Engineered fabrics industry report

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Enabling Better Decisions

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GLOSSARY OF ABBREVIATIONS USED

S.No.	Abbreviation used	Full form
1	3D	Three dimensional
2	AFRA	Aircraft Fleet Recycling Association
3	AI	Artificial intelligence
4	BIS	Bureau of Indian Standards
5	C	Celsius
6	CAGR	Compound annual growth rate
7	CBRN	Chemical, biological, radiological, and nuclear
8	COMPACT	Catalysing Opportunities for Military Partnership, Accelerated Commerce and Technology
9	CPI	Consumer Price Index
10	CSIR	Council of Scientific and Industrial Research
11	DGFT	Directorate General of Foreign Trade
12	DISCOM	Distribution Companies
13	DoCP	Date of Commercial Production
14	DPIIT	Department for Promotion of Industry and Internal Trade
15	DRDO	Defence Research and Development Organisation
16	DWR	Durable Water Repellent
17	E	Estimated
18	ECWCS	Extreme cold weather clothing system
19	eFCI	Eligible fixed capital investment
20	ePTFE	Expanded Polytetrafluoroethylene
21	EV	Electric Vehicle
22	FDI	Foreign Direct Investment
23	Fiscal / FY	Period of 12 months ending on March 31 of that particular year, unless stated otherwise
24	GDP	Gross Domestic Product
25	GVA	Gross Value Added
26	HDPE	High-density polyethylene
27	HSN	Harmonised System of Nomenclature
28	ICAR	Indian Council of Agricultural Research
29	ICE	Internal combustion engine
30	ICT	Institute of Chemical Technology
31	IIT	Indian Institute of Technology
33	IT	Information technology
34	Kg	Kilogram

35	LAMEA	Latin America, Middle East and Africa
36	MMF	Man-made fibres
37	MoD	Ministry of Defence
38	MoU	Memorandum of Understanding
39	MRG	Mechanical rubber goods
40	MRO	Maintenance, repair and overhaul
41	MSE	Micro and small enterprises
42	NBC	Nuclear, biological, chemical
43	NIJ	National Institute of Justice
44	NTTM	National Technical Textiles Mission
45	P	Projected
46	PE	Polyethylene
47	PLI	Production Linked Incentive
48	PM MITRA	Prime Minister Mega Integrated Textile Region and Apparel
49	PPE	Personal Protection Equipment
50	PTFE	Polytetrafluoroethylene
51	PU	Polyurethanes
52	PVC	Polyvinyl chloride
53	R&D	Research and development
54	RBI	Reserve Bank of India
55	TiO_2	Titanium dioxide
56	TPU	Thermoplastic polyurethane
57	UHMWPE	Ultra-high molecular weight polyethylene
58	UV	Ultraviolet
59	WEF	World Economic Forum
60	Y-o-Y	Year on year
61	YTD	Year to date

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EXCHANGE RATE TABLE

Year (Fiscal Year)	₹ Equivalent of one US$	Euro equivalent of one US$	Year (Calendar Year)	₹ Equivalent of one US$	Euro equivalent of one US$
2015-16	66.33	0.88	2016	67.95	0.95
2016-17	64.84	0.93	2017	63.93	0.83
2017-18	65.04	0.81	2018	68.36	0.88
2018-19	69.17	0.89	2019	69.89	0.89
2019-20	70.49	0.93	2020	74.18	0.83
2020-21	73.20	0.85	2021	74.50	0.83
2021-22	74.50	0.86	2022	76.10	0.91
2022-23	80.32	0.96	2023	82.31	0.93
2023-24	82.59	0.93	2024	83.67	0.92
2024-25	84.56	0.93	2025 (YTD)	86.26	0.90

Source: X-rates Monthly average

1 Macroeconomic overview

1.1 Global real GDP grew at a rate of 3.3% in 2024, while India's economy expanded at a higher growth rate of 6.5% over the same timeframe

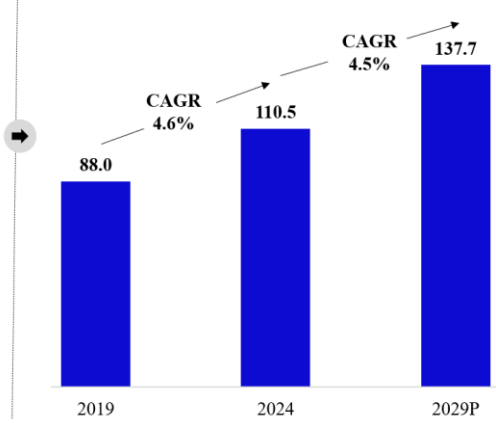
Global real GDP grew at a rate of 3.3% in 2024, despite challenges such as higher interest rates, tighter financial conditions, and geopolitical tensions, including Russia's ongoing war in Ukraine, escalating conflict in the Middle East and turbulent US-China relations. In comparison with the global real GDP growth rate, India is expected to sustain the highest growth rate, with its current year-on-year growth standing at 6.5% in 2024 and projected to remain around approximately 6.5% through 2029. India's growth rate is attributed to strong domestic demand and a rising working-age population.

Real GDP growth – India, China, Germany, USA, UK, World
(Y-o-Y growth %, 2019-2029P)

Top economies	India	China	Germany	USA	UK	World
2019	3.9%	6.1%	1.0%	2.6%	1.6%	2.9%
2020	(5.8%)	2.3%	(4.1%)	(2.2%)	(10.3%)	(2.7%)
2021	9.7%	8.6%	3.7%	6.1%	8.6%	6.6%
2022	7.6%	3.1%	1.4%	2.5%	4.8%	3.6%
2023	9.2%	5.4%	(0.3%)	2.9%	0.4%	3.5%
2024	6.5%	5.0%	(0.2%)	2.8%	1.1%	3.3%
2025	6.4%	4.8%	0.1%	1.9%	1.2%	3.0%
2026P	6.4%	4.2%	0.9%	2.0%	1.4%	3.1%
2027P	6.5%	4.2%	1.5%	2.0%	1.5%	3.2%
2028P	6.5%	4.1%	1.2%	2.1%	1.5%	3.2%
2029P	6.5%	3.7%	1.0%	2.1%	1.4%	3.2%

Source(s): International Monetary Fund, 1Lattice analysis

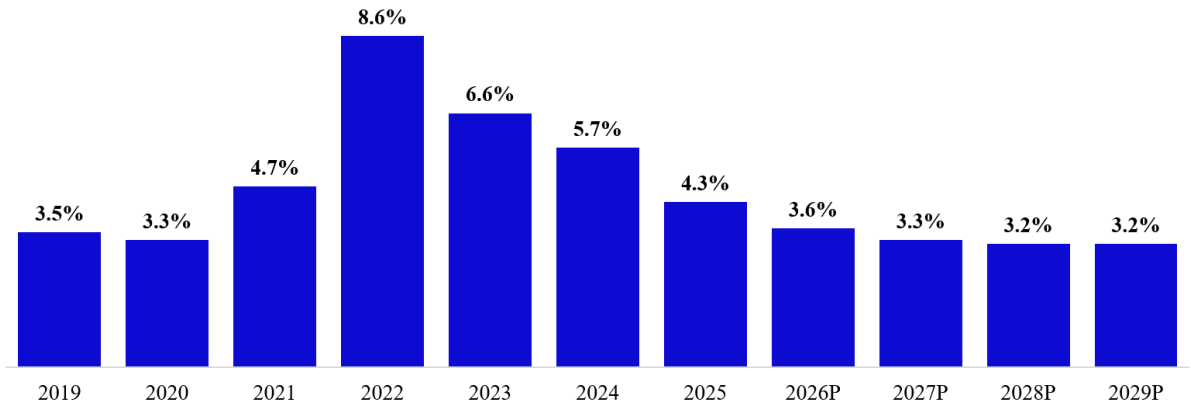
World GDP at current prices
(US$ trillion, 2019-2029P)



1.1.1 Global inflation declined from 8.6% in 2022 to 5.7% in 2024, further it is expected to stabilise at around 3-3.5% by 2029

In 2021, inflation rose to 4.7%, reaching a peak of 8.6% in 2022, driven by oil prices and global demand shocks from COVID-19 pandemic supply disruptions, rapid economic recovery, and the Ukraine-Russia conflict. From 2023 onward, inflation rates decreased gradually, starting at 6.6% in 2023 and settling at around 4.3% by 2025. The rate is expected to stabilise within the 3.2% to 3.6% range from 2026 to 2029.

Global inflation at avg. consumer prices
(%, 2019-2029P)

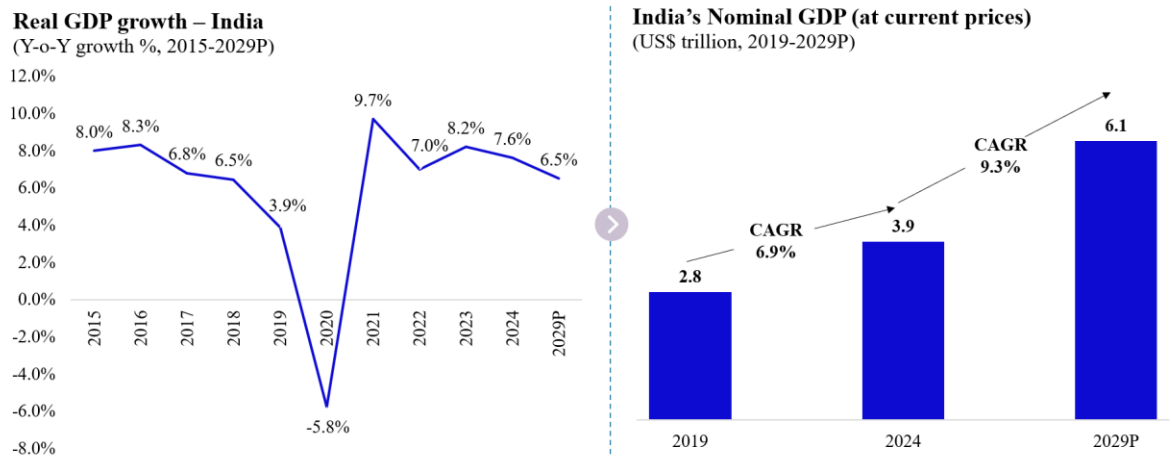


Source(s): International Monetary Fund, 1Lattice analysis

1.2 Indian Macroeconomic Overview

1.2.1 India's nominal GDP was at US$ 3.9 trillion in 2024 and is estimated to reach US$ 6.1 trillion in 2029, growing at a CAGR of 9.3% from 2024 to 2029

India is the fourth-largest economy in the world in 2024 and is expected to become the third-largest by 2028. Over the next 10-15 years, India is expected to be among the top economies driven by rising demand and robust growth across various sectors. India's GDP (at current prices) grew from US$ 2.8 trillion to US$ 3.9 trillion between 2019 and 2024 on the back of reforms like GST, corporate tax revision, and revised FDI limits.



Source(s): International Monetary Fund, 1Lattice analysis

1.2.1.1 Key growth drivers of GDP

India is the fourth-largest economy in the world and is expected to become the third-largest by 2028, driven by robust sectoral growth and rising private consumption. Indian private consumption expenditure is expected to grow due to an increasing proportion of the working-age population and a rise in household income. India's GDP growth is driven primarily by the following factors:

- **Population growth and expanding middle class**: India's growing population, especially the expanding middle class, is increasing and boosting consumer-driven growth. Additionally, India's middle class is expected to reach 1,024.8 million (61% of the total population) by 2047, up from 507.8 million (35% of the total population) in 2024. India, with a median age of 29.5 (as per the latest estimates), has one of the youngest populations globally. By 2030, its working-age population will peak at 68.9%, positioning the country to leverage this demographic advantage and potentially fuel an approximately US$ 10 trillion economy.
- **Rising consumer spending**: As per WEF, India's private consumption, which accounts for over 60% of GDP, continues to grow and is projected to exceed US$ 4 trillion by 2030, driving broader economic expansion while maintaining a steady GDP growth rate.
- **China +1 and supply chain diversification:** As companies, especially multinational corporations, seek to diversify their supply chains away from China due to factors such as trade tariffs and trade barriers impacting the price of imports from China, India has witnessed rapid development in industries such as electronics, pharmaceuticals, and automotive manufacturing. Supporting this shift, the Production-Linked Incentive (PLI) scheme has, as of May 2025, attracted ₹ 1.7 trillion (US$ 20.8 billion) in investments across 14 sectors, boosting domestic production, employment, and exports. The diversification away from China complements and amplifies a broader shift by global buyers towards India as a reliable sourcing hub.
- **Infrastructure investments**: The government's focus on infrastructure, including roads, railways, and urban development, enhances productivity and supports long-term economic growth. For the budget 2025-2026, the government has allocated ₹ 11.2 trillion (US$ 132.6 billion) towards capital expenditure. India launched the National Infrastructure Pipeline (NIP) in Fiscal 2020, which originally envisaged an investment of US$ 1.5 trillion in Fiscal 2025.
- **Foreign Direct Investment (FDI):** FDI facilitates the inflow of foreign capital, improving infrastructure and industrial capabilities. It contributes to job creation, strengthens global trade integration, and supports overall

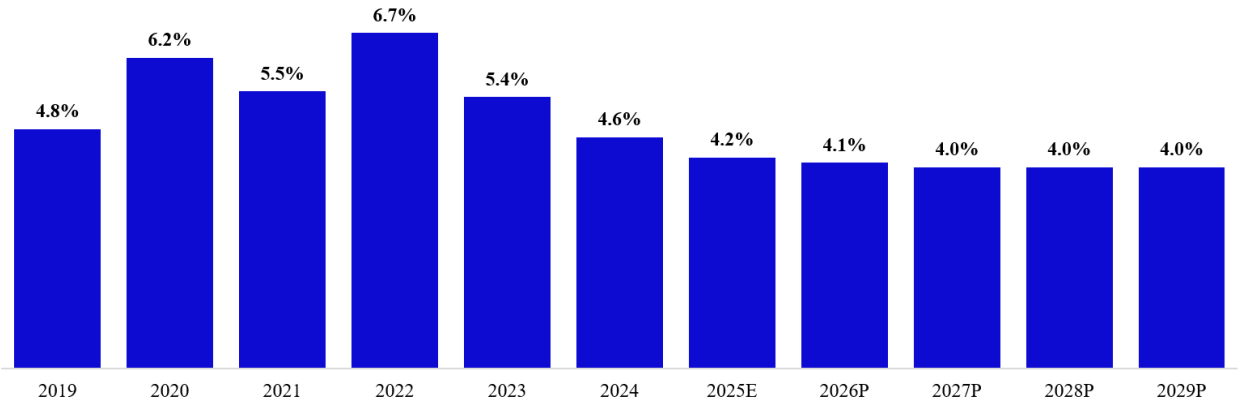
economic growth. As of March 2025, India has attracted gross FDI inflows totalling ₹ 86.8 trillion (approximately US$ 1 trillion) since April 2000.

- **Make in India**: The initiative promotes domestic manufacturing, increasing production and employment opportunities. It reduces dependence on imports, strengthening trade balance and economic stability. Since the inception of "Make in India," the nominal GDP of India has increased from ₹106.6 trillion (US$ 1.3 trillion) in Fiscal 2014 to approximately ₹331 trillion (US$ 3.9 trillion) in Fiscal 2025.

1.2.2 India's CPI inflation rate was 4.6% in 2024, and RBI aims to bring it down to around 4.0% by the end of 2027

During the period of 2020-2022, CPI inflation rates increased due to volatile components like vegetable prices, fuel costs, and commodities such as gold and edible oils. According to the International Monetary Fund, India's CPI inflation rate was 4.6% in 2024 and is estimated to decline to 4.2% by 2025 due to a decrease in food inflation and favourable base effects from 2023 (Russia-Ukraine war). By 2026, the RBI aims to bring the CPI inflation rate to a target of approximately 4%.

India's inflation at avg. consumer prices
(%, 2019-2029P)



Source(s): International Monetary Fund, 1Lattice analysis

1.2.2.1 Measures to control inflation

To control inflation, the Indian government and the Reserve Bank of India (RBI) implemented several measures, including monetary and fiscal policies, supply chain improvements, currency exchange rate policies, and other economic interventions.

Monetary policy

- In 2025, the RBI reduced the repo rate by 25 bps to ~6%, aiming to boost lending and stimulate demand
- When inflation is stable, a lower repo rate can reduce borrowing costs

Fiscal policy

- India's fiscal deficit in 2024 stood at ₹ 4.7 trillion (US$ 53.8 Billion) improving from ~₹ 7 trillion (US$ 79.5 Billion) last year
- A lower fiscal deficit indicates reduced reliance on borrowing

Supply-side interventions

- Maintaining essential commodity reserves to manage fluctuations
- Promoting domestic production and lowering import duties, enhance supply and help stabilise markets

Exchange rate policies

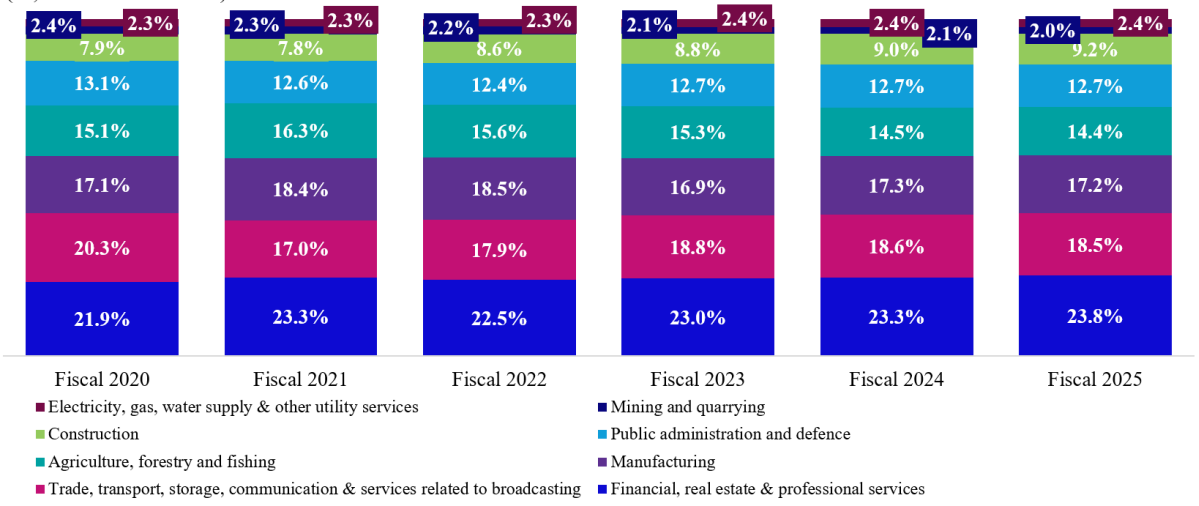
- Stabilising the local currency through market operations reduces import costs
- A stronger currency lowers the prices of imported goods and stabilises overall price levels

1.2.3 In Fiscal 2025, the financial, real estate and professional services segment was the highest contributor to GVA in India with 23.8%, followed by trade, transport, storage, communication and services related to broadcasting (18.5%) and manufacturing (17.2%)

Rapid urbanisation, rising incomes, and demand for housing and commercial spaces, supported by government reforms like "Housing for All", have boosted real estate's GVA share, alongside growth in office, warehousing, and logistics driven by the 'Back to office' policy by companies post-pandemic, IT and e-commerce expansion. The construction segment has seen an increase in GVA contribution from 7.9% in Fiscal 2020 to 9.2% in Fiscal 2025.

GVA by economic activity at constant prices

(%, Fiscal 2020 - 2025)



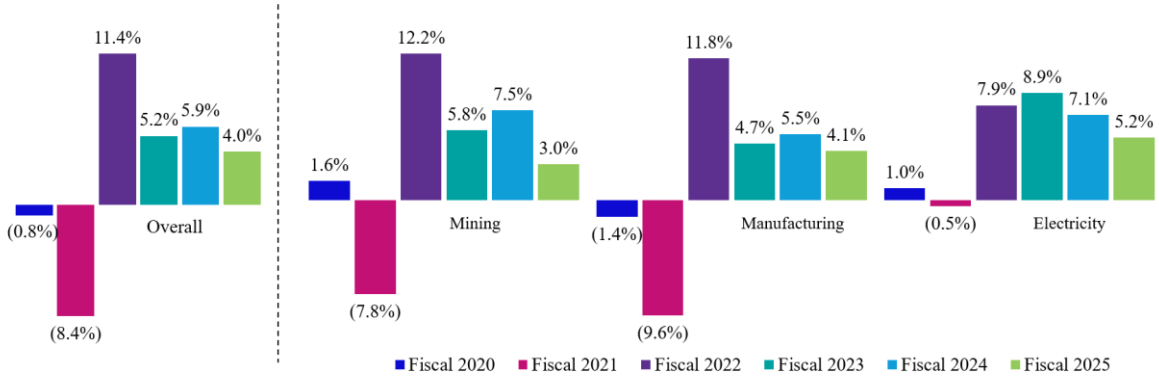
Source(s): MoSPI, 1Lattice analysis

1.3 India's Index of Industrial Production (IIP) grew by approximately 4% in Fiscal 2025, up from (0.8%) in Fiscal 2020

The Index of Industrial Production (IIP) is an index that indicates the performance of various industrial sectors of the Indian economy. The industrial production index tracks how well industries are performing. India's Industrial Production (IIP) growth rate had a robust growth driven by rising domestic demand, import substitution, China + 1 strategy adoption by multinational corporations and growth in capital goods and infrastructure/construction sectors.

India's IIP growth – Sector-wise

(Y-o-Y growth %, Fiscal 2020-2025)



Source(s): Ministry of Statistics and Programme Implementation (MoSPI), 1Lattice analysis

1.3.1 Key growth drivers in the industrial sector

Within India's industrial sector, several key factors are shaping its trajectory, driving significant growth. Notable among these are strategic government allocations, such as PLI and Make in India schemes amongst others. These, complemented by robust industrial expansion and growth in real estate, collectively influence the sector's dynamics.

Growth drivers	
National Manufacturing Policy and PLI scheme	• **National Manufacturing Policy:** The policy aims to increase the sectoral share of manufacturing in GDP, create additional jobs, and enhance global competitiveness • **Production Linked Incentive (PLI) scheme:** Total budget allocation increased by ~108% to ₹ 194.5 Billion (US$ 2.3 Billion) in Fiscal 2026, with ~38% focused on incentivizing manufacturers to boost domestic production across 14 sectors, which has indirectly led to expansion of facilities, building of new plants and warehouses, etc., to support various business activities
Make in India initiative	• **Initiative:** Launched in 2014, Make in India aims to facilitate investment, foster innovation, and build infrastructure, positioning India as a global manufacturing hub • **Sector focus and collaboration:** The initiative targets 27 sectors with support across 24 subsectors, driving growth, jobs, and self-reliance, alongside ₹ 0.1 - ₹ 0.2 Billion (US$ 1.2 - US$ 2.4 Million) of credit guarantees for Micro and small enterprises (MSEs) and startups in the Fiscal 2025–2026 budget
Manufacturing growth	• **Increased FDI:** FDI in India's manufacturing sector has reached ₹ 13.3 trillion (US$ 165.1 Billion), a ~69% increase over the past decade, driven by production-linked incentive (PLI) schemes • **Indications of favourable business environment:** The strong performance of the manufacturing sector points to a favorable environment and rising demand for industrial products
Increased investments	• **Increased housing allocation:** The total expenditure of the Ministry of Housing & Urban Affairs for Fiscal 2024-2025 is estimated at ~₹ 826 Billion (~US$ 10 Billion), reflecting a ~19% increase over the revised estimates for Fiscal 2023-2024 • **Indications of favourable business environment:** The government allocated ~₹ 22 Billion (US$ 2.7 Billion) for the promotion of electronics & IT hardware manufacturing in the budget Fiscal 2024-25

2 Overview of the engineered fabrics industry

Engineered fabrics are a subset of technical textiles, which are advanced textiles designed to deliver functional performance rather than just aesthetic appeal, serving specific industrial, commercial, and protective needs. Amongst the different categories of technical textiles, engineered fabrics are specially developed and custom-made textiles designed through advanced manufacturing techniques to meet specific functional requirements and, beyond functionality, are created for enhanced performance in specialised applications. They are characterised by superior properties such as durability, moisture resistance, breathability, flexibility, and high tensile strength. Engineered fabrics are also different from conventional fabrics, which are created with aesthetic appeal and comfort as the primary considerations.

