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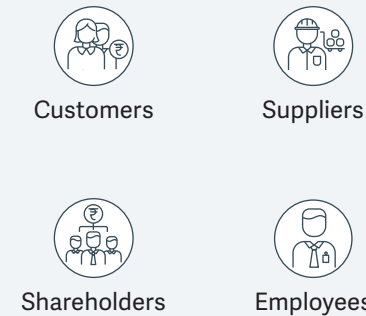
Intellectual Capital

At Grasim, our people, knowledge systems, and robust digital capabilities form the foundation for our innovation strength and resilience. As a *Force for Growth*, we encourage a culture of continuous learning and openness to new ideas. We invest in skill development, leadership training and cross-functional learning to ensure our teams stay ahead of industry trends. Our digital tools enhance decision-making speed, execution efficiency, and agility, while also promoting teamwork and streamlining processes. We champion curiosity, collaboration, and growth at all levels, empowering us to drive better outcomes and create lasting value.

Alignment with SDGs



Stakeholders Impacted



Material Issues

- Innovation and R&D
- Product Stewardship
- Digitalisation, Data Privacy and Security
- Quality and Customer Satisfaction

Strategic Priorities



Supporting Policies

- Environmental
- Quality
- Information Security

Key Risks

- R1 Strategic
- R2 Operational
- R3 Knowledge
- ER Emerging

FY 2024-25 Highlights

₹209 crore
R&D Expenditure

278 members
R&D Team

170+
New Products Developed

55
Active Patent Applications

Our Approach

Our R&D team partners with operations and business units to identify opportunities in product innovation, technology, and processes. We work with industry leaders, research institutions, and value chain partners to develop market-relevant solutions. By embedding automation and digitisation into our strategy, we are modernising operations and advancing technology adoption. Sustainability is core to our development approach, balancing performance with environmental responsibility.

Focus Areas

- 1 New Product Development
- 2 Product Stewardship
- 3 Automation and Digitisation

New Product Development

At Grasim, product development begins with identifying emerging market needs and aligning solutions with sustainability objectives. Pilot-scale evaluations are key to assessing performance and techno-commercial viability. Cross-functional collaboration ensures that insights are effectively applied throughout the development journey. Feedback from customers and partners is integrated at key stages to refine and scale products. Sustainability remains a central driver, shaping decisions around decarbonisation, resource optimisation, and the use of innovative materials to deliver environmentally responsible, commercially viable solutions.



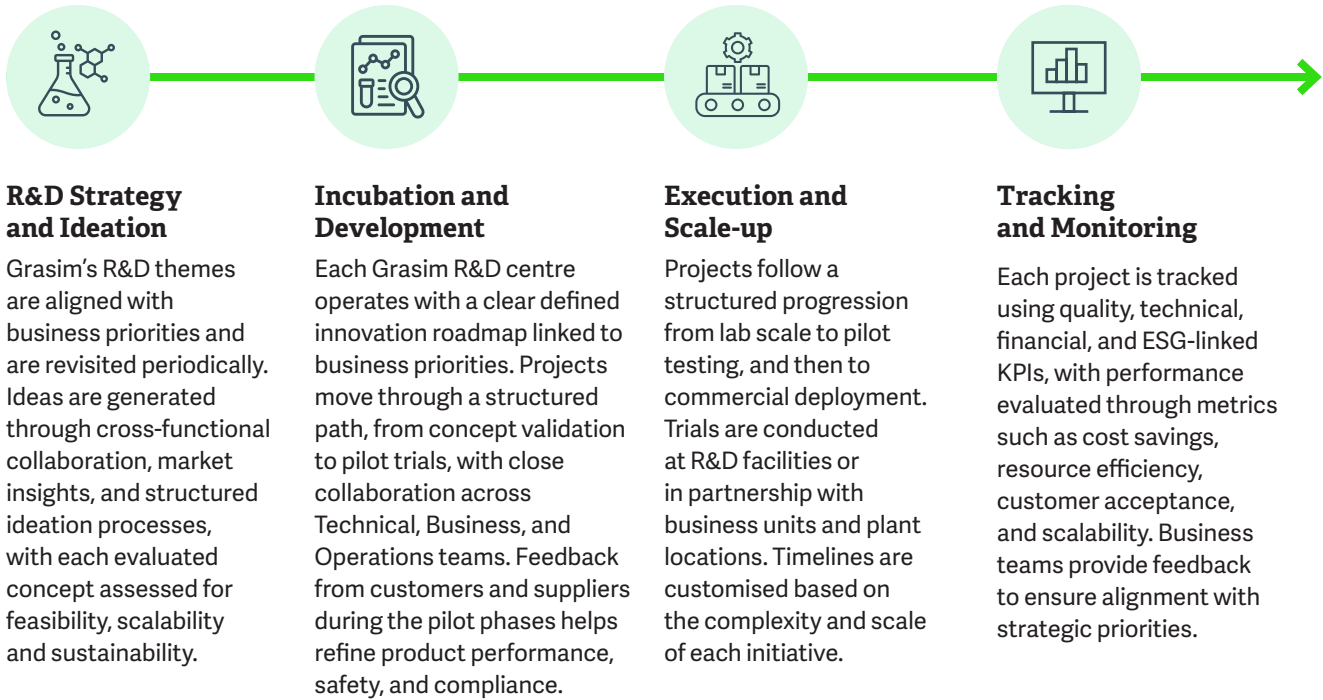
Birla Purocel's Lyocell Fibres: Ushering in a New Era for Flushable Wipes

