are driving more collaborations and offering more services.

**True to its radical spirit, this growth at ATIRA is actually a trigger to cascade exponential growth within the textile industry and thereby fuel the growth of the nation.**

A key stepping stone towards the above is the specialised training that ATIRA is offering to the youth. Young talents bring innovative ideas and adaptability to a sector steeped in tradition, enabling the development of cutting-edge technology, sustainable practices, and global market expansion.

By embracing this youthful perspective, ATIRA is reshaping the textile landscape, fostering innovation, and driving R&Dical growth for the industry as a whole.

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# ADVANCED TEXTILE RESEARCH TO ADVANCE INDUSTRY GROWTH

## ABOUT ATIRA

ATIRA continues to lead the way in research and development for radical growth of textile and its allied industries.

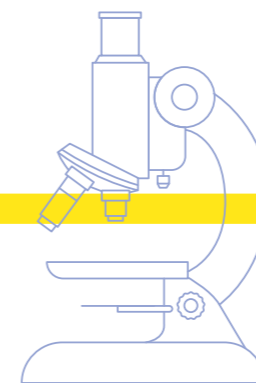


As an internationally acclaimed, fully autonomous, and non-profit institution, **ATIRA's research spectrum spans every facet, from the inception of fibres to the realisation of finished fabrics.**



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 ATIRA's 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 enables the betterment of industry, economy and society**

## COLLABORATION FOR R&DICAL GROWTH

The ATIRA-ISRO collaboration has strengthened over the last seven years. ATIRA has been involved in the development of various components/hardware using advanced materials (Composites) in the areas of antenna, reflectors, camera structures, ground-based hardware etc. for SAC ISRO. The collaboration extends to enhancement of mechanical, electrical and thermal properties of composite materials for application in space technology.

The Space Applications Centre (SAC) of ISRO faced a crucial challenge in developing lightweight, structurally sound, space-based earth observation cameras. The conventional materials, primarily metals, had limitations that hindered the desired objectives of weight reduction, ease of assembly, integration, and testing.

Recognising the need for a solution, SAC ISRO turned to ATIRA as a development partner. The decision was based on several critical factors:

- ATIRA's status as a Center of Excellence (CoE) in Composites, offering comprehensive infrastructural support.
- Access to ATIRA's pool of intellectual and knowledge resources, fostering innovation

During the initial phases of development, the project faced a challenge with an expensive and time-consuming import of a key raw material. However, ATIRA's Composites team, through their expertise, collaborated with SAC ISRO to identify an indigenous alternative. This not only reduced costs but also eliminated dependency on imported materials, and improved supply chain efficiency. Infrastructural limitations occasionally presented challenges, but with mutual understanding SAC ISRO and ATIRA displayed remarkable adaptability. Designs were modified and approaches were changed to overcome obstacles, ensuring successful project completion within the available infrastructure.

The collaboration between SAC ISRO and ATIRA led to the development of some critical components for space-based earth observation cameras. The adoption of advanced materials, particularly CFRP (Carbon Fibre Reinforced Polymer), not only met critical structural and functional requirements but also the project's cost-efficiency and supply chain reliability.



**SAC ISRO'S VISION,  
COMBINED WITH ATIRA'S  
TECHNICAL PROWESS,  
EXEMPLIFIED THE POWER OF  
COLLABORATION IN ACHIEVING  
GROUNDBREAKING RESULTS.**

ATIRA has also been associated with ISRO for the following projects:

**GSAT 19 | GSAT 6A | GSAT 29 | GSAT 11 | Chandrayaan 2**

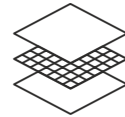
We have developed around 70 different components, some of which are currently in space. With this experience and expertise in tow, we are now looking to leap ahead and collaborate to develop products for Aerospace and Defence industry.