Engineered fabrics are widely used across various sectors:

- In defence, these are utilised in ballistic protection, rapid deployment systems, personal gear, tactical gear, and stealth systems. They are designed to provide high strength, tear resistance, abrasion resistance, fire retardancy, heat resistance, low stretch, UV protection, and remain lightweight to ensure maximum durability and safety.
- In aerospace, these are utilised in parachutes, hot air balloons, paragliders, aircraft evacuation slides, life vests, and floatation devices, amongst others. Here, the fabrics are engineered for lightweight performance, enabling them to withstand the most challenging conditions while meeting strict safety standards.
- The industrial sector employs engineered fabrics in filtration systems, conveyor belts, and protective coverings. Their role here is to ensure reliability in demanding environments where consistent performance under stress, exposure, and heavy use is crucial. By combining durability with safety-critical properties, these fabrics support industrial applications in meeting rigorous standards while maintaining efficiency and safety.
- The automotive sector employs them in interior carpets, roofing systems, heddle belts, tapes, airbags, tyre cords, amongst others.
- The outdoor and lifestyle sector utilises them in travel and outdoor equipment like luggage, backpacks, travel accessories, and rucksacks. The outdoor and lifestyle sector also applies engineered fabrics in outdoor apparel like athleisure, sportswear (such as swimsuits) and cold-weather clothing. Designed to balance rugged strength with lightweight properties, they enhance convenience while withstanding constant exposure to outdoor conditions.

- Sports industries use them in high-performance apparel and protective gear. Here, the emphasis is on materials that deliver both reliability and comfort, supporting athletes and professionals in extreme conditions without compromising flexibility or safety.
- Construction relies on them for geotextiles, insulation, and reinforcement materials.
- Medical applications include wound dressings, surgical drapes, and hygiene products.

Their versatility and adaptability make engineered fabrics essential in numerous engineering and commercial applications.

2.1 Key characteristics of the engineered fabrics industry

The engineered fabrics industry is defined by its ability to deliver specialised materials for high-performance applications across diverse sectors. Its key characteristics include:

- **Application-specific and functionality-driven products:** Engineered fabrics are developed to serve precise requirements in industries such as automotive, defence, aerospace, construction, medical, and industrial filtration. Each fabric is tailored to meet functional needs such as thermal regulation, moisture and breathability management, chemical and biological protection, and load-bearing capacity. Advanced variants also integrate thermal and electrical conductivity, enabling smart textiles for applications in healthcare monitoring, defence systems, and wearables.
- **Products with specialised performance properties:** Engineered fabrics are designed with specialised properties to enhance performance, durability, and adaptability in demanding environments. These include lightweight structures, high strength-to-weight ratio, fire resistance, chemical resistance, waterproofing, breathability, UV protection, thermal insulation, electrical conductivity, and abrasion resistance, making them suitable for a wide range of critical applications.
- **Advanced material composition:** The engineered fabrics industry makes fabrics from synthetic and natural fibres, depending on the application:
  - **Synthetic fibres:** Polyester, polypropylene, polyethylene, polyamide (nylon), aramid (Kevlar), polytetrafluoroethylene (PTFE), and polyurethane. In particular, nylon is a strong synthetic polymer. Nylon 6 and Nylon 66 are the most common types. They have tensile strength, abrasion resistance, and elasticity, making them suitable for automotive textiles, airbags, aerospace, industrial uses, sportswear, outdoor gear, and medical fabrics. Nylons are difficult to process due to heat sensitivity and the risk of degradation during dyeing and finishing. Their moisture absorption affects fabric performance, and uneven dye uptake causes inconsistent colour. Nylon is also prone to permanent creasing.
  - **Natural fibres:** Cotton, wool, silk, jute, and hemp (often treated for durability).
  - **Blends and composite fabrics**: A mix of fibres with coatings, laminations, or nanofiber technology to enhance properties like waterproofing, breathability, and antimicrobial protection. Coatings and laminations add specific properties to engineered fabrics, enhancing performance and durability. Techniques include knife coating, hot-melt, and extrusion coatings that add resistance and function. Thermal lamination bonds fabric layers without reducing performance.
- **Sustainability and recycling:** The industry is rapidly shifting toward eco-friendly materials and sustainable manufacturing.
  - **Recycled fibres**: Polyethylene Terephthalate (PET) from plastic bottles and bio-based polymers like Polylactic Acid (PLA) reduce waste and promote biodegradability.
  - **Biodegradable nonwovens**: Used in hygiene products and packaging to minimise landfill impact.
  - **Energy-efficient manufacturing**: Waterless dyeing, closed-loop processes, and renewable energy reduce resource consumption and emissions.

  Governments worldwide are promoting circular economy models that focus on recycling and waste reduction within the engineered fabrics industry. The circular economy aims to extend the life cycle of materials by designing products for reuse, recycling, and minimal waste generation. In the engineered fabrics industry, this includes closed-loop recycling systems where post-consumer and post-industrial waste are collected, processed, and repurposed into new materials.

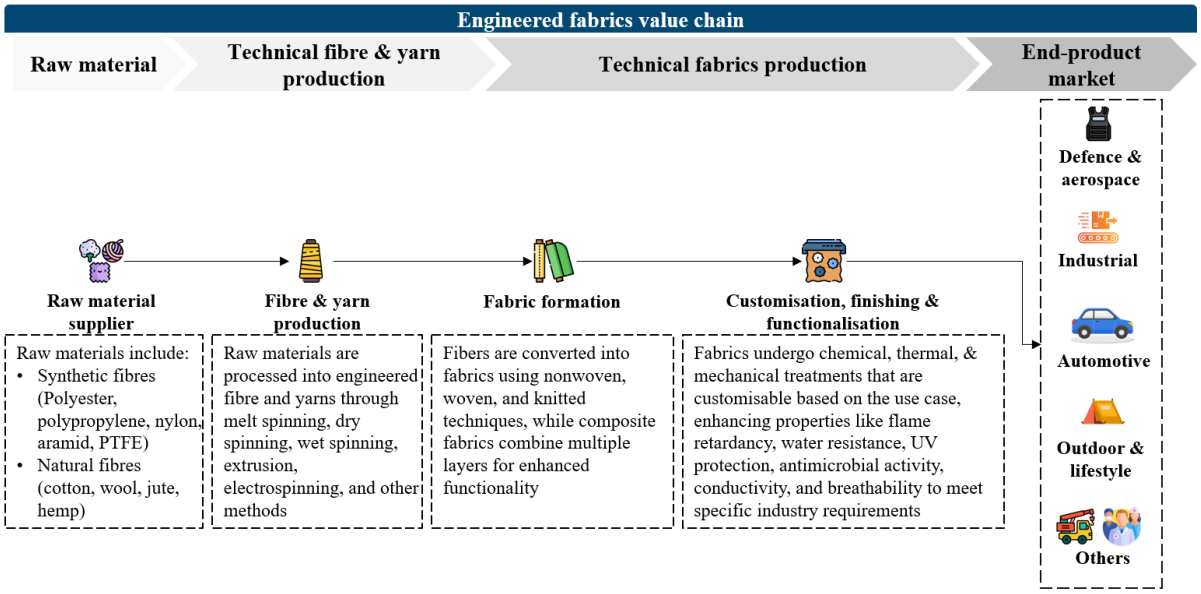
- **R&D and customisation-driven growth:** With rapid technological advancements, the engineered fabrics industry is increasingly focused on innovation and customisation to enhance functionality and performance. Key developments include:
  - **Smart fabrics –** Integrating sensors, conductive fibres, and self-cleaning properties for applications in healthcare, sports, and defence.
  - **3D-printed fabrics** – Used in medical, aerospace, and sports gear, offering lightweight, high-strength, and customisable solutions.
  - **Multi-functional fabrics** – Combining breathability, water resistance, and antimicrobial properties in a single textile for enhanced durability and versatility**.**

In order to deliver specialised materials for high-performance applications across diverse sectors, the following considerations are pertinent:

- **Fabric fineness:** Fabric fineness is measured by grams per square metre ("GSM") and yarn denier. GSM indicates fabric weight, while denier indicates yarn thickness. Reducing yarn denier creates lighter fabrics without losing strength. Fine denier fabrics have a strong strength-to-weight ratio and are used in parachutes, inflatables, medical textiles, and composites where lightweight and durability matter. Producing these fabrics involves challenges like yarn breakage and tension issues.
- **Selection of yarns, weave structures and fabric types:** Developing engineered fabrics requires selecting the correct yarns, weave structures, and fabric types. Yarn choice affects strength, durability, texture, and finish. Weave structures, such as satin, twill or ripstop, influence durability, flexibility, and tear resistance. Ripstop with high-tenacity yarns creates lightweight, tear-resistant fabrics used in parachutes and protective gear. Specialised finishes like water-repellent, flame-retardant, or UV-blocking coatings add functionality. Quality depends on precise control from weaving to finishing.

2.2 Engineered fabrics industry - Value chain

The value chain of engineered fabrics encompasses multiple stages, from raw material sourcing to the end-product market. The engineered fabrics industry produces high-performance fabrics for applications like defence, aerospace, automobile, industrial, outdoor, lifestyle and medical. It focuses on functionality, durability, and advanced materials, integrating specialised processes and sustainability to meet evolving demands.



2.3 Engineered fabrics industry - Entry barriers across the value chain

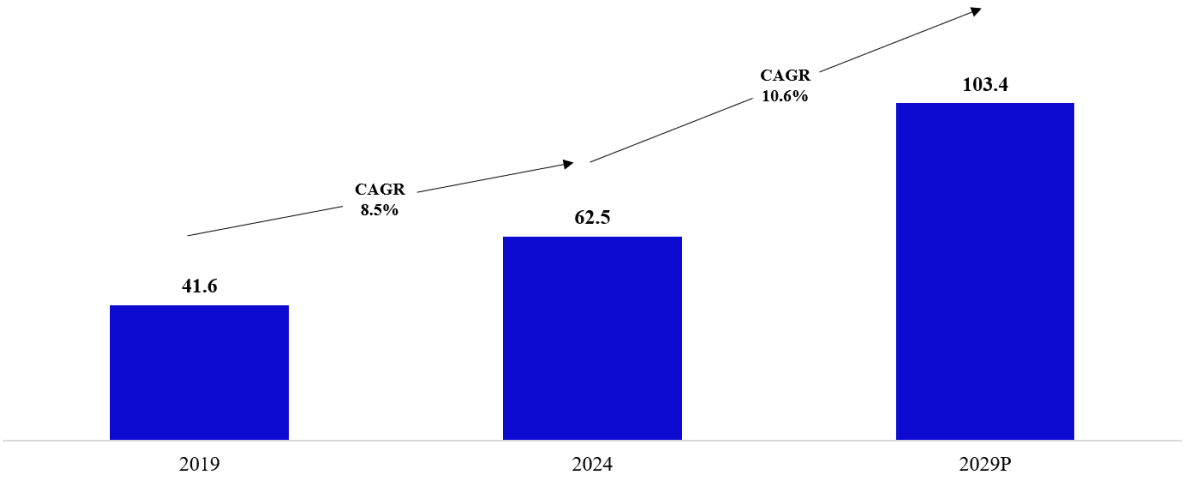
Every stage of the engineered fabrics value chain presents distinct high entry barriers that restrict new entrants. The primary entry barrier in the engineered fabrics industry is technical knowledge and manufacturing know-how. At the outset, setting up a production plant requires navigating a complex regulatory framework. This is followed by an inconsistent ecosystem for raw material procurement, along with the difficulty of meeting the industry requirements of precision and a high level of technological know-how for efficient production. Furthermore, the ability to provide highly customised fabric solutions demands significant R&D investment and deep client collaboration, creating an additional layer of difficulty. Finally, customer acquisition remains a major hurdle, as new players often face credibility gaps.

S.No.	Process	Entry barrier
1.	**Long approval cycles**	• Setting up an engineered fabric plant requires navigating a complex **regulatory framework** and undergoing licensing procedures leading to long lead times - Long **product-approval** cycles of 2-10 years (from design to adoption) from authorised bodies and quality control departments further prolong the process
2.	**Raw material procurement**	• **A limited supplier base** creates significant entry barriers for new companies, as inconsistent raw-material availability restricts efficient and reliable procurement, which is essential for scaling operations • Raw material prices are volatile, influenced by trade policies, production capacity, oil and transport costs, as well as global demand-supply shifts and currency exchange rates - For example, **the price of Purified Terephthalic Acid (PTA) and Mono Ethylene Glycol (MEG)**, key inputs for polyester fibres in engineered fabrics, has historically fluctuated with crude oil prices, supply chain issues, regulations, and global demand shifts
3.	**Production process**	• Primary entry barrier in the engineered fabrics industry is technical knowledge and manufacturing know-how • Engineered fabric production with key functional and technical specifications requires **complex technologies** like multiaxial braiding, advanced coatings, etc., along with **deep ecosystem expertise** - Limited **capabilities** to meet the **customised** requirements of each customer for critical products further **limit** the adoption of engineered fabric production
4.	**Customer acquisition**	• Customer acquisition remains a major hurdle as new players often face **credibility gaps** in delivering engineered fabrics for applications in **key industries** like aerospace & defence • Furthermore, some customers, especially government entities, restrict participation to companies that meet specific criteria such as size, capabilities, and certification

2.4 Global engineered fabrics market size

The global engineered fabrics industry has grown from US$ 41.6 billion in 2019 to US$ 62.5 billion in 2024 with a CAGR of 8.5% from 2019-2024. Looking ahead, the market value is projected to continue its growth and reach US$ 103.4 billion by 2029 with a CAGR of 10.6% from 2024-2029. Globally, prominent players in the engineered fabric industry include DuPont de Nemours, Inc. (U.S.), Freudenberg Group (Germany), TenCate Fabrics (Netherlands), Milliken and Company (U.S.) and others.

Global engineered fabric industry
(US$ billion, 2019-2029P)

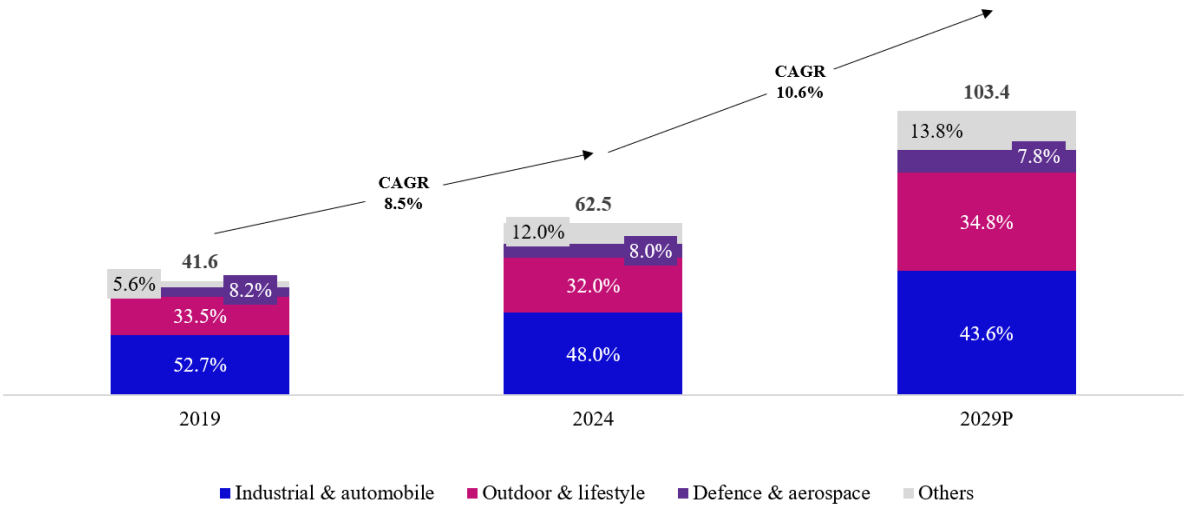


Source(s): 1Lattice analysis

2.4.1 Global engineered fabric market size – By end-user industry

The industrial and automobile segment accounted for 48.0% of the global engineered fabrics industry value in 2024, while the outdoor and lifestyle segment held 32.0%. The defence and aerospace segment made up 8.0%. By 2029, the share of defence and aerospace is expected to remain about the same at 7.8%, whereas the share of the industrial and automobile segment is projected to decline to 43.6%. The share of outdoor and lifestyle is expected to increase to 34.8%.

Global engineered fabric industry – By end-use industry
(US$ billion, 2019-2029P)

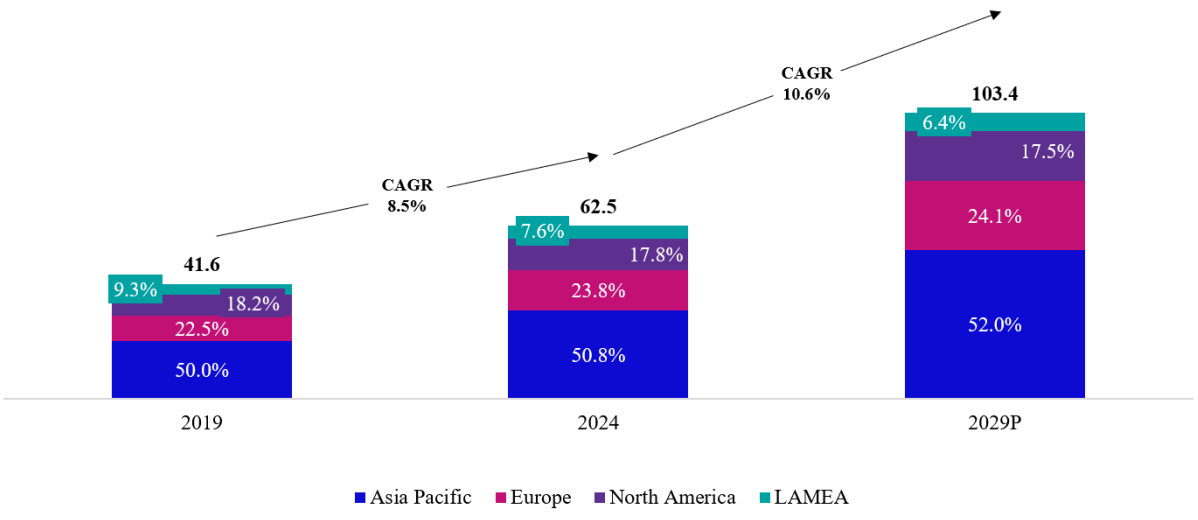


Source(s): 1Lattice analysis

2.4.2 Global engineered fabrics market size– By geography

Asia Pacific accounted for 50.8% of the global engineered fabrics industry in 2024, followed by Europe at 23.8% and North America at 17.8%. The LAMEA region held a smaller share of 7.6%. By 2029, the Asia Pacific is projected to lead with 52.0%, followed by Europe at 24.1%. North America's share is expected to reduce marginally to reach 17.5%, whereas LAMEA's share is anticipated to further decrease to 6.4%.

Global engineered fabric industry – By geography
(US$ billion, 2019-2029P)



Source(s): 1Lattice analysis

2.5 Key growth drivers and trends for the global engineered fabrics industry

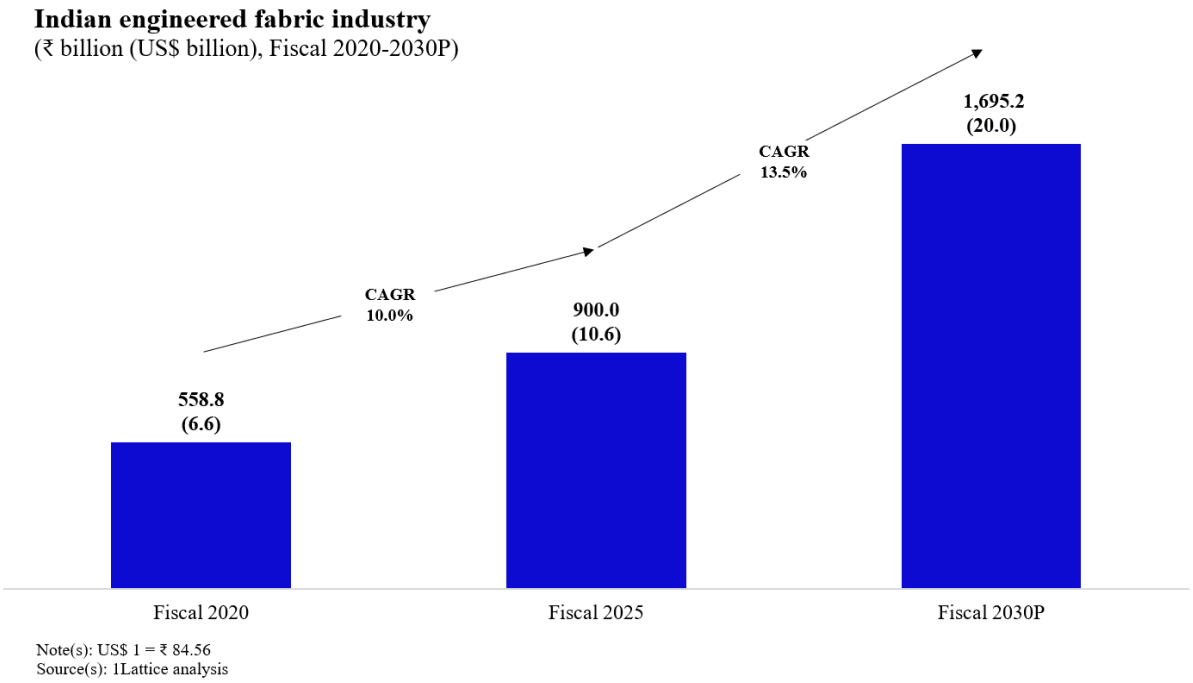
The engineered fabrics industry is growing due to expanding applications, growing regional capabilities, and sustainability trends. Rising demand for eco-friendly fabrics and urban development also contributes to market growth.

