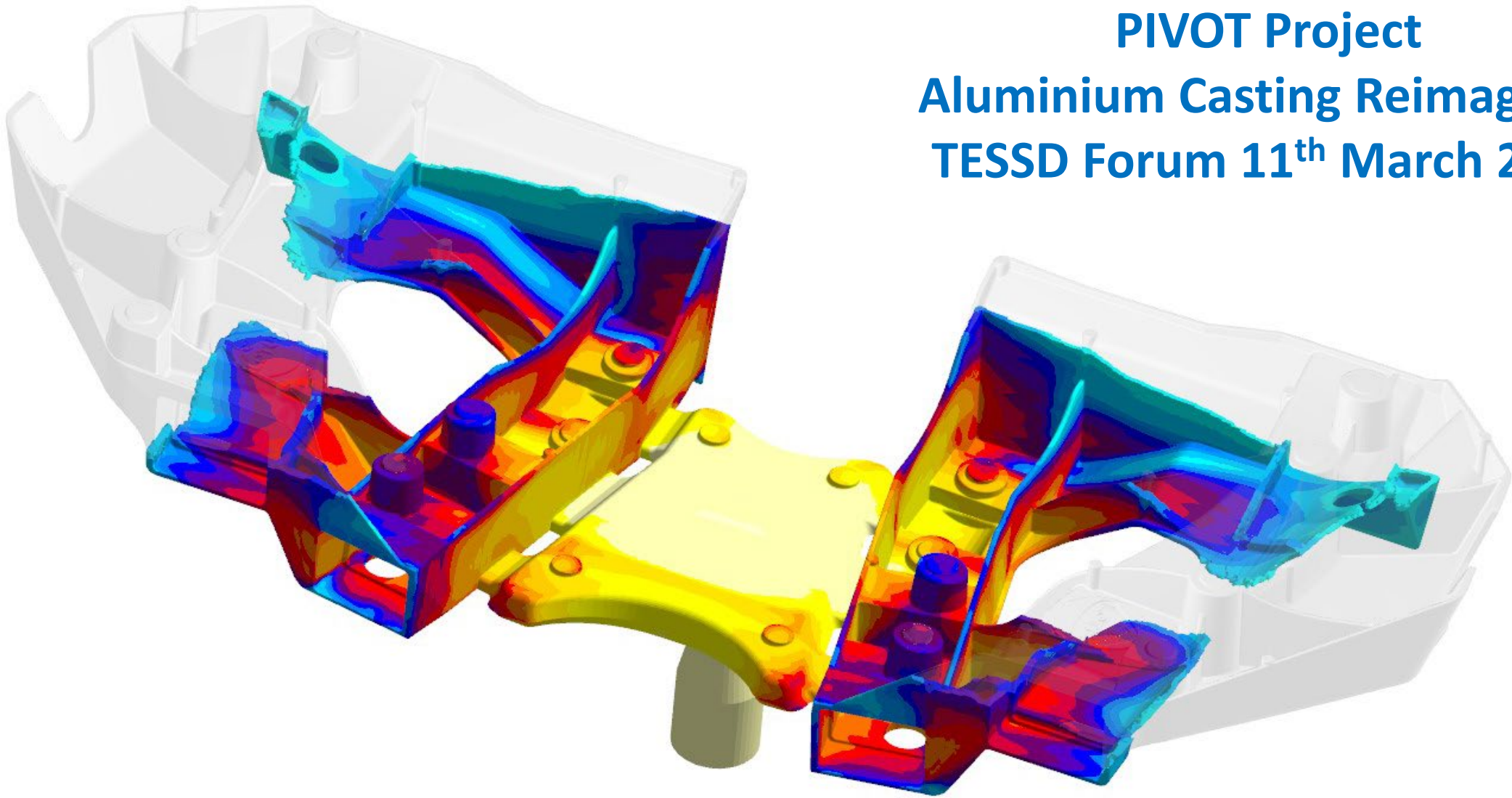


PIVOT Project
Aluminium Casting Reimagined
TESSD Forum 11th March 2025



“Revolutionising the global aluminium casting industry with faster development of lighter and more sustainable cast solutions”

