



The Composites Leadership Forum's Automotive Group - Developing a Composites Supply Chain for the UK's Automotive Sector

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Dr Faye Smith, Department for International Trade
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LCV, 2019

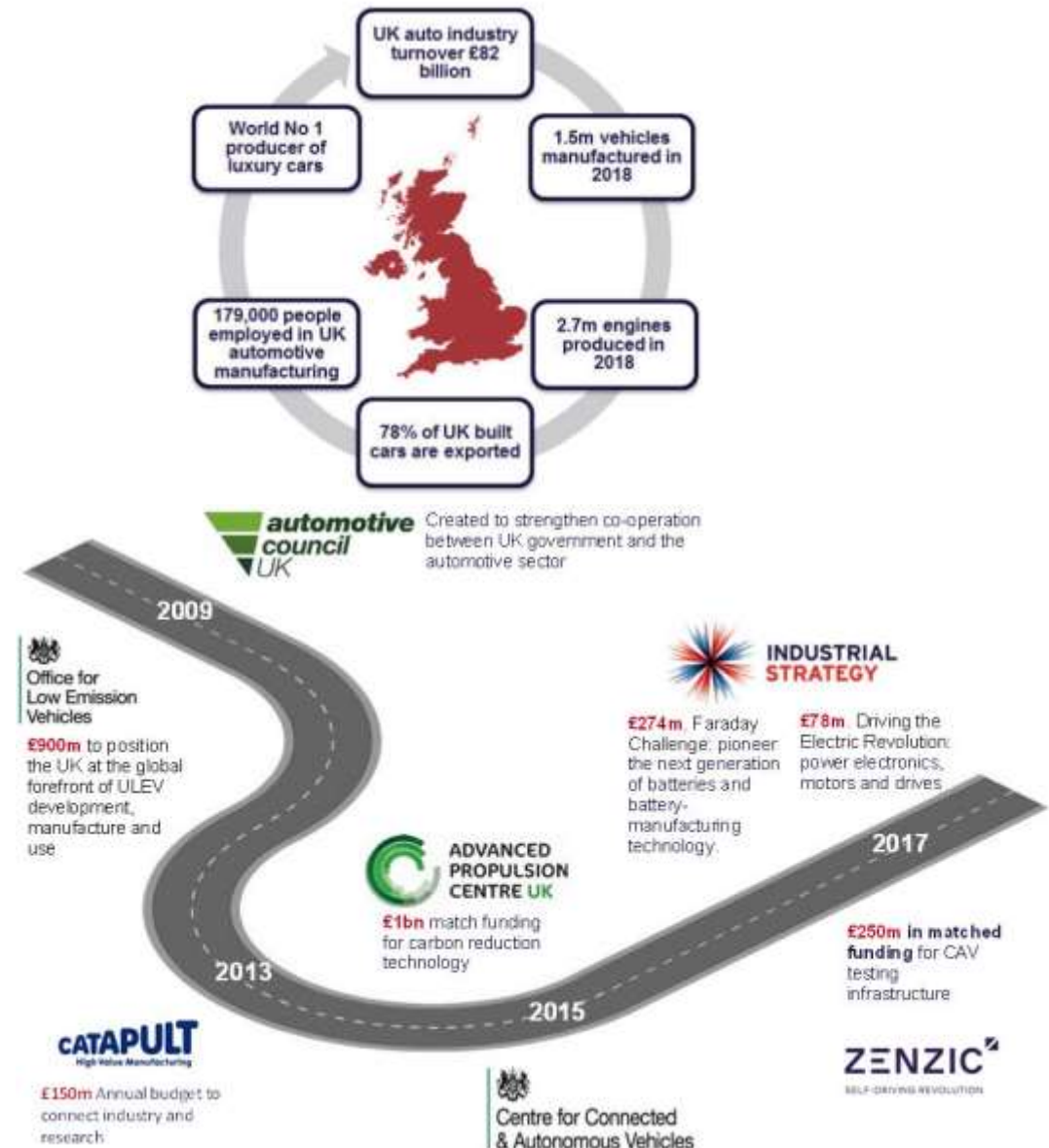


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UK Automotive Industry – An Overview