Birla Purocel is redefining innovation in non-woven applications with the introduction of Lyocell Short Cut fibres for flushable wet wipes, becoming the first brand to offer both Viscose and Lyocell fibre solutions in this segment. This development signals a clear shift towards sustainable alternatives amid evolving regulations and rising consumer expectations.

The global wipes market has traditionally relied on polyester-viscose blends. However, increasing environmental concerns and legislations such as the Single-Use Plastics Directive (SUPD) are driving demand for plastic-free, cellulosic alternatives. Flushable wipes, especially moist toilet tissue formats, require a unique balance between strength during use and rapid disintegration after disposal.

Birla Purocel's Lyocell Short Cut fibres are designed to meet these challenges while advancing sustainability goals. They complement the existing Viscose Short Cut fibres portfolio, offering enhanced flexibility across applications. This reinforces Birla Cellulose as a trusted partner for seeking high-performance, environmentally responsible materials.

Innovation Pipeline: From Ideation to Commercialisation



Innovation is supported by structured knowledge and IP functions, in collaboration with the central legal team for IP creation and protection. Over the past year, Grasim's scientific work was featured in 30+ publications and presented at multiple industry forums. Green product and process criteria align with global standards/guidelines such as EU Best Available Techniques Reference Document (BREF), Single-Use Plastics Directive (SUPD), and Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

R&D Infrastructure

Grasim's R&D ecosystem spans nine specialised centres aligned with core business verticals and backed by centralised analytical and testing capabilities.

Integrated R&D Network

- Taloja, Maharashtra
- 1 Aditya Birla Science and Technology Company Pvt. Ltd. (ABSTC)
 - 2 Paints R&D Lab and Pilot Plant
 - 3 Pulp & Fibre Innovation Centre (PFIC)
 - 4 Performance Material Research Centre (PMRC)
- Kharach, Gujarat
- 5 Fibre Research Centre (FRC)
 - 6 Textile Research Application and Development Centre (TRADC)

Vilayat, Gujarat

- 7 Aditya Birla Water Application and Product Development Centre

Nagda, Madhya Pradesh

- 8 Next Generation Fibre Research Centre (NGFRC)

Harihar, Karnataka

- 9 Clonal Production Centre (CPC)

R&D Priority Areas

- 1 Reducing Water and Energy Use across Plants
- 2 Closed-loop Processes and Waste Recovery
- 3 Green Chemistry and Safe Processes
- 4 Circular Materials and Recycling Initiatives
- 5 Digital Solutions to Improve Plant Efficiency