# CUTTING-EDGE CAPABILITIES THAT PROVIDE LEADING-EDGE TO INDIAN TEXTILE INDUSTRY

## FOCUS AREAS

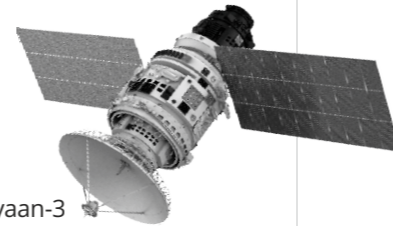
ATIRA is aligned with the Government of India's R&D focus in the technical textile sector. The government is collaborating across ministries and departments to boost demand and adoption of technical textiles as they play a significant role in delivering functionality, safety, and innovation across industries, from healthcare and automotive, to construction and environmental sustainability, fostering economic growth and addressing complex challenges.

### Composites



### Space Industry

The Successful landing of Chandrayaan-3 mission near the lunar South Pole has opened up the global space market for India.



**The country aims to capture 9% of the global space industry by 2030, potentially reaching a \$40 billion space economy by 2040.**

This augurs well for ATIRA. We have been partnering with SAC-ISRO over the last 7 years to develop products like reflectors, antenna, radome, foldable reflectors, sandwich composite for some of the key players in the space industry like SAC ISRO and BEL. We will be leveraging this expertise for key players in the Aerospace and Defence industry.

### Electrical Insulation

ATIRA's innovation extends to the development of a high-performance range of Glass Epoxy Laminates, tailored for both electrical insulation and automotive applications. Our portfolio includes G10, G11, FR 4, FR 5, and H Class laminates, each distinguished by remarkable qualities. These laminates excel in high-temperature environments, exhibit enhanced mechanical properties, and proudly adheres to stringent international standards like NEMA and IEC.

### Nanotextiles

Nanotextiles represent a fusion of nanotechnology and textiles, resulting in materials with exceptional properties. Nanotextiles are poised to revolutionise industries ranging from fashion to healthcare, ushering in a new era of advanced and versatile fabric applications.

### Protective Textiles

Protective textiles are meticulously designed to meet stringent safety standards, ensuring the well-being and security of those who rely on them in demanding environments. This year, we did quite a few special tests as per customer requirement for fire curtains, gloves, fire suit, etc. The variations were either in the parameters of flammability, contact heat or radiant heat, cut resistance, etc. Some new standards were also tested for the first time.

## RESEARCH & DEVELOPMENT



Our commitment to R&D in technical textiles has led to the creation of innovative solutions in the textile industry. These innovations have resulted in a portfolio of valuable patents, establishing us as the frontrunners in innovations and creating value for our customers.



### ATIRA's R&Dical Approach Gets Lauded

Shri. Piyush Goyal, Hon'ble Minister of Commerce & Industry, Consumer Affairs, Food & Public Distribution, Textiles and Leader of the Rajya Sabha visited ATIRA on 20th August 2022. During the visit he took a tour of ATIRA's R&D and Incubation Facilities and appreciated the Research activities and projects lead by ATIRA. He further motivated the team to take a leap and level up the Research activities to drive path breaking innovations in the field of Composites and Technical Textiles.



### Industrial Textiles

Industrial textiles ensure efficiency, safety, and reliability of machines and processes across industries. We developed PTFE Laminated glass fabric for air filtration that combines the exceptional properties of PTFE with the reliability of glass fabric, making it a game-changer in air filtration technology.

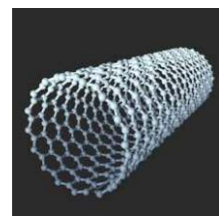


## Key Projects

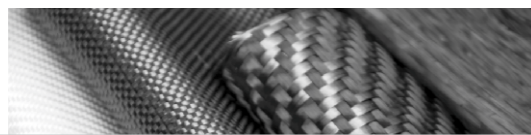
Here are some of the projects that exemplify our commitment to pioneering innovative solutions that drive the growth and competitiveness of the Indian textile industry.