Global trends & growth drivers

Expanding end-use applications	• Engineered fabrics are **gaining traction** across the **automotive, activewear, industrial, medical, and construction** sectors for their **durability, strength, and performance,** which is driving higher industry investments • Wearable fabrics with integrated sensors for health monitoring, remote patient care, and biometric tracking are **becoming popular**, especially in **sports and medical applications**
Growing regional capabilities	• **Asia-Pacific** region leads in **engineered fabric production**, driven by technological advancements in **automotive, medical, and construction** sectors, and by cost-effective labor • Countries like China and India have become **major manufacturing hubs**, benefiting from favourable government policies and significant investments in textile infrastructure
Sustainability & circular economy	• Engineered fabrics made from **recycled or bio-based materials** are increasingly being adopted in sectors like **automotive** interiors to **minimise reliance on virgin materials** and support a circular economy • Regulatory support and rising consumer preference for sustainable materials are driving growth in the **natural fibre market**
Infrastructure growth	• Simultaneously, the expansion of civil engineering and infrastructure projects in emerging economies is accelerating demand for engineered textiles in **urban development and geotechnical applications**

2.6 Indian engineered fabrics market size

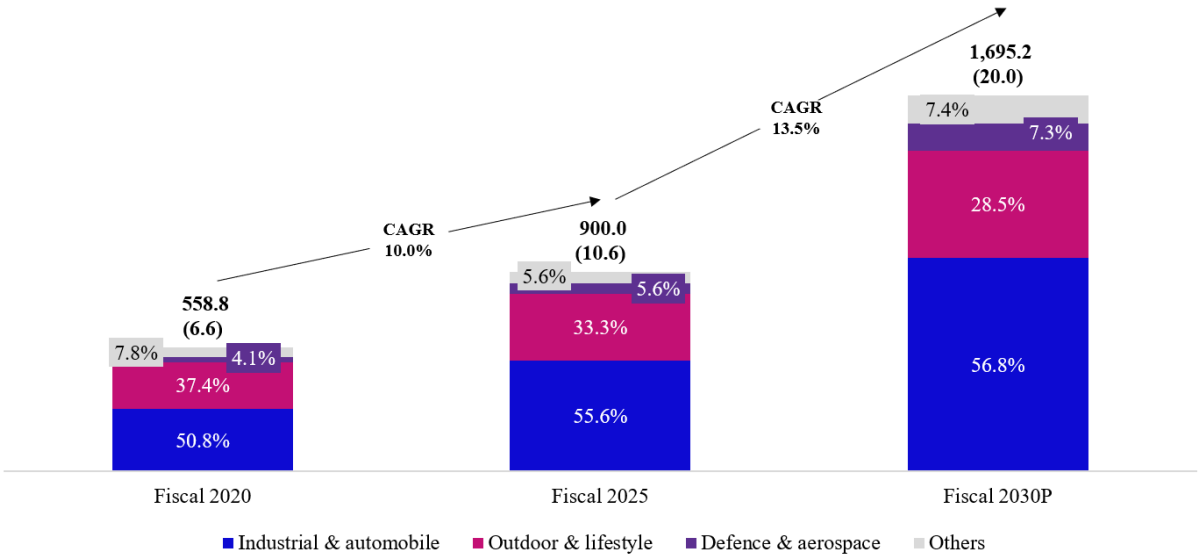
India's engineered fabrics industry, as measured by domestic consumption (including imports) and excluding exports, was valued at ₹ 558.8 billion (US$ 6.6 billion) in Fiscal 2020 and reached ₹ 900.0 billion (US$ 10.6 billion) in Fiscal 2025, growing at a CAGR of 10.0% during Fiscal 2020-2025. The market is expected to grow further and reach a value of ₹ 1,695.2 billion (US$ 20.0 billion) by Fiscal 2030, registering a CAGR of 13.5% during Fiscal 2025-2030.



2.6.1 Indian engineered fabric market size – By end-use industry

In Fiscal 2025, the industrial and automobile segment dominated the Indian engineered fabrics industry, as measured by domestic consumption (including imports) and excluding exports, with a 55.6% share, followed by the outdoor and lifestyle segment at 33.3%, and the defence and aerospace segment at 5.6%. By Fiscal 2030, the industrial and automobile segment is projected to rise to 56.8%, while the outdoor and lifestyle segment is expected to account for 28.5%, and the defence and aerospace segment to 7.3%.

Indian engineered fabric industry – By end-use industry
(₹ billion (US$ billion), Fiscal 2020-2030P)



Note(s): US$ 1 = ₹ 84.56
Source(s): 1Lattice analysis

2.7 Key growth drivers and trends for the Indian engineered fabrics industry

The Indian engineered fabrics industry, as measured by domestic consumption (including imports) and excluding exports, is growing through strong government policies, R&D advancements in high-speciality fabrics, an expanding global market (due to factors including the diversification of supply chains by major manufacturers), increased adoption of sustainable, high-tech textiles and the diversification of supply chains by major manufacturers. Standardisation and quality control measures are also driving domestic production and export competitiveness, while India leverages the China+1 strategy to position itself as a reliable alternative manufacturing hub for global buyers seeking supply chain diversification.

Government policies & incentives	R&D initiatives	Expanding market	Increased adoption
			
• Key initiatives such as the **NTTM, PLI** scheme and **PM MITRA** parks are strengthening India's position as a global engineered fabrics **manufacturing hub** by promoting R&D, domestic & large-scale infrastructure development • Government has dedicated ~**207 Harmonised System of Nomenclature (HSN) codes** and allows **100% FDI** under the automatic route for technical textiles, further increasing the **export capabilities** of India's engineered fabrics industry	• Various R&D initiatives have been undertaken to develop **high-specialty engineered fabrics**, with a focus on automation, AI-driven textile and processing as key enablers for **enhancing product quality** & efficiency in domestic manufacturing • Under the flagship scheme of NTTM, ~**24 R&D** projects have been undertaken by various premier research bodies and institutes for the development of specialty fibres like aramid, super high-tenacity polypropylene, carbon fibre, etc.	• India is increasing its engineered fabrics **global footprint** through enhanced Memorandum of Understanding (MoUs), participation in international trade fairs, and aligning domestic standards with **international benchmarks** to improve **export competitiveness** • India is capitalising on the **China+1 strategy**, positioning itself as a reliable alternative hub as global manufacturers diversify supply chains, thereby attracting buyers and boosting its engineered fabrics export base	• The industry is shifting towards sustainable and **high-tech engineered fabrics**, including ultrafine **nano fibres, non-woven webs**, and functional textiles for filtration, healthcare, & industrial applications • The **Ministry of Textiles** has received an annual budget outlay of **₹ 52.7 Billion (US$ 0.6 Billion)** in FY26, with an aim to promote **domestic production** of technical textiles in India and has collaborated with **Bureau of Indian Standards (BIS)** to develop ~**500** standards for technical textile production in India

In addition to the above growth drivers, the Indian state governments are also offering different subsidies and incentives to boost the domestic manufacturing of textiles, thus impacting the engineered fabrics market. For example, Gujrat launched the Gujrat Textiles Policy 2024 (Effective October 1st 2024 – September 30th 2029), which offers a comprehensive incentive stack for textiles spanning the entire value chain. Under this, units are eligible for capital investment support and credit-linked interest subsidies that vary by taluka/segment, alongside targeted power-tariff assistance to lower operating costs. (₹ 1 per unit, availing power either from DISCOM or renewable power through open-access for a period of 5 years from DoCP).

Capital & Interest Subsidy Structure (Gujrat Textile Policy 2024)

Taluka Category	Capital Subsidy on Eligible Fixed Capital Investment (eFCI)	Interest Subsidy on Term Loan	Duration / Tenor	Caps / Notes
Category 1 (Least developed talukas)	20- 35% of eFCI	7% per annum	7-8 years	Capital subsidy capped at **₹ 0.50-1.50 billion** per project
Category 2	18-30% of eFCI	7% per annum	7-8 years	Capital subsidy capped at **₹ 0.50-1.50 billion** per project
Category 3 (Developed talukas)	10-25% of eFCI	5-7% per annum	5–8 years	Capital subsidy capped at **₹ 0.40 - 1.50 billion** per project

2.7.1 Potential Impact of US Tariffs on the Indian engineered fabrics industry

On July 31, 2025, the United States announced tariffs of approximately 25% on most Indian goods, including engineered fabrics. Effective August 27, 2025, this new tariff brings the total additional duty on Indian products to 50%. Such measures reflect broader global trends where countries impose, adjust, or remove tariffs and trade restrictions in response to shifting economic and political conditions. These actions create sustained uncertainty in global trade and can escalate tensions, potentially slow economic growth and reshape long-term trade patterns through retaliatory measures.

For Indian exporters, higher tariffs could dampen business sentiment and reduce international demand for manufactured products. The scope, duration, and frequency of such trade restrictions remain uncertain, and their impact could be significant. Measures such as tariffs, quotas, embargoes, safeguards, changes to de minimis thresholds, or customs restrictions may increase costs and lengthen shipping times. It is too early to comment on the exact impact on the export opportunities for the Indian engineered fabrics market.

In response, the Indian government may also implement administrative or regulatory actions that affect manufacturers' access to imported raw materials. Any restrictions on sourcing, whether through higher import costs, supply shortages, or the need to reorganise supply chains, could adversely impact the business operations, financial performance, and overall resilience of Indian engineered fabric producers.

2.8 Key end-user industries of engineered fabrics and applications

Engineered fabrics are indispensable across multiple industries, providing advanced solutions tailored to specific applications. Their ability to offer strength, flexibility, thermal resistance, and environmental durability makes them essential in aerospace and defence, industrial and automobile, medical, construction and outdoor and lifestyle sectors. As technology advances, these fabrics will continue to evolve, offering even greater performance and expanding into new applications, reinforcing their significance in modern manufacturing and innovation. Examples of how engineered fabrics are used in the aerospace and defence segment, industrial and automotive segment, outdoor and lifestyle segment and other market segments are as follows.

Aerospace and defence

- Engineered fabrics play a critical role in aerospace and defence, where they are used in aircraft interiors for seats, panels, and insulation, as well as in ballistic protection for body armour, military tents, rapid deployment systems, stealth systems, parachute systems, personal equipment such as combat uniforms, rucksacks, load-bearing vests and lightweight composites in aircraft structures. These fabrics also contribute to parachutes and protective covers used in space exploration, ensuring reliability in extreme conditions.
- To meet these demanding applications, engineered fabrics like fine denier fabrics are used as they possess a high strength-to-weight ratio, ensuring structural integrity while minimising weight. Additionally, fabrics are coated and laminated to provide flame resistance, impact protection, thermal insulation, and durability to withstand extreme temperatures, high velocities, and harsh operational environments.

Industrial and automotive

- In industrial applications, engineered fabrics are extensively used in filtration systems for air, liquid, and gas, as well as in protective clothing that offers fire and chemical resistance, industrial tapes, heddle belts, hoses, and other applications.
- Mechanical Rubber Goods (MRG) fabrics are found in conveyor belts, transmission belts, industrial webbing and slings, ropes and cordages, and reinforcements for composites, providing strength and longevity in high-stress environments.
- Engineered fabrics in automotives are used in airbags, helmets, seat belt webbing, headliners, tyre cord fabric, automobile tapes, drive belts, seat-cover fabric, and convertible soft top.
- These applications demand materials with chemical resistance, thermal stability, and high tensile strength to endure prolonged exposure to harsh substances and temperatures. Additionally, abrasion resistance and durability are crucial for ensuring longevity in high-wear industrial operations, where performance consistency is essential.

Outdoor and lifestyle

- The outdoor and lifestyle sector relies on engineered fabrics for high-performance apparel, including sportswear, rainwear, and protective gear, along with outdoor equipment such as tents, backpacks and "hardlines" such as luggage and backpacks. These fabrics are also integral to footwear components and marine applications like boat covers and sails, where durability and adaptability are key factors.
- To function effectively, these fabrics must exhibit breathability, water and UV resistance, and lightweight flexibility to enhance comfort and usability. Moreover, weather durability and tear resistance ensure that products can withstand prolonged exposure to varying environmental conditions, from heavy rains to extreme sun exposure to prolonged use for transporting personal property.

Others

- Engineered fabrics are used for other industries like healthcare where they are used for surgical gowns, wound dressings, medical drapes, and filtration materials used in masks and hospital air systems, ensuring sterility and infection control.
- In construction, engineered fabric used for geotextiles for soil stabilisation, roofing membranes for waterproofing, and insulation materials for thermal regulation in buildings, enhancing structural integrity and efficiency.

3 Overview of the aerospace and defence industry

The global aerospace and defence sector is evolving rapidly, driven by geopolitical instability, modernisation of military capabilities, and advancements in mission-critical systems, alongside a surge in demand for commercial air travel and the need for airlines to expand and upgrade their fleets with more fuel-efficient aircraft. Nations prioritise innovations in lightweight, durable materials for aerospace applications such as parachutes and protective gear for extreme environments. Surveillance technologies, unmanned systems, and high-altitude operational readiness reshape defence strategies, with geopolitical tensions accelerating investments in resilient, cutting-edge solutions. As a result, global defence spending increased from US$ 2.0 trillion in 2019 to an all-time high of US$ 2.5 trillion in 2024. The growth is driven in part by increased spending from countries such as the United States, China, and a few European countries in direct response to regional geopolitical factors. It is projected to grow at a CAGR of 5.1% from 2024-2030, to reach US$ 3.4 trillion in 2030.

India is accelerating its shift toward indigenous defence manufacturing to reduce reliance on imports and address border security challenges. Government initiatives like "Make in India" and policy reforms foster partnerships between domestic manufacturers and global defence firms. The government has introduced major reforms in the defence sector, with a strong focus on minimising foreign reliance and establishing a robust domestic defence manufacturing base. Notably, Indian defence suppliers typically operate through trade intermediaries to supply the military, highlighting the structured nature of defence procurement in India. Through a structured ecosystem combined with bolstering government policies, India's defence spending has increased from US$ 70.2 billion in Fiscal 2019 to reach US$ 93.9 billion in Fiscal 2024. It is projected to grow at a CAGR of 9.1% from Fiscal 2024-2030 to reach US$ 118.4 billion in Fiscal 2030.

3.1 Key growth drivers and trends in the aerospace and defence industry

The aerospace and defence industry experiences significant growth, driven by rising geopolitical tensions and a surge in defence spending globally, along with increased demand for air travel, which has prompted airline expansions and the replacement of ageing commercial airliner fleets with newer, more fuel-efficient aircrafts, which will increase the demand of engineered fabric used in the aerospace industry. Increased orbital launches by key players are further propelling the sector, while strategic partnerships between nations are fostering collaborative growth and technological advancements. Additionally, government policies supporting indigenous production strengthen indigenous capabilities and ensure long-term sustainability. Together, these factors shape a dynamic and promising future for the aerospace and defence industry.

Key growth drivers & trends

Rising geopolitical conflicts

- The number of **armed conflicts** globally has reached ~**150** in 2023, driving **global demand** for advanced protective gear
  - Russia's invasion of Ukraine has triggered a sharp rise in demand for protective equipment
  - The **Middle East**, a region facing persistent geopolitical conflicts, continues to fuel demand for protective gear among military forces
- **India** is also experiencing a notable increase in **military preparedness**, driven by ongoing border disputes and periodic military talks with **neighbouring countries** like **China, Pakistan and Bangladesh**
  - Active use of indigenous air defence systems and drones in **Operation Sindoor** highlights a shift towards homegrown defence capabilities

Surge in defence spending & budgetary allocations

- Global military spending has surged, due to increased spending by key players such as European countries in response to geopolitical factors, to reach an all time high of ~**US$ 2.5 Trillion** in 2024, an increase of **6.8%** from 2022-2024
  - **The United States** emerged as the **largest defence spender** at ~**US$ 916 Billion**, followed by **Europe,** which saw its military spending reaching ~**US$ 544 Billion, China's and Russia's military spending** were also significant at ~**US$ 296 Billion** and ~**US$ 109 Billion,** respectively
- Aerospace & defence budget allocations have surged in India because of rising geopolitical conflicts
  - **The Ministry of Defence (MoD)** has received the **highest** budget allocation in Fiscal 2025, with ~**US$ 75 Billion** allocated to the ministry

Strategic partnerships & innovation

- Aerospace & defence industry has witnessed an increase in **strategic partnerships** between countries, aiming to pool resources and expertise to drive innovation and growth through collaborative efforts
- For example, under the "**U.S.-India COMPACT for the 21st century"** signed in Fiscal 2025, United States and India have developed a strategic partnership for defence, trade and technology exchange
  - Under this, India has been recognised as the "**major defence partner**" with **Strategic Trade Authorisation-1** (STA-1)

Government policies

- Governments worldwide are introducing **policies** to boost domestic production of aerospace & defence equipment, aiming to meet the **rising demand** for protective gear
  - For e.g., the **Defence Production Act** (DPA) law in US ensures that the nation's defence materials are sourced from its **domestic industrial base**, promoting **self-reliance** and responsiveness to emergency situations
  - Similarly, "**Defence Acquisition Procedure - 2020**" introduced by Indian government highlighted **indigenous manufacturing** as the key to reducing import reliance in its aeronautics & defence industry

Supply chain diversification

- A significant trend shaping the industry is the **diversification of supply chains** by major global manufacturers
  - Key external driver, prompted by the **"China +1" strategy** and a broader need to create more resilient and secure supply lines for mission-critical components
- By **reducing dependence** on a single manufacturing source, companies and nations enhance their operational stability
  - Benefits countries like India, which are positioning themselves as **reliable alternative manufacturing hubs** for engineered fabrics and other advanced materials

3.2 Overview of the engineered fabric and solutions market for aerospace and defence

The engineered fabric and solutions market for aerospace and defence has experienced significant growth due to its critical role in enhancing performance and safety while also providing versatility. Engineered fabrics are specially designed to meet the stringent requirements of the aerospace and defence industry by offering lightweight, durable, and versatile solutions that contribute to improved fuel efficiency and better operational capabilities. Their importance is underscored by the increasing demand for advanced materials that can withstand harsh environmental conditions and provide specialised functionalities such as ballistic protection, thermal resistance and camouflage.

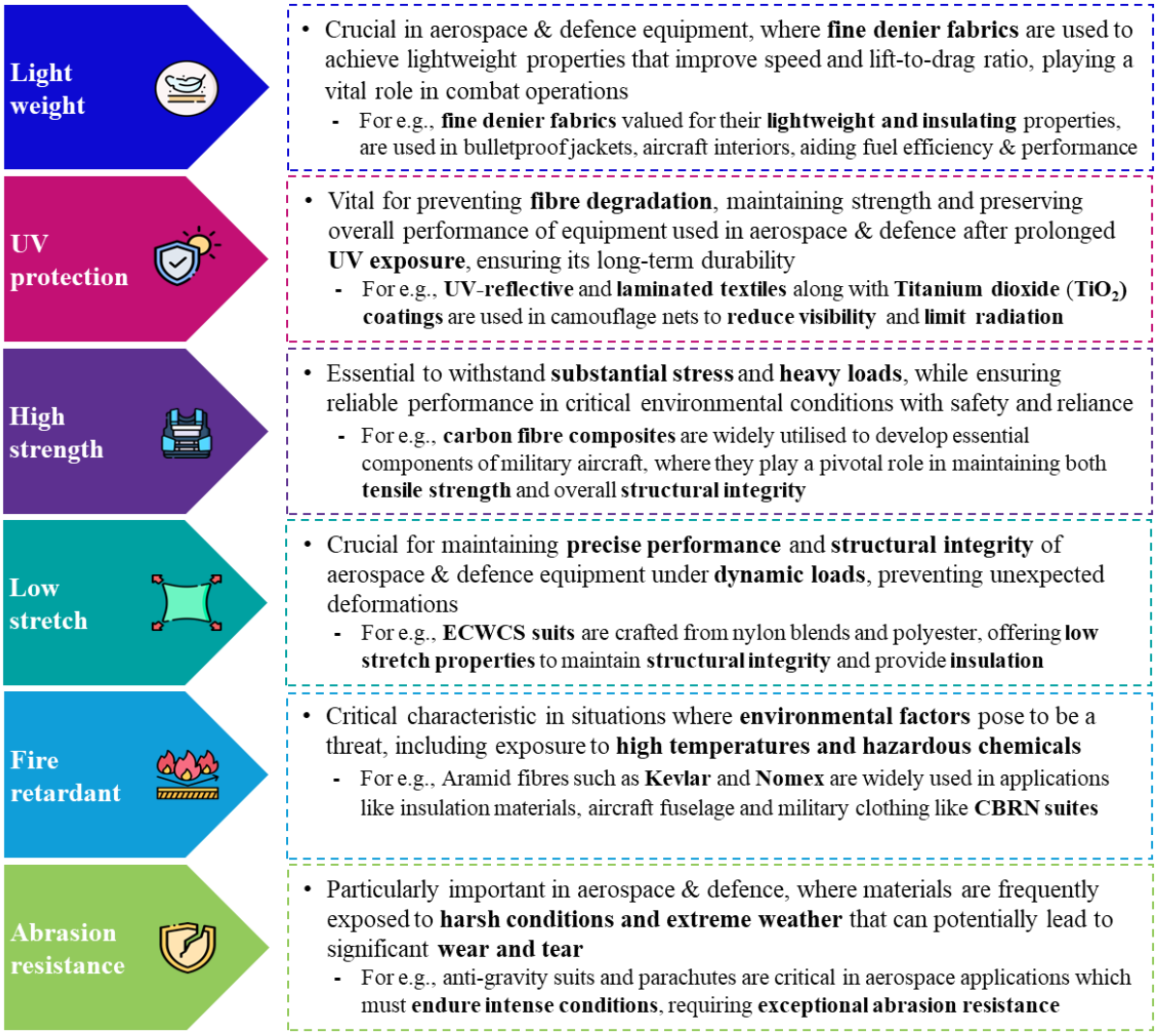
Key applications of engineered fabrics in aerospace and defence:

Engineered fabrics are critical components in the aerospace and defence industry, providing high-performance, durable, and lightweight solutions for mission-critical applications. They are used in a wide range of products, including parachute systems, paragliders, hot air balloons, and aerostats, as well as protective clothing, tactical gear, and load-carrying systems. These specialised textiles are vital for ensuring durability, safety, mobility, and adaptability in extreme operational environments, offering exceptional strength and resistance to environmental stresses

