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COMPOSITES TODAY

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Flexible Pipes for Offshore Applications

Economic Model for Waste Through Livelihood Empowerment: A case study of Ghost nets

MSMEs Driving Growth in India's Composites Industry

Bio Composites for Automotive parts

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Polynt in your World: almost 70-years history of partnership

After the merger in May 2017 the new Polynt Group is a global Company in the Composite Resins, Thermoset Compounds, Gelcoats, Coating, niche Specialties and Intermediates.
This combination enhances the Group's leading position as a global vertically integrated specialty chemicals and composites player, with significant global presence in Europe, North America, and Asia; a strategy initiated by Polynt with the successful integration of PCCR and CCP and now further strengthen by Reichhold's.
The new Group operate on global scale, with extensive product portfolio and R&D competencies, and a clear worldwide leadership in UPR and derivatives.
Polynt-Reichhold Group is known for its quality, impressive range of products and its excellent sales network that can provide first-class service to customers. Customer Service, R&D and Technical Service are well focused on the customers' needs,
offering the best commercial and technical service.
Product innovation is also one of the main features of Polynt; we are constantly working with customers, to find new products and provide solutions to problems.

A Global Company: Innovation & Quality

Polynt Group's global footprint spans through all the continents with manufacturing and commercial facilities,
allowing to provide the customers with innovative and sustainable solutions.
Throughout our production chain, Polynt Group is a pioneer in responsible innovation: we combine products,
quality and progress protecting the environment by improving the products and the process technologies.

Reichhold India

Reichhold Manufacturing Unit started its operation in India in October 2009. The plant spread over 40,500 sq. mts and has a capacity of 37,000 MT of UPR and derivatives.
Reichhold India, being part of Polynt Group, can supply to the Indian market all the products of Polynt Group.
Reichhold India commits to provide to the Customers excellent Products' range, R&D, Commercial and Technical Service Reichhold Site and Operations are managed and operated by well qualified, experienced professionals.
Products' portfolio is shaped on markets and Customers' needs and our Employees are the key to success
Our dynamic Team of Commercial and Technical Collaborators are the catalyst of our competitive advantages
Dedicated Business and Technical teams are experienced in providing to the Customers suitable products and proper commercial support and customer service

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-Gel coats
-Low Profile,Low Shrink Additives, Tooling & Systems
-Bonding Pastes

Applications

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Maharashtra India
Phone: +91 20 66440026

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From the Composites Today Team

Dear Readers,

The composites industry today is standing at a remarkable inflection point. What was once seen as a niche material is now transforming into a strategic enabler of national and global ambitions. By 2030, composites will not only power lightweight electric vehicles and advanced aircraft, but also shape cities, infrastructure, and even clean energy systems in ways unimaginable a decade ago.

In this edition, we invite you to look at composites through the lens of the future. How will new materials influence sustainability targets? How will automation, digital design, and recycling unlock scale and circularity? And how will India position itself as a global hub for advanced materials innovation?

The answers lie in the combined strength of research, entrepreneurship, and collaboration. Together, we are building a future where composites are not just materials of choice, but materials of impact.

Warm regards,
Team Composites Today

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Suzlon secures 381 mw order across three states

Suzlon Group, India's no.1 wind solutions provider, has secured a 381 MW order from Zelestra India and its affiliates, marking a strategic milestone in Zelestra's clean energy journey with their first-ever FDRE (Firm and Dispatchable Renewable Energy) project. This collaboration highlights a growing industry shift, where companies embarking on their renewable energy journey are turning to Suzlon as their trusted wind energy partner. With proven end-to end capabilities, from cutting-edge turbine technology to 25 years of lifecycle support, Suzlon is empowering both corporate and utility players to meet their decarbonization goals with scale, reliability, and speed.

The 381 MW project, involving 127 of Suzlon's S144 turbines, will be spread across Maharashtra (180 MW), Madhya Pradesh (180 MW), and Tamil Nadu (21 MW). The project is a part of SJVN's FDRE bid in Maharashtra and MP, while the Tamil Nadu portion will serve Commercial & Industrial (C&I) power consumers.

Girish Tanti, Vice Chairman, Suzlon Group, said, "India's energy transition landscape is at a pivotal juncture, where the pursuit of reliable, round-the-clock renewable power (FDRE) is taking centre stage. This project marks that critical shift. We are honoured to collaborate with Zelestra, a global pioneer in decarbonization, as we collectively propel India towards a sustainable energy future. At Suzlon, we're committed to driving this transition forward, one innovative project at a time."

Sajay KV, CEO, Zelestra India, said, "This partnership with Suzlon marks a significant step in our vision to deliver even more ambitious and complex multi-technology renewable energy solutions for our customers across India. It sets the foundation for delivering our portfolio of 5 GW, from our strategically sited and uniquely co-located hybrid projects with Interconnection certainty of 2027 and 2028. We are confident that Suzlon's experience and capabilities will help us deliver clean, reliable power to meet the country's growing energy demand."

PTC Industries announces MoU with Kineco Aerospace & Defence

PTC Industries Limited and Kineco Aerospace & Defence have signed a Memorandum of Understanding (MoU) to collaboratively develop and manufacture value-added aerospace components and structural assemblies. This strategic partnership combines PTC's expertise in high-integrity metal castings, including exotic materials like titanium and superalloys, with Kineco's strong capabilities in advanced lightweight composite structures for aerospace and defence. The MoU was signed in Lucknow on August 12, 2025, by Mr. Sachin Agarwal, Chairman & Managing Director of PTC Industries and Mr. Shekhar Sardessai, Founder, Chairman & Managing Director of Kineco Group.

The collaboration's scope is extensive, encompassing the co-development of hybrid aero-structures that combine composites and metallics and the localisation of critical aerospace components, including flight-critical parts. Both companies will also jointly participate in global Request for Quotations (RFQs), particularly for civil and defence programs. Furthermore, the MoU facilitates advanced research and development (R&D) and technology transfer in collaboration with organisations like DRDO and other key stakeholders. This synergy is expected to significantly accelerate indigenisation, create value-added jobs and foster intellectual property within India's burgeoning aerospace ecosystem, supporting the nation's ambitions in civil aviation, air defence and space sectors.

Toray to supply space-grade composite materials for Constellation Solar Arrays

Toray Advanced Composites, a global leader in high-performance composite materials, announced that it has signed a long-term supply agreement (LTA) with Airborne Aerospace B.V. to provide advanced composite materials for the production of solar array substrates for mega-constellation satellites.

With over four decades of space heritage and in-flight, mission critical reliability, Toray's space qualified epoxy-based, carbon fibre-reinforced materials will be manufactured and supplied from Toray Advanced Composites' European Centre of Excellence for thermoset systems in Langley Mill, UK, and used by Airborne in the manufacture of the solar array substrates and yoke panels.

Continued on page 8

Hot Press Molding

Pressing SMC and BMC at elevated temperatures

Sheet Molding Compound (SMC) and Bulk Molding Compound (BMC) are intermediate products which are finally pressed to end products in a press at temperatures around 150°C. The final products are very diverse and include components for the automotive-, electrical- and building industry.

Nouryon offers a broad range of curing agents for SMC and BMC and the choice depends for example on the desired cycle time, shelf life, surface quality and sustainability level (VOC content for example).

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- Percarbonates: Trigonox® 117, Trigonox® BPIC-C75
- Perketales: Trigonox® 29-C90, Trigonox® 22-C50

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Produced to tight tolerances on fibre areal weight, resin content and slit width, the high-performance materials from Toray will be supplied in 6-inch (15cm) wide uni-directional prepreg tape format, enabling the efficiencies needed for the new space age, through high-volume production using Airborne's robotic Automated Tape Laying (ATL) technology, specifically developed for space applications.

Teijin Carbon Europe successfully passes Nadcap audit

Teijin Carbon Europe announced that it has successfully passed the Nadcap (National Aerospace and Defense Contractors Accreditation Program) audit and has been awarded accreditation for non-metallic material manufacturing and testing.

Nadcap is the leading international program for auditing and accrediting special processes in the aerospace and defense industries. Managed by the Performance Review Institute (PRI), the audit applies demanding requirements in terms of process control, quality assurance, and documentation.

“This achievement marks an important milestone for our company and underscores our commitment to technical excellence and the highest quality standards,” says Jana Kubitz, Head of Aerospace Marketing, EMEA. “For our customers, Nadcap accreditation is a strong signal of our reliability and precision – especially for safety-critical applications.”`

With this successful Nadcap certification, Teijin Carbon strengthens its position as a trusted partner for highly demanding industries worldwide. “The accreditation not only enhances our competitiveness but also opens up access to new markets and customer segments – particularly in the aerospace sector”, states the announcement.

Teijin Carbon is a subsidiary of the Teijin Group, specialized in the production and development of carbon fibers and carbon fiber-based materials.

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- Hydraulic Extractor
- Pipe Hydrotesters
- Filament winding software
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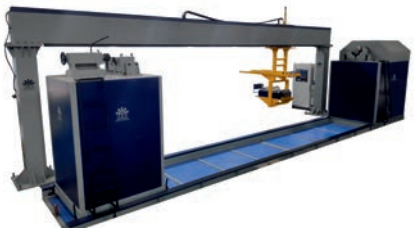
- Mandrels upto 14,000mm length



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8M Vertical Winder, AUSTRALIA

2 Axes 5 Spindle Winder, USA

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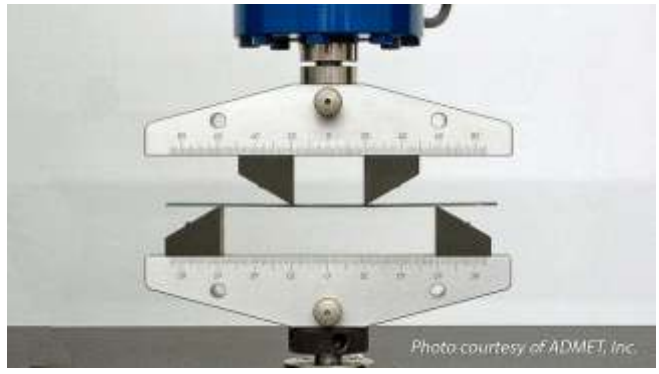
ASTM to develop flexure testing standard for composites

ASTM International is developing a proposed standard that organizations can use to design, analyze, and certify composite structures in the aerospace, automotive, marine, and civil engineering fields. The proposed standard (WK93387) is being developed by the structural test methods subcommittee (D30.05), which is part of the committee on composite materials (D30).