# PIONEERING INNOVATIVE SOLUTIONS



- 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
- Crafted PTFE Nano-fibers on glass fabric, revolutionising filtration. The incorporation of PTFE Nano-fibers not only enhances the filtering capabilities but also significantly extends the lifespan of the filtration media
- Created a Nano-fiber water filter, sponsored by the Ministry of Textiles, delivering 99% efficiency in purifying drinking water, combating heavy metals, turbidity, and microbes. The filter is now available for commercial use
- Development of Nano- fibres for medical and pharmaceutical applications like wound healing and drug delivery
- Development of biodegradable polymer Nano fibres for Cosmetological applications
- Material development for deployable and foldable reflector
- Graphene-Based E-Textile for Monitoring Minute Body Deformation
- Analysis of Electrical Conductivity of carbon Nanomaterials
- Indigenised carbon fibre sleeve, a product that finds application in Aerospace Industry using Robotic Radial Braiding machine
- Development of Carbon Strips on Pultrusion Machine



## TESTING AND CONSULTING SERVICES

Through Testing and Consulting Services, we equip businesses with invaluable insights into their products and services, enabling them to craft strategic decisions that set them on the path to growth.



**This demonstrates ATIRA's ability to adapt and thrive in changing market conditions, showcasing our commitment to providing valuable services to a diverse range of industries.**

### Testing Labs at ATIRA

ATIRA offers top-notch analysis and testing facilities that encompass a wide spectrum of services, including, but not limited to, the evaluation of fibres, yarns, fabrics, garments, technical textiles, high-visibility clothing, geotextiles, chemicals, solid fuels, effluents, drinking water (covering both chemical and biological aspects), biological parameters related to textiles, and precise trace analysis of hazardous substances.



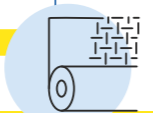
**Textile Testing Lab**



**Chemical Testing**



**Protective Textile Testing**



**Geotextile Testing**



**Environmental Testing**



**Eco Lab**



**Composite Lab**

The Composite Lab, established nearly a decade ago, has been a pivotal player in conducting comprehensive testing of diverse composite materials to meet the unique demands of various sectors.



Notably, the lab achieved significant milestones, including:

**Empanelment by Delhi Jal Board and MCGM for CIPP liner testing**

The lab also enriched its portfolio with the **addition of over 20 new test parameters**, further enhancing our testing capabilities and service offerings



**Geotextile Testing Lab**

Our Geotextile Testing Lab is equipped with the capacity to test all varieties of Geotextile products currently in the market.

**We have the capability to assess more than 30 essential test parameters. Leveraging this extensive capacity, coupled with our swift turnaround time, we achieved a remarkable surge in testing services.**

This reflects our commitment to excellence and the industry's growing reliance on our comprehensive testing services.





## ECO LAB

Our ECO LAB is at the forefront of addressing ecological and environmental concerns, offering testing services for a wide range of requirements, including heavy metals, toxic parameters, and formaldehyde, among others. The sophisticated lab testing infrastructure has received NABL accreditation for evaluating parameters related to drinking water, wastewater, and groundwater.

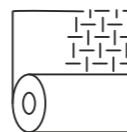


**ATIRA's commitment to environmental stewardship and quality testing is exemplified through our NABL accreditation, ensuring accuracy and reliability in all our ecological and environmental assessments.**



**NABL accreditation of ATIRA laboratories: All the labs of ATIRA were accredited for 2 years in July 2022 for a total of 226 parameters.**

## Calibration Lab



Our Calibration Lab extends calibration and testing services to an impressive 69 industrial segments. This laboratory holds the prestigious NABL Accreditation, assuring the highest standards of accuracy and reliability in our services. Presently, our calibration efforts encompass a diverse range of parameters and instruments/artifacts, including dimension and mass metrology.

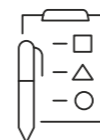
**In FY23, we successfully calibrated around 1,046 instruments, demonstrating our commitment to precision and excellence in serving a wide array of industries.**

## NABL accreditation of Solid fuel testing at ATIRA



ATIRA's Textile Testing Lab has taken a significant step by obtaining NABL accreditation for Solid Fuel testing. The move aims to enhance the credibility and instill confidence among our valued customers, reaffirming our commitment to providing authentic and reliable testing services in the field of Solid Fuel.

## CONSULTING SERVICES



### Chemical Technology Division (CTD)

The CTD department specialises in defect analysis, utilising a comprehensive blend of qualitative and quantitative methodologies. Our services encompass a diverse spectrum of areas, including fabric defect analysis, certification of cloth samples for customs authorities, performance and testing of processing chemicals, evaluation of dyestuffs for export quality, and the creation of composite soiled stripes.