	Parameters	Definition	Key characteristic
Parachute systems & inflatables	 Parachutes	• Aerial equipment designed for **controlled descent** through the atmosphere	• Provide enhanced strength, durability, & resistance to environmental factors, ensuring **reliable deployment** and safety during descent or flight
	 Paragliders	• Aerial equipment designed for **gliding flight** through the atmosphere	• Provide strength and durability, resists environmental stresses to ensure harmless deployment, **stable flight, and safe descent**
	 Hot air balloons	• Aerial equipment designed to **control descent** or provide **sustained flight** by utilising air resistance and aerodynamic principles	• Provide uniformity, strength, and airtightness, ensuring safe and efficient flight with **controlled ascent and descent**
	 Aerostats	• **Inflatable structures** such as **balloons** or **blimps** used for sky surveillance, communication, or weather monitoring	• Provide **multi-layered laminates** to ensuring durability and resistance to harsh environmental conditions
Stealth & tactical systems	 Rain poncho	• Lightweight, **waterproof covering** designed to shield personnel and gear from rain and wet conditions	• Provides **full-body protection from rain** and stays durable even in harsh conditions
	 Bulletproof jackets	• Personal **protective gear** incorporating ballistic-resistant materials to absorb and disperse impact	• Delivers **reliable ballistic protection** while maintaining mobility, comfort, and durability
	 ECWCS	• A **three-layered clothing** system specifically designed and evaluated to provide insulation, waterproofing, strength & lightweight properties	• Superior **thermal insulation** and moisture-wicking properties to ensure protection in **extreme cold** and **high-altitude** conditions
	 High altitude & visibility clothing	• Specialized clothing engineered for operations in high-altitude, low-visibility environments	• Ensures water resistance, **abrasion resistance**, and **high-visibility markings** for safety in harsh climates
	 CBRN	• **Protective gear** designed to shield against hazardous **CBRN threats** while maintaining durability, breathability, and mobility	• Comprehensive protection from **environmental threats** while maintaining **mobility** and **breathability**
Rapid deployment systems	 Camouflage sets	• **Specialised nets** designed to **conceal** military personnel and equipment by blending with the surroundings, reducing visual & infrared detection	• Provides **stealth** and **concealment**, providing coverage against **visual** and **infrared detection** with advanced trilobal patterns and adaptive functionality
	 Rucksacks	• Heavy-duty **load-carrying packs** designed for transporting equipment and supplies	• **Ergonomic, durable**, and modular with **high load capacity** for extended operations
	 MOLLE system	• Modular Lightweight Load-Carrying Equipment system with webbing and attachment points	• Enables **customizable, secure, and adaptable gear configuration** for mission-specific needs

3.3 Key characteristics of the engineered fabric for aerospace and defence

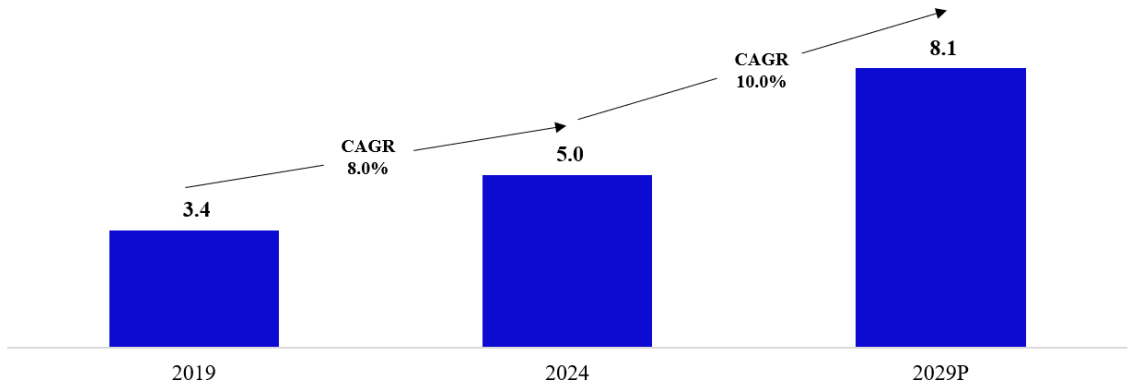
Engineered fabrics used in the aerospace and defence industry possess key characteristics that ensure optimal performance. These include lightweight characteristics for improved speed and lift-to-drag ratio, UV protection to reduce radiation and extreme heat exposure, high strength for maintaining structural integrity, and low stretch coupled with high abrasion resistance to enhance overall performance. Fabrics used in aerospace and defence applications must meet exact specifications, which require a high level of technical manufacturing expertise



3.4 Global engineered fabric market size for aerospace and defence

The global market for engineered fabric for aerospace and defence grew from US$ 3.4 billion in 2019 to US$ 5.0 billion in 2024, reflecting a CAGR of 8.0%. It is further projected to reach US$ 8.1 billion in 2029, growing at a CAGR of 10.0% between 2024-2029

Global engineered fabric market for aerospace & defence
(US$ billion, 2019-2029P)

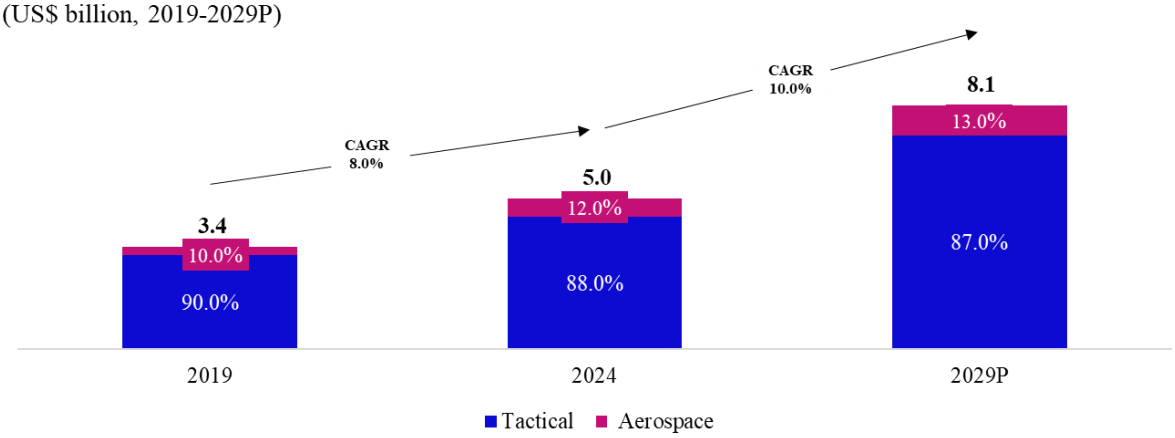


Source(s): 1Lattice analysis

3.4.1 Global market segmentation of engineered fabric for aerospace and defence – By product type

The engineered fabric market is segmented into aerospace (includes military parachutes, sports parachutes, paragliders, and inflatables) and tactical gear (includes tactical clothing, stealth systems fabric, rapid deployment systems fabric and speciality gear fabrics such as bulletproof jackets, ECWCS, high altitude & visibility clothing, CBRN, rain ponchos, etc.) based on product into aerospace and tactical. Tactical gear contributed the majority share of 88.0% in 2024, with aerospace contributing 12.0%. By 2029, tactical gear is expected to contribute 87.0%, with aerospace contributing 13.0%.

Global engineered fabric market for aerospace & defence – By product type
(US$ billion, 2019-2029P)



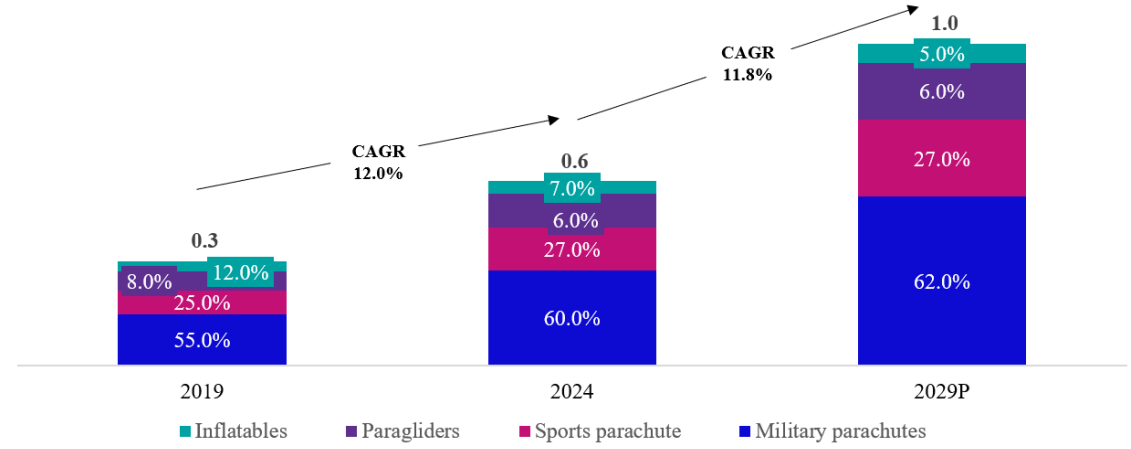
Source(s): 1Lattice analysis

Aerospace products include military parachutes, sports parachutes, paragliders, and inflatables. The global engineered fabric for aerospace products grew from US$ 0.3 billion in 2019 to US$ 0.6 billion in 2024, reflecting a CAGR of 12.0%. It is further projected to reach US$ 1.0 billion in 2029, growing at a CAGR of 11.8% between 2024-2029.

Amongst the aerospace products, military parachutes account for the majority share of approximately 60.0% in 2024, sports parachutes accounting for approximately 27.0% and followed by paragliders and inflatables at approximately 6.0% and approximately 7.0% respectively. In 2029, the share of military parachutes is expected to grow to

approximately 62.0%, with sports parachutes, paragliders and inflatables accounting for approximately 27.0%, approximately 6.0% and approximately 5.0% respectively.

Global engineered fabric market for aerospace – By product type
(US$ billion, 2019-2029P)

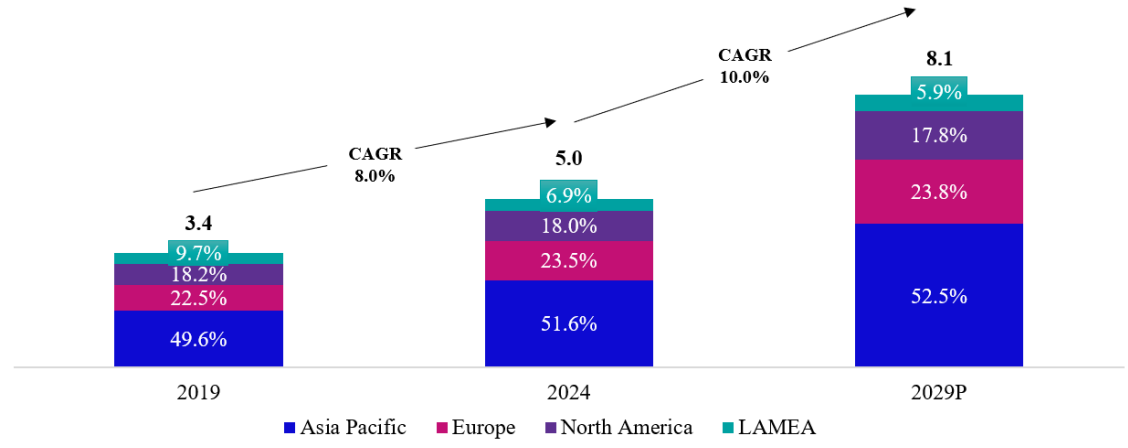


Source(s): 1Lattice analysis

3.4.2 Global market segmentation of engineered fabric for aerospace and defence – By geography

The engineered fabric market is segmented by North America, Europe, Asia Pacific, and LAMEA based on region. Asia Pacific contributed the majority share of 51.6% in 2024, followed by Europe at 23.5% and North America at 18.0%. By 2029, Asia Pacific is expected to retain its majority share at 52.5% driven by robust manufacturing capabilities and abundant raw material supply, with Europe and North America contributing 23.8% and 17.8%, respectively.

Global engineered fabric market for aerospace & defence – By geography
(US$ billion, 2019-2029P)



Source(s): 1Lattice analysis

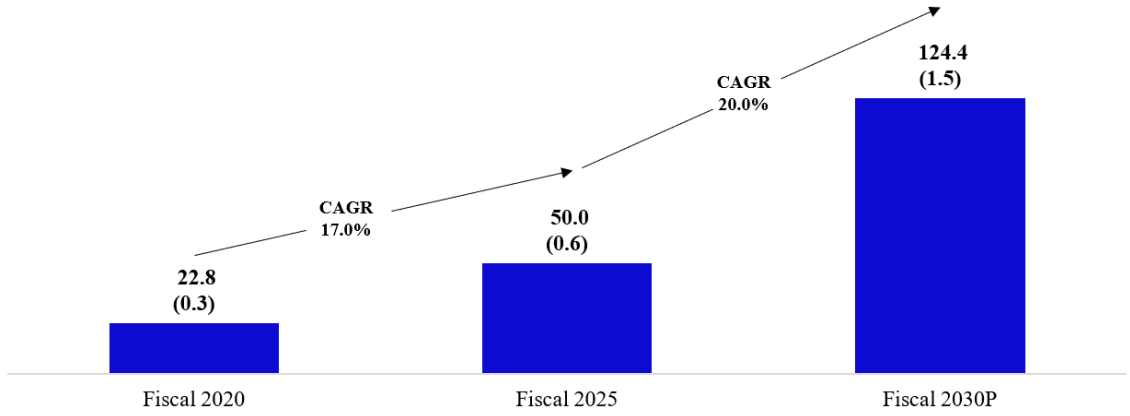
3.5 Indian engineered fabric market size for aerospace and defence

The Indian engineered fabric market for aerospace and defence, as measured by domestic consumption (including imports) and excluding exports, grew from ₹ 22.8 billion (US$ 0.3 billion) in Fiscal 2020, to ₹ 50.0 billion (US$ 0.6 billion) in Fiscal 2025, reflecting a CAGR of 17.0% during Fiscal 2020-2025. It is further projected to reach ₹ 124.4

billion (US$ 1.5 billion) in Fiscal 2030, growing at a CAGR of 20.0% during Fiscal 2025-2030. The growth in the market for aerospace and defence-related fabrics in India is being driven primarily by Indian government requirements to procure defence-related products domestically. This push for self-reliance is supported by several key government initiatives and policies aimed at boosting local manufacturing and reducing imports. The National Technical Textiles Mission (NTTM) and the "Make in India" initiative are central to this effort, promoting domestic R&D for advanced fibres like aramid and nylon and fostering the creation of indigenous machinery. The government is also driving import substitution through:

- **Collaborative R&D:** A "pooled resource approach" involves premier institutions like the Defence Research and Development Organisation (DRDO) to develop specialized fabrics for applications like protective gear.
- **Financial incentives:** To make domestic production more cost-effective, customs duties have been eliminated on certain high-speed looms, while the Basic Customs Duty (BCD) on some imported knitted fabrics has been increased to protect local manufacturers.
- **Targeted investments:** The government has approved investments under the NTTM to develop advanced textiles, such as Phase Change Material (PCM)-based activewear for military personnel operating in extreme weather conditions.

Indian engineered fabric market for aerospace & defence
(₹ billion (US$ billion), Fiscal 2020-2030P)

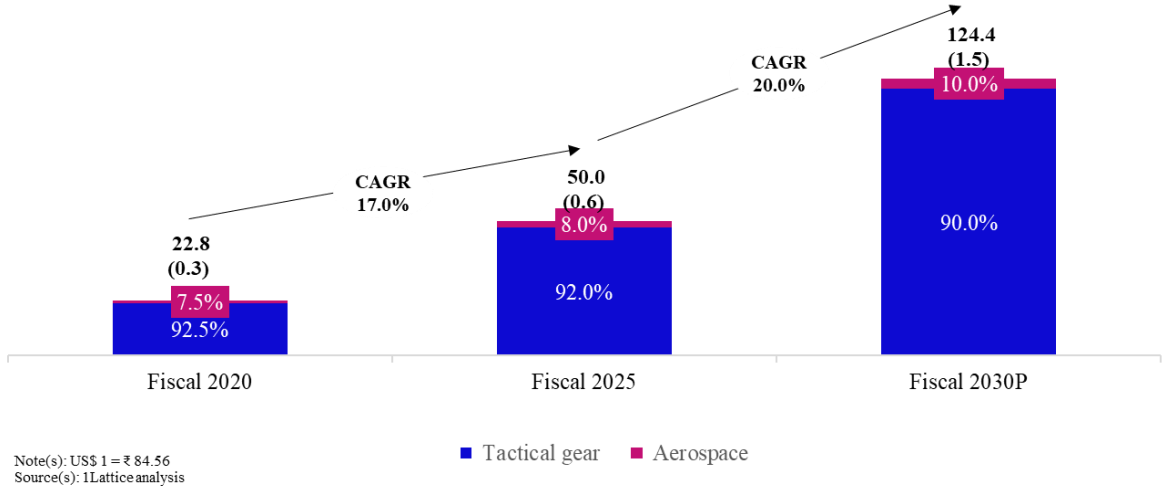


Note(s): US$ 1 = ₹ 84.56
Source(s): 1Lattice analysis

3.5.1 Indian market segmentation of engineered fabric for aerospace and defence – By product type

The engineered fabric market is segmented into aerospace (military parachutes, sports parachutes, paragliders, and inflatables) and tactical gear (includes tactical clothing, stealth systems fabric, rapid deployment systems fabric and speciality gear fabrics such as bulletproof jackets, ECWCS, high altitude & visibility clothing, CBRN, rain ponchos, etc.) based on product into aerospace and tactical. Tactical gear contributed to the majority of domestic consumption (including imports) and excluding exports, 92.5% in Fiscal 2020, with aerospace accounting for 7.5%. By Fiscal 2030, the portion of tactical gear as a percentage of domestic consumption (including imports) and excluding exports, is projected to be 90.0%, with that for aerospace being 10.0%.

Indian engineered fabric market for aerospace & defence – By product type
(₹ billion (US$ billion), Fiscal 2020-2030P)

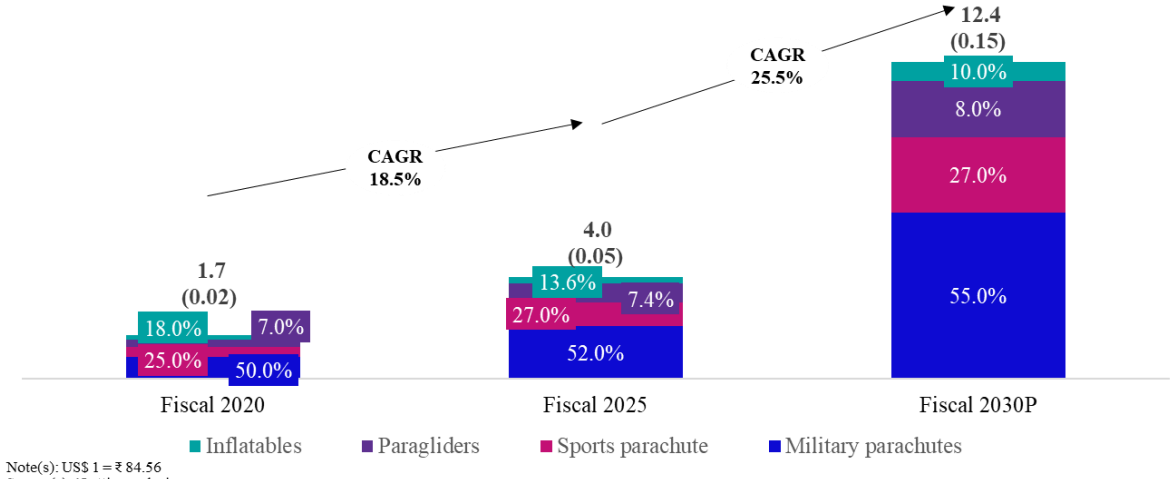


Note(s): US$ 1 = ₹ 84.56
Source(s): 1Lattice analysis

The market in India for aerospace fabrics, as measured by domestic consumption (including imports and excluding exports, is segmented into military parachutes, sports parachutes, paragliders, and inflatables based on product type. The market in India for aerospace fabrics as measured by domestic consumption (including imports and excluding exports) grew from ₹ 1.7 billion (US$ 0.02 billion) in Fiscal 2020, to ₹ 4.0 billion (US$ 0.05 billion) in Fiscal 2025, reflecting a CAGR of 18.5% during Fiscal 2020-2025. It is further projected to reach ₹ 12.4 billion (US$ 0.15 billion) in Fiscal 2030, growing at a CAGR of 25.5% during Fiscal 2025-2030.

In the aerospace fabric market, military parachutes account for the majority share of 52.0% in Fiscal 2025, sports parachutes accounting for 27.0% and paragliders and inflatables at 7.4% and 13.6%, respectively. In Fiscal 2030, the share of military parachutes is expected to grow to 55.0%, with sports parachutes, paragliders, and inflatables accounting for 27.0%, 8.0% and 10.0%, respectively.

Indian engineered fabric market for aerospace – By product type
(₹ billion (US$ billion), Fiscal 2020-2030P)



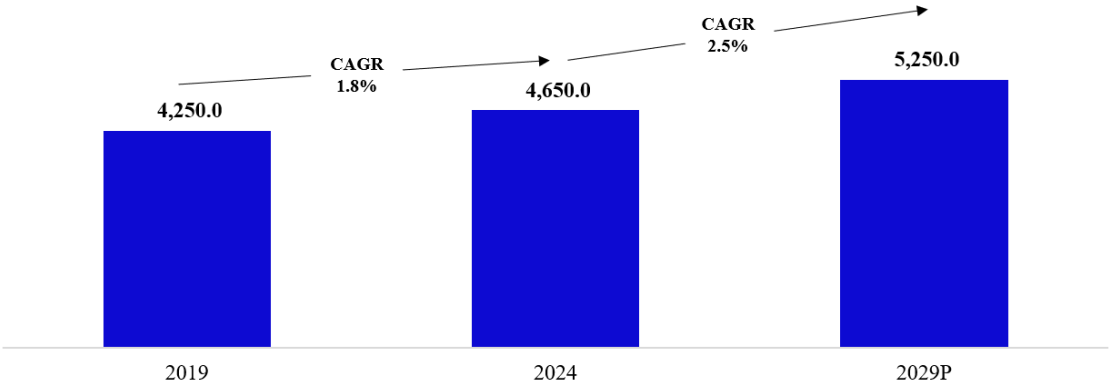
Note(s): US$ 1 = ₹ 84.56
Source(s): 1Lattice analysis

3.6 Global solutions market size for aerospace and defence solutions market

The global solutions market for aerospace and defence encompasses a wide range of end products made with engineered fabrics, including bulletproof jackets, stealth systems such as camouflage nets and other stealth gears, aerial systems such as parachutes systems, tents, rapid deployment systems such as decoys and shelters, inflatables, and personal equipment including combat uniforms, rucksacks and load-bearing equipment. Driven by advancements in material technology, increasing defence modernisation, and expanding aerospace applications, this market continues to grow as countries seek high-performance, durable, and lightweight fabric solutions for mission-critical operations.

The global solutions market for aerospace and defence grew from approximately US$ 4,250.0 million in 2019 to approximately US$ 4,650.0 million in 2024, reflecting a CAGR of 1.8%. It is further projected to reach approximately US$ 5,250.0 million in 2029, growing at a CAGR of 2.5% between 2024-2029.