- A highly competitive economy (World No. 8, World Economic Forum).
- The most flexible labour force in Europe and the best country in Europe for industry/university co-operation (Automotive Council survey, 2018).
- Lowest labour costs in Western Europe.
- Number 2 in Europe for automotive productivity.
- World's largest manufacturer of luxury and specialist cars.
- World's largest motorsport cluster.
- First European manufacturer of both electric vehicles and battery packs.
- Four of the Top 10 research universities in the world.
- Europe's leading cluster of automotive engineering consultancies.
- Major government investment into automotive (£2.5 billion plus) with spending priorities guided by the industry.



Success : UK automotive strategy for growth and sustainability

Invest in innovation and technology:

- £1 billion over 10 years in new Advanced Propulsion Centre
- Improve co-ordination / collaboration with academic research

Enhance supply chain competitiveness and growth:

- £3m inward investment via DIT's Automotive Team
- Improve access to finance via Banking/Industry framework

Invest in people – ensuring the right skills:

- 5 year plan for 7,600 apprentices and 1,700 graduates
- Attracting more young people, especially women, into automotive

Create competitive business environment for automotive:

- Enhancing the UK's flexible labour market & support free trade
- Partnership between Auto Council, EU & local enterprise
- Continued early market support for ultra-low carbon vehicles

→ Sets out the collaborative activity that will secure the next stage of automotive sector growth



Roadmaps Developed:

- Bus
- Commercial & Off-Highway Vehicle
- Passenger Car
- Motorsport Technology
- Electric Machines
- Electrical Energy Storage
- Energy & Fuels
- Intelligent Connected Vehicle
- Power Electronics
- Thermal Propulsion Systems
- Virtual Product Engineering
- Lightweight Vehicle and Powertrain Structures

Composites Leadership Forum

Established as a result the 2009 UK Composites Strategy to strengthen leadership in the sector.

The CLF is working to influence the Government and other bodies to bring together support for composites and ensure growth and industrial success for the UK.

Strategy refresh delivered 2016.
www.compositesleadershipforum.com

Chairman:

Ken Smart, McLaren Automotive

Stakeholders:

BEIS, Innovate UK, EPSRC, KTN Ltd, DIT.

Delivery Partners:

High Value Manufacturing Catapult, Composites UK, CIMComp.

Industry Groups:

Aerospace Technology Institute, Automotive Council, Motorsport Industries Association, Construction, Defence, Renewables UK, Marine Industries Alliance, Railway Industry Association, Materials Suppliers

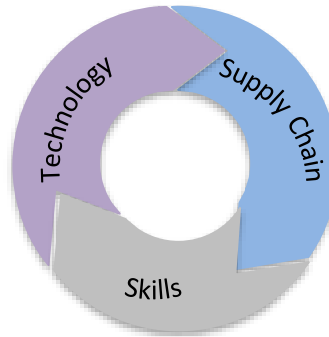
CLF: How We Work

CLF Leadership & Strategy Delivery

Working Groups			
Technology	Workforce	Sustainability	Regs, Codes & Standards

HOW

Lead Industry Group	Strategy	Description
Aerospace	DELIVER	Accelerate organic growth in established sectors already using composites.
Automotive	DEVELOP	Technologies and supply chains to capture immediate market opportunities.
Construction	DIVERSIFY	Enable UK industry to take advantage of opportunity in other sectors.



OUTPUTS

- Industry sector and common capability requirements converted into delivery plans through existing funding mechanisms and specific asks
- Acceleration of cross sectoral knowledge transfer to improve supply chain capabilities, in technologies and skills
- Increased supply chain productivity through earlier exploitation and deployment of disruptive technologies and greater use of automation via Ind 4.0

Growth by £10.2bn to £12.5bn by 2030



Automotive Composite Group

Established by the Automotive Council's Manufacturing Group and the CLF. The Group is chaired by Henry Sarel-Cooke of GKN.