In FY23, we continued to deliver added value to our customers by implementing a series of initiatives:

#### FTIR Implementation

Introduced Fourier Transform Infrared Spectroscopy (FTIR) for precise identification of organic polymeric compounds and organometallic compounds, enhancing our purity assessment capabilities.

#### Aramid Fabric Dyeing

Expanded our capabilities by introducing Aramid fabric dyeing in our state-of-the-art High-Temperature High-Pressure (H.T.H.P.) dyeing plant, complemented by special auxiliaries and dyes.

#### Performance Chemicals Analysis

Our comprehensive qualitative and quantitative testing for various performance chemicals and auxiliaries, including film, involved comparative studies and individual performance assessments based on moisture regain at 65% RH and 85% RH.

#### SEM Integration

Embraced advanced technology by adopting the Scanning Electron Microscope (SEM), a superior tool compared to traditional microscopes, for enhanced research and analysis.

#### Application Parameter Development

Achieved a significant milestone by successfully developing application parameters for a single product in wet processing for both cotton woven and knitted fabrics, applicable to both exhaust and continuous systems.

#### Barium Activity Number Test

Implemented the Barium activity number test to confirm the quality of mercerisation processes, ensuring top-notch outcomes.

#### Potato Starch Efficiency Evaluation

We conducted a rigorous evaluation of potato starch efficiency to optimise our processes and resource utilisation.





## Environmental Engineering Division

For the past two decades, ATIRA's Environment the division has served as the Gujarat Pollution Control Board (GPCB) Schedule 1 auditor. Our commitment to auditing industrial activities in accordance with GPCB guidelines remains unwavering. However, in FY23, our primary focus shifted towards providing consultancy services aimed at enhancing adequacy.



The consultancy services were offered on the following subjects:

- Product Change
- Product Mix
- ETP Upgradation
- APCM Upgradation
- Proposed (New) Plant
- EMS System adequate for Existing plant
- ZLD System
- EC Not Required Certificate
- Fuel Change / Change of Utilities
- Gypsum Study
- Hazardous Waste Study
- Soil Contamination Study
- Soil Remediation Study
- Groundwater Contamination
- Spent Acid Contamination Study



## Idea Incubation and MSME Support

### Empowering Entrepreneurs and Industries

The Start-ups and MSME's in India are catalyst for economic growth.

India ranks **3<sup>rd</sup>** globally in start-ups with an anticipated **12-15% YoY** growth, while MSMEs contribute around **33%** to India's total GDP.

ATIRA, through R&D, is at the forefront of empowering both - the start-up entrepreneurs and MSME industries through two different incubation centres: the Incubation Centre for Technical Textiles and the specialised Focus Incubation Centre for Composites.

### Incubation Centre for Technical Textiles

Along with wider width weaving facility and sectional warping machine, the incubation centre at ATIRA also has carbon weaving loom for developing carbon woven fabrics that find application in composite, aerospace, construction and other industries. The Incubation Centre also boasts of some state-of-the-art and advanced machines/facilities like Hot Melt Coating and Lamination Machine (by LACOM). This machine offers an eco-friendly and sustainable technology to manufacture laminated textiles that find application in several industries like defence, apparel, industrial textiles etc.

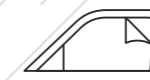
## Key Highlights for the Year

### Commercialised Projects

**PTFE Laminated Glass Fabric** for air filtration



**Black Roll-down Film** for automotive industry



**700 GSM Glass Fibre Fabric** for filtration application



**High Tenacity Polyester Fabric** for airbag liner application



### Focus Incubation Centre for Composites

Our Focus Incubation Centre aims to develop technology and products for the Laminates industry and offers a comprehensive range of services to support the development and production of bespoke laminates for power industry. Over the years, FIC has been instrumental in empowering numerous companies by offering them unparalleled expertise and resources.



