

# Intellectual Capital

# A Comprehensive Innovation Roadmap for Growth

Grasim embraces innovation across its entire value chain, securing its position as a market leader. Our intellectual capital enables us to adapt and maintain competitiveness in a changing world. Our intangible assets—strong brands, experienced professionals, cutting-edge infrastructure and technology, and robust processes have led to financial success and value creation for stakeholders.

### STAKEHOLDERS IMPACTED

- Customers
- Value-chain Partners
- Shareholders
- Employees

### MATERIAL ISSUES

- Innovation and R&D
- Opportunities in Clean Technology
- Digitalisation, Data privacy and Security
- Product Stewardship
- Quality and Customer Satisfaction

### KEY RISKS

- Strategic Risk
- Operational Risk

### ALIGNMENT WITH SDGs





FY23 Highlights

**₹124 crore**  
R&D Expenditure

**9**  
Number of R&D Facilities

**17**  
Patents Granted

**2**  
Product Innovation

**7**  
Collaborations for New Product Development

**313**  
R&D Team

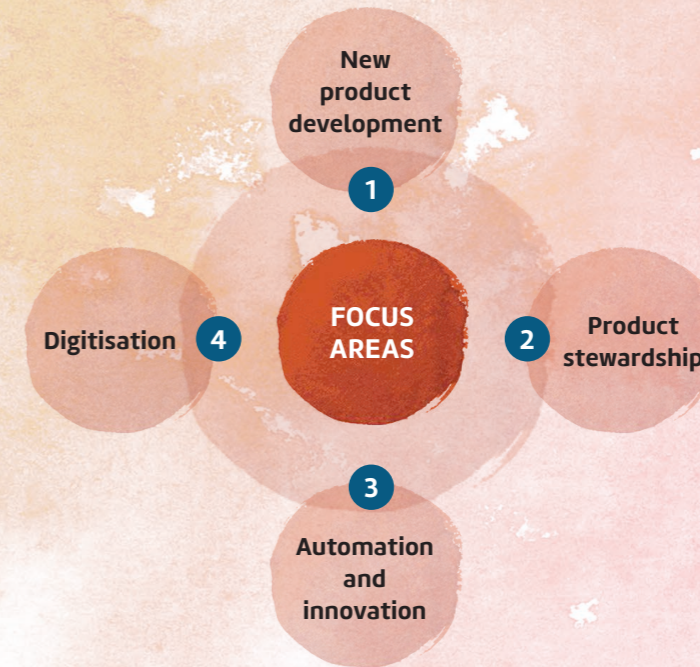
OUR APPROACH

Innovation is one of the foundations for our business strategy. We collaborate with technology companies, global research institutes, and other value chain members to create environmentally sustainable products to enhance our customers' products and provide eco-friendly solutions. The focus of our R&D facilities is to address our customers' changing needs in a dynamic and competitive business

landscape. Our emphasis on R&D and innovation ensures we remain ahead of the competition and propel expansion of our various businesses.

Innovation is fostered across different verticals like process improvement, data analytics, new product development, scaling up facilities and customer support function.

Our R&D Team includes Post Doctorate, PhDs, postgraduates and graduates with varied specialisations in textiles, chemical and information technology, applied sciences, and synthetic/physical chemistry.



**1 NEW PRODUCT DEVELOPMENT**

**Significant R&D advancements**

- Developed a novel toughened Epoxy system for the fabrication of composite pressure vessels
- Introduced composite LPG Type 4 Cylinders in the Indian market with the commercialisation of the product
- Developed a new line of Tile Grout and adhesives and added it to the Construction Chemicals product line

**Strategic initiatives across R&D**

- Established an R&D division focused on construction chemicals, specifically tile grout and industrial grout
- Commercialised a variety of high-value products:
  - VSF for Fire Retardant (FR) textile application
  - VSF short-cut for flushable wipes application
  - Coarse Denier Excel fibres
  - Special VSF grade eco-dry for hygiene application
- Established a state-of-the-art R&D centre for the paint segment.

Life cycle assessment to identify risks and concerns arising from our production and disposal activities

Closed loop involves the reuse of by-products within the production cycle

**2 PRODUCT STEWARDSHIP**

Product safety to secure handling and transportation of finished products

Reducing footprint to optimise resource utilisation and generate sustainable value for society

Sustainable manufacturing encompasses numerous facets of sustainability, including modelling and optimisation, remanufacturing, sustainable supply chains, reverse logistics, and closed-loop supply chains. Our policy on product stewardship requires socially and environmentally responsible manufacturing, use, and management of our products throughout its lifespan. Life Cycle Assessment (LCA) are conducted at regular intervals across various products at different locations.