Aim: "to facilitate development of UK technology capability and supply chain capacity to deliver high productivity manufacturing of globally competitive, higher volume composite structures and components".

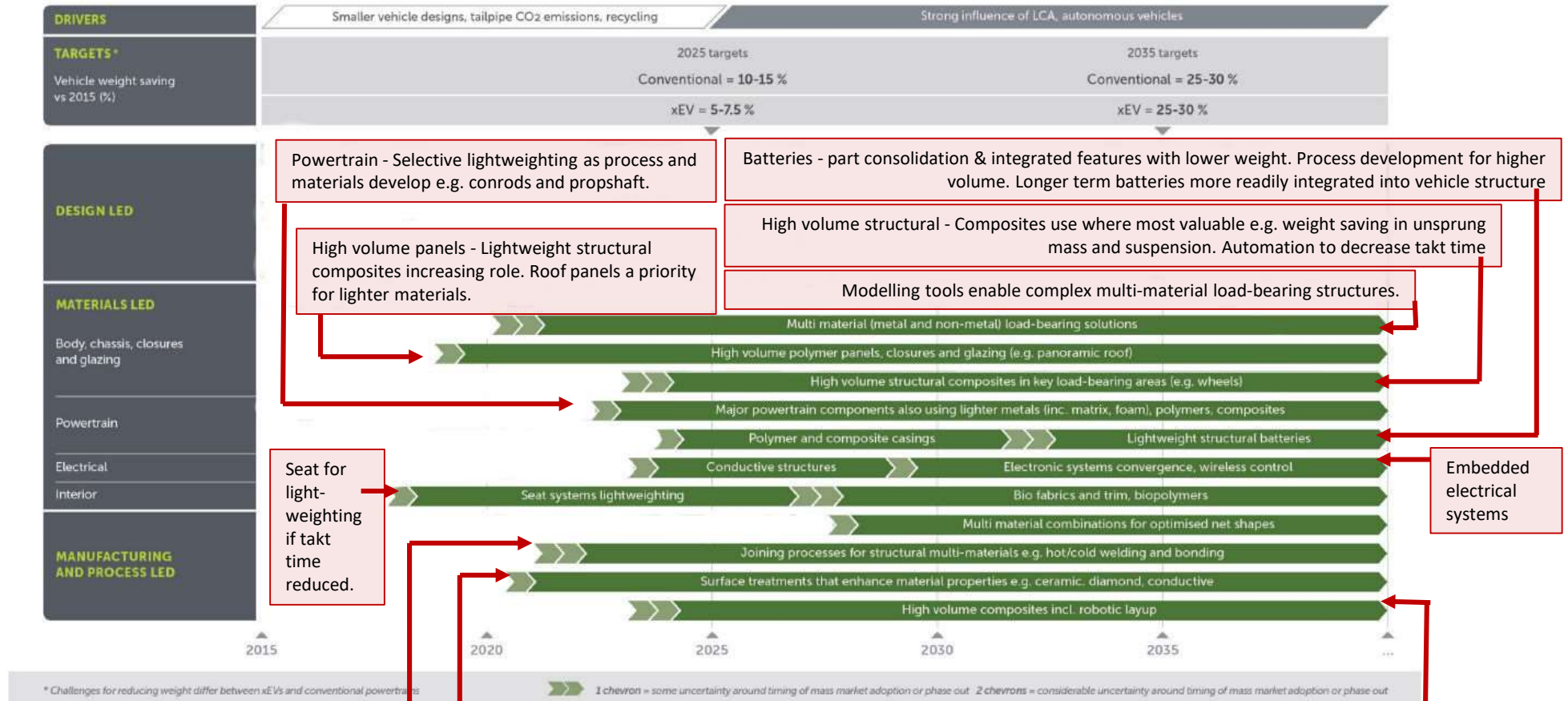
The ACG has set targets, mapped out the supply chain development required and is now seeking to fill gaps that could restrict future development.