According to ASTM member Adam J. Sawicki, the proposed standard practice contains procedures to modify the D7264/D7264M polymer matrix composite laminate flexure test method to permit testing of specimens containing open and filled holes.

Sawicki adds that the practical applications of WK93387 (in combination with WK93388) center on the generation of open-hole and filled-hole flexure data that can be used in the design and analysis of composite structures.

"These tests are performed to complement D5766/D5766M for open-hole tension, D6484/D6484M for open-hole compression,



and D6742/D6742M for filled-hole tension and compression," says Sawicki. "Notched laminate flexure tests typically exhibit higher surface strains at failure than those obtained under in-plane open-hole and filled-hole testing. This higher strain capability helps to design weight-efficient structures."

This effort directly relates to the United Nations Sustainable Development Goal #13 on Climate Action.

Kautex Textron wins significant BEV battery housing contract

Kautex Textron GmbH & Co. KG (Kautex), Germany, a Textron Inc. company, announced it has received an order from a leading automotive OEM for a full-BEV (Battery Electric Vehicle) thermoplastic composite lower battery housing unit. The lower housing is part of the company's Pentatonic battery enclosure portfolio, facilitating battery electric and hybrid electric vehicle production.

The Kautex Pentatonic product line offers lightweight, customizable EV solutions made from thermoplastic composite or composite metal hybrids. These solutions include products which not only enhance the thermal management of the battery pack but also contribute to the overall lightweight design, boosting vehicle performance and extending driving range.

Two Kautex test vehicles

The lower housing seals and protects the vehicle battery while meeting extensive structural and stringent thermal requirements, such as crush and bottom impact testing, and

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external and internal fire tests. It will be produced for a major BEV platform, spanning across multiple vehicle brands. This Kautex Pentatonic solution offers advantages over its conventional metal counterparts, with lower cost through a reduction in components due to its high functional integration and thus a leaner bill of material. The thermoplastic composite material helps to lower the carbon footprint of the part, while the lightweight housing contributes to reducing carbon emissions while driving. This multi-material approach provides corrosion resistance with no compromise in performance throughout the lifespan of the vehicle.

Bureau Veritas joins “Wind for Shipping” EU project

Bureau Veritas Marine & Offshore (BV) and Bureau Veritas Solutions Marine & Offshore (BVS) announced their participation in Wind for Shipping (W4S), a European research and development initiative funded by the Interreg North-West Europe programme. Launched in January 2025 and running through July 2028, the project brings together twelve partners — including shipyards, shipping companies, research institutions, and regional authorities — from across the Netherlands, Germany, Belgium, and France, with the shared goal of accelerating the maritime sector's transition toward low-emission shipping.

Wind for Shipping focuses on the development, scaling, and adoption of wind propulsion technologies —specifically rotorsails and wingsails. These innovative systems harness wind power and have the potential to reduce fuel consumption by an estimated 20% to 40%, significantly cutting greenhouse gas emissions from commercial vessels. The project's total budget is €5.7 million, of which €3.4 million is co-financed by the European Union.

The initiative plays a key role in supporting European climate ambitions by addressing some of the main barriers to the commercial deployment of wind-assisted propulsion. It seeks to lower production costs, optimize manufacturing processes, and strengthen the entire value chain, from design and production to installation and operation. The project also aims to strengthen regional maritime innovation ecosystems by fostering collaboration among coastal regions. By aligning research, production, and logistics capacities, Wind for Shipping contributes to building Europe's position as a Maritime Centre of Excellence for Green Shipping.

Uplift360 awarded grant for breakthrough carbon fibre recycling innovation

Cleantech company Uplift360 has been awarded an Innovate UK Smart Grant: July 2024 round, to scale its pioneering low-energy chemical recycling technology, ChemR. Selected as one of only 44 successful projects from a pool of 2,134 applications, ChemR is the world's first ambient-condition chemical recycling process for advanced composite materials. It has the potential to transform carbon fibre waste management across aerospace, automotive, defence, and clean energy sectors.

"This grant is a major step forward. ChemR shows that high-performance recycling can be both clean and scalable," says Harry Miller, Product & Engineering Director at Uplift360.

Solving the UK's Carbon Fibre Waste Problem - and Supporting National Strategy

The use of Carbon Fibre Reinforced Polymers (CFRPs) is rapidly expanding due to their high strength, low weight, and corrosion resistance. Yet as much as 50% of CFRP is wasted during manufacturing, and the UK currently produces between 30,000–50,000 tonnes of CFRP waste annually — material with a potential value exceeding £1.2 billion if effectively recycled. With only 20% of CFRP waste currently recycled — and less than 2% reused due to limitations in thermal and mechanical recycling methods — the sector urgently needs a scalable, sustainable alternative.

ChemR: A Cleaner, Smarter Recycling Alternative

ChemR is a proprietary chemical recycling process that reuses its solvent between batches and is capable of operating at room temperature and pressure. ChemR delivers high purity recovered fibres ready for reinjection into composite manufacturing. Its direct solvent reuse and mild operating conditions offer a cleaner and more cost-effective alternative for manufacturers facing carbon reduction targets and Extended Producer Responsibility (EPR) regulations.

Next Steps

Uplift360 will deliver a pilot-scale ChemR system, conduct real-world demonstrations with partners, and build evidence to support commercial roll-out across high-value industries.

As the only UK-developed chemical recycling solution for carbon fibre with a reusable solvent system, the project will aim to:

- Scale the process to an integrated pilot line
- Demonstrate that chemical recycling can be cost-effective
- Preserve fibre quality with no degradation
- Adapt flexibly across different applications
- Position the UK as a global leader in a market where only 2% of recycled carbon fibre is reused

EuCIA highlights the untapped potential of Europe's composites recycling market

While the amount of composites waste is a small compared to plastics, aluminium and other popular materials, Europe's transition to a circular economy makes sustainable waste management essential. To inform policy development and infrastructure planning the European Composites Industry Association (EuCIA) has estimated the volume of thermoset composites waste accessible for recycling. This data will also support the activities of the new European Circular Composites Alliance (ECCA).

The effective management of end-of-life (EoL) composites requires accurate data on the waste volumes. However, the amount of composites waste generated in Europe is not officially monitored. EuCIA has therefore been collaborating with its members and partners to estimate the potential size of the composites recycling market.

EuCIA has developed a model based on the gross domestic product (GDP) of European countries which predicts a total volume of thermoset composites waste of about 914 kt in Europe in 2025. The situation is more complex and the volume currently accessible for recycling is much lower for several reasons:

- Some composite components (e.g. wind turbine blades) are exported for reuse outside of Europe.
- In many cases, composite parts are embedded in infrastructure that cannot be easily retrieved for recycling, such as underground pipes and tanks.
- Collection and sorting systems tailored to recycling composites are limited and therefore a large number of end-of-use composite products are not collected.

Estimated total thermoset composites waste (GDP model)2025, 914 kt.

EuCIA therefore conducted a deeper analysis per market, considering several factors, including the existence of established collection and recycling routes. This indicates that the actual volume of thermoset composites waste accessible for recycling is likely to be around 228 kt in 2025, approximately 25% of the theoretical amount predicted by the GDP waste model. Of this, we estimate that currently a maximum of 5% is being recycled.

These figures clearly show an untapped resource that could potentially be returned to the value chain. Exploiting this opportunity will require the building of a robust European value chain and infrastructure to enable reuse and recycling of composite materials. Longer term, establishing systems to enable more widespread collection and sorting of composites waste will be key to fully realising a circular economy for composite materials.

Further information, including estimates of the size of the composites waste streams generated by different market sectors, is available in the new publication *Reimagining end-of-use composites as a new resource.* This is available to download from the EuCIA Knowledge Hub: https://eucia.eu/knowledge-hub/sustainability.

Mobilising investment into recycling

This waste data will input into the activities of the new European Circular Composites Alliance (ECCA), which aims to identify and resolve the legal, economic and technical barriers to composites recycling. The alliance will recommend essential policy updates, such as the creation of dedicated waste codes for EoL composites, to enable the scaling up of sustainable composites recycling solutions. It will also promote the building of markets for secondary (recycled) composites.

The ECCA is a sectorial alliance of EuCIA, launched in partnership with JEC in March 2025. All stakeholders are invited to join the alliance to drive collective action and build a circular and competitive future for Europe's composites industry. The first meetings of the ECCA Working Groups is scheduled in August.

“The collaboration of Europe's composites stakeholders is essential to achieve the full circularity of composite materials,” states Raphaël Pleynet, EuCIA's Managing Director. “ECCA members will commit to this goal, working together to fully establish the circular economy for composites by implementing strategies for greater reuse, repair, repurposing and recycling, and setting and delivering on targets for the recycling of existing products.”

Recycling all components in carbon fiber composites

Technology helps overcome affordability barriers to wider use and manufacturing of a high-value material found in aircraft, bicycles, cars, and more.