"At Grasim, innovation is fundamental to how we create long-term value. We have consistently built businesses that lead in performance, responsibility, and forward-looking innovation. Our team exemplifies this commitment, leveraging science-driven, future-ready R&D to accelerate growth and sustainability. Our R&D centres play a pivotal role in this journey. Innovation fuels sectoral progress, enhances competitiveness, and positions us to respond to global challenges, including those outlined in the UN Sustainable Development Goals (SDGs). As we look ahead, our innovation agenda will continue to unlock new possibilities, strengthen partnerships, and empower our people to ensure we remain resilient, relevant, and responsible in a changing world."

Dr. Aspi Patel
Chief Technology Officer



Intellectual Capital



R&D Initiatives

1. Sustainable Dyeing Process for Excel Fibres

Introduced a masterbatch-dyeing process where pigments are embedded directly into the dope, reducing the need for harmful chemicals and water. This results in high-quality dope-dyed fibres with a lower environmental footprint.

2. Elemental Sulphur Reduction in Spinning

Optimised CSF spinning by adding metal oxide and using nitrogen blanketing, leading to improved steam efficiency and increased CS₂ recovery.

3. Continuous Dissolver (CD) Implementation

Enhanced the Cellulosic Staple Fibre (CSF) dissolution process using the CD concept, which enhances fibre quality, optimises energy consumption, and production costs.

4. Infrared (IR) Enhanced CSF

Integrated IR-active minerals into fibre manufacturing to produce CSF suited for winter wear, offering added warmth and wellness benefits.

5. Analytical Testing Services for the Paint Formulator

At the forefront of quality assurance, our Analytical Testing Services Group (ASG) delivers reliable testing of multiple paint formulations. From raw material validation to advanced performance testing, ASG ensures consistency, durability, and compliance across our manufacturing plants.

6. Sustainable Lyocell Filament Yarn (LFY)

Developed an eco-friendly alternative to traditional cellulosic filament yarn using a closed-loop NMMO (N-methylmorpholine N-oxide) process. This process delivers higher tenacity with significantly reduced environmental impact.

7. In-house Flame Retardant (FR) Synthesis

Developed and patented organophosphorus-based FR additives, reducing external dependency and enabling cost-effective, eco-friendly production of flame-retardant CSF.

8. Membrane Distillation with Mechanical Vapour Recompression (MVR) Technology

Piloting a next-generation evaporation system that combines membrane distillation with MVR, potentially reducing energy use by up to 40% in process evaporation.

9. IR Thermal Imaging for Quality Control

Deployed an IR thermal imaging system in the CSF business to detect and quantify wet lumps at the dryer end, enhancing process control in fibre production.

10. Development of Food-grade Phosphoric Acid Technology

At the Karwar plant, the Chemicals business is developing in-house technology to produce food-grade phosphoric acid by removing impurities such as arsenic, cadmium, and the characteristic green tint from technical grade phosphoric acid. The initiative addresses the rising challenge of metal contamination and aims to enable cost-effective, high-purity production to meet stringent food-grade standards.

Birla Opus Paints R&D

The state-of-the-art facility was inaugurated on 4th May 2022. The R&D is run by over 99 well-qualified and highly experienced scientists, supported by an additional team of 30 technicians and operators. The facility hosts sophisticated laboratories to facilitate advanced research and development and has built world-class product lines in paints and coatings. This is the second-largest paints R&D facility in the country, with highly qualified personnel and one-of-a-kind microbiology labs and pilot plant facilities, which no other paint R&D centre in the country possesses.

The R&D also houses its own, one-of-a-kind pilot plant facility spanning over 18,700 sq. ft, equipped with state-of-the-art equipment for process standardisation of polymers, paints, re-dispersible powders, wood finishes, colourants, and more. The R&D is backward integrated with in-house polymer and colourant development, further strengthening its capability to innovate and deliver customised solutions.