### FIC Composites

FIC introduced innovative insulation material and ventured into the development of diverse products including battery separators, aircraft deck materials, and glass phenolic pre-pregs. These exceptional products caught the attention of prestigious clients, including industry giants like Tata and Reliance. It further solidified FIC Composites' reputation as an industry innovator and solution provider.

### Developments

Successfully completed about **12 prototype developments** on the **wider width and carbon weaving looms**. Commercialisation of following developments expected soon:

a. **Glass Fibre Composite Fabric**

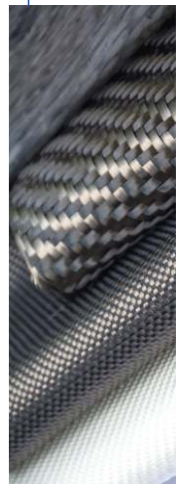


b. **3" diameter Glass Fibre Sleeve** for Aerospace application



### Creating a Blue Ocean Industry for JRD Fibre Pvt. Ltd -

JRD Fibre Pvt Ltd, a prominent supplier of FRP/ARP rods to the fibre optics industry, sought to diversify its product offerings and explore new industry domains. With this objective, the company embarked on a transformative journey in partnership with the composites team at ATIRA. The team presented material for transformer motors and generators with unique features and exceptional functionality. Recognising the potential for innovation and market disruption, ATIRA and JRD Fibres entered into collaboration under the banner of FIC Composites yielding outstanding results.



## TRAINING AND SKILL DEVELOPMENT

The training and skilling provided by ATIRA ensure that both employees and companies are well-prepared to navigate the challenges and opportunities of the modern workplace, ultimately leading to sustainable growth and success. ATIRA runs a skill development programme for upskilling workers in Printing Industry in collaboration with Stovec Industries. It includes both theory and practical sessions. An evaluation module post training helps to assess the trainees' level of skill development and gauge the efficacy and outcome of the training programme.



The primary objectives of the trainings are:

- To upskill the personnel
- To reduce value loss in processing and thereby improve the quality of the printed fabrics
- To ensure proper maintenance of the machines

**We have trained 320 workers so far, since the programme started in October 2020.**

### GCCI-ATIRA Certificate Course on 'Textile at a Glance'

In January 2023, a Certificate course on Textile at a Glance was organised jointly by the Gujarat Chamber of Commerce and Industry (GCCI) and ATIRA. The course covered topics across the textile value chain: Ginning, Spinning, Weaving, Processing, Knitting, Garmenting, Home Textiles and Technical Textiles along with industrial visits to leading units in those value chain. In all, 35 young entrepreneurs from units across Gujarat, Maharashtra and Tamil Nadu participated in the course.

Other trainings conducted in the year include:

- Technical skills development training for employees of Kumar Cotton mills pvt. Ltd.
- One-week Industrial Training Programme for Sundaram composites on 'Carbon Fiber and Its Processing' by Composites team



## NEXT-GEN APPLICATIONS FOR NEXT-GEN GROWTH HORIZONS

### Research & Development Services

#### ADOPTING A COLLABORATIVE APPROACH

Collaborations harness the strengths of multiple organisations like expertise, resources, and accelerated innovation. These strengths when meld together, lead to breakthrough products and services.



**In FY23, ATIRA continued to strengthen collaborations with industry and academic institutions to drive innovation, leverage collective intelligence, and make a significant contribution to the advancement of industry and society at large.**

#### INDUSTRY COLLABORATIONS

FY23 saw a significant growth in number of collaborations compared to last year. This translated in the growth and enhancement of business reputation, credibility, and market visibility.



## Academic Collaborations

### ATIRA and Ahmedabad University

ATIRA has recently collaborated with Ahmedabad University (AU) to encourage knowledge and resource sharing. This Collaboration will also help drive innovation in the form of joint research projects and skill development programmes. We have also collaborated with School of Engineering and Applied Science at AU wherein the university will offer a 2-year Master of Technology programme in Composites. The technical expertise and facilities of both institutions will be brought together for this programme.