Researchers from National Renewable Energy Laboratory (NREL), USA has developed a method for Recycling All Components in Carbon Fiber Comp-osites. The paper, “Acetolysis of epoxy-amine resins for carbon fiber-reinforced polymer recycling,” appears in the journal *Nature.*

Technology helps overcome affordability barriers to wider use and manufacturing of a high-value material found in aircraft, bicycles, cars, and more

Deconstructing epoxy resins with hot acetic acid has the potential to provide a scalable and affordable solution for recycling a material used in a range of high-value consumer products, according to new research from the Bio-Optimized Technologies to keep Thermoplastics out of Landfills and the Environment (BOTTLE) consortium.

Carbon fiber composites (CFCs) are high-strength, low-weight materials made from epoxy-amine resins that encase long carbon fibers. CFCs enable lighter and more efficient bicycles, planes, and automobiles and are a critical component of the pressure vessels used for comp-ressed natural gas shipping and storage. However, the cost and energy-intensive production of CFCs limit their application, and there is a near total lack of scalable and economically viable recycling methods for these important materials.

CFCs are generally made with epoxy-amine resins, similar in chemistry to many epoxies commonly found in hardware stores. These composites form a stiff and resistant plastic, but also one that cannot be dissolved or melted. While the resins are relatively cheap, the fibers they surround are not, so the resulting composites are quite expensive.

The BOTTLE team's solution ended up being surprisingly simple. Hot acetic acid, the same compound that is found in vinegar, can cleave all the key bonds within these resins. Former NREL postdoctoral researcher Ciaran Lahive (now at University of Manchester), and co-first author on this study, demonstrated this reaction during an intensive reaction screening effort for another project.

Deconstructing epoxy resins with hot acetic acid has the potential to provide a scalable and affordable solution

The team learned something remarkable: Not only do the polymer networks in the resin solubilize rapidly, but the acetic acid also stabilizes their chemical comp-onents, enabling high yields of reusable chemical building blocks. Extensive optimization work from NREL interns Katie Stevenson (now at Columbia University) and Sydney Reiber (now at the University of Graz) led to a process effective on end-of-life waste from a variety of industries.

Importantly, the researchers also determined there was no impact on the strength of the recycled carbon fibers

(rCF), which is critical to ensuring they retain their value after being extracted from the composite. To demonstrate this, they took 80 grams of a scrap mountain-bike frame made of composite material and deconstructed it. Using the carbon fibers they had just extracted, they then made new composites that exhibited more than twice the strength-to-weight ratio of steel.

Not only is the cost of rCF predicted to be quite low compared to virgin fiber but the energy consumption is also practically zero when factoring in the recovered epoxy building blocks. The process is not limited to CFC only—glass fiber composites like those found in turbine blades, boat hulls, or automobile bumpers and hoods could also be treated.

“Long-term, this technology could be used to create value from challenging comp-osite waste streams that are currently piling up in landfills,” said BOTTLE CEO Gregg Beckham, the senior author of the study and a senior research fellow at NREL. “Current technologies are not yet able to make a dent in that waste stream, but we think that this process could be useful for this application as well.”

FEATURE ARTICLE

MSMEs Driving Growth in India's Composites Industry

How small and medium enterprises, skill-building, and policy support are shaping a lighter, cleaner future!

Wajida Irfan Shaik
FRP Institute, admgr@frpinstitute.org

From wind-turbine blades and FRP piping to automotive body panels and drones, India's composites value chain increasingly rests on the ingenuity of micro, small and medium enterprises (MSMEs). With procurement preferences, skill missions, and digital marketplaces expanding market access, MSMEs are scaling up productivity and quality while new demand from renewables and mobility opens the next decade of growth[1].

Why MSMEs matter—now more than ever

MSMEs are a structural pillar of India's economy: they consistently contribute around 30% of GVA and nearly half of merchandise exports. Within manufacturing supply chains, including chemicals, polymers, tooling and precision parts; MSMEs provide the dense network of job shops and specialist processors that make composites viable at scale. Recent government data shows MSME export contribution at ~45.7% in FY 2023–24, underscoring their growing role in global value chains[2].

Digital public infrastructure is widening access to government demand. The Government e-Marketplace (GeM) recorded ₹5.4 lakh crore GMV in FY 2024–25, with sizable participation from micro and small enterprises, an opportunity for FRP/GRP pipes, tanks, housings, shelters, and fabricated composite components to sell directly to government buyers.

Where the demand is: end-use hotspots for composites

- **Wind energy.** India's wind additions are set to accelerate again; GWEC's 2024 outlook highlights a new project pipeline and policy momentum. That translates directly to demand for large composite blades, nacelle covers, and ancillary structures, an area where MSME machining, molds, core-kit supply, and repair services thrive[3].
- **Water, sewage & industrial fluids.** FRP/GRP pipe & tank systems are expanding with city-scale water projects and corrosive-service replacements, a classic MSME domain (filament winding, hand lay-up, infusion). Adoption aligns with

End-use hotspots for composites

- **Wind energy.**
- **Water, sewage & industrial fluids**
- **Automotive & mobility.**
- **Aerospace & drones.**

[1] Press Release:Press Information Bureau

[2] AU3244_rPgKDZ.pdf

[3] Composites Market Size, Share, Growth | Report, 2030

lifecycle-cost and corrosion-resistance priorities in public utilities.

· **Automotive & mobility.** Lightweighting keeps composites in focus- body panels, leaf springs, seats, battery enclosures, and aero parts for EVs and buses. Multiple industry trackers project continued growth for automotive composites and lightweight materials through the decade, creating Tier-2/Tier-3 opportunities for tooling, SMC/BMC, and thermoplastic composites[4,5].

· **Aerospace & drones.** Carbon-fiber frames, fairings, and payload housings benefit from the PLI push for drones and components, which brings MSMEs into aerospace-grade manufacturing and testing ecosystems [6].

Estimates for India's composites market varies widely depending on whether analysts count materials vs end-products and which sub-segments they include. Industry observers such as JEC Group caution that scope and methodology drive the gaps so MSMEs should benchmark within their specific niche (e.g., FRP pipe, automotive SMC, wind blades) rather than rely on a single headline number.

Policy tailwinds MSMEs can tap

1. **Public Procurement Policy for MSEs (PPP-MSE), 2012 (as amended).**
   Central Ministries/Departments/CPSEs have a mandatory 25% annual procurement target from MSEs: including 4% from SC/ST-owned and 3% from women-owned MSEs. Bids may include benefits like EMD exemption and relaxed prior-turnover conditions for eligible MSEs. This is highly relevant for FRP pipes/tanks, shelters, platform components, and other composite items commonly procured by utilities and railways.
2. **GeM as a demand engine.**
   With GeM's FY 2024–25 GMV at ₹5.4 lakh crore, MSMEs supplying standardized composite products (e.g., tanks, ladders, gratings, enclosures) can win repeat orders, provided they list with clear specs, test certificates, and warranty terms.
3. **Finance & working capital.**

· **TReDS** platforms (RBI-regulated) let MSMEs discount receivables from large buyers including CPSEs easing cash-flow stress on order-driven composite shops.

· **MSME SAMADHAAN** offers an official channel to track and pursue delayed payments under the MSMED Act, useful when dealing with long public-project cycles common in water/wastewater FRP supply.

· **CGTMSE** provides collateral-free credit guarantees to micro/small enterprises; useful for capex into infusion setups, curing ovens, 5-axis trimming, and QA labs.

4. **RAMP (Raising and Accelerating MSME Performance).**
   A multi-year, World Bank–supported program focusing on market access, productivity, and greening for MSMEs. Composite manufacturers can leverage state-level interventions, cluster development, and quality schemes aligned with RAMP's pillars.
5. **Lean and ZED for quality & sustainability.**

· The MSME Competitive (Lean) Scheme helps deploy Kaizen, 5S, TPM, and Six Sigma cutting scrap and resin waste, improving lay-up consistency, and stabilizing cure cycles.

· ZED (Zero Defect Zero Effect) recognition nudges MSMEs toward process discipline and environmental stewardship increasingly demanded by OEMs and global buyers.

The skill equation: building a composite-savvy workforce

Composites are technique-sensitive; defects hide in fiber orientation, void content, and cure history. India's skill ecosystem is responding:

Building a composite-savvy workforce

- **PMKVY 4.0 (Skill India Digital).**
- **Apprenticeships (NAPS-2).**
- **MSME Technology/Tooling Centres & CIPET.**

[4] Automotive Composites Market, Industry Size Forecast Report [Latest]

[5] Automotive Lightweight Materials Market Size & Forecast To 2034

[6] PLI Scheme Drones and Drone Components | Ministry of Civil Aviation

- **PMKVY 4.0 (Skill India Digital).** The 2024 guidelines emphasize demand-driven curricula and integration with Skill India Digital Hub: a way to channel training toward composites processing, NDT, mold-making, and CNC trimming via Sector Skill Councils and approved providers.
- **Apprenticeships (NAPS-2).** Partial **stipend support (up to 25% / ₹1,500 per apprentice per month)** lowers the cost of onboarding shop-floor trainees into lay-up, infusion, filament winding, and QC roles; proposals in 2025 aim to lift the stipend further and index it to inflation.
- **MSME Technology/Tooling Centres & CIPET.** A nationwide network of MSME technology/tool rooms and CIPET's specialized programmes (e.g., Design for Composites, FRP pipe standards, morphological analysis) provide short-term skilling and testing infrastructure MSMEs can plug into without heavy upfront spend.

What leading MSMEs are doing differently?

- **Process upgrades with quick ROI.** Moving from open lay-up to vacuum infusion/RTM to cut styrene emissions and improve fiber-volume fraction; installing in-line gel timers, thermocouples, and dataloggers for traceable cure profiles; adopting **d**igital traveller sheets that tie process parameters to each part ID.
- **Material and design agility.** Adding **thermoplastic composites** for recyclability and rapid forming on repetitive parts; standardizing core-kit nesting to reduce trim waste; partnering with universities for finite-element simulation of laminate schedules, often via apprenticeship projects.
- **Market access discipline.** Prioritizing GeM listing hygiene (clear specs, drawings, test reports), using TReDS for receivables, and participating in vendor development meets under PPP-MSE to get pre-qualified with CPSEs.