**Partnerships**

Product stewardship evolved from the responsible management of hazardous wastes to a greater emphasis on resource conservation. Product stewardship approaches have altered the relationship between the social and material realms, resulting in the emergence of industrial sectors and the formation of partnerships. Due to this, agreements have been propelled by either the government or the private sector and have involved collaboration between these two parties.



**Key Partnerships**

- A joint development programme has been initiated with National Chemical Labs in Pune to develop a new product and process with the 'Sustainable Chemistry' approach. This programme aims to improve our bio-based product portfolio
- A letter of intent has been established to collaborate with CSIR-CSMCRI. The project will involve working alongside the exosome startup group to develop water treatment solutions and improve product activities
- An MoU with IIT BHU to explore new types of cellulosic products
- On the advisory board of the Georgia Institute of Technology

**Product and Method Innovations**

At Grasim, our focus towards new product development has been across all our businesses. The emphasis on the development of new products has played a crucial role in the expansion of the market. Our proactive approach to engaging with customers and soliciting their feedback enables us to innovate our practices, as well as identify and address gaps in our products and services.

**Viscose**

The R&D centres are dedicated to creating innovative yarns and fabrics in collaboration with local partners. This has facilitated the development of new printing bases for commercial fabric manufacturers, the development of seasonal fabric samples using the latest and most sought-after yarns, and modifications in weaving patterns. The initiative promotes natural, sustainable, and biodegradable yarns to raise awareness about environmental sustainability.

**Chemicals**

In FY23, we added a few molecules towards chlorine. The new product range added to our Group is Chloromethane. Its introduction will help in the Indian value chain of Chlorine and Hydrochloric acid, and helps us in improving our utilisation rate for caustic. Due to integration levels, there is a wide opportunity for us to dive deep into new chemistries.

The partnership with Lubrizol, global leader in chlorinated polyvinyl chloride (CPVC) would be initiated this year. Lubrizol is constructing 100 KTPA at Vilayat (Gujarat) in two phases, creating

single largest site capacity for CPVC resin production globally.

Focus areas for new product development:

- Value addition
- Consistency in quality
- Process improvement and innovation
- Cost and optimisation of product performance

**Integrating Sustainability into Every Step of the Supply Chain**

We utilise the innovation management process to create a dynamic organisation that is both resilient to near-term uncertainties and also prepared for the future. We are constantly working to enhance the sustainability of our products and procedures. This includes improving the energy and material conversion efficiencies of manufacturing processes, lowering effluent and air emissions, and boosting the productivity of its assets. We keep a close tab on our sustainability progress and evaluate how it stacks up against publicly announced goals.

**CASE STUDY**

**The Revolutionary 'Tree-Free' Lyocell Fiber Derived from Industrial Waste**

Grasim and Nanollose, an Australia-based biotechnology company, began developing the first 'tree-free' Lyocell fibre derived from bacterial cellulose grown from industrial waste in 2020. Together, we filed a patent application for high-tenacity Lyocell fibres manufactured from bacterial cellulose based on R&D efforts in January 2021. Nullarbor™ comes from *nulla arbour*, the Latin word for 'no trees'.

Bacterial cellulose is renewable and biodegradable like plant-based cellulose and is produced by natural fermentation with non-pathogenic bacteria. Bacterial cellulose, made from agricultural waste and

by-products, does not damage old-growth or endangered forests as it creates pure cellulose. Microbial cellulose can be utilised in current Lyocell fibre spinning facilities. A closed-loop solvent system makes Lyocell synthesis ecologically friendly. Nullarbor fibres are stronger than wood pulp Lyocell yet retains its exquisite feel.

Grasim's R&D team created a small sample of 100% bacterial cellulose Nullarbor fibre, which was utilised in testing to make a sample 3D-knitted clothing with multiple knit patterns. The fibre performed effectively in standard industrial equipment throughout the yarn making and knitting operation.

Our pilot facility generated the first fibre batch in 2022 after successful laboratory scale testing. Using industrial yarn spinning, weaving, knitting, and dyeing equipment, numerous partners have turned this fibre into high-quality fabrics. Fibre and fabric shrinkage, colour fastness, and pilling tests have shown their outstanding quality.

In essence, Nullarbor™ is a high-tenacity Lyocell fibre generated from industrial waste bacterial cellulose or wood pulp. Nullarbor fibre is stronger and more eco-friendly than wood pulp-based Lyocell.