There are 14 labs, namely: Enamel, Wood Finishes, Distemper, Colourants, Exterior Emulsion Paint, Exterior Textures, Waterproofing, Interior Emulsion Paint and Special Effects (SFX), Polymer-Emulsion and Resins, Paint Microbiology, Analytical Services, Common Facilities in R&D, Pilot Plant, Product Lifecycle Management Software, and Colour Science Lab.

The Colour Science Lab developed over 4 lakh shade recipes for all tin table products for the Dealer Tinting System (POS). Further, the R&D Centre has two unique facilities, namely:

- a) **Outdoor Natural Weathering** Facilities, established in Mahad, Talaja, and Calicut, each spread over 30,000 sq. ft, to test exterior products against natural vagaries such as high monsoon, winds, UV radiation, and microbial growth (fungus, moss, algae, etc.).

- b) **CEZ: A state-of-the-art Controlled Environment Zone** (Walk-in Chambers) to simulate product application testing under varying environmental conditions of temperature and humidity prevailing across the country.

Spend on R&D

The R&D spend is approximately 1.8% of net revenue, with an investment of ₹55 crore as part of capital expenditure.

The R&D team has developed best-in-class 170+ products with backward integration of polymers (WB emulsions and SB resins) and POS tinting system colourants, in a record time of three years. The range encompasses exteriors, interiors, enamels, wood finishes, waterproofing, exterior textures and interior designer finishes, wallpapers, and application tools. Most of the products are market-validated and have been well received, demonstrating distinct superiority over leading competitors.

The products were developed and launched only after successful field validation across 10 cities in the country, involving more than 500 painters, ensuring clear advantages over existing market benchmarks.

Product Lifecycle Management (PLM) Software

PLM Software integrated with SAP is established to facilitate the smooth interface of formulations, specifications, test methods, raw materials (RM), packing materials (PM), and regulatory requirements with related functions such as manufacturing, marketing, supply chain, and finance.

The R&D is well-equipped and continuously engaged in new product development, quality optimisation, value engineering, and sustainable solutions.



Product Stewardship

We embrace responsibility for our products, from raw material selection to production and usage. Life Cycle Assessments (LCAs) help us identify critical environmental impact areas and guide strategies for continuous improvement. Our commitment to circularity drives initiatives such as closed-loop systems and by-product reuse, helping minimise waste and maximise resource efficiency. Product performance, safety and customer feedback inform improvements in design, material choices, and delivery, enabling us to develop sustainable, high-quality solutions that respond to evolving market needs.



CASE STUDY

Sustainable Innovation in Dyeing – Anionic CSF for Brighter, Cleaner Shades

Overview

Conventional dyeing processes are resource intensive and generate dye-laden effluents and chemical waste, presenting a clear opportunity to reduce environmental impact and improve process efficiency. This project focused on enhancing CSF with anionic additives to enable dyeing with cationic dyes, resulting in a more sustainable, efficient dyeing process that produces vibrant colours with reduced resource use and pollution.

Solution

An anionic additive was introduced into the cellulose dope during fibre production, improving affinity for cationic dyes. This concept was successfully demonstrated through scale-up and commercial trials by the R&D teams at the Fibre Research Centre and the Nagda plant. Both the Fibre Research Centre and the Textile Research and Application Development Centre were instrumental in refining the process and developing shade options. Collaboration with the

Marketing team and key customers helped fine-tune dyeing protocols and establish the downstream value chain. The additive was integrated using existing manufacturing infrastructure, enabling smoother adoption across operations.

Impact

This innovation reduces dye consumption and environmental impact by enabling salt-free dyeing at lower temperatures. It simplifies processing of blends with cationic polyester and acrylic through single-bath dyeing, and offers a cost-effective solution for mélange and patterned fabrics. The use of basic dyes expands shade variety and enhances brilliance. A patent has been filed, reinforcing our intellectual property portfolio and competitive edge.

Future Outlook

Further efforts are focused on establishing fabric performance standards, streamlining supply chain integration, and scaling up market availability. With strong customer interest and broad application potential, anionic CSF is set to support responsible fashion with lower environmental impact and higher value creation.