The roadblocks—and how policy can unblock them

- **Fragmentation and QC variability.** Composite part failure is often a process failure. Wider adoption of **shop-floor metrology,** resin QC, and NDT should be encouraged via ZED incentives and cluster testing labs, especially in FRP pipe & tank clusters.
- **Working-capital stress on public projects.** Enforce timely payment provisions, mainstream TReDS onboarding for all CPSE buyers/suppliers, and expand GeM's receivables financing coverage for MSE-coded sellers.
- **Skills refresh at speed.** Fast-track **PMKVY 4.0 job roles** for composites (lay-up technician, infusion operator, composites QA inspector) and apprenticeship seats dedicated to composites manufacturing lines, with co-funded ToT (training-of-trainers).

The roadblocks—and how policy can unblock them

- **Fragmentation and QC variability.**
- **Working-capital stress on public projects.**
- **Skills refresh at speed.**

A pragmatic 6-month action plan for a composites MSME

1. **Get procurement ready.** Udyam-register, secure ZED Bronze (or higher), and publish test certificates; list on GeM with standard SKUs (tanks/pipes-/gratings/enclosures).
2. **Unlock cash flow.** Onboard to TReDS and set SOPs for e-invoicing CPSEs; use CGTMSE to finance a small infusion setup and QA instruments.
3. **Skill and certify.** Register for NAPS-2 apprentices; sponsor two line-leaders through CIPET short courses; adopt Lean (5S + standardized work) on the highest-volume line.
4. **Go where demand grows.** Build a micro-portfolio for wind ancillaries (molds, covers, transport fixtures) and **utility** FRP (non-metallic handrails, ladders, cable trays) segments with steady tender flow.

FEATURE ARTICLE

Developing a Sustainable Economic Model for Waste Through Livelihood Empowerment: A case study of Ghost nets

Arjun Vora
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Ghost nets

Waste management is essential in today's context. Governments are creating laws that require industries to be responsible for the waste they produce. Companies are making efforts to comply with these regulations, and consumers are becoming increasingly conscious of reducing, reusing, and recycling waste.

While all stakeholders of this planet must collaborate to manage waste, it is necessary to create economic incentives to achieve a sustained and significant impact of waste management initiatives on our environment. One of the significant challenges of waste management has always been the collection of waste at the source and finding a use for it. A case in point is ghost nets - waste that is left at sea.

Ghost nets are fishing nets that are left at sea because they are

either worn out and discarded by fishermen or break away during use due to wear and tear. The ghost nets themselves become a hazard for fish and sea life, entangling fish and turtles that are unable to escape. Turtles are often caught up in these ghost-nets and die due to suffocation, as they are unable to come up for air, or suffer injuries on their flippers while trying to dislodge themselves from these nets.

In the Gulf of Mannar region in India, ghost nets have affected up to 12% of branching corals and damaged around 25% of a 7.2-hectare coral reef site. This threatens the coral reef ecosystem and the livelihoods of local fishermen who depend on it. Endangered species like olive ridley turtles are frequently found dead along the coasts of Andhra Pradesh and Odisha, entangled in ghost nets.

Dr. Supraja of the TREE Foundation states that “Ghost nets, abandoned or lost fishing gear, pose a severe threat to marine life. These silent killers entangle countless marine animals, including endangered sea turtles, dolphins, and fish, leading to injuries, suffocation, and death. The persistent presence of ghost nets that are manufactured with materials that are made to last long disrupts ecosystems and undermines marine conservation efforts." The TREE Foundation has been influential in incentivising fishermen to retrieve ghost gear through the “Incentivization Initiative” established by Dr. Supraja and her team. The organisation provides Rs. 10 per kg of ghost gear collected. Out of this, Rs. 5 goes to the fishermen and the remaining goes to the fisher women (mothers or wives of the fishermen). This initiative has already had a tremendous impact. Since the inception of the Ghost Net Retrieval program in 2021, fishermen have collected and handed over 186 tonnes of ghost nets to the TREE Foundation. In the same period, 1,075 beneficiaries received incentives that have supported their family livelihoods. Moreover, the program annually covers an average of 15,000 participants.

Although the program has been successful, the ghost nets are not being recycled fully. Rather, they are piling up in stockyards, with only a small portion being used for various sample methods. Additionally, the program requires ongoing funding to compensate fishermen for their efforts in retrieving ghost gear. To combat this problem, an effective circular economy must be established where ghost nets can be recycled into a viable product form. Establishing a recycling market for ghost nets will enable ghost net retrieval participants, namely fishermen, to enter the commercial supply chain in the recycling industry, thereby creating a viable and sustainable retrieval program.

This paper explores the potential for recycling ghost nets, which comprise the majority of ghost gear, and utilising them in an end product to establish a circular economy.

PET and rPET

Fishing nets are typically made from plastic fibres, and Polyethylene Terephthalate (PET) is commonly used in the making of fishing net fibres. PET is a type of plastic processed in the petrochemical industry and is widely used to manufacture various types of plastic products, including bottles, clothing, and shoes.

India is recognised for its high efficiency in managing waste. One such highly recycled material is PET bottles. There is a highly efficient industry of PET bottle collection, cleaning, crushing, shredding, and selling PET bottles to the industry, managed by a network of garbage collectors, processors, and traders. Recycled PET (rPET) from recycling PET bottles has found use in various products, including clothing, packaging, polyester resin manufacturing, and even shoes.

The use of recycled plastic bottle waste (rPET flakes) is now established, and the end UPR product made from this material is acceptable and commercially viable. The use of recycled Ghost nets (rPET nets) in production has never been attempted. The reason is a lack of awareness in the PET recycling industry of the usability of rPET ghost nets.

Having identified a potential use of rPET nets it is essential to understand the technical usability of the material so that a case can be made for all the participants in the supply chain ecosystem that collecting, processing and use of rPET nets is both commercially and economically beneficial to all participants of the ecosystem.

Testing of Laboratory Batch

In the chemical industry, a crucial step in developing a new product is testing formulations in a laboratory setting. Under the guidance of chemists and at the laboratory of a prominent chemical manufacturer, I observed the laboratory-scale production of UPR using rPET nets collected from the TREE Foundation, an environmental nonprofit in Chennai. Although the complete formulations for O-UPR are proprietary, for academic purposes, I was given to understand that approximately 35% of the UPR formulation by weight of a Pure O-UPR, which includes Phthalic Anhydride (PA) at approximately 25% and Monoethylene Glycol (MEG) at approximately 10%, may be replaced by PET.

Exhibits

Certificate of Analysis of the sample produced

SCOTT BADER

CERTIFICATE OF ANALYSIS
(EN10204 3.1)

Customer Order

(date format is: DD-MM-YY)
Print date
28-07-25

Description
espol™-32.06

Lot number
0003475238

Manufacture date
24-07-25

Comments

Result Description	Result	Units	Acceptance Range
APP- Light Pale Yellow opaque Viscous	Accepted	Light Pale Yellow opq Viscous	
Specific Gravity-WeightperGallonCup@24	1.11	g/cm3	>= 1.10 <= 1.12
AV- ON RESIN AS SUPPLIED	16.03	mgKOH/g	>= 10.00 <= 18.00
Volatile Organic Compounds	30.10	%	>= 30.00 <= 36.00
VISC-BF-LVT SP3 , 60RPM @ 25C	530	mPa.s	>= 450 <= 550
GT @30°C 1ml Co 2% + 1.5 ML BM50	9.5	Min	>= 9.0 <= 15.0
Maximum Exotherm Temperature	178.0	°C	>= 150.0 <= 190.0

Shelf Life : The material supplied is fit for purpose for 3 months from date of manufacture, if stored as recommended.

Storage conditions: Store between 5 and 25°C in the original, unopened container in a dry, well ventilated place. Protect from freezing and direct sunlight. Avoid contact with oxidising agents. If stored outside of the recommended storage conditions shelf life will be significantly reduced

This document is processed electronically and carries no signature of approval.
Quality department manager.

Certificate of Analysis –Laminate

CRYSTIC® | SCOTT BADER Making a positive difference | espol™

Certificate No.: QC/23-24/ **Date: 28/07/2025**	**CERTIFICATE OF ANALYSIS** **Complies to IS-6746-1994 (Reaffirmed 2005)**	SBPL/FP.COA Rev.03-DT:10.08.23

Batch Number:	**# 0003475238 (# L 15048)**
Product Name:	PET- FN / espol™ 32.06
HS Code:	**39079120**
Date of Manufacture:	24-Jul-25
Date of Expiry:	22-Oct-25

Tests as per IS 6746-1994 (Reaffirmed 2005)

MECHANICAL PROPERTY - LAMINNATE

Sr.No.	Description	Unit	Acceptance Range		Result	
			Lower Limit	Upper Limit	Lab Batch No-# L15048 (PET-FN) - LAMINATE	Remarks
1	Tensile Strength	N/mm^2	150	200	184.61	Average of 5 Readings
2	Tensile Modulus	N/mm^2	13000	20000	16680	Average of 5 Readings
3	Flexural Strength	N/mm^2	200	300	270.72	Average of 5 Readings
4	Flexural Modulus	N/mm^2	4000	6000	5159.09	Average of 5 Readings
5	HDT	Deg. C.	45	50	NA	

Note	**The material supplied is fit for purpose for 3 months from date of manufacture, if stored as recommended at 25°C in the original, unopened container in a dry, well ventilated place. Protect from direct sunlight. Avoid contact with oxidising agents. If stored outside of the recommended storage conditions, shelf life will be significantly reduced. Mix throughly before use.**

QA Manager **QA Chemist**

Disclaimer: While Test results are based on our laboratory experiments and correct to the best of our knowledge, users (customers) are recommended to establish themselves that the process and materials are satisfactory for their requirements. No liability is accepted by Scott Bader Pvt Ltd for any losses and damages.