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**AUTOMATION AND INNOVATION**

Grasim's innovation process is propelled by its core competencies. It comprises:

Synergy	Agility
<ul style="list-style-type: none"> <li>• The integration of all functions in a synergistic approach involves guiding innovation and change management through a stage-gate process</li> <li>• Cross-functional teams comprising marketing, manufacturing, and R&amp;D personnel from diverse businesses collaborate on projects spanning the entire product development cycle, from ideation to market launch</li> </ul>	<ul style="list-style-type: none"> <li>• We prioritise ongoing workforce training and technological advancement to quickly adapt to rapid changes</li> <li>• We are committed to enhancing our workforce, capabilities, and infrastructure to ensure our strength and readiness for the future</li> </ul>
Consolidation	Collaboration
<ul style="list-style-type: none"> <li>• Our accumulated experience and willingness to adopt new technology provides us with a competitive advantage</li> <li>• We are continuously improving our manufacturing processes by incorporating advancements in technology such as the Internet of Things, AI/ML, Big data analytics, and digitisation</li> </ul>	<ul style="list-style-type: none"> <li>• We collaborate with customers, vendors, researchers, technology providers, and startups to achieve our objectives</li> </ul>

**Prime Factors**

We strive for continuous innovation to enhance our products and address the needs of all stakeholders. Our primary areas of focus are:

- Developing novel value-added products and applications as a response to evolving customer demand
- Enhancing product quality via novel methodologies and minimising material usage
- Minimising effluents and emissions to promote sustainability
- Embracing the growing trend towards digitisation

**Significance**

Having established several advanced R&D facilities, we are steadfast on our commitment to sustainability in the long run. Our business operates in a commoditised product market and distinguishes itself from competitors through noteworthy investment in R&D.

**Innovation Initiatives at the Business Level**

- A strong emphasis on process consistency and efficiency has enabled the optimisation of consumption ratios for the main raw materials in the viscose process.
- Progress was made in the development of man-made cellulosic fibres (MMCFs) from textile waste; commercial production of Liva Reviva; VSF containing 30% textile waste was attained on one of the large VSF production lines





**4**  
**DIGITISATION**

Grasim has evolved from a fundamental digital infrastructure to one that now incorporates cutting-edge technology based on ideas from the Fourth Industrial Revolution. The business follows three principles listed below across all its core functions including manufacturing, marketing, sustainability, safety, finance and commercial, and human resources.



The above principles are important as they have helped us in navigating through this journey of digitisation in:

- Improving sales, marketing, operations, and sustainability judgements using digital dashboards
- Testing new technology that would also help us reach our goal of being part of the global lighthouse network
- Implementing industrial IoT, AI/ML and predictive modelling aggressively to improve processes and lead to quality
- Addressing safety, reliability, and financial issues in our older units, selectively replicate proven digital tools and technology



**Our journey from basic infrastructure to leading with transformational changes**

Basic infra	Basic digital	Digitise	Readiness of the IoT infra	Digitalise	Transformation
Covers SAP Hyperion, network connectivity, server, setups, basic applications	Covers historian (AspenTech and PI), smart dashboards, daily reports	Covers information in digital format available for ready processing	Such as Cloud, Edge Servers, LoRaWAN/ private 5G at sites for scale up	Covers improvements and automations such as predictive models, dashboards, etc.	Focuses on new ways of business operations such as blockchain-based traceability, robotics, etc.

We are currently implementing over 50 initiatives spanning enterprise resource planning or ERP (supply chain visibility, quality, contract management, and more), business intelligence and dashboard, and infrastructure/security. The key digital initiatives in FY23 span across operations, sales and marketing.

**Integration of Automation and Innovation at the Business Level**

To improve the effectiveness and efficiency of business processes, the manufacturing units developed and implemented the mentioned processes:



**Equipment performance management system**

It aims to enhance customer satisfaction by ensuring consistent production of the desired product.

**Operations**

Equipment Lifecycle Management programme, connected workmen, smart asset maintenance, thermography for condition check of old equipment, robotic cleaning, automated packing, warehouse management system, reliability improvement through industrial IoT and analytics, soft sensors for quality

improvement, steam dashboards, and energy management system (IoT based)