It is working with Government and funding bodies to identify funding mechanisms to facilitate this.

Participants include:

- McLaren
- JLR
- Nissan
- Williams
- GKN
- Gordon Murray Design
- Nippon Electric Glass
- Nottingham University
- National Composites Centre
- Dept for International Trade
- Innovate UK
- APC

ACG Input to Lightweighting Roadmap



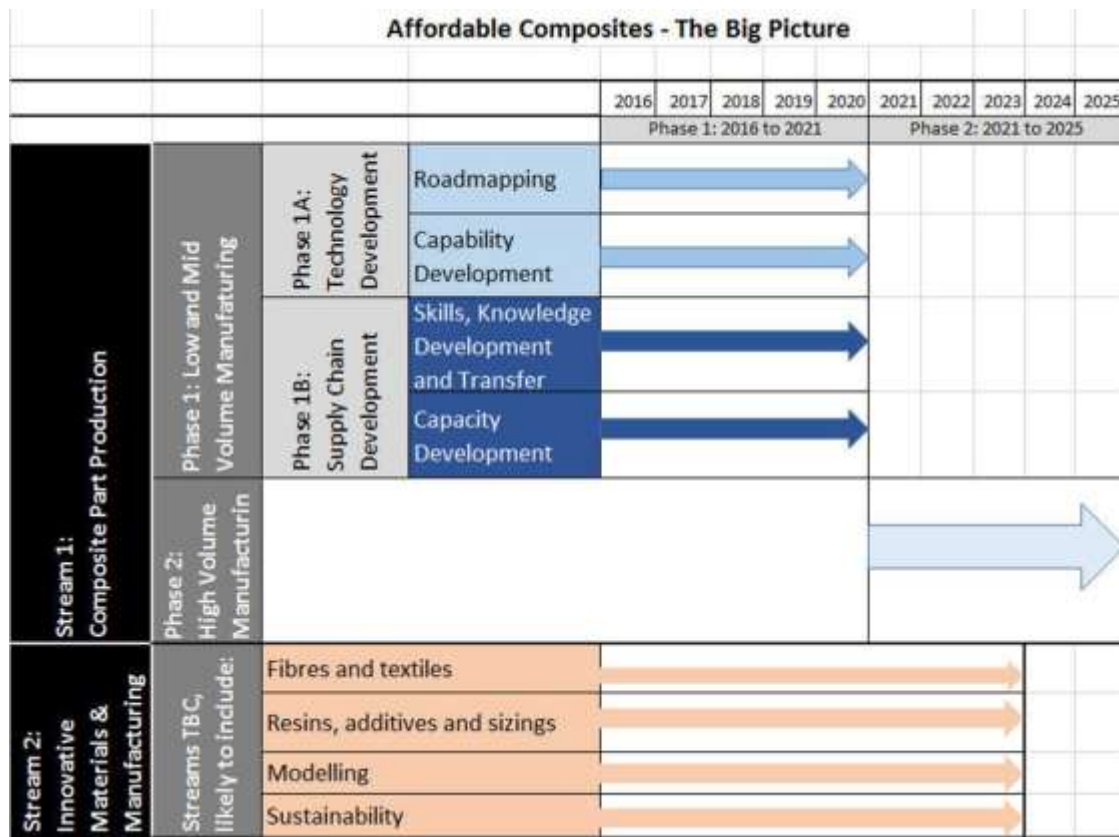
Joining - Development of mono-material processes for multi-materials such as multi-point joining (e.g. thermoplastic welding), bonding (e.g. quick cold cure resins), mechanical joining.

Surface treatments enable enhanced component performance such as thermal, hardness, low friction, aesthetics.