Key Partnerships

Tree-free Lyocell Innovation

Birla Cellulose, in partnership with Australian biotech **Nanollose**, has pioneered the world’s first ‘tree-free’ Lyocell fibre made from bacterial cellulose. This innovation combines Nanollose’s patented technology, which converts waste streams into cellulose with Birla Cellulose’s proprietary process to create Lyocell fibre. It represents a significant advancement in sustainable textiles, offering a high-performance, low-impact alternative to wood-based fibres.

Scaling Circular Fibres

We are accelerating circularity by partnering with leading textile innovators like **SaXcell, Circulose, and Circ**. Our MoU with SaXcell facilitates the supply of Lyocell fibre containing 30% recycled cellulose, now commercially available under the brand name ‘SaXcell’. Additionally, in a strategic partnership with US-based Circ, we will source recycled pulp. These initiatives drive innovation for next-generation circular fibres and reduce dependence on virgin raw materials.

Puneh: Purpose Meets Innovation

Birla Cellulose and **Usha Yarns** have developed Puneh, an extraordinary line of mechanically recycled yarns that merge purpose and innovation. These yarns incorporate eco-friendly fibres such as Liva Reviva and Birla Spun Shades. The Puneh Signature and Puneh Iconic blends offer durable, sustainable solutions that advance circularity in the textile industry.

Black Pigment Pilot Project

We continue to actively support pilot projects led by **Fashion for Good (FFG)**, providing lab and pilot-scale testing to validate promising emerging innovations. One such initiative, the ‘Black Pigment Pilot’, developed in collaboration with FFG partners, explores the use of dope-dyed black fibres made from waste- derived pigments. This approach reduces reliance on conventional dyes and helps lower the carbon footprint associated with traditional textile dyeing.

Algae-based Colour Solutions

In collaboration with **Algaeing™**, we are co-developing an algae-based, dye-free cellulosic fibre that offers environmental benefits. Coloured using natural algae-derived nutrients, this sustainable innovation eliminates the need for synthetic dyes, offering a cleaner, safer, and eco-friendly alternative for skin-contact textiles. This breakthrough supports our goal of reducing chemical usage and enhancing the sustainability of textile production.

Beetle-affected Wood Fibre Development

Birla Cellulose, in collaboration with **Stockholm University**, has successfully produced Lyocell fibres using pulp derived from beetle-damaged spruce wood, addressing forest degradation caused by bark beetle infestations, a challenge exacerbated by climate change. This pioneering research has gained recognition in a peer-reviewed scientific journal, highlighting our efforts to turn environmental challenges into sustainable solutions.

Our Key Partners



**Birla Cellulose and Walmart:
Scaling Sustainability through Collaboration**

The partnership between Birla Cellulose and Walmart marks a significant step in advancing sustainable innovation within the textile industry. Since 2017, Walmart has engaged closely with Birla Cellulose through NYC Studio, recognising its leadership in responsibly sourced man-made cellulosic fibres. This collaboration has deepened through ongoing engagement with Walmart’s global teams, agents, and suppliers, supporting a wide spectrum of supply chain integration, product education, and sourcing alignment.

As Walmart strengthened its sustainability roadmap, including its Canopy Style commitment and the launch of its Preferred Fibre Guidelines, Birla Cellulose played an instrumental role in advancing responsible sourcing and integrating its tracer-enabled, eco-enhanced fibre portfolio, including Livaeco.

In 2022, the partnership took a major leap forward with the signing of a Trademark Licensing Agreement, enabling co-branded programmes, hangtags, and retail visibility across Walmart’s extensive store network and E-commerce platforms. In 2024, the first co-branded collection featuring Livaeco Viscose was launched. This collaboration continues to establish benchmarks in sustainable retail, anchored in shared intent, scalable impact, and measurable outcomes.

**Birla Modal and Lux Koffy:
Redefining Comfort in India’s
Innerwear Market**

India’s innerwear market is evolving rapidly, fuelled by rising consumer expectations around comfort and style. Birla Modal, a next-generation man-made cellulosic fibre (MMCF), is well known for its soft feel and premium quality. Partnering with Lux Koffy, an innerwear label under the Lux Group, Birla Modal has helped shape a new benchmark in this segment.