Project supported by the Advanced Propulsion Centre, UK

- Bi-annual funding programmes. This project is APC25
- 3 year project, commenced November 2024.
- £5.8 million, match funded by APC through Innovate UK

APC Mission

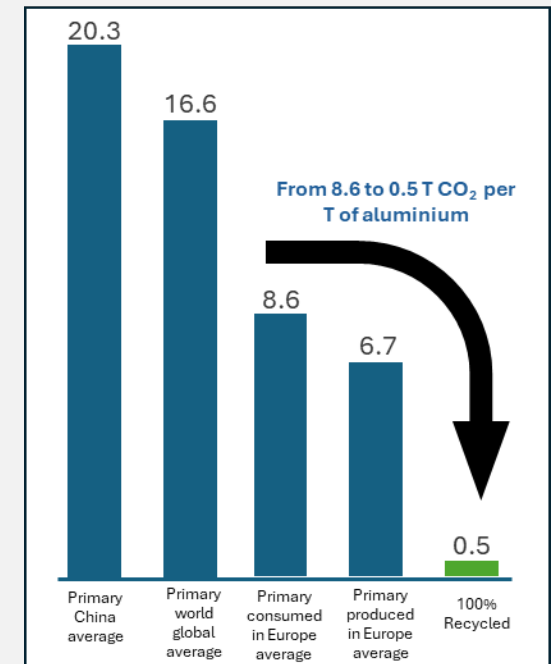
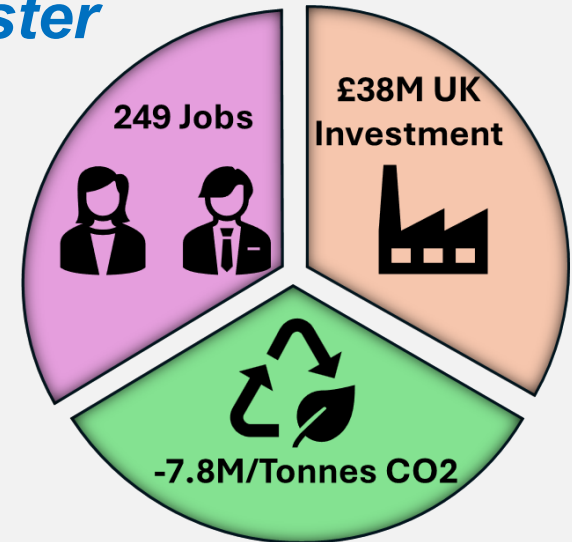
- Support UK’s long-term vision and underpinning capabilities by securing long term R&D investment
- Achieve through the associated supply chain, design, build, test and manufacture of net-zero carbon emission vehicles

Industry Need

- Casting development is key to automotive mass reduction, especially in transition to Electric Vehicles
- Embedded carbon levels in castings need to be dramatically reduced to meet new industry standards

PIVOT Solutions

- A global first: one-stop-shop casting development software
- Up to 30% mass reduction in future designs
- 100% recycled content with no loss of mechanical properties
- A new approach to aluminium recycling for UK circularity
- UK as global casting centre of excellence