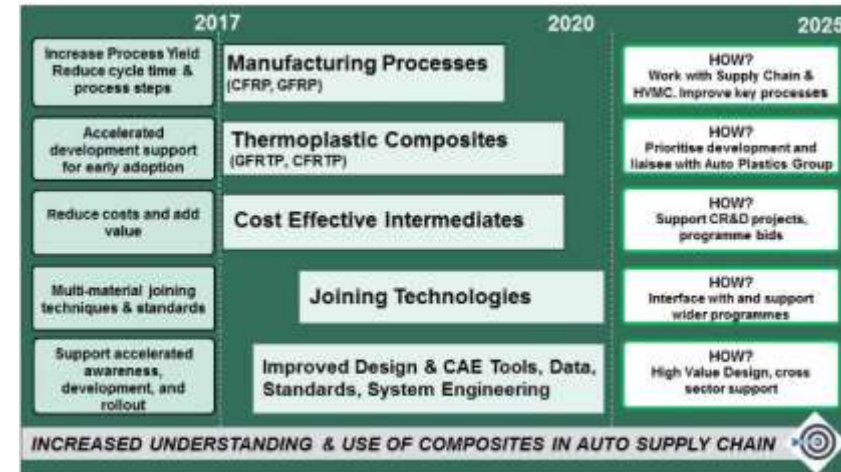
Reducing the takt time unlocks new applications at mid & high volume. Requires preforming & automation to increase speed, reduce waste and increase accuracy.