Apart from AU, we are collaborating with other institutes including:

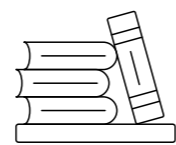
- Pandit Deendayal Energy University
- NMICPS Technology innovation Hub, IIT Hyderabad
- Nirma University
- Institute of Advanced Research
- Malaviya National Institute of Technology, Jaipur

### EMPOWERING THE POWERLOOM

ATIRA's Powerloom Service Centres are multifaceted hubs engaged in training, testing, consultation, and the facilitation of workshops, awareness programmes, and seminars related to schemes by the Ministry of Textiles, all aimed at benefitting powerloom units. Located strategically, ATIRA operates three such centres in Ahmedabad, Dholka, and Indore.

### By The Book: ATIRA Library's Wealth Textile Resources

ATIRA Library has rich resources of more than 46,000 books and bound Volume Journals. National and International Standards on Textile and Allied Subjects are updated every year.



In FY23, these centres diligently conducted a series of awareness programmes and facilitated the **testing of 76 samples**. Both in-house and on-site training programmes were successfully conducted, **benefitting 89 participants**. Additionally, consultation services were extended to **around 500 business units**, addressing quality, developmental, and mechanical challenges.

### CULTIVATING HUMAN CAPITAL

Growth of human capital is paramount for nation's socioeconomic growth. At ATIRA, we nurture talent to spark innovative perspectives, harness the collective expertise and experience of our diverse team to engineer solutions that cater to a broad spectrum of industry needs. Each employee at ATIRA possesses unique talents and their talents converge to drive solutions leading to economic and societal growth.

During the year, **ATIRA team grew and welcomed four new members to its ranks**. This expansion brings a wealth of knowledge and expertise to the team and will contribute to our continued success in research and development.

# FUTURE FOCUS



### Future Initiatives & Projects

ATIRA is actively engaged in initiatives that will shape the future of many emerging industries. With a particular inclination on developing local options for imported intermediary products such as pre-pregs, we would also take on development projects for carbon and glass fibre composite parts for drones and electric vehicles.

### Carbon Composites for Drones, UAMs and Aerospace Industry

ATIRA is focusing on the development of carbon composites intended for use in the Drone and Urban Air Mobility (UAM) systems in Aerospace Industry. With relevant infrastructural upgrade and strategic industrial and academic collaborations, we would accelerate our design-to-build research approach composites domain. This strategic endeavour is poised to have a ripple effect not only within the aerospace sector but also in related industries such as automobiles and defence.

In the coming years, our R&D efforts are expected to yield a series of new products and applications that will revolutionise the way carbon composites are perceived.



## Key Research Projects



### Enhancing Mechanical Performance of Fibre-Reinforced Composites

Leveraging nanomaterials to strengthen a wide range of materials, including Carbon Fibre-Reinforced Composites, for the creation of robust and lightweight aerospace and defence structures.

### Improving Electrical Conductivity in Fibre-Reinforced Composites

Expanding the Applications of Traditional Fibre-Reinforced Composites through Enhanced Electrical Properties, uncovering opportunities in Aerospace, EMI Shielding, Lightning Strike Protection, Sensors, Reflectors, and De-icing.

### Revolutionising Wearable Technology with Graphene-Based e-Textile Sensors

Harnessing Graphene's Distinctive Qualities to Introduce Innovative Functionalities to Fabrics, Fibres, and Yarns, Paving the Way for Next-Level Wearable Tech in Healthcare, Safety, and Security.

### Enhancing the Mechanical Properties of Natural Fibre-Based Composites for Sustainable Advancement

Utilising Graphene and Carbon Nanotube-Based Natural Fibre-Reinforced Composites to craft lighter, stronger, and more efficient material

Development of  
**PA6 and Chitosan Nanofibres Based Water Filter**

Development of **PVDF, Teflon coated Nanofibres based Thermal Insulation Fabric for Defence application**

Development of  
**Neem oil based PA6 Nanofibres coated Antibacterial fabric**

**This innovation-driven approach underscores ATIRA's commitment to staying at the forefront of technological progress and contributing to the growth and evolution of multiple industries.**

# ANNUAL REPORT 2022-2023



# R&DICAL GROWTH



**AHMEDABAD TEXTILE INDUSTRY'S  
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