Interview with the author

What inspired you to take up ghost nets as a research topic?

Growing up in Mumbai and often traveling by boat to Alibaug, I noticed clusters of floating garbage, including discarded fishing nets. This sparked my interest in marine waste and its impact on coastal communities. In 10th grade, while researching sustainability, I connected with Mr. Viral Thakker (Deloitte), who introduced me to Dr. Supraja Dharini, founder of the TREE Foundation in Chennai. Inspired by her work with fishermen and marine conservation, I began exploring ways to create commercial value from discarded fishing nets (ghost nets). I rea-lised that integrating them into the circular economy—collection, cleaning, sorting, and reuse in manufacturing—was essential, and this became the focus of my research.

Your study shows ghost nets can be used in composite resin production. Can you explain how this works and why this approach is significant?

Ghost nets are primarily made of nylon and PET, both of which have recycling potential. I focused on PET nets, as recycled PET flakes already have a strong market. Through secondary research and industry consultations, I found that PET flakes can replace PA and MEG in unsaturated polyester resin (UPR) production. With support from technologists, I tested PET ghost nets supplied by the TREE Foundation at a private lab, successfully proving their applicability. The next step was to ensure economic viability and validate the results with a reputed company, both of which I achieved. I now aim to work with the TREE Foundation to scale up collection and integrate fishermen into a self-sustaining supply chain.

Why is this important for industry and the environment?

India generates about 9.5 million tonnes of plastic waste annually, with over a third leaking into the environment. Ghost nets not only endanger marine life but also add to this plastic burden. By incentivising fishermen to collect discarded nets and converting them into recycled PET and nylon, this initiative creates economic value while reducing reliance on virgin materials. For industry, it offers cost-effective, sustainable raw materials; for the environment, it drives circularity, prevents marine entanglement, and reduces plastic pollution. This alignment of economic and ecological incentives makes the approach both viable and impactful.

Validation test results for the resin, cast and laminate are as shown in the Exhibit section.

Commercially, the cost reduction as a percentage of market pricing (average monthly O-UPR price was ~INR 115 per kg from Apr-23 to Jul-24) is estimated at 5% to 11%, considering a raw material cost reduction of 6 to 13 INR/kg (again using costing data for PA, MEG and rPET from months of Apr-23 to Jul-24). The raw material cost difference, therefore, as a percentage of the sale price, is substantial.

In conclusion, the growing issue of ghost gear can be addressed by recycling it into commercially viable resources, such as O-UPRs, thereby promoting a circular economy and enhancing global sustainability. This study demonstrates that rPET derived from ghost nets is not only cost-effective, with potential cost reductions of up to 11% on market pricing, but also integrates environmental conservation with economic benefits. By retrieving, recycling, and repurposing ghost nets into high-value products, this model has the potential to mitigate ecological damage while supporting key stakeholders, including governments, fishermen, and manufacturers. Scaling such initiatives can drive significant progress in advancing sustainability and achieving long-term environmental and economic goals.

Acknowledgements

Thank you to Viral Thakker, Partner and Leader, Sustainability and Climate, Deloitte South Asia, Dr. Supraja Dharini of the TREE Foundation, Chennai; Dr. Trushar Desai, R&D Technologist in Thermoset Resins; Scott Bader India; for their support.

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Flexible Pipes for Offshore Applications

Strohm completes successful field trials of thermoplastic composite pipes (TCP) for Petrobras, Brazil at water depths of 1,500 metres

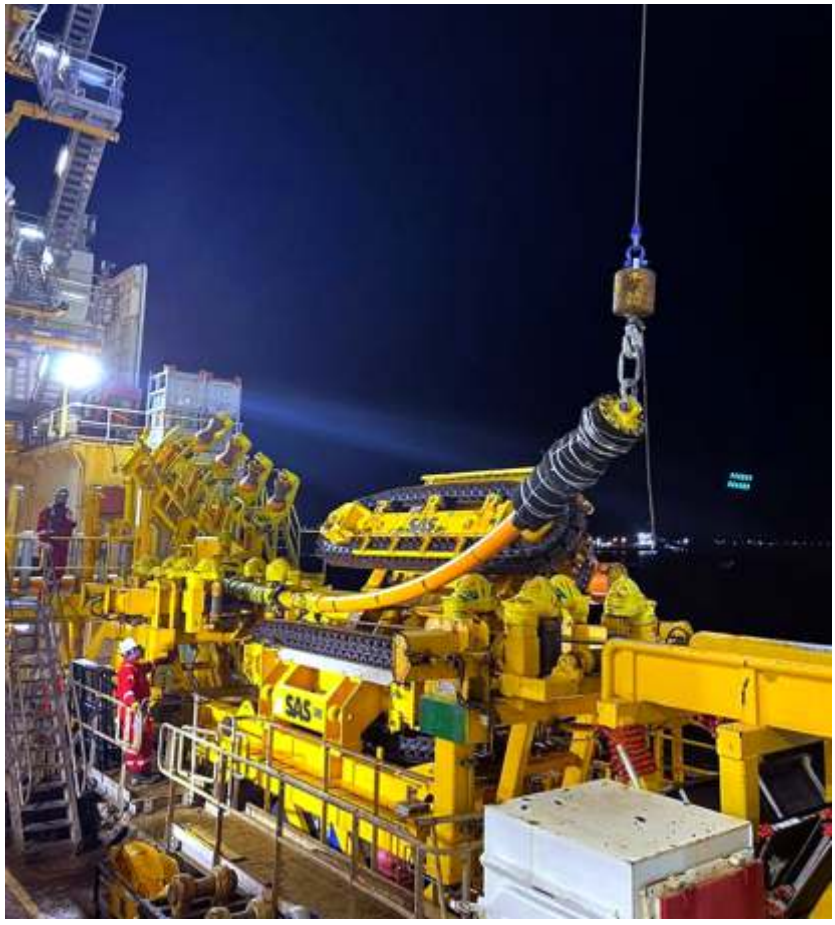
Strohm (Netherlands), the world's first and leading producer of thermoplastic composite pipe (TCP), has successfully completed the first field trials with Petrobras for its TCP pipe design offshore Brazil, at water depths of approximately 1,500 metres.

The testing and engineering assessments, which were conducted in the Campos Basin recently, have demonstrated the pipe's performance under real-world conditions as well as the ease of its installation, using the same standard flexible pipe installation vessels which are already part of Petrobras' fleet.

The trials were conducted in partnership with Petrobras, ensuring the product meets both industry standards and the unique conditions of the Brazilian market. Strohm's TCP was tested using the same methodologies and standards as conventional flexible pipes.

The pipe's robustness and ease of installation have been assessed, including crushing and deep immersion performance (DIP) tests, as well as subsea first and second-end vertical connection tests. As part of the process, the pipe was installed in a catenary configuration in which it was kept for 24 hours to assess its behaviour under normal operational conditions.

The tested TCP is suitable for post-salt wells, and the tests results provided valuable learnings that will support the qualification of TCPs for pre-salt applications as well. Since the technology is resistant to stress corrosion cracking caused by CO_2 - one of the major challenges in the area, it shows strong potential as a definitive solution for the pre-salt cluster offshore Brazil



Furthermore, TCP has a significantly smaller carbon footprint compared to conventional flexible pipes due to the materials used and its light weight, leading to lower transportation and installation costs. It can be installed using vessels currently available in the market, and further, due to its light weight, also enables simpler and more cost-effective installation methods to be deployed, such as the subsea pallet.

Renato Bastos, VP Brazil at Strohm, said: “This successful phase marks the culmination of a remarkable collaboration between Petrobras and Strohm throughout the last few months and the field trial results are proof of the innovation and quality that TCP brings to the industry. The technology has the potential to transform the global deepwater market and unlocks a huge potential for us in Brazil.

Recyclable Wind Turbine Blade

The first 220-meter diameter recyclable thermoset resin blade wind turbine jointly developed by Swank New Materials and Sinoma Blade in China

Swank New Materials Technology Co., Ltd. ("Swank New Materials"), a subsidiary of Swank Investment Holding, Goldwind Science & Technology Co., Ltd. ("Goldwind"), and Sinoma Technology Wind Blade Co., Ltd. ("Sinoma Blade"), jointly developed the first recyclable wind turbine (220m diameter) and officially arrived at the Tonghua Wind Farm in Jilin Province, China. This marks not only a major milestone for Swank in green innovation technology, but also a crucial step forward in green management for the wind power industry.

The project utilizes Swansea's innovatively developed EzCiclo recyclable thermoset resin, features blades in the current mainstream over-100-meter profile, and is equipped with Goldwind's modular, mass-produced, custom-built turbine units. It is estimated that using EzCiclo recyclable thermoset resin, for example, can reduce the carbon footprint of each 8-10MW wind turbine by approximately 100 tons of carbon dioxide equivalent (CO_2e) over its entire lifecycle.

Swancor Group's innovative CleaVER degradation liquid technology degrades discarded blades into recycled glass fiber and oligomers. The recycled fibers and oligomers can then be reused in new blade manufacturing and other cross-industry applications. The recycled glass fiber reduces its carbon footprint by 56% compared to virgin glass fiber, providing an efficient and low-carbon solution for waste disposal. Goldwind Technology, as the complete wind turbine manufacturer, provides integrated wind farm solutions, while Sinoma Blades optimizes the blade manufacturing process and Jianheng certifies components and turbine units. Together, they form a complete value chain from materials to manufacturing to certification and application.