PIVOT

Performance Integrated Vehicle Optimisation Technology



sarginsons

Intelligent Aluminium



ALTAIR



Brunel
University
London



GESCRAP

RECYCLING FOR SUSTAINABILITY

Net Zero Impact: Advanced Propulsion Centre UK since 2013



302
low-carbon
projects

529
project partners



59,000+
jobs created /
safeguarded



425 million+
tonnes of
CO2 savings



1 million+
vehicles use
APC-funded technology

£1.65bn+
investment
facilitated



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The PIVOT Team

Collaborative



Partners



Steering Committee



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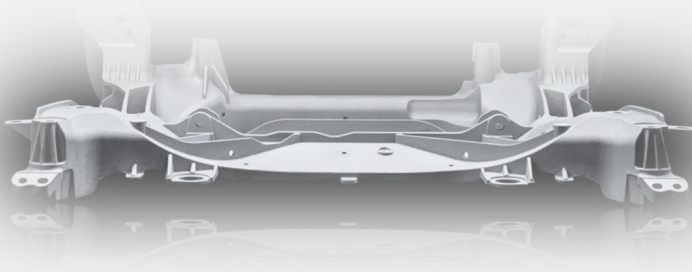
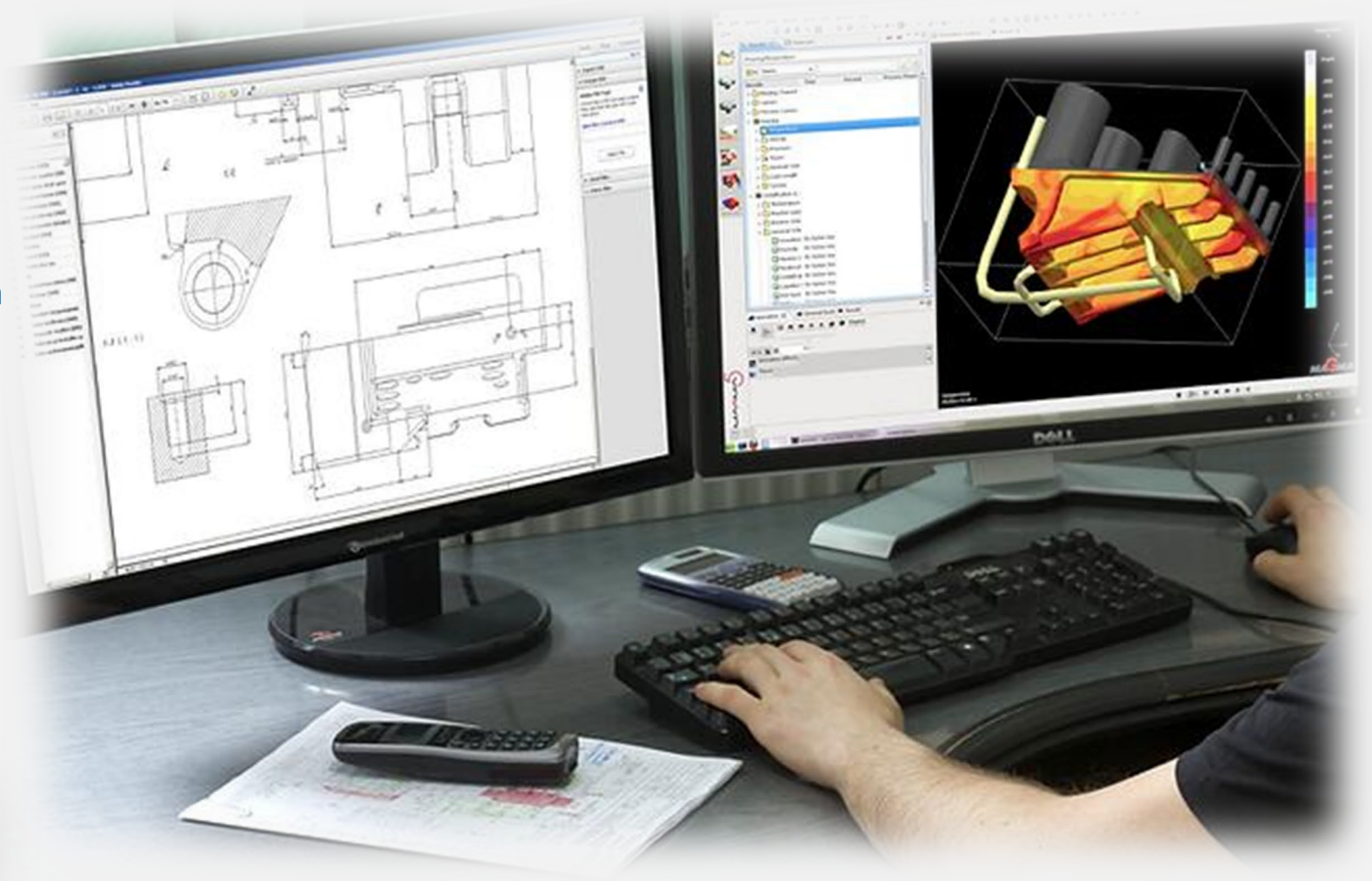
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Sarginsons Technology Centre

- Multi-disciplinary team with CAD & CAE specialists, casting simulation, analytics and metallurgists
- Comprehensive supporting software including Magma, Inspire Cast, OptiStruct, Solidworks and more.
- We support casting development from concept to fully manufactured solution with a focus on high strength, complex and lightweighted components.
- Globally leading in casting predictive performance and mapping.
- Key focus is automotive, particularly with the shift to EV, but many other sectors in our portfolio of customers.
- Digital derisking support for large volume manufacture in global foundries.