Global aerospace & defence solutions market
(US$ million, 2019-2029P)

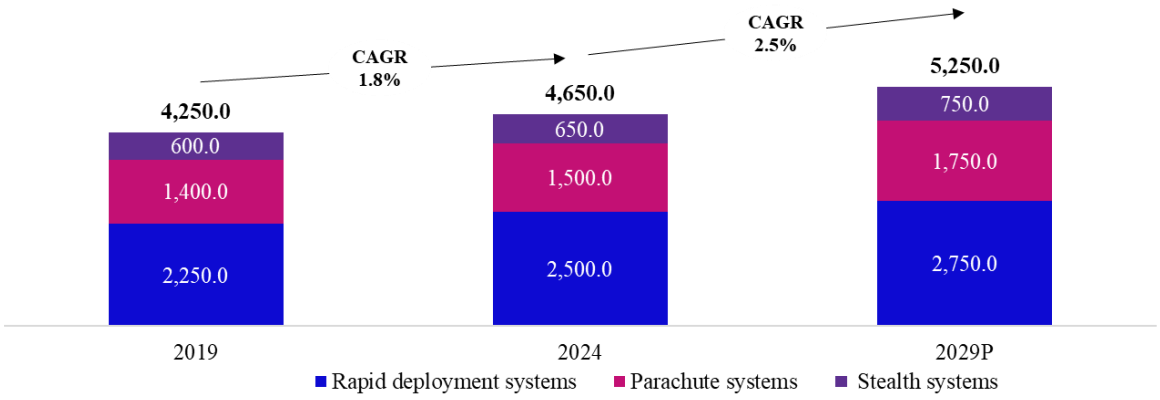


Source(s): 1Lattice analysis

3.6.1 Global solutions market size for aerospace and defence solutions market– By product type

The global market for aerospace and defence solutions is segmented by type into parachute systems, stealth systems, and rapid deployment systems. Rapid deployment systems contributed approximately US$ 2,250.0 million in 2019, followed by parachute systems contributing approximately US$ 1,400.0 million and stealth systems contributing approximately US$ 600.0 million. By 2029, rapid deployment systems are projected to reach a market size of US$ 2,750.0 million, with parachute systems and stealth systems growing to US$ 1,750 million and US$ 750 million, respectively.

Global aerospace & defence solutions market – By product type
(US$ million, 2019-2029P)



Source(s): 1Lattice analysis

3.7 Entry barriers in the engineered fabric industry for the aerospace and defence segment

Complex approval processes, stringent regulations, supply chain challenges, and market credibility issues associated with the engineered fabric market pose significant entry barriers in the engineered fabric industry. Furthermore, many customers, particularly government agencies, restrict participation in their projects to companies that meet specific qualifying criteria and mandatory certifications. For example, the market for defence fabrics and solutions, both in India and globally, is a custom solutions market in which product introduction involves working closely with the customer over a design and adoption period that can last from two to 10 years. These factors collectively make it difficult for new players to enter the market, thereby limiting its widespread adoption. The chart below describes these challenges in further detail.

Entry barrier	Description
 **Complex approval process**	• Setting up an engineered fabric manufacturing plant involves securing **multiple permits** and undergoing a rigorous **empanelment process** with stringent quality checks and repeated audits - Adhering to the industry standards like **Quality Control Orders** (QCOs) adds to these operational complexities, often resulting in long cycles of **~2-10 years** from design to adoption
 **Supply chain challenges**	• Ensuring a consistent supply of **high-quality raw materials** poses to be a challenge for new entrants, with **limited vendors** supplying their proprietary fabrics to pre-existing **industry partners** • **Dependence on imports** for specialty fibers further disrupts the supply chain, creating a substantial barrier to entry
 **Market credibility issues**	• Gaining **market credibility** is a significant challenge, as the aerospace & defence industry is primarily dominated by established players with long-standing **customer relationships** and **proven track records** - Customers stick to **pre-approved suppliers,** with proven track records, creating barriers for new entrants and making it difficult for them to **gain traction**
 **Challenging production process**	• Fabrics for aerospace and defence applications should **meet exact** and often **technically demanding specifications**, which require a high level of technical manufacturing expertise and advanced weaving technology, so that customised solutions with specified functional requirements across varied applications can be delivered - Solutions offered by engineered fabric products are **highly complex** in nature, with only a **few number** of players possessing the required **capabilities** & **expertise** to serve each customer with **customised** requirements - Military fabrics, for example, have to be customised for their use in hazardous conditions, including for durability, comfort and performance

3.8 Trends in the engineering fabrics and solutions industry for aerospace and defence

The engineered fabrics and solutions market is evolving significantly in the aerospace and defence industry. Key trends include continuous enhancements in products, with emphasis on both cost-efficiency and quality. There is a noticeable shift in manufacturing processes, driven by the incorporation of innovative materials and composites, alongside a growing emphasis on sustainable manufacturing practices. Additionally, the adoption of lightweight materials has led to increased operational efficiency, enabling reductions in MRO costs. These transformations are shaping a more advanced and cost-effective future for the industry. The chart below describes these trends in further detail.

Key trends

Product improvement

- Integration of **materials** known for their exceptional strength-to-weight ratio, fatigue resistance, and thermal properties, has greatly **enhanced products** in the aerospace & defence industry, leading to light weight amd high-performance solutions
  - Specialised materials like **meta-aramids** are increasingly incorporated into **personal protective equipment** to provide enhanced softness amd flexibility
  - **Vectran fibre** is used for aerospace components such as **inflatable habitats** amd **parachutes**, providing improved strength, cut and heat resistance
- Use of **smart materials** with capabilities to respond and adapt to **environmental stimuli** is further enhancing the products in aerospace & defence by leveraging **adaptive fabrics** for diverse applications
  - For e.g., "**nanotech armour and smart suits**" are built to detect **NBC threats**, along with wearable electronics to communicate with net centre rooms (centralised control stations)

Manufacturing shift

- Growing demand for **lightweight materials**, particularly in the aerospace industry, has driven manufacturers to prioritise lighter equipment to enhance **fuel efficiency**
  - Similar surge is observed in the defence sector, with rising demand for lightweight protective gear, designed for improved mobility and comfort in prolonged usage
  - For e.g., manufacturers are designing **CBRN suits** using lightweight fabrics to enhance comfort, while their **ergonomic design** ensures postural stability without compromising performance
- Increasing **environmental concerns** and **stricter regulations** are driving manufacturers to prioritise the use of recyclable and eco-friendly materials
  - Initiatives like those from the **AFRA** are leading the charge, setting standards to ensure that **85-90%** of an aircraft's weight can be **recycled or reused** after dismantling
  - Such initiatives highlight a **collective shift** towards the widespread adoption of **greener & sustainable** fabrics in the aerospace & defence industry

Increased efficiency

- Engineered **coated fabrics** are largely used in aerospace applications to provide durability against UV exposure & harsh temperatures, which helps in **reducing wear and tear**, enhancing safety and longevity of components
- Development of self-healing and adaptive polymers in aerospace applications is further transforming aircraft maintenance by lowering costs and improving efficiency
  - For e.g., **EU funded HIPOCRATES project** has made several composites with epoxy based self-repairing polymers to reduce **MRO costs**
- Similar adoption of engineered fabrics with light weight and high strength properties is visible in defence industry, with protective gear and ballistic armors increasingly adopting such fabrics
  - Engineered fabrics enhanced with materials such as **graphene and metamaterials** are being incorporated to improve performance of protective clothing like bulletproof vests and combat uniforms

3.9 Export opportunities for the Indian engineered fabrics market in aerospace and defence

India is strategically positioned to seize significant opportunities in engineered fabric exports due to the following factors, amongst others:

- **Large-scale polyester production:** India is the second-largest producer of man-made fibres (MMFs), particularly polyester, worldwide. It is well-positioned to meet the growing demand for lightweight and durable fabrics essential in aerospace and defence applications. These fabrics, crucial for products ranging from aircraft interiors to military protective gear, offer strong export potential for India in engineered fabrics in global markets.

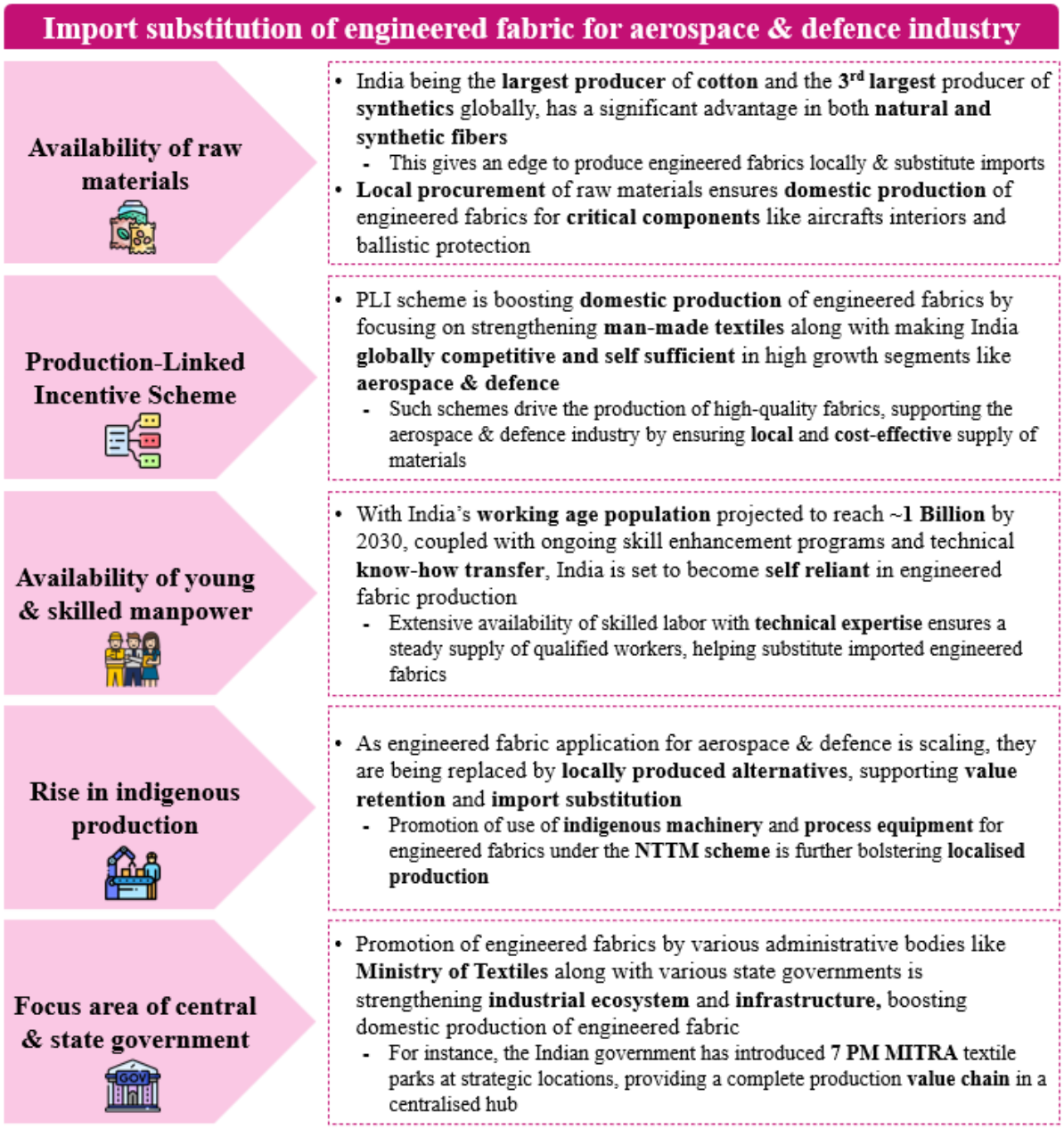
- **Government initiatives:** The government of India has introduced several initiatives to boost the export of engineered fabrics, which is vital for both the aerospace and defence sectors. The National Technical Textiles

Mission (NTTM) scheme is a key initiative that focuses on research and development, promotion and market development, export promotion, and skill development. Under this scheme, the Synthetic and Rayon Textiles Export Promotion Council (SRTEPC) has been assigned the role of "Export Promotion Council" to actively promote engineered fabrics in global markets. This initiative is particularly important for the aerospace and defence industries, where high-performance fabrics are increasingly in demand. Furthermore, the government has proposed to set up 7 Mega Investment Textiles Parks (PM-MITRA), aimed at creating a level playing field for domestic manufacturers to compete internationally. These efforts will help India strengthen its position in the global aerospace and defence supply chains, supporting both innovation and competitiveness.

- **Strategic partnerships:** As India strengthens its strategic partnerships with key countries like the United States, the United Kingdom, European nations, Israel, and Taiwan to supply aerospace and defence equipment like personal protective gear, it is poised to meet the increasing demand for high-performance engineered fabrics used in such applications. These economies, facing rising geopolitical tensions, generate consistent demand for specialised engineered fabrics and solutions such as composite fabrics and insulation materials. India's growing role as a supplier to these countries will significantly enhance its export opportunities in the global aerospace and defence industry.

3.10 Import substitution of engineered fabric for the Indian aerospace and defence industry

India is making significant strides in substituting imports of engineered fabrics for domestic aerospace and defence production, driven by several key factors. These include the availability of raw materials, which provide an edge in developing cost-effective, high-quality fabrics; production-linked schemes promoting localised manufacturing; a young and skilled workforce with technical expertise; increasing indigenous production; and strong government initiatives supporting the sector. Together, these elements pave the way toward greater self-reliance in engineered fabric production.



3.11 Case study for aerospace and defence solutions – SMPP Limited

SMPP Limited is an Indian designer and manufacturer of defence equipment including ammunition components, personal protection products and protection kits for land, air and sea platforms. Founded in 1985, SMPP Limited has evolved into a market leader for personal ballistic protection products made of composites, in terms of value of domestic government orders awarded in Fiscal 2024. SMPP Limited's customer base includes armed forces, the police, the paramilitary and other security forces. In the near future, SMPP Limited plans to establish a new facility which is anticipated to be the largest private-sector ammunition manufacturing site in India, covering an area of 800 acres. The company achieved approximately ₹ 5 billion in revenue from the sale of products in Fiscal

2024, bring it to a CAGR of approximately 23% from Fiscal 2021-2024 in terms of revenue from the sale of products.

After SMPP Limited's incorporation in 1985, it received its first customer order in defence manufacturing for the supply of semi-combustible cartridge cases of 120 mm and 125 mm in 1991. Since then, it has expanded into manufacturing combustible cartridge cases and components requiring explosive raw material, and certain protection products such as bulletproof jackets, vests, helmets panels and plates. In 2018, SMPP Limited received an order for 186,138 bullet resistant jackets under a government contract, which it fulfilled in 2022. In 2023, its subsidiary was also issued an Arms License by the DPIIT to undertake manufacturing of 125 mm, 125 mm mortar, 120 mm tank, 81 mm, 155 mm, 130 mm, 105 mm, 40 mm and 30 mm ammunitions.

4 Overview of the industrial and automotive industry

Industrial and automotive applications are fundamental to global economic development and drive efficiency, innovation, and sustainability across various sectors. From manufacturing to construction, these applications integrate advanced technologies and processes to optimise production, improve quality, and reduce environmental impact. Mechanical Rubber Goods (MRGs), including drive belts, hoses, tapes (such as tapes for the leather and shoe industries, and tapes used for insulation), seals and gaskets, amongst others, play a critical role in industries such as automotive, construction, aerospace, and industrial machinery, ensuring durability and performance. As industries continue to evolve, the adoption of automation, smart systems, and sustainable practices is reshaping traditional operations, enabling businesses to enhance productivity and remain competitive in an increasingly dynamic market. Inflatables, which include products like airbags, aircraft evacuation slides, rescue boats, and inflatable habitats, are crucial air-holding structures. They play a vital role in safety, rescue, and operational support, where engineered fabrics ensure they are lightweight and can be compactly stored, yet offer the strength and reliability needed for rapid deployment and performance in critical situations.

In the automotive sector, industrial applications streamline manufacturing processes through precision engineering, robotics, and automated assembly lines, ensuring high-quality production while reducing costs. The shift toward EVs has further introduced new manufacturing techniques and material innovations to enhance vehicle performance, efficiency, and safety. Automotive tapes (including wire harness tapes), used for bonding, insulation, and vibration dampening, support lightweight vehicle design and improve assembly efficiency. Similarly, roof liners, which enhance vehicle aesthetics and reduce noise, are increasingly being developed using sustainable and lightweight materials. Snow socks, a winter traction device that cover tyres by replacing heavy metal chains with lightweight textile alternatives, are also gaining traction. Hoses, essential for fuel, coolant, and hydraulic systems, contribute to the efficiency of both ICEs and EVs. Additionally, peel-ply, widely used in composite manufacturing, is crucial in automotive and aerospace applications for improving adhesion and surface preparation in high-strength bonding.

4.1 Key growth drivers and trends of industrial and automotive applications

Industrial and automotive applications are witnessing key growth drivers and trends. The increased adoption of connected technologies and smart automation is boosting demand for engineered fabrics production in India. This is further supported by government regulations and infrastructure development aimed at enhancing domestic production. These government-led initiatives are themselves bolstered by the diversification of supply chains by major global manufacturers of end-products that use engineered fabrics, which increases the inflow of investments and the resilience of the domestic market whilst reducing import dependence. The industry is also seeing strong shifts towards sustainability and green innovations, along with new manufacturing techniques enabling an increased degree of product customisation and the use of advanced materials. For more details on these key growth drivers and trends, please see the following chart.

Key growth drivers & trends for industrial applications

Connected technologies & smart automation

- Automotive industry is shifting towards connected technologies by increasingly employing engineered fabrics for diverse applications like smart seating and upholstery, lighting and connectivity due to their lightweight, pressure resistant and conductive properties
- Engineered fabrics with embedded sensors are deployed to detect occupant pressure, posture & fatigue, supporting safety systems like airbags and seatbelt alerts

Government regulations & infrastructure growth

- Government initiatives like "Make in India" aimed at indigenous production are significantly enhancing the domestic production of engineered fabrics in India
- Increased investment in textile parks and development of world-class infrastructure is significantly accelerating the domestic production
  - Diversification of supply chains by major global manufacturers of end-products using engineered fabrics is further increasing the investments, resilience and reducing import dependency

Sustainability & green innovations

- Eco-friendly materials such as biodegradable plastics, recycled metals, and bio-based composites are being adopted across industries to reduce environmental impact and promote circular economy practices
- Energy-efficient solutions, including renewable energy integration, advanced insulation in construction, and resource-efficient manufacturing techniques, are helping industries reduce carbon footprints and optimise energy consumption

Customisation & new manufacturing techniques

- 3D printing and flexible production systems are enabling mass customisation, reducing lead times, minimising material wastage, and supporting on-demand manufacturing across sectors like healthcare, automotive, and aerospace
- Collaborative robots (cobots) and AI-driven supply chain management are optimising industrial processes by improving worker safety, enhancing precision in assembly lines, and ensuring efficient inventory and logistics management

Advanced material usage

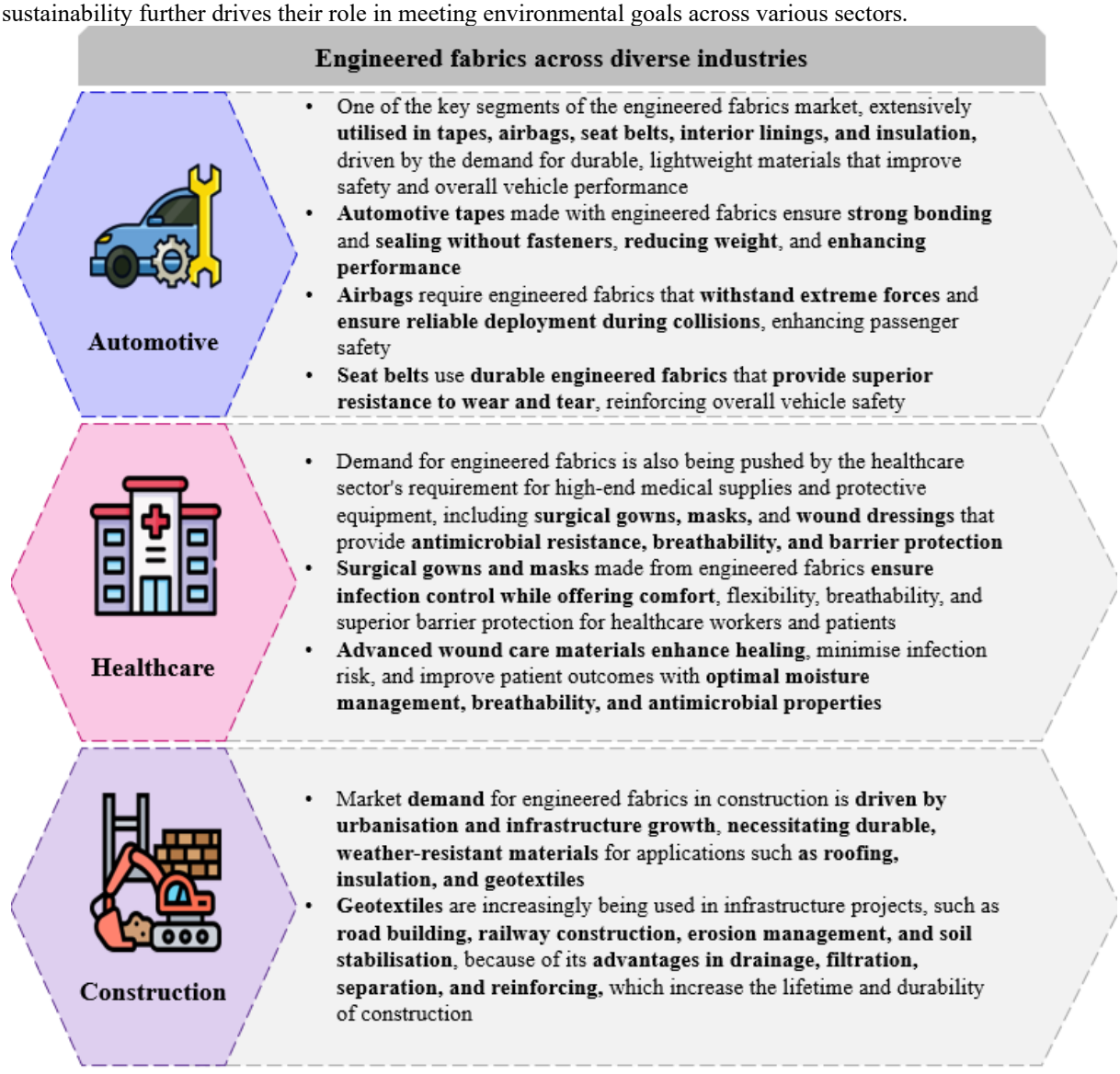
- Lightweight composites, including carbon fiber and advanced alloys, are improving fuel efficiency and durability in automotive, aerospace, and construction industries while reducing material costs and environmental impact
- Smart and self-healing materials, such as shape-memory polymers and bioengineered coatings, enhance performance in infrastructure, medical devices, and electronics by offering longer lifespans and reducing maintenance requirements

4.2 Overview of the engineered fabric market for industrial and automotive applications

The engineered fabric market for industrial and automotive applications is characterised by its focus on high-performance materials tailored to specific needs. The engineered fabrics market spans multiple sectors, including automotive, healthcare, and construction, with examples of the applications of engineered fabrics in these sectors as follows:

- The automotive industry incorporates these fabrics in tapes, airbags, seat belts, interior linings, drive belts, and insulation, driven by the need for lightweight, high-strength materials that enhance safety and vehicle performance.
- The healthcare industry relies on them for medical equipment coverings, surgical drapes, and wound dressings, benefiting from their antimicrobial properties, fluid resistance, and ease of cleaning.
- In the construction industry, engineered fabrics are used in roofing, insulation, and geotextiles, offering superior resistance to weathering, tearing, and abrasion.