Lux Koffy’s transition from conventional cotton to 100% Birla Modal signals a move towards enhanced performance and elevated design. The collaboration introduced a premium innerwear range that combines Modal with spandex, offering superior comfort, breathability, and durability. This transition was backed by extensive product trials and planning to ensure consistency across quality, design and manufacturing.

The collaboration has further strengthened brand recognition, enabling both retailers and consumers to associate the range with trusted innovation and lasting comfort. Together, Lux Koffy and Birla Cellulose are redefining what comfort means for the modern Indian consumer.



Focus Area 3

Automation and Digitisation

Automation

Our core competencies fuel continuous innovation and advancement in manufacturing and product development, enabling us to meet the evolving expectations of stakeholders.

Core Competencies

Synergy

- We integrate functions through a collaborative, innovation-led approach that enables us to manage change effectively
- Cross-functional teams, including experts from marketing, manufacturing, and R&D, work together for automation and digitisation projects

Agility

- We invest in continuous workforce development and technological advancement to respond swiftly to market shifts
- This approach strengthens our technological capabilities and prepares us for future challenges and opportunities in the areas of automation and digitisation

Consolidation

- We combine our experience with advanced technologies to drive continuous improvement in manufacturing
- Tools such as IoT, AI/ML, big data analytics, and digitisation have significantly enhanced our manufacturing efficiency and precision

Collaboration

- We collaborate with customers, vendors, researchers, and technology partners to drive shared progress and achieve strategic goals

Advanced R&D

State-of-the-art facilities drive continuous innovation and product excellence.

Sustainability-led Innovation

Innovative processes to optimise resource use and minimise environmental impact.

Value-added Products

Focus on developing differentiated, high-performance products for diverse applications.

Digital Integration

Enhancing traceability solutions, data analytics and digital collaboration across operations.

Market Differentiation

Product innovation and sustainability to position us as a leader in a rapidly evolving industry.

CASE STUDY

Birla Pivot: Driving Digitisation in B2B Construction Materials Space

We have introduced several automation initiatives aimed at boosting process efficiency and reducing manual intervention. Our B2B E-commerce platform, Birla Pivot, is central to this shift, streamlining and simplifying business interactions.

- Seller Invoice Ingestion:** Leveraging Optical Character Recognition (OCR) and Machine Learning (ML), this tool automates the scanning and digitisation of customer documents, minimising manual data entry and improving speed and reliability.

- PI PDF Upload to Custom RFQ:** Using ML capabilities, this feature enables the team to generate Request for Quotations (RFQs) directly from uploaded PDF copies of pro forma invoices, significantly reducing operational effort.
 - PivotEdge (RFQ Engine):** An end-to-end platform that converts customer enquiries into quotations and orders with speed and accuracy, cutting down turnaround time and enhancing accuracy.
- Together, these initiatives mark a shift from traditional offline operations to agile, digitally enabled workflows. By embedding automation and data-driven tools, we are improving turnaround times and strengthening service reliability.

PivotEdge (RFQ Engine)

Overview

B2B commerce in India continues to rely heavily on offline negotiation channels such as calls, meetings, and emails. For Birla Pivot, a platform connecting buyer demand with sellers, credit providers, and logistics partners, this created layers of complexity, often leading to longer turnaround times (TATs) and limited data visibility. A digital system was needed to streamline interactions, reduce TATs, and enable data-driven decision-making.

Solution

We developed PivotEdge, a mobile-first RFQ engine designed to support the entire B2B sales funnel, from lead generation to enquiry to RFQ, quote, and order. The platform enables seamless coordination between internal teams and external stakeholders.