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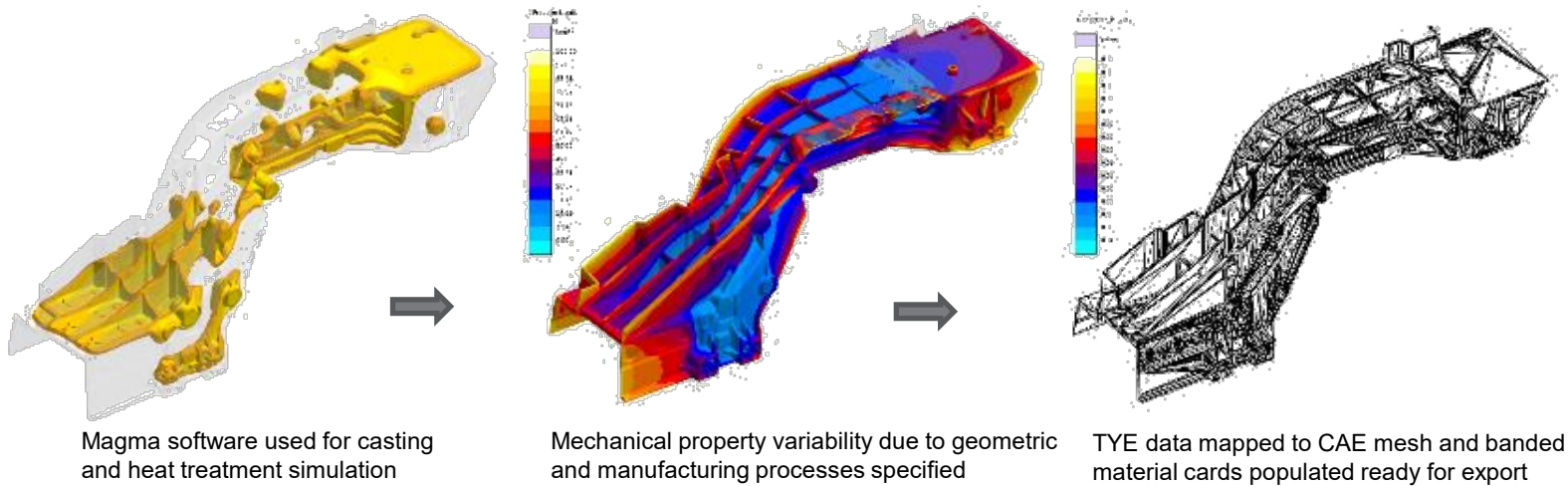
Brunel
University
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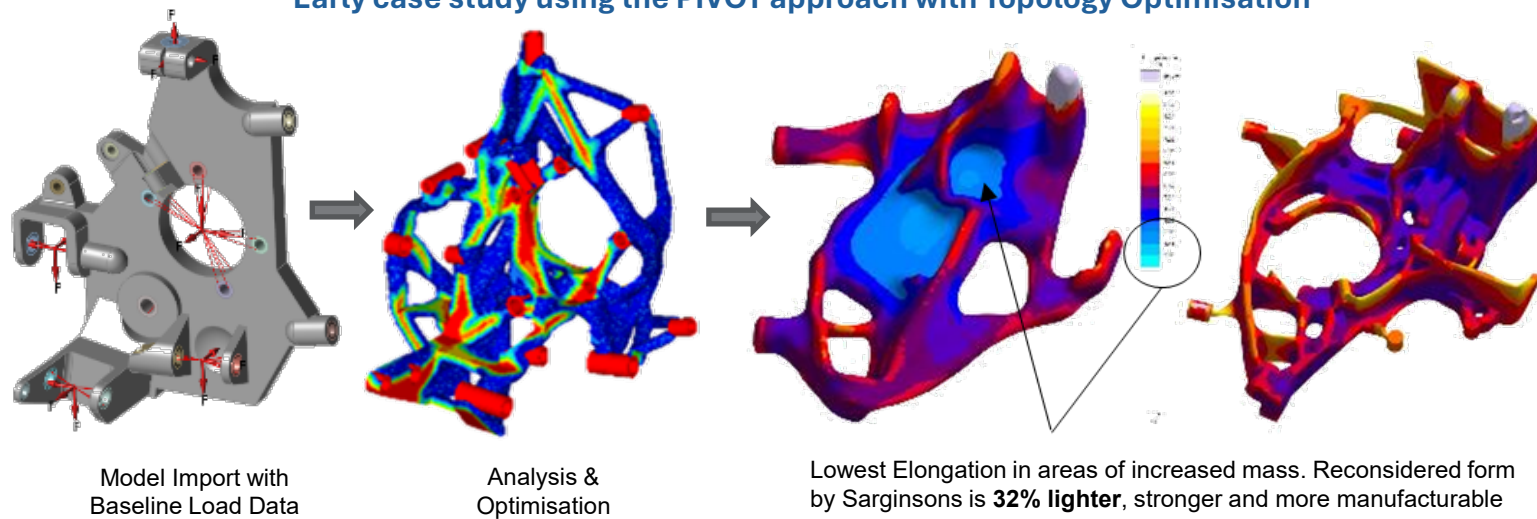
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Technical Approach & Innovation - Sarginsons

