

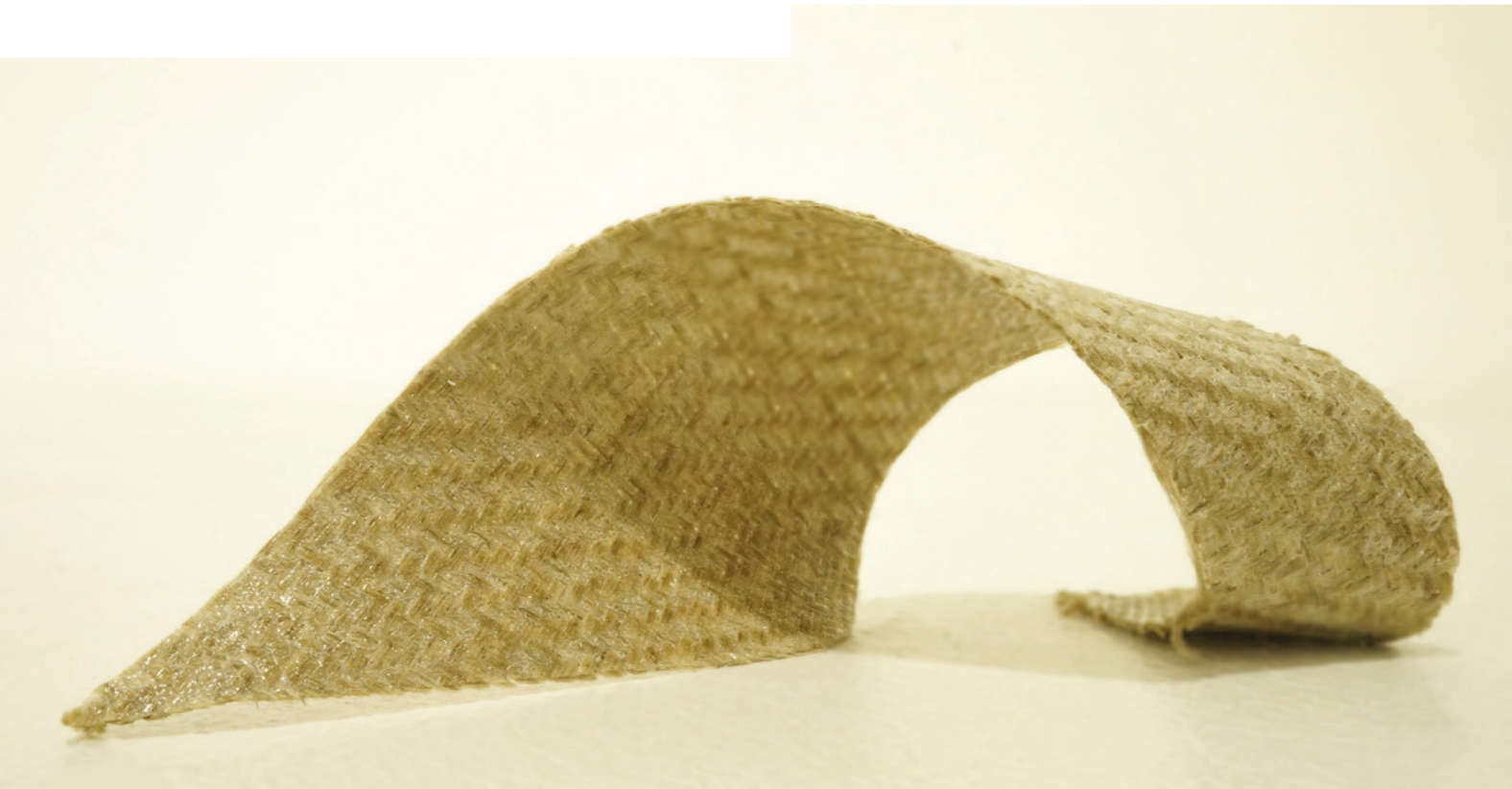
**CAC
TECHNICAL PAPER**

CAC Enable Sustainable Visual Finish
Composite Components for Automotive OEMs

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Cobra Advanced Composites (CAC) has supplied premium automotive OEMs with lightweight composite components since 2006. Throughout this period, CAC has focused on visual carbon fibre prepreg parts, building a reputation as a leading global supplier. With new European regulatory targets approaching fast, vehicle manufacturers are now focused on developing technologies that not only reduce emissions from their fleets, but also lessen the environmental impact of the processes and components used to create their vehicles by using more sustainable materials and processes.

In response to these regulatory targets and demand from leading OEMs, CAC has created a range of automotive composite solutions that use lower environmental impact natural flax fibre reinforcements in place of more traditional carbon fibres.



Natural flax - a sustainable alternative to carbon for automotive parts

CAC currently serves a broad range of customers across the automotive and motorcycle industry, typically supplying sets of prepreg carbon fibre parts with a high-quality, clear coated visual finish.

Flax fibres, mainly cultivated in Western Europe and much less energy intensive to produce than carbon, have been identified as a potential alternative to carbon fibre in the types of parts that CAC manufacture. Low in density, with a specific stiffness similar to glass fibres and a similar coefficient of thermal expansion in composites to carbon, flax fibres also provide good impact resistance and excellent vibration damping.

With CAC now receiving development requests and formal RFQs specifying “flax” or “natural fibre composite” options, as well as more traditional woven carbon twill and carbon SMC finishes, it is clear that natural fibre parts will become a much more common sight on road cars in the next 3-5 years.