ACG Technology Development

Affordable Composites Proposition Development



High Level Roadmap Detail

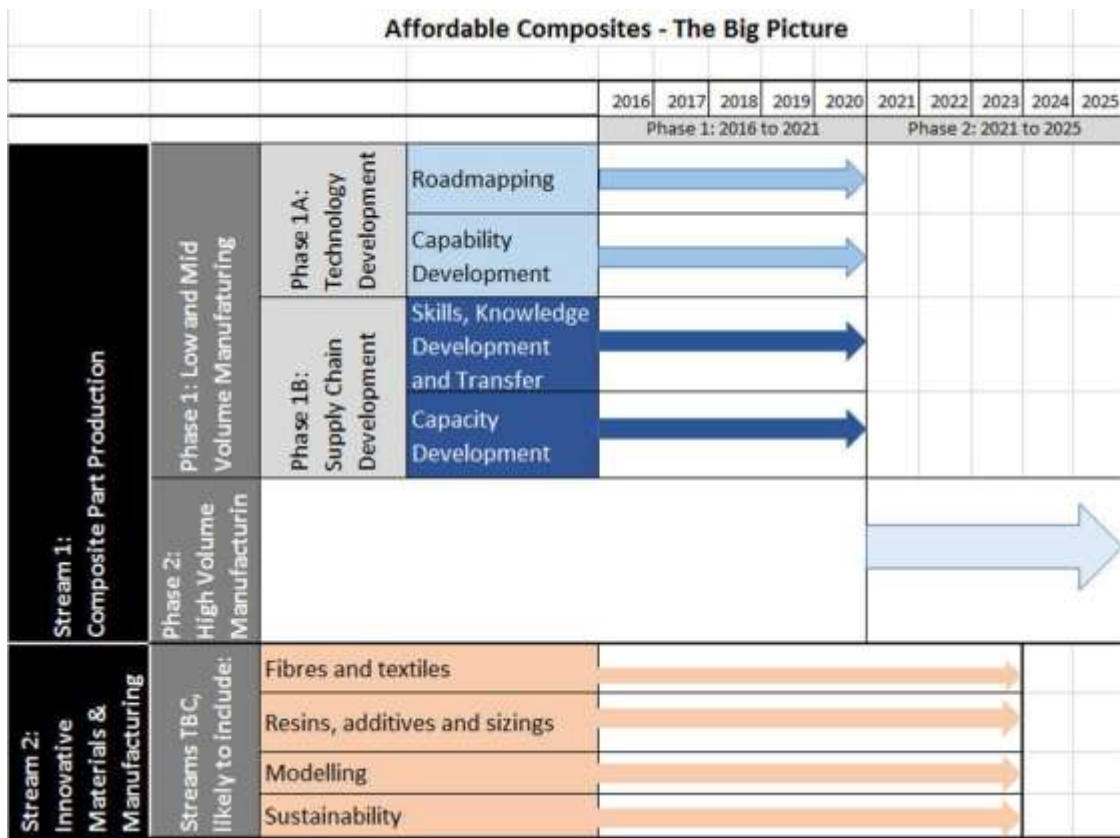


Targets for Automotive Composites

Reference	Description	Addressed by	2020	2025
1	Weight reduction	Design		-15%
2	Targeted on-cost per kg weight saved	Cost	£5 - £20/kg saved	£2.50 - £5/kg saved
2.1	Reduction of manufactured cost of finished composite components	Cost	>50%	>70%
2.2	Cycle (takt time)	Cost	120s	60s
3	Demonstrate technologies for recyclability	Sustainability	>85%	>85%
4	Local added value % of finished CF component	UK GVA	>30% by value	>50% by value
5	Material cost reduction (including elimination of in-process waste)	Materials	>30%	>60%
6	Reduction in CFRP embodied energy	Sustainability & Materials	50%	80%

ACG Technology Development

Affordable Composites Proposition Development



Stream 1: Part production.

- Roadmapping work used to hold 4 collaboration generation workshops.
- When 2 specific calls were targeted, 13 composite projects worth £21.5m were funded.
- HVM Catapult has worked to develop a cross-Catapult composites programme of work.
- Currently considering development of a Composite Large Scale Project across Automotive and Aerospace sectors.
- Promoting materials requirements in Made Smarter.
- BSI Standards report out shortly.

Stream 2: Materials Innovation.

- 'Materials for Mobility' bid into Industrial Strategy Challenge Fund call made short list but was not successful. Other options now being considered.
- Working to re-establish the Advanced Materials Leadership Council.

ACG Supply Chain Development

- Analysis of the automotive composites supply chain demonstrated a lack of automotive tier 1 companies engaging in composites development in the UK. These companies were targeted to get involved in collaborative R&D. Examples of projects developed are shown in the table below and GKN's story is presented after this slide.
- In line with stream 2 of the roadmap, focused on materials development, materials suppliers were also encourage to get involved in collaborative projects rather than just supply material into them.

Examples of collaborative R&D projects focused on automotive composites development