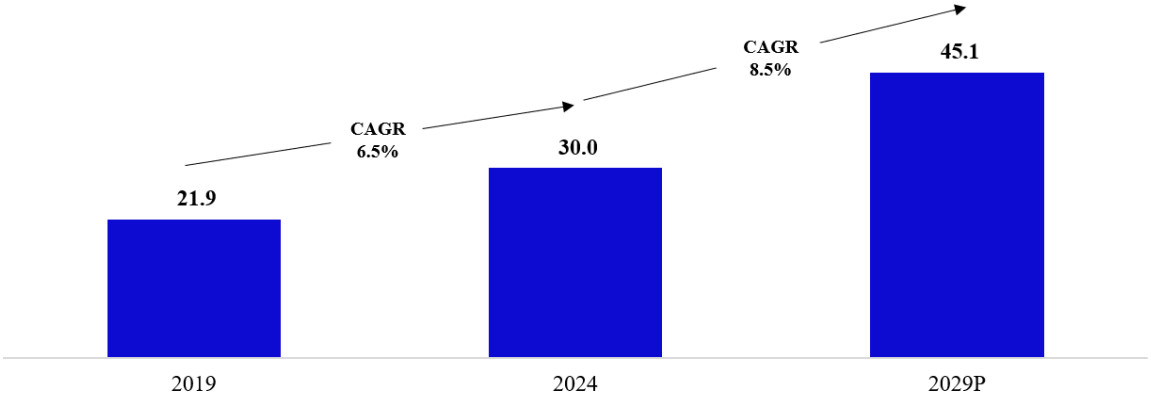
As technology advances, new applications for engineered fabrics continue to emerge, while increasing emphasis on sustainability further drives their role in meeting environmental goals across various sectors.



4.3 Global engineered fabric market size for industrial and automotive applications

The global market for engineered fabric for industrial and automotive applications grew from US$ 21.9 billion in 2019 to US$ 30.0 billion in 2024, reflecting a CAGR of 6.5%. It is further projected to reach US$ 45.1 billion in 2029, growing at a CAGR of 8.5% between 2024-2029.

Global engineered fabric market for industrial & automobile
(US$ billion, 2019-2029P)

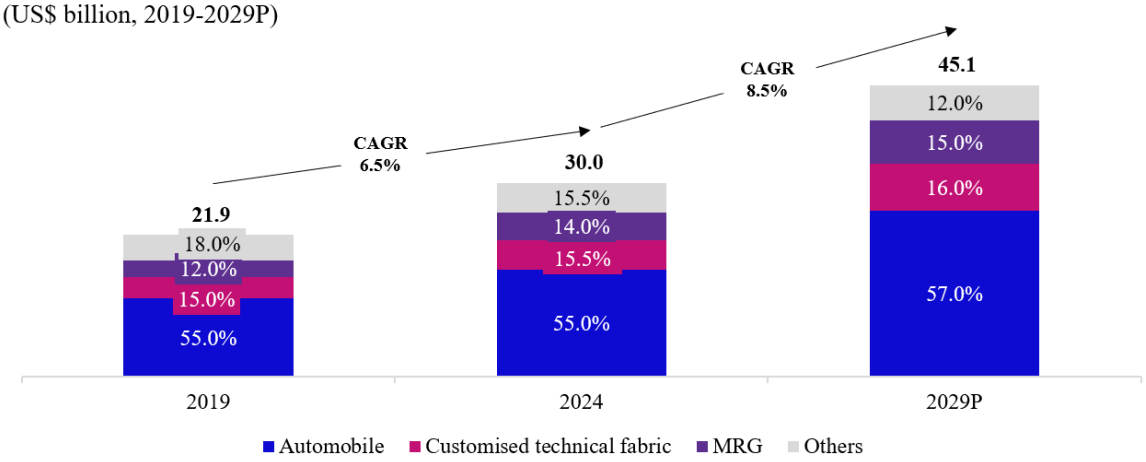


Source(s): 1Lattice analysis

4.3.1 Global market segmentation of engineered fabric for industrial and automotive applications – By product

The engineered fabric market for industrial and automotive applications is segmented into automobiles, MRG and customised technical fabric based on product. Automobiles (including applications such as automotive wire harness tapes) contributed the majority share, which stood at 55.0% in 2024, whereas customised technical fabric stood at 15.5%, MRG fabric at 14.0% and other products (filtration fabrics, bolting cloth, coated abrasives, etc.) stood at 15.5%. By 2029, automobile fabric is poised to capture 57.0% of the market, with customised technical fabric and MRG fabric contributing 16.0% and 15.0%, respectively, while others stood at 12.0%. The market for inflatables is a global market where only a few companies enjoy a quasi-monopoly, making it ripe for disruption as customers look for alternate sources.

Global engineered fabric market for industrial & automobile – By product
(US$ billion, 2019-2029P)

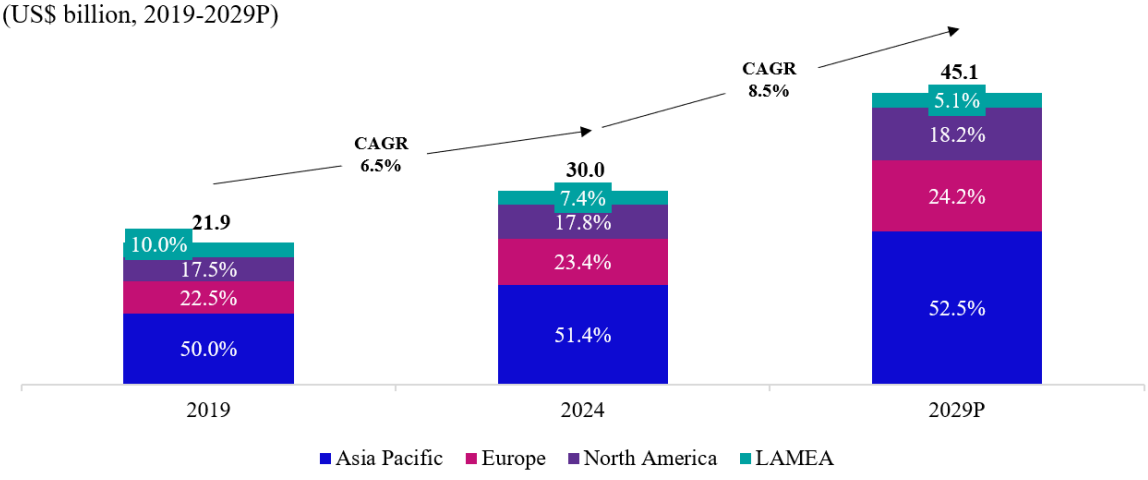


Source(s): 1Lattice analysis

4.3.2 Global market segmentation of engineered fabric for industrial and automotive applications – By geography

The engineered fabric market for industrial is segmented into North America, Asia Pacific, Europe, and LAMEA based on geography. Asia Pacific contributed the majority share of 51.4% in 2024, followed by Europe at 23.4% and North America at 17.8%. LAMEA contributed 7.4% to the market. By 2029, Asia Pacific is poised to capture 52.5% of the market, with Europe and North America contributing 24.2% and 18.2%, respectively. The Asia Pacific region leads the global engineered fabric market due to its booming automotive and industrial sectors, strong manufacturing base, and significant urbanisation and economic growth.

Global engineered fabric market for industrial & automobile – By geography
(US$ billion, 2019-2029P)

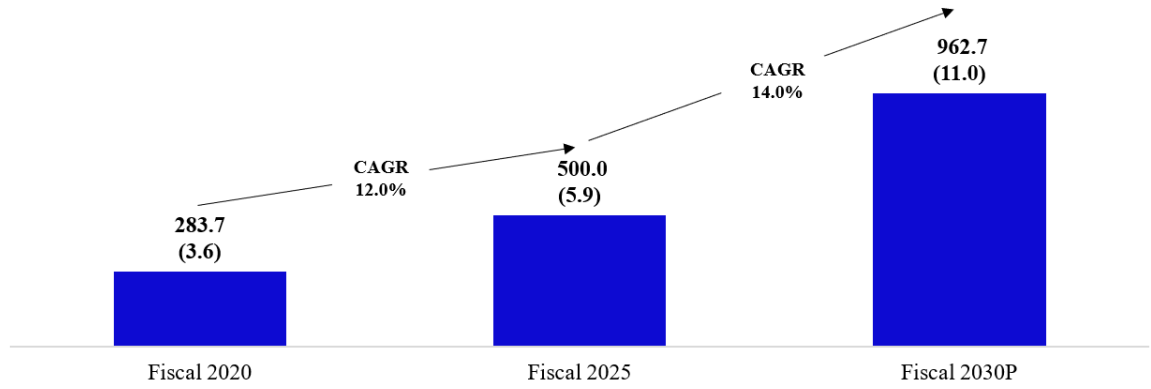


Source(s): 1Lattice analysis

4.4 Indian engineered fabric market size for industrial and automotive applications

The Indian engineered fabric market for industrial applications, as measured by domestic consumption (including imports) and excluding exports, grew from ₹ 283.7 billion (US$ 3.6 billion) in Fiscal 2020, to ₹ 500.0 billion (US$ 5.9 billion) in Fiscal 2025, reflecting a CAGR of 12.0%. It is further projected to reach ₹ 962.7 billion (US$ 11.0 billion) in Fiscal 2030, growing at a CAGR of 14.0% between Fiscal 2025 - 2030.

Indian engineered fabric market for industrial & automotive
(₹ billion (US$ billion), Fiscal 2020-2030P)

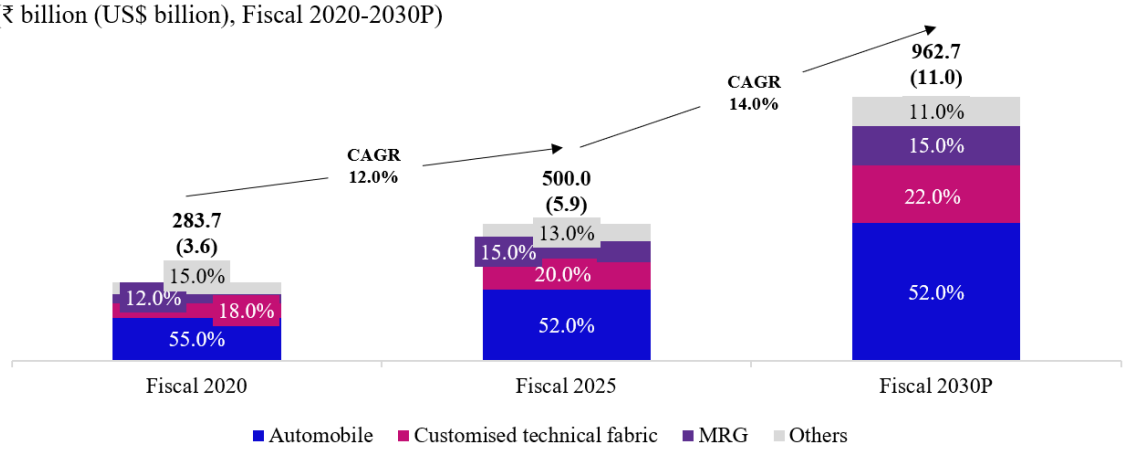


Note(s): US$ 1 = ₹ 84.56
Source(s): 1Lattice analysis

4.4.1 Indian market segmentation of engineered fabric for industrial and automotive applications – By products

The engineered fabric market in India is segmented into automobiles, MRG and customised technical fabric based on product. Automobiles contributed to the majority share of domestic consumption (including imports and excluding exports), with a share of approximately 52.0% in Fiscal 2025, followed by customised technical fabric at approximately 20.0% and MRG at approximately 15.0%. In Fiscal 2030, the market share attributable to the automobile segment is poised to remain at approximately 52.0%, with that for customised technical fabric and MRG contributing approximately 22.0% and approximately 15.0%, respectively.

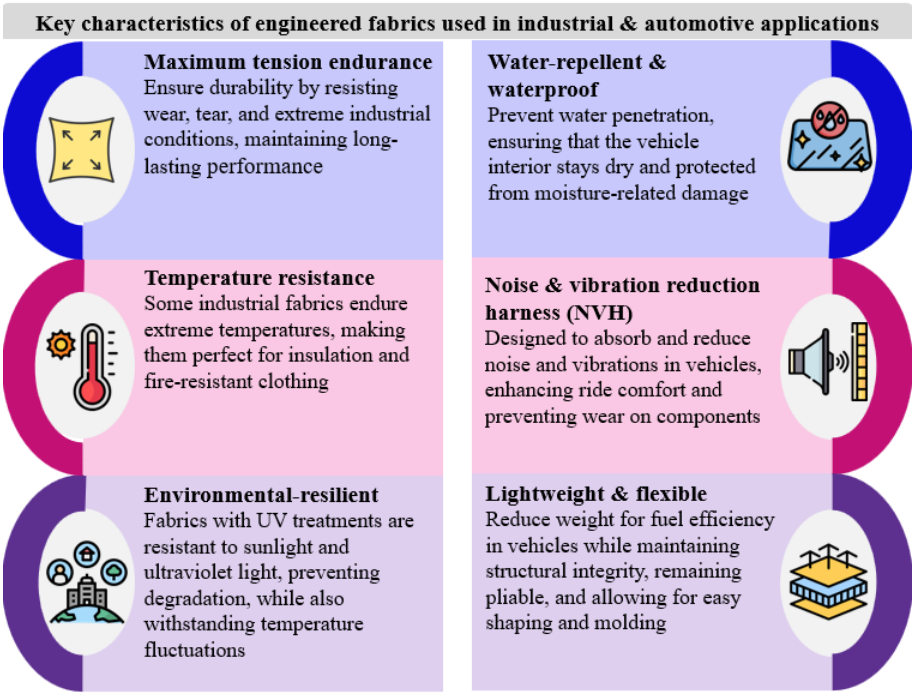
Indian engineered fabric market for industrial applications – By product
(₹ billion (US$ billion), Fiscal 2020-2030P)



Note(s): US$ 1 = ₹ 84.56
Source(s): 1Lattice analysis

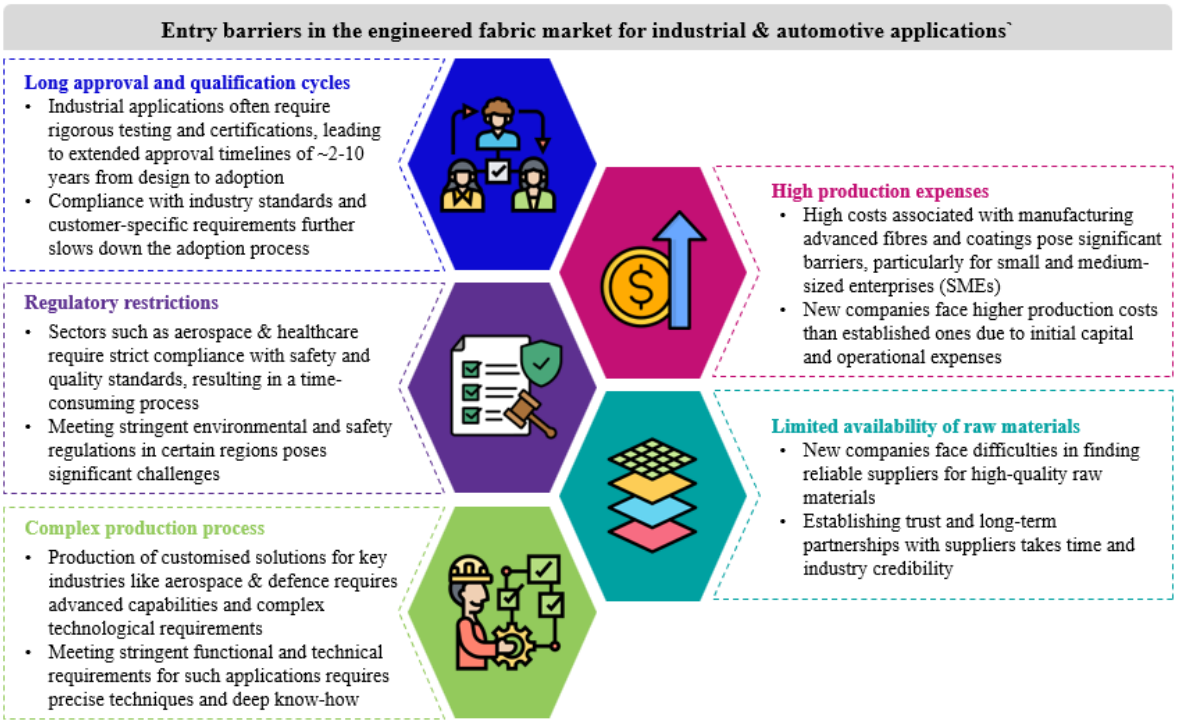
4.5 Key characteristics of engineered fabrics used in industrial and automotive applications

Engineered fabrics for industrial and automotive applications are designed with key characteristics such as high tensile strength for durability in extreme conditions, temperature resistance for insulation and fire resistance, and environmental resilience to withstand UV exposure and temperature fluctuations. These fabrics are lightweight and flexible, helping to reduce overall vehicle weight. Additionally, they are water-repellent and waterproof to prevent moisture damage. Noise and vibration reduction (NVH) designs improve ride comfort and minimise wear on vehicle components, ensuring enhanced performance and reliability across various industries.



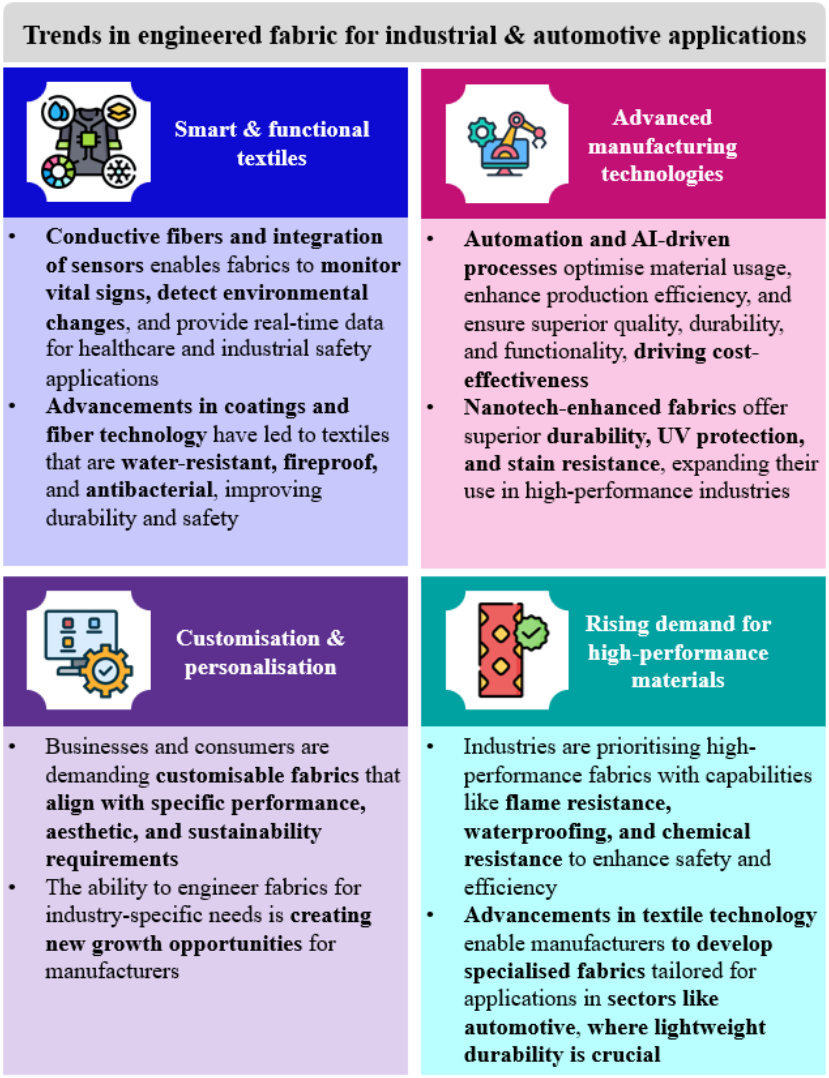
4.6 Entry barriers in the engineered fabric market for industrial and automotive applications

Key entry barriers in the engineered fabric market for industrial and automotive applications include long qualification and approval cycles, regulatory restrictions, high production expenses, complex production processes and the limited availability of raw materials. The latter three in particular hinder manufacturing efficiency and scalability. These factors present high entry barriers and significant obstacles for new businesses entering the industry. These factors also contribute to business stability and customer stickiness.



4.7 Key trends in the engineered fabric market for industrial and automotive applications

Key trends in the engineered fabric market for industrial and automotive applications include the emergence of smart and functional textiles. Advanced manufacturing technologies, including automation and nanotechnology, are improving efficiency, durability, and cost-effectiveness. Furthermore, the increasing customisation and personalisation of fabrics tailored to specific industry needs is driving new growth opportunities. The rising demand for high-performance materials with properties like flame resistance and waterproofing is fuelling innovation in sectors such as automotive and healthcare.



4.8 Export opportunities from India for engineered fabric for industrial and automotive applications

There are several promising opportunities for exporting engineered fabrics for industrial and automotive applications from India, driven by factors such as:

- **Diverse applications:** Engineered fabrics, designed for functions like protection, filtration, medical use, insulation, reinforcement, and sound absorption, are witnessing rising demand. With applications across healthcare, automotive, construction, and more, this high-margin, high-growth sector presents a strong opportunity for Indian manufacturers.
- **Supportive government regulations:** The National Technical Textiles Mission aims to position India as a global leader in technical textiles, with export promotion as one of its key components. This initiative targets an average annual export growth of 10-12%. To support this, the Synthetic and Rayon Textiles Export Promotion Council (SRTEPC), now MATEXIL, has been designated as the Export Promotion Council for technical textiles.
- **Rising global demand across industries:** The global engineered fabric market is undergoing a significant transformation, driven by innovations in material science, sustainability efforts, and rising demand in key sectors such as automotive and healthcare. Demand for medical textiles, speciality fabrics, industrial fabrics, protective textiles, and agricultural textiles is fuelled by the rapid growth of engineered fabrics in industries

like automotive, healthcare, oil and petroleum, infrastructure, and construction. Looking ahead, the market is expected to experience a major shift with the increasing adoption of smart textiles and bio-based fabrics, offering enhanced functionality and environmental benefits. As industries increasingly seek efficient, durable, and eco-friendly solutions, the demand for high-performance textiles will continue to rise, creating new opportunities for manufacturers.

4.9 Import substitution for engineered fabric for domestic, industrial, and automotive applications

India is making significant strides in replacing imports of engineered fabrics with domestic production for industrial and automotive applications. These efforts, outlined below, position India as a global leader in technical textiles, driving innovation, self-reliance, and sustainable growth.