The project not only provides over 20 million kilowatt-hours of clean electricity annually but also solves the environmental problem of landfill disposal of traditional fiberglass blades through Shangwei's recyclable thermosetting resin technology, making a substantial green contribution to local rural development.

The rollout of this recyclable blade wind turbine not only marks a new breakthrough in global environmental protection and resource recycling for the wind power industry but also provides a clearer path for the industry's future sustainable development. Swansea Investment Holdings will continue to uphold its commitment as a strategic investor in sustainable industries, deepening its investment in innovative technologies and key sectors. Through its diversified global presence, Swansea is committed to promoting a sustainable ecosystem across industries and supply chains.

Composites Pipes Waste-To-Energy Plant

Composites collector pipes developed by QHeat and Exel Composites improved the energy production and storage capacity

QHeat and Exel Composites have created composite pipes that improve the energy efficiency of the waste-to-energy plant. The tailored composite collector pipes were developed to meet the plant's specific needs, with a focus on durability, sustainability, and recyclability.

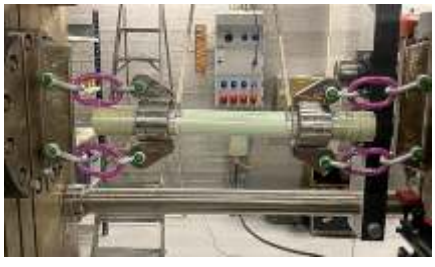
QHeat has completed its co-created product innovation together with Exel Composites, a publicly listed Finnish company serving global industries with advanced composite solutions. The partners developed and installed custom-made composite collector pipes in one of QHeat's geothermal wells at the Lounavoima site.

“The composite collector pipes improved the energy production and storage capacity of Lounavoima's borehole by nearly 10 percent compared to the previous solution,” says QHeat CEO Erika Salmenvaara.

Having previously worked with Lounavoima, QHeat was familiar with the plant's requirements. It needed a cost-effective and sustainable solution to improve energy efficiency while meeting regulations.

A natural fit for collaboration

Exel designed and manufactured the



collector pipes, which QHeat installed using specialized tools. As a pioneer in bespoke composite solutions and with a growing focus on energy applications and circularity, Exel was a natural fit for the collaboration.

“We got to work ambitiously and openly on a product that has the potential to launch us into new business areas and markets. We could demonstrate that the composite pipes have an estimated 50-year lifecycle and can be responsibly disposed of at the end of it,” says Pertti Kainu, Product Business Owner at Exel Composites.

While QHeat owns the solution and patent for the geothermal well technology, Exel's R&D team and decades of composites expertise played a crucial part in the co-creation project. Both parties were equally impressed by each other's expertise.

The collector pipes needed to withstand their own weight two kilometers underground, while also insulating heat to ensure energy isn't lost during transfer. Exel's composite solution rose to the occasion, being metal-free, lightweight, optimized for flow and insulation, and recyclable.

The pipes are made of fiberglass utilizing a continuous manufacturing process called pultrusion. This material might seem unconventional compared to acid-resistant steel or plastics. However, traditional materials weren't a good fit for this case: metals conduct heat, and plastic lacks the mechanical strength required at such depths.

Composite materials can be applied well beyond geothermal energy, in areas such as wind and solar power, where their performance characteristics – lightness, insulation, corrosion resistance and long lifetime – deliver major benefits. This supports, among others, industries driving the green transition.

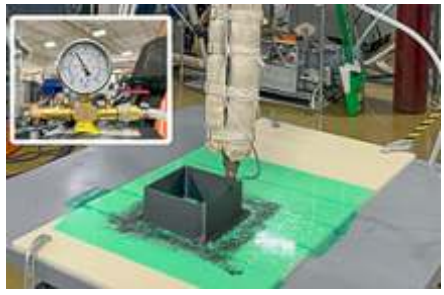
Vacuum-Assisted Extrusion Technique

Oak Ridge National Laboratory develops a vacuum-assisted extrusion method reduces internal porosity in large-scale 3D-printed composites

Scientists at Oak Ridge National Laboratory (US) have developed a vacuum-assisted extrusion method that reduces internal porosity — by up to 75% — in large-scale 3D-printed polymer parts.

Large-format additive manufacturing, or LFAM, enables the direct printing of meter-scale structures used in aerospace, automotive and defence tooling. But widespread adoption has been hindered by internal porosity, or voids, that weaken printed components. Reducing porosity is key to improving strength, durability and overall performance.

ORNL researchers tackled this



challenge with a novel approach: integrating a vacuum hopper during the extrusion process to remove trapped gases and minimize void formation in fiber-reinforced materials. These materials are widely used in LFAM for their stiffness and low thermal expansion but often suffer from intrabead porosity that limits part quality.

The new system reduced porosity to under 2%, even with varying fiber content.

“Using this innovative technique, we are not only addressing the critical issue of porosity in large-scale polymer prints but also paving the way for stronger composites,” said ORNL's Vipin Kumar. “This is a significant leap forward for the LFAM industry.”

While the current method is designed for batch processing, ORNL has developed a patent-pending concept for continuous deposition systems, which will be the focus of upcoming research.

Design and Analysis Software for Composites

AnalySwift's VABS program is a general-purpose cross-sectional analysis tool

AnalySwift, LLC, is a provider of efficient high-fidelity modelling software for composites. The Florida International University is participating in AnalySwift's, Academic Partner Program (APP), and is using its VABS simulation software for researching aerospace structures such as wings and antennas. The work is part of the broader Fluid-Structure Interaction (FSI) Laboratory within the Department of Mechanical and Materials Engineering, which seeks to improve aerospace structure design and facilitate stress flow based on the principles of Constructal Law.

The APP offers participating universities no-cost licenses of engineering software programs VABS and SwiftComp so students, researchers, and faculty can leverage the tools in their academic research.

The VABS program is a general-purpose cross-sectional analysis tool for predicting structural beam properties and recovering 3D stresses, strains, and strengths of slender composite structures. It is a powerful tool for modelling composite rotorcraft (helicopter, air mobility, unmanned aerial vehicles) and wind turbine rotor blades, as well as other slender composite structures, such as propellers, landing gear, and high-aspect ratio wings.

Dr. Wenbin Yu, CTO of AnalySwift. said “VABS reduces analysis time from hours to seconds by quickly and easily achieving the accuracy of detailed 3D FEA with the efficiency of simple engineering models. With VABS, engineers can calculate the most accurate, complete set of sectional properties such as torsional stiffness, shear stiffness, shear centre for composite beams made with arbitrary cross-section and arbitrary material. It can also predict accurate detailed stress and strength distribution for composite beams, which are usually not possible with 3D FEA for realistic composite structures.”

Hybrid Tape Development Line

Designed and built by Cygnet Texkimp to provide direct melt and slurry-based processing capability for a wide range of polymers and applications

The University of Sheffield Advanced Manufacturing Research Centre (AMRC, Sheffield, UK) has announced the UK's first open-access, hybrid fibre reinforced thermoplastic tape development capability to accelerate innovation in sustainable composites technologies.

The dedicated research platform will feature a dual-mode thermoplastic processing line, designed and built by fibre handling and converting technology specialist Cygnet Texkimp (Northwich, UK) to provide direct melt and slurry-based processing capability for a wide range of polymers and applications.

The line also incorporates Cygnet Texkimp's Flatline creel and fibre spreading technologies to maximise the range of fibres that can be processed, and to facilitate the development of novel composite tapes for downstream processing into composite components for industry.

Dr Gary Foster, Senior Technical Fellow – Thermoplastic Composites at the AMRC, said: “This open access capability will provide material and tape suppliers, as well as downstream composite manufacturers the opportunity to develop novel tapes for their end-users. Leveraging the AMRC's expertise in advanced manufacturing and materials processing, this initiative will facilitate more in-depth research into sustainable composites and provide a better understanding of key processing parameters.”

Thermoplastic composites offer several advantages, including recyclability, high performance, adaptability and efficiency. They are known for their lightweight, strong and impact-resistant properties and can be easily moulded and reshaped. Their ability to be recycled and repurposed at the end of their life cycle contributes to sustainability. Furthermore, with almost unlimited shelf life and compatibility with automated processes, thermoplastics eliminate extended cure times, reduce errors and make them ideal for high-volume production.

The hybrid line will be installed at the AMRC's Factory of the Future facility where businesses and researchers will be able to develop new processing methodologies for novel thermoplastic composite intermediate tapes on a small-industrial scale with support from the AMRC.

Andy Whitham, Director of Process Development at Cygnet Texkimp, said: *“The AMRC's new thermoplastics research capability will provide a world-class testbed for businesses to explore the opportunities offered by these novel composites and adds considerable capacity and expertise to the UK's composites manufacturing capability.*

“Our hybrid line provides extensive control of the processing parameters for thermoplastic materials development. It will allow organisations to fully develop new processes and products on a small-industrial scale and prove out their concepts before investing in machinery.”

The dual-mode line allows industrial-grade polymers such as polypropylene, nylons and PEEK to be processed from pellets using Cygnet Texkimp's direct melt impregnation technology or powdered polymers to be processed using water-based slurries. The line is modular in design and allows rapid conversion between these two operating modes.

The integration of Cygnet Texkimp's Flatline creel and fibre spreading technologies enables processing of a range of fibres including carbon, glass, recycled and natural fibres. It can also be configured to produce composite tapes in a variety of widths from 45mm up to 180mm and with a specific fibre and polymer weight per metre.