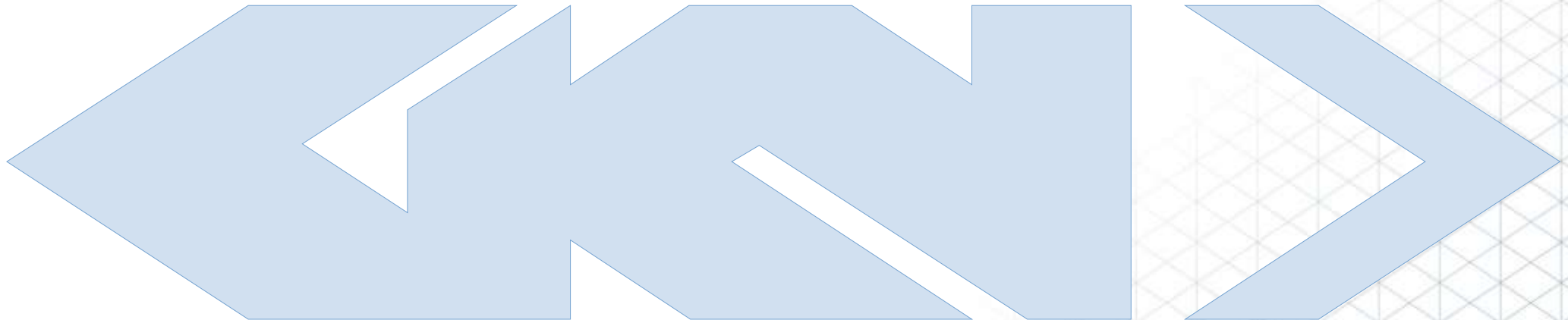
Title	Acronym	Lead	Partners	Project Value	Start	End
Thermoplastic Overmoulding for Structural Composite Automotive Applications	TOSCAA	SGL	JLR, LMAT, Engenuity, AMRC, Nottingham Uni, Nifco, Surface Generation	£2,805,863	Sep-16	Mar-18
Light-join: Joining technologies to enable implementation of lightweight structures in automotive	Light-Join	JLR	Nissan, Scott Bader, Granta Design, Far UK, Stadco (Magna), Gestamp, TWI, Warwick Uni	£2,345,370	Apr-17	Jun-19
Building a Volume Supply Chain for Affordable Lightweight Composite Structures	Century	GKN	JLR, LMAT, Engenuity, AMRC, Nottingham Uni, Nifco, Surface Generation	£4,983,394	Sep-16	Jul-19
Chamaeleon	Chamaeleon	JLR	GKN, Magna, Powdertech, Warwick Uni, Brunel Uni	£7,311,837	Jun-17	Feb-20
Composite Hybrid Automotive Suspension System Innovative Structures	Chassis	Ford	Gestamp, NCC, University of Nottingham	£2,510,115	Mar-18	Feb-21
Tucana	Tucana	JLR	Toray, Magna, Broetje-Automation UK, CCP Gransden, Expert Tooling	£37,619,650	Nov-18	Apr-21
Affordable High Rate Composite Structures	ARCS	Sigmatex	Nissan, GKN, Sheffield Uni, Cranfield Uni	£5,031,529	Feb-19	Jan-22

Key:

Tier 1s in red
Materials suppliers in blue



GKN Wheels & Structures Composite Walk

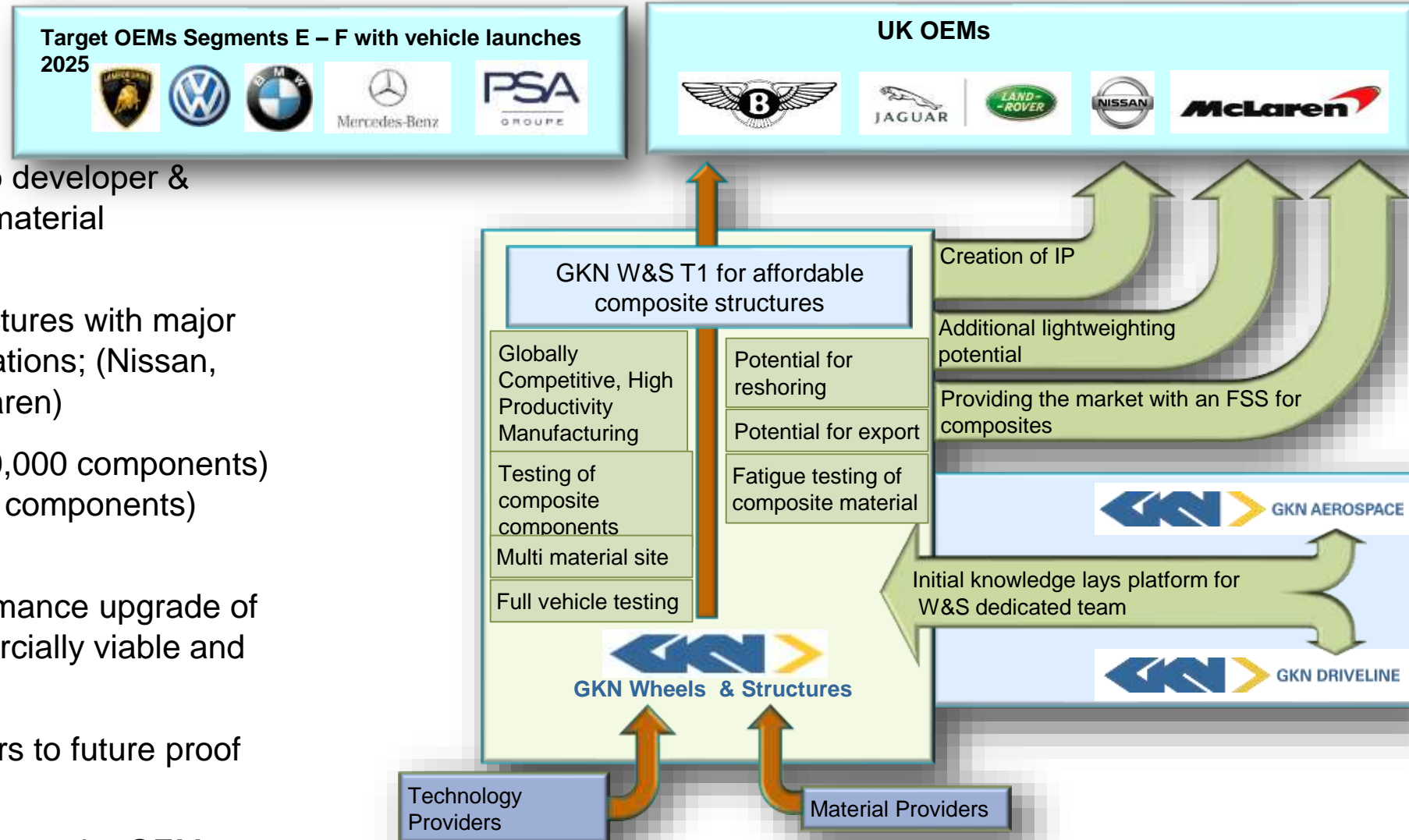


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Mission

Mission

- > Establish GKN W&S as “go to developer & supplier” of composite/ multi material components within the UK.
- > Position GKN Wheels & Structures with major OEMs next production applications; (Nissan, JLR, Bentley, Lotus and McLaren)
- > Accommodate high (circa 100,000 components) and low volume (circa 20,000 components) opportunities.
- > Offer lightweight / high performance upgrade of vehicle structure for a commercially viable and competitive cost
- > Work with technology providers to future proof our offering
- > Become an automotive FSS for major OEMs



Telford Composite Maturation

2017

2018

2019

2020

2021

2022

2023

2024

Design & development

SMC Design Capability
Wet Pressing design Capability
Tooling Design

Material development

Material Characterisation
Feature Trials
Full part Testing

Process & facility

Dev and Line trial area established
Fatigue Testing
Development Press Installed
Prototype press
High volume Facility – Industry 4.0

In 2015 GKN Telford was metal structures and wheels MFG, which had:

- **2015 Attended CLF event and subsequently made a bid (successfully) in DALV competition**
- **No area for development of new technologies**
- **Little Composites design / testing knowledge**
- **Limited market knowledge**

Through project century and with the networks supported by the CLF we have begun to develop and shape our future

Current Composite Projects

Century

End Aug 2019

Success criteria:

- Opportunity on further, higher MRL, composite projects.
- Supply chain understanding
- Costing and customer endorsement
- Composite landscape knowledge
- Components manufactured using volume suitable process – SMC & Wet pressing

Chamaeleon

End Mar 2020

Success criteria:

- SMC design achieving maximum stiffness uplift within packaging envelope.
- DFM allowing optimised manufacturing.
- Robust cost model
- Telford composite processing capability installed.
- Run at Rate proven
- Exhibit to JLR capability and potential for exploitation

ARCS

End Qtr 1 2021

Success criteria:

- First opportunity to press using wet pressing process.
- Component using mixed materials (recycled)
- Exhibit to Nissan capability and potential of composite opportunity.

GKN positioned with major OEMs for next production applications.

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