- **Advancements in research and development:** India has made significant strides in advancing research and development for engineered fabrics through a collaborative 'pooled resource' approach, involving premier institutions like CSIR laboratories, IITs, DRDO, ICAR, and others. Fundamental research focuses on developing high-performance fibres, sustainable materials, and advanced coating technologies, while application-based research targets specific industrial needs such as automotive textiles, medical textiles, protective gear, and geotextiles. This interdisciplinary framework, supported by government initiatives and oversight from the Mission Steering Group, enables India to innovate, reduce import dependency, and develop customised solutions for sectors like healthcare, agriculture, and infrastructure.
- **Government initiatives and policies:** The Indian government has introduced several initiatives, such as the National Technical Textiles Mission (NTTM), to boost the domestic production of engineered fabrics. These efforts include R&D for advanced fibres like carbon, aramid, nylon, UHMWPE, and their composites, as well as applied research in agro-textiles, geotextiles, medical textiles, mobile textiles, and sports textiles with a focus on sustainability. The government also promotes skill development, creates indigenous machinery in line with the "Make in India" initiative, and fosters innovation among young graduates through startups and ventures. To further enhance domestic production, the budget has exempted two types of shuttleless looms, Rapier Looms (below 650 meters per minute) and Air Jet Looms (below 1,000 meters per minute), from customs duty, reducing it from 7.5% to zero, which is expected to lower production costs and improve the quality of high-value textile products. Additionally, the Basic Customs Duty (BCD) on knitted fabrics has been revised, increasing it from "10% or 20%" to "20% or ₹ 115 per kg, whichever is higher," aiming to curb cheap imports and provide relief to domestic manufacturers, particularly in textile hubs like Surat and Ludhiana.
- **Technological advancements:** Nanotechnology is transforming smart textiles by enhancing properties such as antimicrobial resistance, self-cleaning, UV protection, fire retardancy, and energy harvesting, with the potential for new applications across various industries, including sports and defence. In a significant move, the Indian government has approved an approximately ₹ 255 million (approximately US$ 3 million) investment under the National Technical Textiles Mission (NTTM) to develop Phase Change Material (PCM)-based activewear in collaboration with IITs, focusing on climate-adaptive clothing for military personnel facing extreme weather conditions. Meanwhile, E-textiles are gaining traction in sports and fitness for bio-signal monitoring to improve performance and prevent injuries, though seamless integration remains challenging, with most designs still depending on detachable modules.

4.10 Case study for industrial and automotive applications – Garware Technical Fibres Limited

Founded in 1976, Garware Technical Fibres Limited is a leading Indian manufacturer of technical textiles, specialising in products like high-performance fishing nets, aquaculture cages, geosynthetics, and coated fabrics. It boasts a diverse solutions portfolio with its products spanning defence, transport, sports, shipping and offshore, and industrial applications, amongst others. The company reached ₹ 15.4 billion in revenue from operations in Fiscal 2025, which reflected a a CAGR of 9.0% from Fiscal 2022-2025.

Garware Technical Fibres Limited is recognised as a Four Star Export House by the DGFT, Ministry of Commerce, Government of India. It has also been granted 28 patents and has a product portfolio of over 20,000 SKUs.

5. Overview of the outdoor and lifestyle industry

The outdoor and lifestyle industry is driven by innovation, performance, and evolving consumer preferences across recreation, sports, and everyday essentials. From apparel and footwear to outdoor gear and accessories, this sector focuses on enhancing durability, comfort, and functionality. Advanced materials, ergonomic designs, and smart features are shaping products that cater to both active lifestyles and everyday convenience.

In outdoor recreation, developments in lightweight gear, high-performance fabrics, and weather-resistant materials enhance comfort and safety. Lifestyle products, including smart wearables, activewear, and travel essentials, integrate modern designs and advanced functionality to enhance user experience. Footwear is evolving with shock-absorbing soles and breathable materials for better support, while backpacks and travel gear incorporate smart storage solutions and durable finishes for long-lasting use. As consumer expectations rise, brands continue to refine their offerings with cutting-edge technology and superior artisanship, ensuring style, comfort, and practicality across various activities.

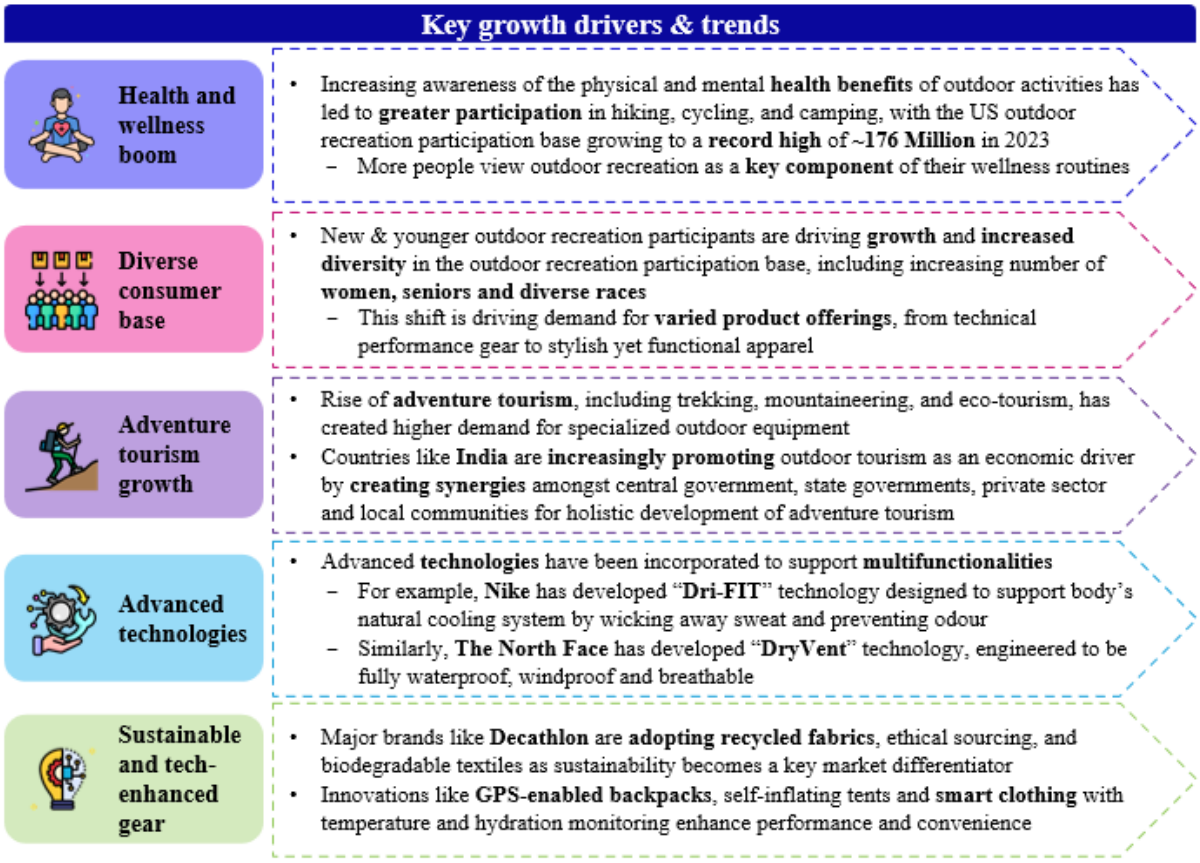
The outdoor and lifestyle industry encompasses a diverse range of products designed to withstand demanding environments while ensuring durability, comfort, and performance. These applications cater to outdoor enthusiasts, professionals, and adventure seekers, integrating materials that offer weather resistance, lightweight properties, and enhanced functionality.

Key applications:

- **Apparels**: Performance garments made from engineered knits/wovens (polyester, nylon, merino blends) and laminated membranes (ePTFE/PU) with stretch fibres and functional finishes (Durable Water Repellent (DWR), UV, antimicrobial), providing moisture management, weather protection, durability, and thermal regulation for activewear, uniforms, and PPE
- **Footwear:** Shoe uppers and components incorporating engineered meshes, 3D spacer knits, and PU-coated microfiber nonwovens, reinforced with Thermoplastic polyurethane (TPU) overlays and lined with waterproof-breathable or thermoregulating booties/liners, delivering fit, support, breathability, and protection for running, hiking, safety, and lifestyle use
- **Backpacks:** Outdoor gear made from fabrics like Cordura, nylon, mesh and recycled polyester, offering abrasion resistance, strength, and water resistance, widely used for hiking, trekking and travel purposes.
- **Sleeping bags:** Lightweight insulated bedding solutions designed for outdoor activities like camping, hiking and extreme weather conditions made from water-repellent fabrics with zip closures to provide insulation in outdoor settings with a general rating of around approximately (9)°C for winter bags and up to approximately 2°C for summer bags
- **Luggage:** Travel bags and suitcases made from durable fabrics such as polyester, nylon, and polycarbonate-reinforced textiles, which are lightweight materials offering strength, water resistance, and ease of handling for frequent travel applications
- **Tents:** Shelter solutions made from fabrics like polyester, nylon, canvas, and poly-cotton, offering waterproofing, UV resistance and structural stability, used in various outdoor activities ranging from lightweight backpacking to heavy-duty expeditions
- **Mattresses:** Portable sleeping surfaces made from PVC, textile-reinforced urethane, or rubber, available in inflatable and foam-based options to provide comfort, portability, and thermal insulation for various outdoor applications
- **Workwear (including high-visibility clothing):** Highly luminescent clothing made from special pigments and polyester blends, designed for industrial, construction, and outdoor work environments to offer durability, weather protection, and enhanced visibility for safety and compliance purposes.
- **Performance fabrics:** High-performance gear, footwear, and apparel made from materials like PU, PVC, nylon, and spandex, offering strength, abrasion resistance and durability, ensuring versatility and reliability in extreme conditions. Products include winter jackets, rainwear apparel, fashion jackets, high-altitude clothing, and athleisure, amongst others

5.1 Key growth drivers and trends for outdoor and lifestyle applications

The outdoor and lifestyle market is expanding due to a rising health-conscious population and its demand for quality products, along with a surge in adventure tourism, supported by government and business investments in outdoor infrastructure. Sustainability, tech-integrated gear, and the fusion of fashion with functionality shape industry trends. Social media also drives consumer interest. As brands innovate with smart features and eco-friendly materials, the market continues to grow, catering to both performance-driven and style-conscious consumers. In addition, while India has historically relied on imports from China and Taiwan for activewear fabrics, brands are now shifting supply chains (including manufacturing bases) to India, driven by local demand and the "China +1" strategy. Further, India benefits from demand from Bangladesh, Vietnam, Sri Lanka, and countries in Africa, which lack the capacity to manufacture engineered fabrics for the outdoor market.



5.2 Overview of the engineered fabric market for outdoor and lifestyle applications

Engineered fabrics are integral to outdoor and lifestyle applications, offering enhanced durability, functionality, and comfort. The engineered fabric market for outdoor and lifestyle applications is growing steadily, driven by technological innovations, a focus on sustainability, and the broadening of application areas. These factors collectively contribute to the market's robust growth prospects in the coming years.

Material composition and properties

These fabrics are crafted from materials like polyester, nylon, and advanced composites. Polyester is favoured for its affordability and resistance to environmental degradation, making it suitable for outdoor use. Nylon is renowned for its strength and flexibility, contributing to the longevity of outdoor gear. Innovative materials, such as those developed by Outlast Technologies, incorporate phase change materials to regulate temperature, enhancing user comfort.

Functional attributes
Engineered fabrics are designed to withstand environmental challenges. They offer properties like water repellence, UV protection, and stain resistance, ensuring performance in diverse conditions. Breathability is also a key feature, allowing moisture to escape and enhancing user comfort during activities.

Technological advancements
Recent developments have led to fabrics with integrated cooling technologies, effectively reducing skin temperatures in hot climates. These innovations enhance comfort and safety for users in extreme heat conditions.

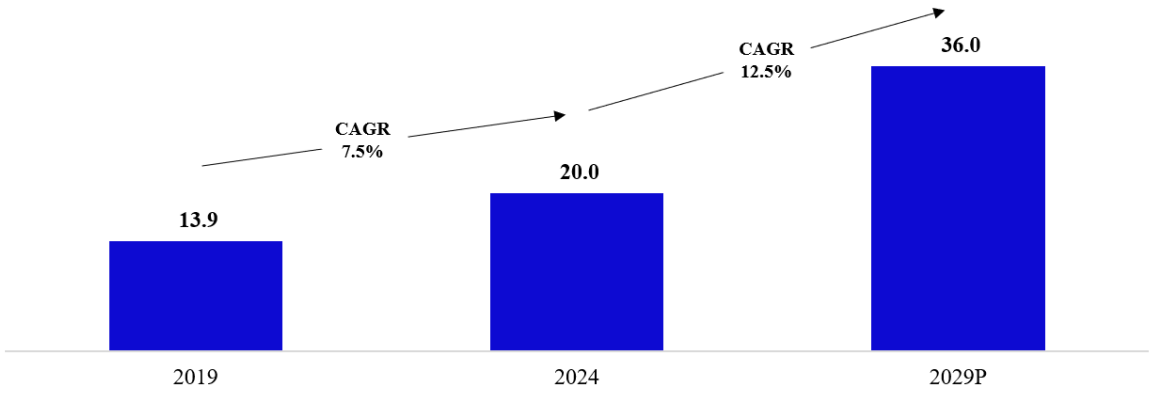
Sustainability initiatives
The industry increasingly focuses on sustainable practices, balancing durability with environmental impact. Manufacturers explore eco-friendly materials and processes to meet consumer demand for sustainable products.

Applications in outdoor and lifestyle products
Engineered fabrics are integral to a wide range of products, including outdoor furniture, awnings, tents, and technical apparel. Their versatility and performance characteristics make them essential in both functional and aesthetic aspects of outdoor and lifestyle applications.

5.3 Global engineered fabric market for outdoor and lifestyle applications

The global engineered fabric market for outdoor and lifestyle applications grew from US$ 13.9 billion in 2019 to US$ 20.0 billion in 2024, reflecting a CAGR of 7.5%. It is further projected to reach US$ 36.0 billion by 2029, growing at a CAGR of 12.5% between 2024 and 2029.

Global engineered fabric market for outdoor & lifestyle
(US$ billion, 2019-2029P)

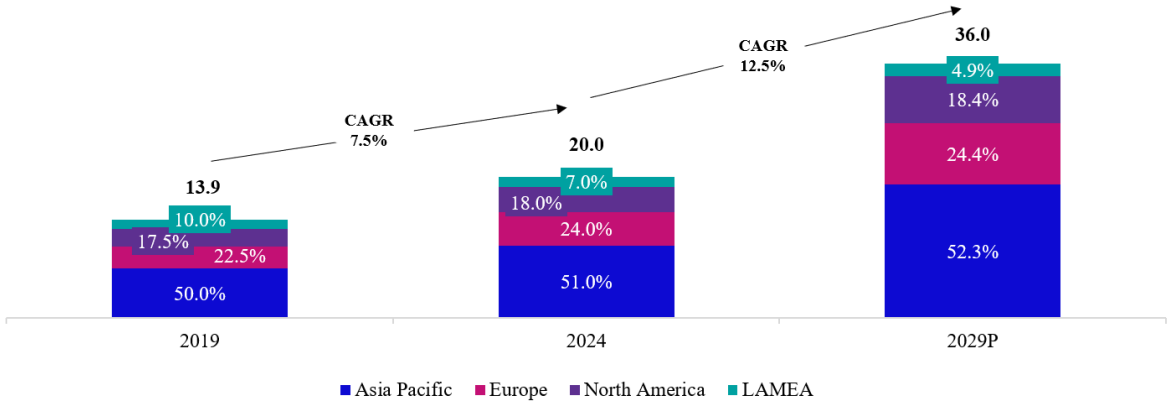


Source(s): 1Lattice analysis

5.3.1 Global market segmentation of engineered fabric for outdoor and lifestyle applications – By geography

The engineered fabric market for outdoor and lifestyle applications is segmented into Asia Pacific, Europe, North America, and LAMEA based on geography. Asia Pacific contributed the majority share of 51.0% in 2024, followed by Europe at 24.0% and North America at 18.0%. LAMEA contributed 7.0% to the market. By 2029, Asia Pacific is poised to capture 52.3% of the market, with Europe and North America contributing 24.4% and 18.4%, respectively.

Global engineered fabric market for outdoor & lifestyle applications – By geography
(US$ billion, 2019-2029P)

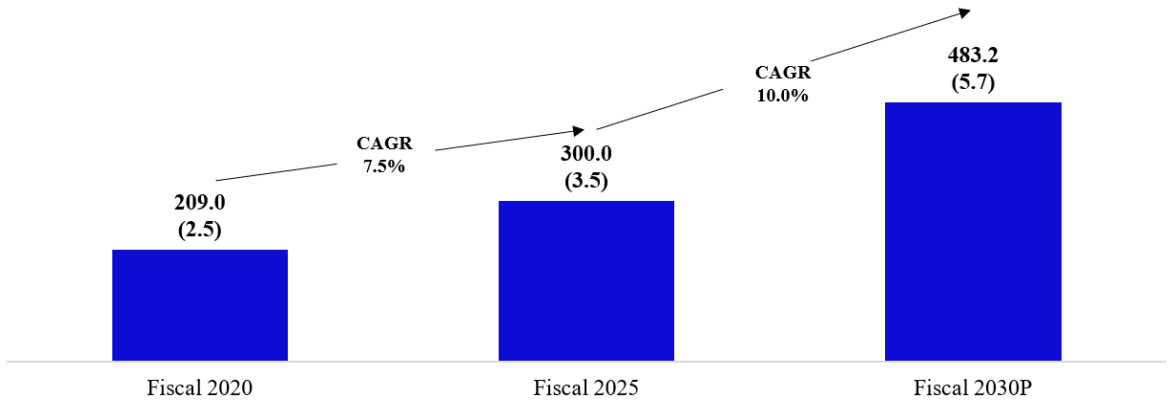


Source(s): 1Lattice analysis

5.4 Indian engineered fabric market for outdoor and lifestyle applications

The Indian engineered fabric market for outdoor and lifestyle applications, as measured by domestic consumption (including imports) and excluding exports, grew from ₹ 209.0 billion (US$ 2.5 billion) in Fiscal 2020 to ₹ 300.0 billion (US$ 3.5 billion) in Fiscal 2025, reflecting a CAGR of 7.5%. By 2030, it is projected to reach ₹ 483.2 billion (US$ 5.7 billion), growing at a CAGR of 10.0%.

Indian engineered fabric market for outdoor & lifestyle applications
(₹ billion (US$ billion), Fiscal 2020-2030P)



Note(s): US$ 1 = ₹ 84.56
Source(s): 1Lattice analysis

5.5 Key characteristics of engineered fabric for outdoor and lifestyle applications

Engineered fabrics for outdoor and lifestyle applications offer key characteristics like water resistance and breathability, durability and abrasion resistance, and environmental resistance. They provide strength while remaining lightweight and can withstand abrasion, mechanical stress, and extreme temperatures. They are lightweight and versatile, which, coupled with their chemical compatibility and stress endurance, make them ideal for diverse applications.

Water resistance and breathability	• Engineered fabrics often feature **water-repellent coatings** like **DWR**[1], ensuring protection against rain and moisture while also maintaining breathability • These fabrics allow air and moisture to pass through and thus prevent overheating, ensuring **breathability** during physical activities
Environmental resistance	• Engineered fabrics are designed to block harmful **UV rays**, ensuring protection during outdoor activities • Advanced **coated fabrics** are designed to **withstand extreme temperatures**, making them suitable for high-temperature environments
Lightweight and versatile	• Engineered fabrics are significantly **lighter** than traditional materials, enhancing overall comfort and mobility • Such fabrics can be adapted for a **wide range of applications**, from sportswear to outdoor gear and lifestyle clothing
Durability and abrasion resistance	• Engineered fabrics are designed to withstand harsh conditions, **resist abrasion** and maintain their integrity over time, reducing the need for frequent replacements • Such characteristics are essential for applications where fabrics are exposed to abrasive materials, ensuring a **longer lifespan**
Chemical compatibility and stress endurance	• Engineered fabrics are important for applications involving **contact with chemicals**, ensuring the fabric does not degrade or react adversely • These fabrics are designed to withstand high mechanical stress, making them suitable for applications like **inflatable structures** and **architectural shading**

Note(s): [1]Durable Water Repellent

5.6 Entry barriers in the market

Entering the engineered fabric market for outdoor and lifestyle applications presents significant challenges due to high technical, financial, and regulatory barriers. New entrants must master complex manufacturing processes and meet stringent performance standards, overcoming several hurdles to compete with established players. Below are the key entry barriers in this segment.

High initial capital expenditures

Significant upfront investments in advanced manufacturing technologies, such as coating, lamination, and composite layering, are required to produce engineered fabrics that meet stringent outdoor performance standards

Complex manufacturing & production process

Mastering intricate processes to manufacture critical fabrics like fine denier is complex in nature due to the susceptibility of fine yarns to breakage, tension inconsistencies & weaving defects

Deep R&D and design capabilities

Limited R&D resources hinder innovation in high-performance engineered fabrics with essential properties like waterproofing, UV resistance, and breathability, making it challenging to meet outdoor and lifestyle brand requirements

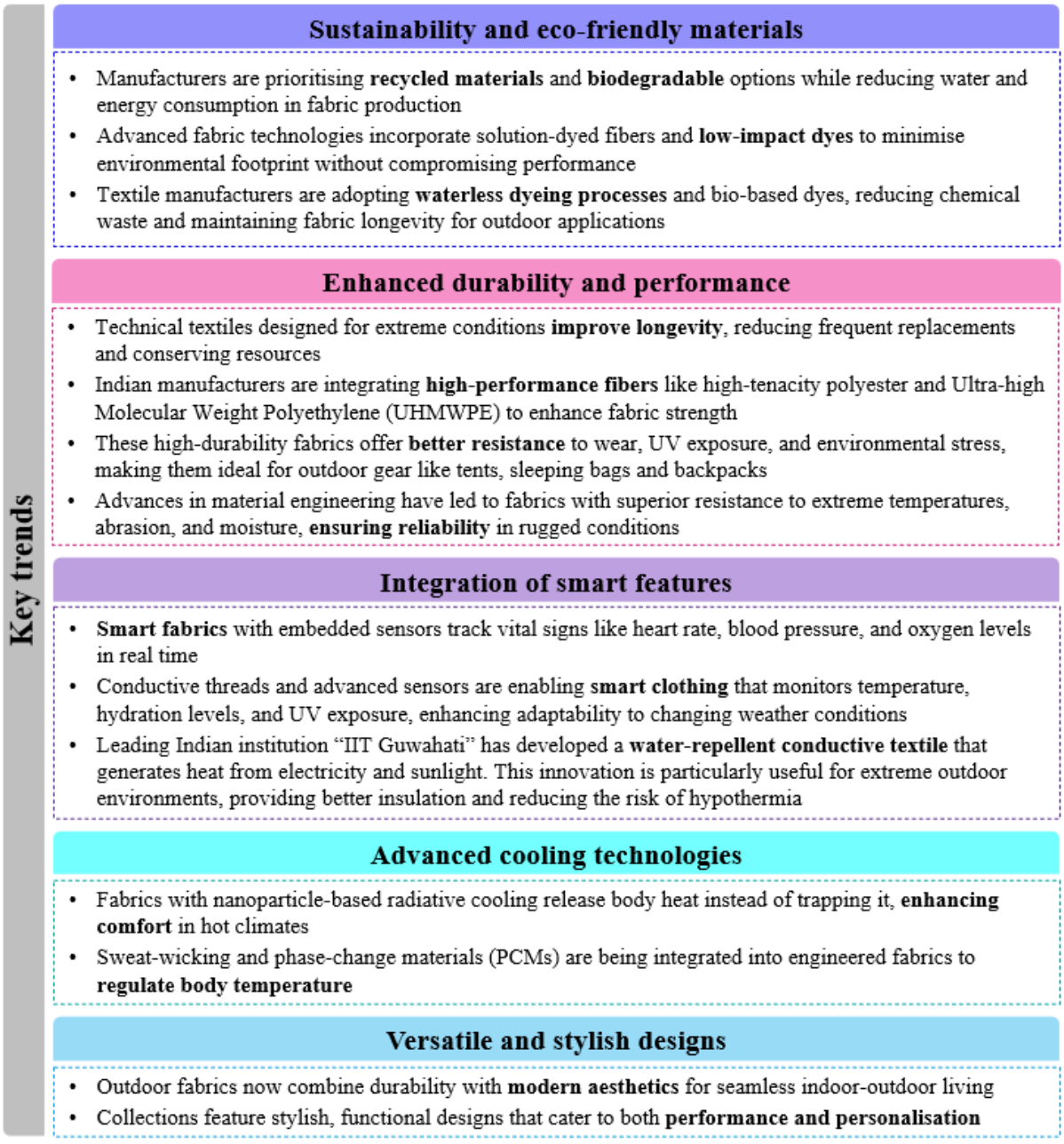
Brand recognition and dependability

New entrants must establish a strong reputation and gain the trust of outdoor and lifestyle brands that prioritize reliability, performance consistency, and field-tested materials from proven suppliers

5.7 Trends in engineered fabric for outdoor and lifestyle applications

Engineered fabrics in outdoor and lifestyle applications are evolving rapidly, driven by the need for sustainability, durability, and enhanced user experience. Manufacturers are increasingly adopting eco-friendly materials, integrating smart features, and developing advanced performance technologies that ensure comfort, reliability,

and style. These innovations are reshaping outdoor gear and lifestyle products, making them more functional, adaptive, and consumer centric.