Additive Manufacturing in Shipbuilding

Damen Compact Crafts and CEAD collaborate to develop a 3D-printed HDPE Workboat

Damen Compact Crafts (DCCr), Netherland, part of the Damen Shipyards Group, and high-tech company CEAD, Netherland are launching a collaboration to develop a 3D-printed HDPE Workboat (HWB) using CEAD®HDPro material. The project will take place at CEAD's Maritime Application Center (MAC) in Delft. Through this initiative, two Dutch innovation leaders are joining forces to explore the potential of large-format additive manufacturing for the maritime industry.

From technology to application: 3D printing for the professional market

With this project, Damen aims to investigate how 3D printing technology can contribute to the faster, more sustainable, and more flexible production of functional vessels. The HWB is being designed as a versatile vessel, suitable for a wide range of operations, including inspection, support, patrol, and logistical tasks. By 3D printing the hull of the boat, not only is more design freedom achieved, but it also opens the possibility of integrating recycled and renewable materials.

For this project, CEAD contributes its expertise in large-format 3D printing and is developing print technologies capable of processing superior HDPE blends. The project serves as a prime example of how technological innovation and market knowledge can reinforce one another.

“This collaboration demonstrates how technology can directly contribute to practical solutions in the maritime sector,” said Charléne van Wingerden, Chief Business Development Officer at CEAD. “The MAC was founded to accelerate exactly these kinds of innovations – and a 3D-printed HWB is a perfect example of that.”

“Innovation and standardisation are part of our DNA at Damen. 3D printing allows us to respond more quickly and flexibly to what our customers really need. It's an exciting step toward smart, sustainable solutions that work,” said Nick Pruissen, Managing Director at Damen Compact Crafts.

Building the future of maritime production together

In this project, Damen and CEAD combine their complementary expertise:

CEAD as a technology pioneer in large-format composite 3D printing, and Damen as a specialist in designing and delivering compact workboats for a wide range of applications.

With this first step, both parties are exploring the opportunities of a new production process for the maritime industry – focused on sustainability, efficiency, and innovation. The success of the 3D-printed HWB could open the door to broader applications of additive manufacturing in shipbuilding.

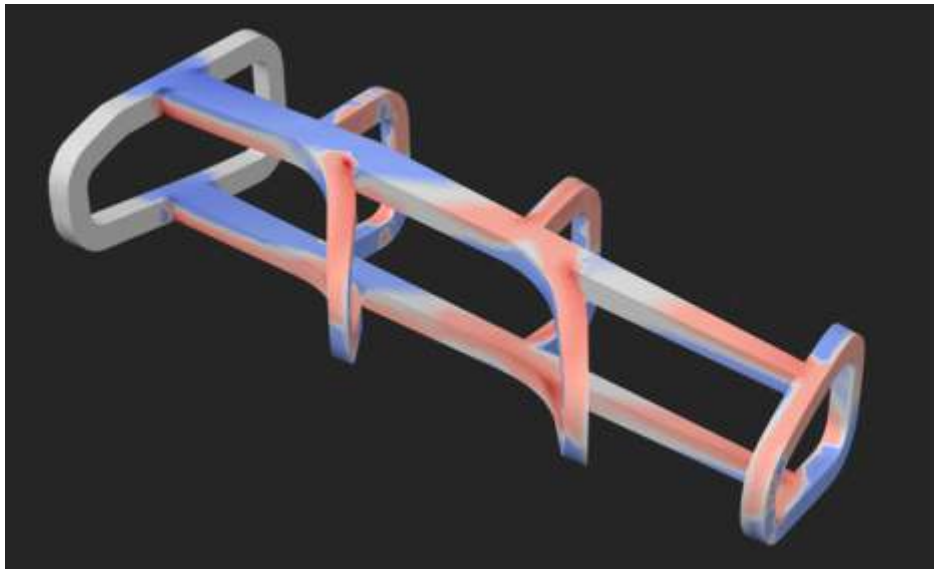
FEA Simulation for Anisotropic CF3D Structures

Advancement in the simulation of anisotropic composite materials, which have unique directional strengths based on fiber orientations

Continuous Composites (CCI), USA has been awarded a $1.9 million Tactical Funding Increase (TACFI) contract from the U.S. Air Force to develop a groundbreaking Finite Element Analysis (FEA) tool for Continuous Fiber 3D Printing (CF3D). This contract, which started in November 2024, will run through August 2026, and represents a significant advancement in the simulation of anisotropic composite materials, which have unique directional strengths based on fiber orientations.

According to a CCI announcement, currently, commercially available FEA solutions are limited to isotropic materials, such as metals, where strength and stress responses are uniform in all directions. However, CF3D® composites are anisotropic, with primary strength in the direction of the fibers. This creates a challenge for traditional FEA software, which cannot accurately predict material behavior based on fiber orientation.

“We're solving a major gap in FEA simulation tools,” said Steve Starner, CEO of Continuous Composites. “Existing software only assigns a single directional property to each layer of composite material, but CF3D's fiber steering requires a more dynamic approach. Our new tool will accurately simulate how our parts will behave under various conditions, which is crucial for industries like aerospace and defense.”



CCI is partnering with industry experts on the development of this new FEA tool. The tool will ingest CF3D toolpath data to generate mesh representations that more accurately reflect fiber orientation, material behavior, and structural performance of how anisotropic parts will react to real-world loads.

As part of this effort, CCI will integrate the new tool into CF3D Studio™, enabling the prediction of material properties and performance before physical testing begins. This capability is expected to dramatically reduce development time and increase reliability in the design of complex composite parts used in mission-critical applications.

This contract is a major milestone for Continuous Composites, advancing CF3D technology from a manufacturing process to a comprehensive design-to-performance solution. The development of this tool represents a significant leap forward in the simulation of high-performance, lightweight composite parts, with potential applications across the aerospace, defense, and UAV industries.

Woven Fabric material with increased layers

Dyneema®, owned by Avient Corporation, an innovator of materials solutions, has once again pushed the boundaries of fabric engineering — this time by increasing the Dyneema® layers in its latest advanced composite fabric material. These new Dyneema® Woven Composites take material performance to the next level by combining the unmatched strength of a Dyneema® composite core with a 100% Dyneema® abrasion-resistant woven face fabric.

This next-generation composite fabric material can offer up to 10

times more abrasion resistance, 5 times better tear resistance, and 34% weight savings compared to the existing Dyneema® high-performance composite portfolio.

Fifteen times stronger than steel yet light enough to float on water, Dyneema® is the original ultra-high-molecular-weight polyethylene (UHMWPE) fiber, which is trusted in countless applications where performance is paramount and reliability is critical.

The secret is in the science. Dyneema® Woven Composites feature a dual-layer composite structure that combines the strength, abrasion resistance, and durability of a fully woven Dyneema® face fabric with the dimensional stability, structural integrity, and lightweight waterproof properties of Dyneema® composite technology. The result is a fabric that is highly durable under significant load conditions and after prolonged use.

Replication of Space Multilayer Insulation's Cloth Fabric

Versiv Composites (US) and Bron Aerotech (US) announced that the replication of Space Multilayer Insulation's (MLI) Beta® Cloth Fabric is now available to customers with demanding applications worldwide for space applications. Following the closure of the former Saint-Gobain facility the two companies have worked closely together to replicate legacy Beta® Cloth Fabric materials.

Versiv is a recognized expert in high-performance, technology-driven, fluoropolymer-based composites films and fabrics. Bron Aerotech specializes in sourcing, converting, and supplying high-performance engineered films, fabrics, foils, foams, coatings, and adhesives that meet aerospace OEM specifications.

According to Versiv, the replicated product meets the same physical performance levels as before, and the supply chain is now fully secured. In addition, Beta® Cloth Fabric continues to meet key specifications, including these of Nasa, Northrop Grumman and Lockheed Martin. This covers both CF500F at 1295mm/51” and the static dissipative version CF500GW at 2030mm/80.

Beta® Cloth Fabric continues to meet key specifications, including those of NASA, Northrop Grumman, and Lockheed Martin. Beta cloth can be combined with unique coatings and other material laminations with other high-performance materials, supporting new space requirements and Multilayer Insulation applications.

Versiv is also exploring options to expand this range and offer alternative materials to support other space requirements and extend Versiv's range of products for Multilayer Insulation.

Prepregs made from natural fibers

SGL Carbon’s pre-impregnated materials used in the body of Toyota Hilux which is competing in the Asia Cross Country Rally

In early July, Tras Ltd., a Japan-based company, unveiled the new natural fiber body for the Toyota Hilux, which is competing in the Asia Cross Country Rally in Thailand. SGL Carbon supplied the pre-impregnated materials, known as prepregs, for the car's body. These materials are manufactured at the SGL site in Willich, Germany. With several components made of natural fiber composites, the car stands out with the natural look of the flax fibers.

SGL Carbon has been involved in developing prepregs and components made from natural fibers, such as flax, for several years. The flax fiber fabric is manufactured by Bcomp, a Swiss cleantech company with which SGL has collaborated on various projects for some time. At the SGL site in Willich, the ampliTex™ flax fiber fabric is pre-impregnated with a matrix material.

“A major challenge was the comparatively high moisture absorption of the flax fibers. We therefore used a special transparent, fast-curing resin system that has proven particularly resistant to and tolerant of the high moisture content of the natural fibers. This ensures an attractive appearance of the components as well as the good mechanical and thermal properties of the composite material, which are particularly important in motorsports,” explains Dr. Thomas Meinhardt, Team Lead Technical Marketing Prepregs at SGL Carbon.

The finished prepregs were then processed into the final components by Tras. The company specializes in manufacturing, testing, and demonstrating car bodies made from natural fibers. “The use of the special resin system was an important improvement for us, as we often face very high humidity in Asia, yet the components must still meet the rigorous demands of racing. With this natural car body, we now have a lightweight, sustainable component that looks great too,” says Masanao Nitta, CEO of Tras Ltd.