CAC creates a complete package of flax solutions

CAC has focused its initial development work with flax fibers on prepreg components that are processed in an autoclave. Maintaining the same process as existing CAC programs allows the most accurate comparison and measurement versus already defined processes. Taking a staged approach to natural fibre introduction, CAC has developed the following solutions:

- **Standard visual carbon twill outer ply with flax fibre backing plies.** This option maintains the classic carbon look of the twill weave fabric but substitutes the backing plies for a woven flax prepreg material. Visual trim components often use 3 plies of material in total, this new option uses a single carbon ply and 2 flax plies.
- **Visual flax twill outer ply with flax fibre backing plies.** Increasing the natural fibre content with 100% flax fibre reinforcement produces the most sustainable construction. CAC has developed processes to produce both satin and gloss finish clear coated parts with exceptional surface finish quality.
- **Body colour painted flax fibre components.** CAC has also productionised fully painted flax fibre parts, providing a natural fibre composite option for components where a visual fibre finish is not required.

The part constructions above use woven flax fabrics that are combined with a prepreg epoxy resin system. CAC are also able to provide OEMs with data for a full CO2 and product cost impact study, comparing the new flax components to benchmark data for existing carbon fibre parts.

Working through the challenges with natural fibres



While flax fibres can be integrated into most composite processes, these naturally derived fibres can present certain challenges that CAC has successfully resolved to produce high quality visual finish parts.

- Natural fibres are typically shorter, coarser and have more broken filaments than carbon fibres. Flax fibre debris from within the prepreg can travel to the part surface when the epoxy resin flows and cures, presenting unacceptable visual defects compared to a carbon fibre part.
- Flax fibres are highly hydrophilic. Trimming the edges of a moulded composite part can expose unsealed fibres which may then absorb moisture from direct contact with water or from humidity. Proper surface coating and full encapsulation of the flax fibres mitigates this moisture sensitivity.
- Finishing natural fibre composite parts, where the weave pattern is left visible through a clear coat lacquer, also provides certain challenges in production. Fibre print-through can be a problem for manufacturers of gloss finished parts. CAC has mastered the processing of both gloss and satin finish components to the highest automotive standards.

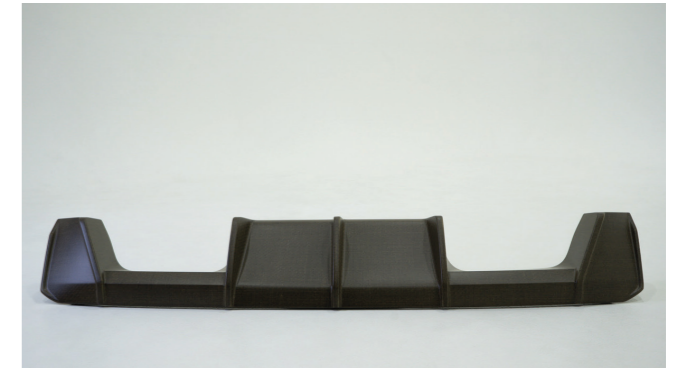
Currently CAC works with leading players in the rapidly maturing flax fibre industry. Many top fibre producers are now focusing their composites strategies on link-ups with major composite weaving players. These new collaborations have the potential to provide lower cost flax reinforcements coupled with the secure supply chains and quality standards required by CAC and its OEM customers

State-of-the-art flax based automotive components

CAC has optimised its new range of flax fibre solutions to give OEMs a broad range of production-ready colour and surface gloss options. CAC flax parts now offer OEMs a validated, sustainable alternative to carbon fibre.

By leveraging its strengths in clear coated carbon manufacturing and natural fibre expertise developed in other business units, CAC has successfully navigated the challenges of processing flax to meet the toughest of automotive quality standards

Looking ahead, CAC is ready and looking forward to matching its customers' demands for more sustainable parts. Working with leading global suppliers, CAC can colour the protective lacquer, epoxy resin system and even the flax fibres themselves, creating natural fibre components with a huge palette of potential colours and shades.





Factory and process - a complete sustainability focus

CAC operates a world-class manufacturing unit that operates as a standalone facility within the 100,000m² production site operated by Cobra International 70km southeast of Bangkok. CAC and Cobra continuously work to improve the efficiency and sustainability of their operations, with group-wide initiatives focusing on green energy sources, maximizing on-site waste sorting, recycling, reducing water consumption and minimizing the plastic content of its packaging.

Tree planting programs around the site as well as mangrove re-planting initiatives around Thailand help to create a greener environmental aspect that is now matched at component level by the top quality sustainable flax parts produced by CAC.

“At CAC, we are constantly developing our composite processes. With our latest program, creating the highest quality flax-based visual components for our OEM customers, we’ve been on a challenging yet fascinating and rewarding journey. We are very proud of the results achieved, with CAC now offering a full range of natural fibre composite solutions that perfectly complement our traditional visual carbon fiber parts.”

Michel Roeffaers
Managing Director Commercial, CAC.





One-Stop Shop for Serial Production of
Strong, Light and Beautiful Composite Products

Tel: +66 38 454 219 - 28
Email: info@cobrainter.com

700/478 Amata City Chonburi Industrial Estate,
Moo 7, Donhuaror, Muang District,
Chonburi 20000, Thailand

www.cobrainter.com



Case Studies