**Knowledge management system**

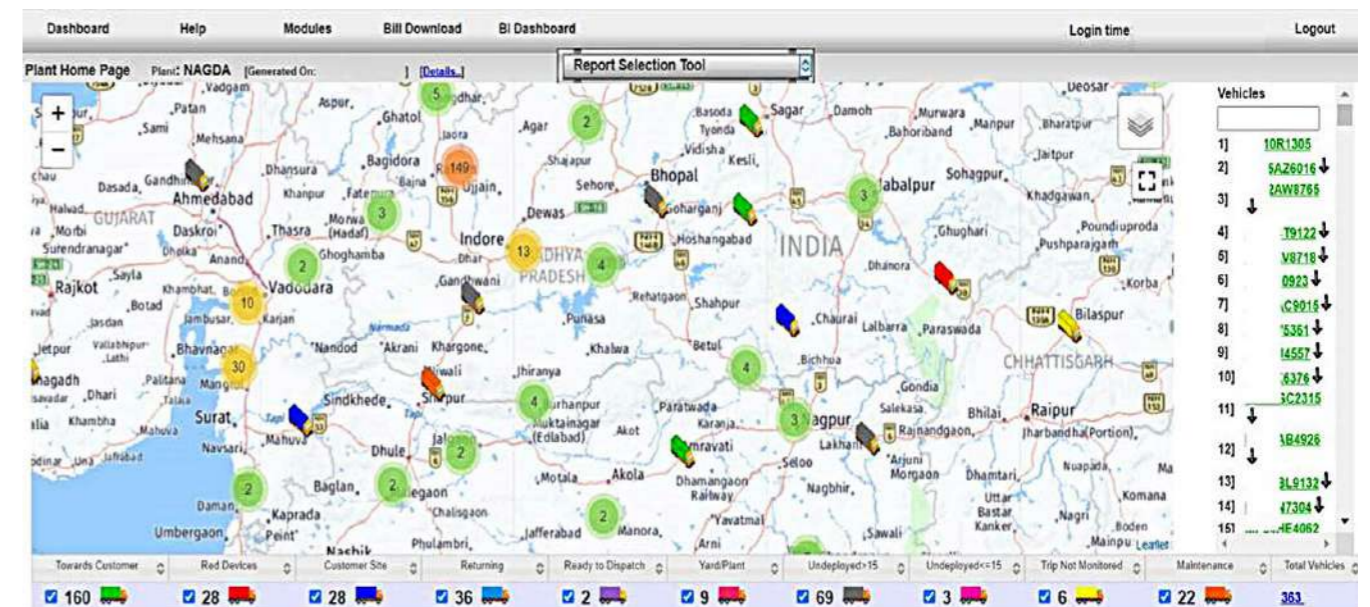
The purpose of a knowledge management system is to gather applied knowledge from various sources within an organisation, both tacit and explicit, and store it in a central location for easy access by employees. The knowledge management portal is accessible to people across manufacturing units. The process flow of knowledge management is as follows:



**Key Projects**

**Central control tower**

It is a system that enables the co-ordination of logistics, dispatch, safety, logistics service providers, and customers.





**Sales and marketing**

Our move towards digitalisation has covered different business segments during FY23 through our innovations, such as Digital Way of Life (DWOL), Innovation and Project Management (IPM), and Digital Data Integration (DDI 2.0).

**Central manufacturing cockpit**

It helps observe and evaluate manufacturing process parameters in real-time to improve process control, dependability, and safety. The system provides real-time visualisation and analysis capabilities to establish a seamless connection between the factory floor and upper management.

**CASE STUDY**

**Grasim Sustainable Product and Process Innovation**

**The objective of ‘Chemistry for a Greener World’ is to guarantee that our merchandise, distribution networks, and resolutions are ecologically sustainable, secure, and socially accountable. We are committed to generating sustainable value for all stakeholders through various means such as product and process innovations, manufacturing excellence, partnerships, and meeting consumer needs. Through R&D and innovation, our holistic approach aims to deliver new solutions for a greener future.**



In our textile business segment, we focused on the advancement of hemp fibre technology. The development was conceptualised as a prospective approach to alleviate the risk associated with the supply of flax fibre. Hemp is a multifaceted crop that can be grown for various applications, rendering it a highly sustainable option. With the help of our R&D team the quality characteristics of hemp yarn was enhanced. The outcome was achieved through a collaborative methodology that improved finish and process parameters. This approach has resulted in improved yarn imperfection level, while concurrently improving tenacity and elongation properties that are comparable to the benchmark.

The chemical business had to be shifted towards the use of less toxic Long Chain Chlorinated Paraffins (LCCP),

post restriction imposed by REACH (EU) and Stockholm Convention (UN) on Short Chain Chlorinated Paraffins as persistent pollutants. To meet customer demand for diverse application, we developed a process for producing LCCPs. Through dedicated efforts of the R&D team, three LCCP variants with different chlorine contents were synthesised and characterised. The stability of the product was addressed by the stabilisers. This helped in benchmarking the product against customer specifications. Our LCCP product is compliant with REACH regulations and exhibits favourable potential for export. Post above R&D and plant efforts and attaining the quality requirements the LCCP product is being marketed as TWIST CPR and is being manufactured since FY23.

Our product TWIST series comprise of speciality blends that are free from phthalates. They are a viable substitute for primary plasticisers that are typically incorporated into PVC to enhance its flexibility and softness. The substance aids in enhancing plasticity and reducing viscosity in PVC formulations, while also fulfilling lubrication needs. The TWIST range comprises of two grades, namely TWIST FC 73, and TWIST FM-M0, along with several sub-grades that possess specific properties. These grades are utilised in the production of compounds such as wires, cables, footwear, and paver blocks, as well as plastisol products like textile auxiliaries and inks. Additionally, they are used in the manufacturing of pipes, PVC-leather coating, PVC films, and other related applications.