Advantages of Flax Fiber Components

Components made from Bcomp's flax fiber technologies offer up to 85% lower CO_2 footprint from cradle to gate compared to pure carbon fiber parts, thanks to the use of renewable raw materials and the possibility of end-of-life thermal energy recovery.

Additionally, every gram of weight counts, especially in motorsports. Composites with flax fibers from Bcomp offer a sustainable lightweight solution. In combination with the powerRibs™ reinforcement grid, similar stiffness and weight as pure carbon fiber components can be achieved. Furthermore, the natural fiber components perform well in crash tests and provide very good vibration damping, making them useful for demanding motorsport applications.

Bio Composites for Automotive parts

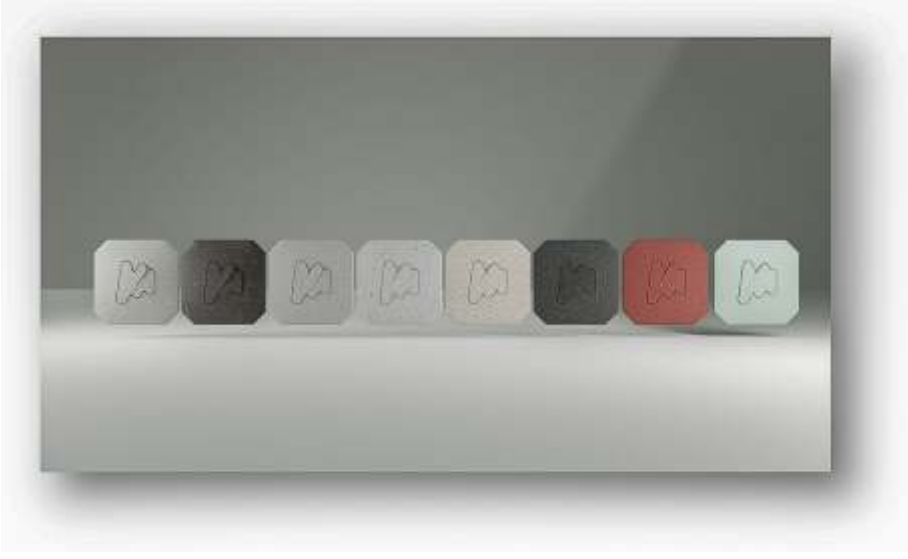
Materi'act unveils sustainable bio composite materials for injection technology in the automotive industry

Materi'act (France), Forvia's sustainable materials subsidiary, unveiled NAFILean Vision, a groundbreaking advancement in sustainable bio composites for injection technology in the automotive industry. Building on the success of NAFILean-R, a recyclable bio composite made from recycled plastics reinforced with 20% hemp fibers, this new material family not only meets stringent performance standards but also enhances aesthetic quality by making biomass visible, setting a new benchmark for eco-friendly and visually appealing automotive parts, said in an announcement.

A new era of visible green technology

NAFILean Vision is the newest addition to the NAFILean family, well known for incorporating sustainable materials in over 10 million vehicles globally. This innovative bio composite blends low carbon recycled plastics from post-consumer sources with renewable biomass, such as hemp, wood, reed, vine shoots, and even oyster shells, which help sequester CO_2.

NAFILean Vision maximizes the decarbonization of plastics and introduces them to visible automotive parts. The variety of biomass fillers enables the creation of a wide range of visible sustainable materials, with rich aspects that reflect their nature and origin in a wide variety of colors, grains, depth, and high perceived quality textures. Unlike traditional materials that might require additional processing, NAFILean Vision can be used in a one-shot injection process, eliminating the need for post-processing, like deco painting or film, leading to further reductions in CO_2 emissions and costs. It incorporates up to 25% biomass, carefully selected for its high potential to sequestrate carbon emissions and can be combined with specially developed colouring technologies to meet the advanced Colour Material and Finish (CMF) requirements of automotive OEMs.



Setting a new standard for visible sustainability

Life Cycle Assessments demonstrates an impressive reduction in carbon footprint by up to 75%, establishing NAFILean Vision as a leader in sustainable material solutions for the automotive industry.

Entirely recyclable, it also sup-ports a circular economy and minimizes waste. This innovation was showcased in a concept car in its ocean bound recycled plastics variation, featuring a unique blend of 10% renewable oyster shell particles and 20% recycled plastics, collected by MATERI'ACT ecosystem partner Plastic Odyssey. It received an enthusiastic response from automotive OEMs and paved the way to serial application in the future.

Unlocking creative potential

Beyond the sustainability benefits, it offers enhanced creative flexibility and streamlined development processes with tools like 3D digital surfaces and comprehensive design and process guidelines. It aligns with current design trends and allows for innovative, environmentally conscious automotive interior designs.

FibreCoat develops new material for 'stealth' composites

The new fibre-reinforced composite – still at the proof-of-concept stage – goes beyond traditional radar-shielding technology.

FibreCoat, a world leader in materials technology, has developed a groundbreaking fibre-reinforced composite capable of making aircraft, tanks and spacecraft invisible to radar. The company, founded in Germany in 2020 but developing its materials since 2014, is known for inventing a novel technology to coat metals and plastics onto fibres, thus combining the properties of the fibres and the coating material, during the fibre-spinning process.

The new fibre-reinforced composite – still at the proof-of-concept stage – goes beyond traditional radar-shielding technology. Where existing solutions rely on reflecting radar waves, FibreCoat's fibre reinforced composite, a thin and flexible radar absorbing material (RAM), absorbs them. It uses bicomponent multifilament yarn dispersed in composites and is made from carefully engineered blends of PMMA, carbon nanotubes, and Alucoat fillers. These are tuned for precise thicknesses (ranging from 0.5 mm to 6 mm) and for key radar frequency bands such as the X-band (8–12 GHz).

It is a major leap forward that increases the number of possible applications, from military stealth to electronic protection. The RAM has achieved reflection losses of up to -40 dB, equivalent to 99.99% radar absorption – making it among the most effective RAMs available today.

Unlike many stealth solutions that degrade at angle, FibreCoat's multilayer composites maintain performance across curved surfaces and slanted radar exposure. In testing, they have achieved ≥ -10 dB reflection loss up to 60° in Transverse Electric (TE) mode and up to 45° in Transverse Magnetic (TM) mode.

Current stealth technology typically requires thick plating or specialised paints. Rival materials are narrow band, so targeting a single radar frequency. FibreCoat's solution, in contrast, is lightweight, flexible, and broadband: absorbing radar across a wide spectrum of frequencies and outperforming existing materials by up to 100 times.

The fibre-reinforced composite, a type of 'meta-material', is soon to be commercially available. The company has completed successful laboratory tests and measurements and expects field testing to be complete this year.

FibreCoat may offer the fibre to partners for integration into final products.

Dr Robert Brüll, CEO of FibreCoat, said, “This is a leap forward. We're moving stealth technology beyond the limits imposed by needing to reflect, rather than absorb radar waves.”

The stealth technology market is a critical part of the defence sector. At a time of geopolitical unrest, there is surging demand for materials that do more without adding weight, complexity or cost.

FibreCoat's range of products offer strength, conductivity, shielding, and recyclability at a fraction of the weight and cost of their competitor products. FibreCoat now employs 42 members of staff and has three production sites: Aachen, Germany; Rustavi, Georgia; and Gorlice, Poland.

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About FRP Institute

FRP Institute is a not-for-profit, professional society, started in 1999 for the promotion of the Indian composites industry. It has members from across India representing:

FRP Composites Item Manufacturers
Raw Material Manufacturers, Traders, Dealers, and Agents
Product and Machinery Manufacturers
Designers, R&D Professionals
Consultants, Academicians, and Others

Main Objectives of FRP Institute:

1. Conduct training courses on various technical subjects relevant to composites
2. Organize technical conferences and exhibitions, especially the International Conference and Exhibition on Reinforced Plastics (ICERP)
3. Create outsourcing opportunities for composites from India
4. Host webinars
5. Publish a monthly magazine – *Composites Today*
6. Facilitate B2B meetings

Key Activities and Contributions:

ICERP: Organized every two years since 2002; the flagship event of the Indian composites industry
Promotes innovation, material and product quality, and environmentally-friendly practices
Hosted 11 ICERP events and 6 national conferences in association with TAACMA, Hyderabad
Conducts 3-day basic and in-house training programs tailored to industry needs
Organizes India Pavilions at international composite expos like JEC World, Paris
Well-connected with global composites associations
Publishes "*Composites Today*" in print and digital, reaching 7,500+ professionals across India
Runs webinars on current industry topics
Facilitates raw materials, machinery, and product sourcing for industry and end-users

Academic & Industry Partnerships:

Encourages collaboration between academia and industry for research, design, and application development
Supports student learning and industry-sponsored research
Released the Indian Composites Industry Directory (2023) to support networking and business growth

Current Action Plan:

Create market survey reports and opportunity assessments
Launch a monthly e-newsletter
Promote composites recycling
Organize FRP Pavilions in major end-user exhibitions
Facilitate joint ventures and technical collaborations with global companies
Foster materials testing, research, and design collaboration between industry and academia

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About Composite Today

About Composite Today

Composites Today is the **official monthly e-magazine of FRP Institute**, India's apex body promoting fibre-reinforced plastics and composite materials. Since its launch in **2001**, the magazine has served as a vital resource for the composites ecosystem, transitioning from print to **100% digital (PDF)** circulation in **2022**.

Each issue delivers timely insights on:

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- **Innovations in processing & technology**
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- **Industry news, R&D, and market trends**

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This provides advertisers enhanced visibility through global reach **and** 24x7 digital access**.**

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- **Global access**: Readership across India and internationally

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As a specialized publication with a focused, knowledge-driven audience and strong regional presence, ***Composites Today*** offers a highly cost-effective platform for industry communication. It is ideal for:

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