Key Features:

- Modular design that supports decoupled yet integrated negotiations among buyers, sellers, logistics providers, and credit partners
- User-centric experience across multiple channels including website, WhatsApp, email, and customer service channels, offering real-time updates and personalised dashboards

- Role-based access controls and detailed audit trails to minimise manual errors and ensure compliance
- Integrated workflows for Sales, Sourcing, Credit, and Operations teams, creating a single, cohesive negotiation journey

Adoption was driven through usability testing, hands-on training, and a phased migration from legacy systems to minimise disruption.

Impact

PivotEdge has transformed the negotiation process on Birla Pivot, delivering key outcomes:

- **Operational Efficiency**
Enquiry-to-quote turnaround times were significantly reduced. Digitisation of the quotation process resulted in considerable time savings
- **Improved Win Rates**
RFQ win rates increased, supported by a structured, timely, and data-informed negotiation approach
- **Enhanced User Experience**
Greater transparency and trust through consistent branding, personalised interfaces, and multi-seller quoting capabilities improved overall user engagement

Digitisation

Digitisation is reshaping how we operate, collaborate, and make decisions across the value chain. We are integrating advanced technologies such as Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT) to streamline processes, improve transparency, and strengthen engagement with our value chain partners. IoT-enabled sensors facilitate predictive maintenance, reducing unplanned downtime and improving asset reliability, while digital dashboards offer real-time insights, enabling faster, data-driven decisions. By integrating these digital solutions into our daily workflows, we are driving greater operational efficiency and resilience.

Key Initiatives

- **RM/CM Dashboards:** Custom dashboards for Relationship Managers and Category Managers offer real-time insights into performance metrics, enabling teams to track progress against targets, identify gaps, and take timely corrective action. These dashboards have improved data accessibility and enhanced decision-making efficiency.
- **IoT-based Shipment Tracking:** In collaboration with technology partner 'Freight Tiger,' geo-tracking devices have been deployed on outbound shipments. This enables real-time truck tracking, providing customers with live delivery updates and improving supply chain visibility.
- **Kalki:** A real-time production monitoring tool that captures machine-level data like speed, uptime, and output to calculate efficiency across machines, lines, and departments. It supports consistent product quality and enhances productivity through improved visibility and actionable insights.



- **O9 Platform:** The implementation of the O9 platform has enhanced demand-supply planning by digitally integrating forecasting, demand, procurement, production, and dispatch processes. This end-to-end solution streamlines planning and improves coordination across functions for greater efficiency.
- **Data Analytics Integration:** We leverage data analytics to drive informed decision-making in R&D and production, improving both operational efficiency and sustainability outcomes.

These initiatives reflect our continued shift towards a smarter, more agile supply chain. Through digitisation, we are building a stronger interface with stakeholders, streamlining internal processes, and positioning the Company for sustained growth in a digital-first environment.



Transforming Retail Efficiency with D365

Overview

Grasim's Textiles business is modernising its retail technology landscape to improve operational control and ensure business continuity across both Company Owned Company Operated (COCO) and Franchise Owned Franchise Operated (FOFO) stores. With evolving customer expectations and a shift towards omnichannel retailing, the need for a unified digital platform to connect core retail functions became imperative.

Solution

We implemented Microsoft Dynamics 365 (D365) as a cloud-native solution, bringing together point of sale (POS), retail back office, and inventory management in one integrated platform. The system empowers central teams with real-time operational oversight across store locations, facilitates smooth store migrations, and enables smart stock transfers.

D365 has strengthened Grasim's retail infrastructure, reduced turnaround times for critical operations, and positioned the business for agile, customer-centric growth.

Key Features

- Mobile POS, ensuring uninterrupted operations during network outages
- Inventory Buddy Lookup, improving inventory visibility across stores
- Integrated payment gateways, GST filing, and order management system (OMS) to meet both operational and statutory requirements

Impact

- **Operational Control:** Real-time data sync provides centralised visibility and control across all retail locations
- **Inventory Efficiency:** Near real-time stock updates and checks prevents negative billing and improves order fulfilment
- **Omnichannel Readiness:** OMS integration supports E-commerce and enables store fulfilment from nearby locations
- **Compliance and Security:** Role-based access, audit readiness, and SaaS-managed backup enhances system reliability