5.8 Export opportunities from India for engineered fabric for outdoor and lifestyle applications

India's engineered fabric sector, particularly in outdoor and lifestyle applications, is experiencing significant growth, presenting substantial export opportunities due to the following reasons:

Government initiatives and market growth

The Indian government has launched the National Technical Textiles Mission (NTTM) to position India as a global leader in technical textiles. This mission aims to increase exports from US$ 2.5 billion (2023) to approximately US$ 10 billion by 2030.

Production Linked Incentive (PLI) scheme
To encourage domestic manufacturing, the government introduced the PLI scheme for textiles, which includes technical textiles. As of July 2023, 17 applications dedicated solely to technical textiles were approved, with a projected investment of ₹ 63.5 billion ($ 744.2 million).

Export performance and opportunities
India's exports of technical textile products increased by 28.4% from US$ 2.2 billion in Fiscal 2021 to US$ 2.8 billion in Fiscal 2022. Sportech (including sport and leisure, active wear, outdoor and sport articles) saw notable growth, with exports increasing by 21% between 2022 and 2023.

Strategic advantages
The political situation in competing countries like Bangladesh has led global retailers to consider India as a more stable sourcing destination. This shift presents opportunities for Indian manufacturers to capture a larger share of the global technical textiles market.

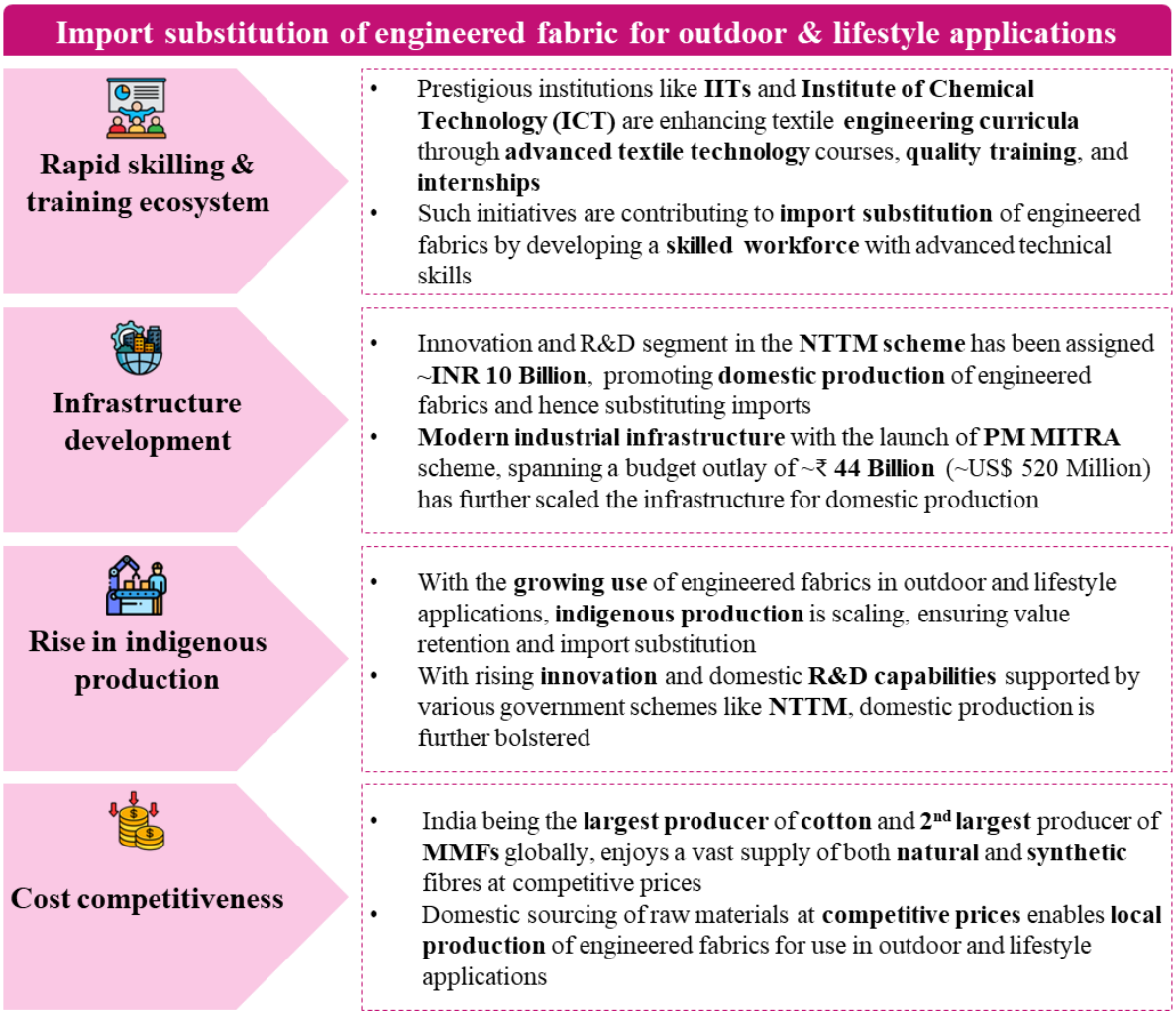
Strategic focus areas
To capitalise on these export opportunities, Indian manufacturers should focus on:

- **Innovation and R&D:** Investing in research to develop high-performance fibres and innovative textile solutions tailored to outdoor and lifestyle applications.
- **Sustainability practices:** Aligning with global sustainability trends by adopting eco-friendly manufacturing processes and materials, thereby appealing to environmentally conscious consumers and markets.
- **Compliance with international standards:** Ensuring products meet international quality and safety standards to enhance acceptance in global markets.

By leveraging government support, aligning with global market trends, and focusing on innovation and sustainability, India's engineered fabric sector is well-positioned to boost exports in the outdoor and lifestyle segments significantly.

5.9 Import substitution for engineered fabric for domestic outdoor and lifestyle applications

India is making strong strides towards achieving import substitution through a series of strategic efforts. These include rapidly upskilling and training its workforce to ensure high-quality labour, scaling infrastructure to enhance domestic production capabilities, and promoting indigenous manufacturing to replace imports. Moreover, the country's cost competitiveness, driven by the wide availability of raw materials at competitive prices, enables the substitution of imports of engineered fabrics for outdoor and lifestyle applications, paving the way for greater self-sufficiency.



5.10 Case study for industrial applications - Formosa Taffeta Co., Ltd.

Formosa Taffeta Co., Ltd. was founded in 1973 and is headquartered in Douliu, Taiwan. Over the years, the company has evolved into a leading textile manufacturer, offering advanced textile solutions to meet diverse industry needs. Its products include eco-friendly fabrics, sports and outdoor fabrics, safety and lifestyle fabrics, umbrella fabrics, carbon fabrics, spun yarn, tyre cords, and polyethylene (PE) plastic bags. The company reached approximately US$ 0.9 billion in sales revenue in 2024, which reflected a CAGR of approximately (8.7%) from 2021-2024.

After its establishment in 1973, Formosa Taffeta Co., Ltd. established an umbrella bone plant in 1979 and subsequently a tyre cord plant in 1980. Formosa Taffeta Co., Ltd. was first listed on the Taiwan Stock Exchange in 1985. It established a second plant in Taiwan in 1992. Thereafter, it entered the oil product business in 1998. From 1999 to 2016, Formosa Taffeta Co., Ltd. established five more plants, including plants in Vietnam and Dong-Nai for, amongst others, weaving and the manufacturing of high performance breathable waterproof coating and laminated fabrics.

6. Company overview and financial benchmarking

Company and strengths

Kusumgar Limited is a specialist in the engineered fabric industry with a history of successfully delivering bespoke solutions to customers.

The company manufactures specialised products using advanced technical processes, making it difficult to replicate comparable products. This is further bolstered by its unique, diverse and comprehensive machinery and equipment for the manufacture of an assortment of fabrics and solutions, which is a capability shared by only a few of its industry peers due to the demanding technical and manufacturing requirements of the industry. It would take a competitor considerable time to reach Kusumgar Limited's level of technical knowledge and manufacturing capability. Kusumgar Limited has been a pioneer in the engineered fabrics industry for certain unique fabric configurations, such as parachute fabric. Kusumgar Limited is also recognised as one of the major players in military parachute fabrics outside the United States and China, and as one of the major manufacturers domestically of high-performance technical fabrics for parachutes, heddle belts and spindle tapes, with a limited number of companies selling such products in comparable quantities. In the mechanical rubber goods business line, Kusumgar Limited is selling hoses to Indian companies and is looking to expand globally and is identifying other niches and developing solutions for impressions/other mechanical rubber goods. With the limited domestic competition in the engineered fabrics industry, Kusumgar Limited is well-placed to both capture market share and increase the wallet share from existing customers.

Kusumgar Limited has also become a supplier for leading global brands, supplying materials to designated fabricators. A strong focus on sustainability is reflected in the company's eco-friendly alternatives, including fabrics made from recycled or low-impact materials, aligning with the automotive industry's transition toward greener technologies. Sustainable operations are further reinforced using solar and biomass energy and the adoption of eco-friendly finishing techniques, underlining its commitment to social and environmental stewardship.

Kusumgar Limited uses synthetic fibres like nylon, polyester, and aramids, each for specific applications. Their fabrics range from 15D to 1000D, where "D" stands for denier, a unit that measures the thickness of the yarn. A lower denier (e.g., 15D) indicates a finer, lighter fabric often used for ultra-lightweight applications, while a higher denier (e.g., 1000D) represents a thicker, more durable fabric suitable for heavy-duty use. They also offer coating and lamination methods tailored for high-performance needs.

6.1 Financial benchmarking

Kusumgar Limited, founded in 1970, develops speciality technical textiles for demanding applications ranging from defence and aerospace to inflatables, automotive, MRG and outdoor, while positioning itself as a customised, total-solutions partner. Its integrated capabilities span weaving and finishing through coating and lamination, supported by in-house R&D and quality assurance. For Fiscals 2025, 2024 and 2023, Kusumgar Limited had the highest, highest and second highest EBITDA Margin among the benchmarked peers listed on Indian stock exchanges, respectively.

Garware Technical Fibres Limited established in 1976, provides application-focused technical-textile solutions across aquaculture, fisheries, sports, geosynthetics, agriculture, industrial applications, coated fabrics, material handling, bird-net protection, shipping and offshore, safety, defence and government, and yarns and threads. It has a global footprint.

Arvind Limited, founded in 1931, operates across multiple businesses, including fabric and apparel, brands and retail, real estate, engineering, environmental solutions, advanced materials, telecom, and garmenting.

SRF Limited, incorporated in 1970 as Shri Ram Fibres, is a chemicals-based, multi-business entity engaged in manufacturing industrial and speciality intermediates, with businesses in fluorochemicals, speciality chemicals, packaging films, and technical textiles.

Parameters	Company	FY25	FY24	FY23

Revenue from operations (INR in million)	Kusumgar Limited	7,789.97	4,679.08	3,016.48
	Garware Technical Fibres Limited	15,401.13	13,256.11	13,055.49
	Arvind Limited	83,288.10	77,377.50	83,824.80
	SRF Limited	1,46,930.70	1,31,385.20	1,48,702.50
EBITDA (INR in million)	Kusumgar Limited	1,883.89	1,318.47	678.61
	Garware Technical Fibres Limited	3,187.66	3,184.10	NA
	Arvind Limited	9,185.90	8,860.40	8,450.00
	SRF Limited	29,703.30	27,440.00	37,080.00
EBITDA Margin (%)	Kusumgar Limited	24.18%	28.18%	22.50%
	Garware Technical Fibres Limited	20.70%	24.02%	NA
	Arvind Limited	11.00%	11.40%	9.56%
	SRF Limited	20.22%	20.89%	24.94%
PAT (INR in million)	Kusumgar Limited	1,119.88	843.96	372.17
	Garware Technical Fibres Limited	2,315.48	2,102.68	1,722.00
	Arvind Limited	3,673.80	3,526.30	4,131.70
	SRF Limited	12,507.80	13,357.10	21,623.40
PAT Margin (%)	Kusumgar Limited	14.17%	17.78%	12.25%
	Garware Technical Fibres Limited	15.00%	15.90%	13.20%
	Arvind Limited	4.90%	4.40%	4.90%
	SRF Limited	8.44%	10.10%	14.47%
Net Debt (INR in million)	Kusumgar Limited	2,053.14	(667.60)	362.52
	Garware Technical Fibres Limited	2,738.45	1,721.46	2,809.30
	Arvind Limited	12,600.50	12,498.50	13,271.90
	SRF Limited	36,120.80	42,004.10	33,792.90
Net Debt to EBITDA Ratio	Kusumgar Limited	1.09	(0.51)	0.53
	Garware Technical Fibres Limited	0.86	0.54	NA
	Arvind Limited	1.37	1.41	1.57
	SRF Limited	1.19	1.49	0.88
Return on Equity (ROE) (%)	Kusumgar Limited	56.26	86.13	100.61
	Garware Technical Fibres Limited	18.60	17.00	16.90
	Arvind Limited	9.60	9.70	11.10
	SRF Limited	10.38	12.25	22.89
Return on Capital	Kusumgar Limited	42.89	55.87	64.81
	Garware Technical Fibres Limited	24.10	22.50	20.80

Employed (ROCE) (%)	Arvind Limited	14.35	14.90	14.55
	SRF Limited	12.90	13.30	21.89
Working Capital Cycle (in days)	Kusumgar Limited	14	(10)	(44)
	Garware Technical Fibres Limited	99	86	83
	Arvind Limited	14	15	15
	SRF Limited	11	14	20
Fixed Assets Turnover Ratio	Kusumgar Limited	5.05	4.27	3.82
	Garware Technical Fibres Limited	5.88	5.36	5.48
	Arvind Limited	2.61	2.48	2.65
	SRF Limited	1.12	1.17	1.68

Note(s):

1. *Revenue from operations means the revenue from operations for the year/period.*
2. *EBITDA for Kusumgar Limited is calculated as profit before tax, plus depreciation and amortisation expense, plus finance costs, less other income.*
    - *EBITDA for Garware Technical Fibres Limited, Arvind Limited and SRF Limited is as per their respective public company filings.*
3. *EBITDA Margin (%) is calculated as EBITDA divided by Revenue from Operations.*
4. *PAT is the profit for the year/period.*
5. *PAT Margin for Kusumgar Limited and SRF Limited is calculated as profit for the year expressed as a percentage of total income.*
    - *PAT Margin for Garware Technical Fibres Limited and Arvind Limited is as per their respective company filings.*
6. *Net Debt for Kusumgar Limited is calculated as the total of non-current borrowings and current borrowings, minus the total of cash and cash equivalents and bank balances other than cash and cash equivalents (or other bank balances, as applicable) as at the end of the Fiscal.*
    - *Net debt for Garware Technical Fibres Limited, Arvind Limited, and SRF Limited is as per their respective public company filings.*
7. *Net Debt to EBITDA Ratio for Kusumgar Limited, Garware Technical Fibres Limited, and Arvind Limited is calculated as Net Debt divided by EBITDA.*
    - *Net Debt to EBITDA Ratio for SRF Limited is as per their respective public company filings.*
8. *Return on Equity (ROE) for Kusumgar Limited and SRF Limited is calculated as profit for the year divided by Average Total Equity. Average Total Equity is calculated as the sum of total equity as at the beginning of the Fiscal and total equity as at the end of the Fiscal, divided by two ("**Average Total Equity**").*
    - *Return on Equity (ROE) for Garware Technical Fibres Limited and Arvind Limited is as per their respective public company filings.*
9. *Return on Capital Employed (ROCE) for Kusumgar Limited, Arvind Limited and SRF Limited is calculated as EBIT divided by capital employed. Capital employed is calculated as total assets less current liabilities as at the end of the Fiscal Year. EBIT is calculated as profit before tax (or in respect of Arvind Limited profit before exceptional items and tax), plus finance costs.*
    - *Return on Capital Employed (ROCE) for Garware Technical Fibres Limited is as per its public company filings.*
10. *Working Capital Cycle (in days) is calculated by dividing the number of days in the applicable Fiscal by the working capital ratio, which is calculated as revenue from operations divided by Average Net Working Capital. Net working capital is calculated as total current assets less total current liabilities ("**Net Working Capital**"). Average Net Working Capital is calculated as (Net Working Capital as at*

*beginning of the Fiscal plus Net Working Capital as at the end of the Fiscal) divided by two ("**Average Net Working Capital**").*

11. *Fixed Asset Turnover Ratio is calculated as revenue from operations divided by Average Fixed Assets. Fixed Assets is property, plant and equipment ("**Fixed Assets**"). Average Fixed Assets is calculated as (Fixed Assets as at beginning of the Fiscal plus Fixed Assets as at end of the Fiscal) divided by two ("**Average Fixed Assets**").*
12. *The financial information and ratios for each of the companies above are on a consolidated basis.*

Source(s):
Financials for Kusumgar Limited are taken from the restated financial statements contained in the draft red herring prospectus issued by Kusumgar Limited in September 2025.
Financials for Garware Technical Fibres Limited are taken from the consolidated financial information of Garware Technical Fibres Limited as set out in its public company filings.
Financials for Arvind Limited are taken from the consolidated financial information of Arvind Limited as set out in its public company filings.
Financials for SRF Limited are taken from the consolidated financial information of SRF Limited as set out in its public company filings.

6.2 Operational benchmarking

	Capacity			Revenue split by geography						Revenue split by segment (INR in million)											
	Capacity Utilization			Domestic revenue (%)			Export revenue (%)			Aerospace and Defence fabrics			Aerospace and Defence solutions			Automotive and industrial fabrics			Outdoor and lifestyle fabrics		
	FY23	FY24	FY25	FY23	FY24	FY25	FY23	FY24	FY25	FY23	FY24	FY25	FY23	FY24	FY25	FY23	FY24	FY25	FY23	FY24	FY25
Kusumgar	82.77%	94.33%	42.32%	61.19%	74.38%	76.78%	38.81%	25.62%	23.22%	1,440.52	3,134.88	3,700.92	46.93	8.64	2,219.02	1,131.13	1,113.86	1,126.34	311.61	291.65	569.00
Garware	NA	NA	NA	38.21%	39.69%	37.98%	61.79%	60.31%	62.02%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arvind	NA	NA	NA	55.91%	58.89%	59.05%	44.09%	41.11%	40.95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SRF	NA	NA	NA	78.52%	45.40%	49.85%	21.48%	54.60%	50.15%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note(s):

1. *Capacity utilization for Kusumgar Limited is the aggregate capacity utilisation across all processing, dyeing, finishing, printing and coating factories as at the end of and for the relevant year ended March 31, based on the capacity utilisation for each manufacturing unit as mentioned in the company disclosures.*
2. *Domestic revenue (%) for Kusumgar Limited is the revenue from contracts with customers within India as a percentage of total revenue from contracts with customers.*
    - *Domestic revenue (%) for Garware Technical Fibres Limited, Arvind Limited and SRF Limited is as per their respective public company filings.*
3. *Export revenue (%) for Kusumgar Limited is the revenue from contracts with customers outside India as a percentage of total revenue from contracts with customers.*
    - *Export revenue (%) for Garware Technical Fibres Limited, Arvind Limited and SRF Limited is as per their respective public company filings.*
4. *Revenue from Aerospace and Defence Fabrics for Kusumgar Limited is the revenue from contracts with customers from the Aerospace and Defence Fabrics market segment for the Fiscal Year.*

5. *Revenue from Aerospace and Defence Solutions for Kusumgar Limited is the revenue from contracts with customers from the Aerospace and Defence Solutions market segment for the Fiscal Year.*
6. *Revenue from Automotive and Industrial Fabrics for Kusumgar Limited is the revenue from contracts with customers from the Automotive and Industrial Fabrics market segment for the Fiscal Year.*
7. *Revenue from Outdoor and Lifestyle Fabrics for Kusumgar Limited is the revenue from contracts with customers from the Outdoor and Lifestyle Fabrics market segment for the Fiscal Year.*

6.3 Threats and challenges to the engineered fabrics industry

Some of the key challenges faced by the industry are:

- **Raw material dependence and price volatility:** Heavy reliance on petrochemical-based inputs (polyester, polypropylene, nylon) exposes the industry to crude oil price fluctuations, international trade policies (such as US tariff implications), changes in global demand, changes in environmental regulations and supply chain disruptions (such as during COVID-19 or geopolitical tensions), which impact availability and cost stability.
- **Import dependence for machinery:** The engineered fabrics industry is heavily reliant on imported high-end machinery, leading to higher costs and supply chain risks. Limited domestic manufacturing capacity hampers competitiveness and slows innovation.
- **Technology and innovation pressure:** Continuous demand for lighter, stronger, multifunctional fabrics requires high R&D spend. Rapid technology shifts (nanofibers, smart textiles, bio-based polymers) could render existing capacities obsolete.
- **Regulatory and environmental challenges:** Increasing scrutiny on single use engineered fabrics (e.g., PPE, hygiene products) due to waste management and microplastic concerns. Stricter environmental norms on emissions, wastewater, and plastic use raise compliance costs.
- **Intense competition and pricing pressure:** The presence of large global players with scale and advanced R&D makes it difficult for smaller firms to compete. Alongside this, customer focus on cost efficiency drives strong pricing pressure, squeezing margins and limiting reinvestment in innovation.
- **Evolving customer preferences:** Inability to respond swiftly to changing customer needs and industry trends can adversely impact business performance. Continuous investment in innovation, technology, and talent is essential to deliver differentiated, high-quality products that meet evolving expectations and sustain customer relationships.