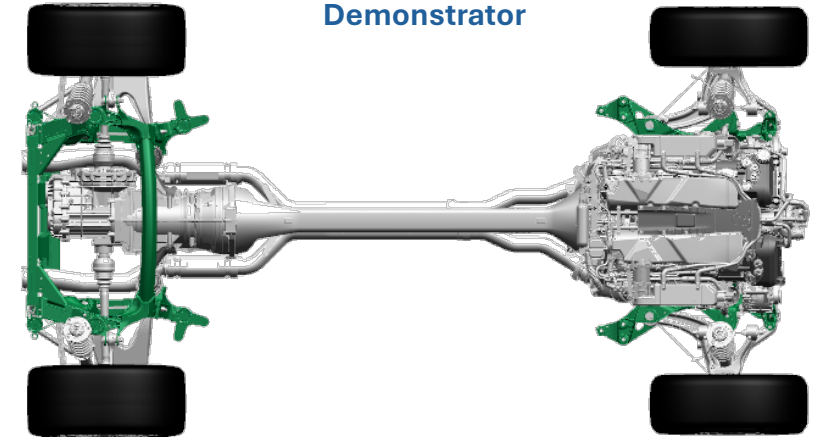
The Material Mapping Process (Current State of the Art)



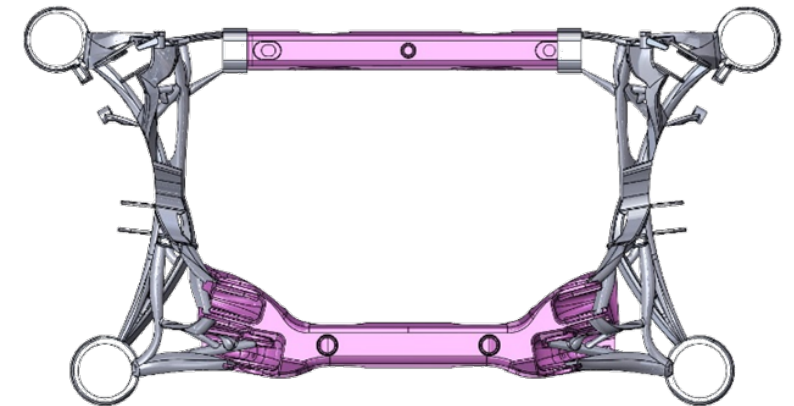
Early case study using the PIVOT approach with Topology Optimisation



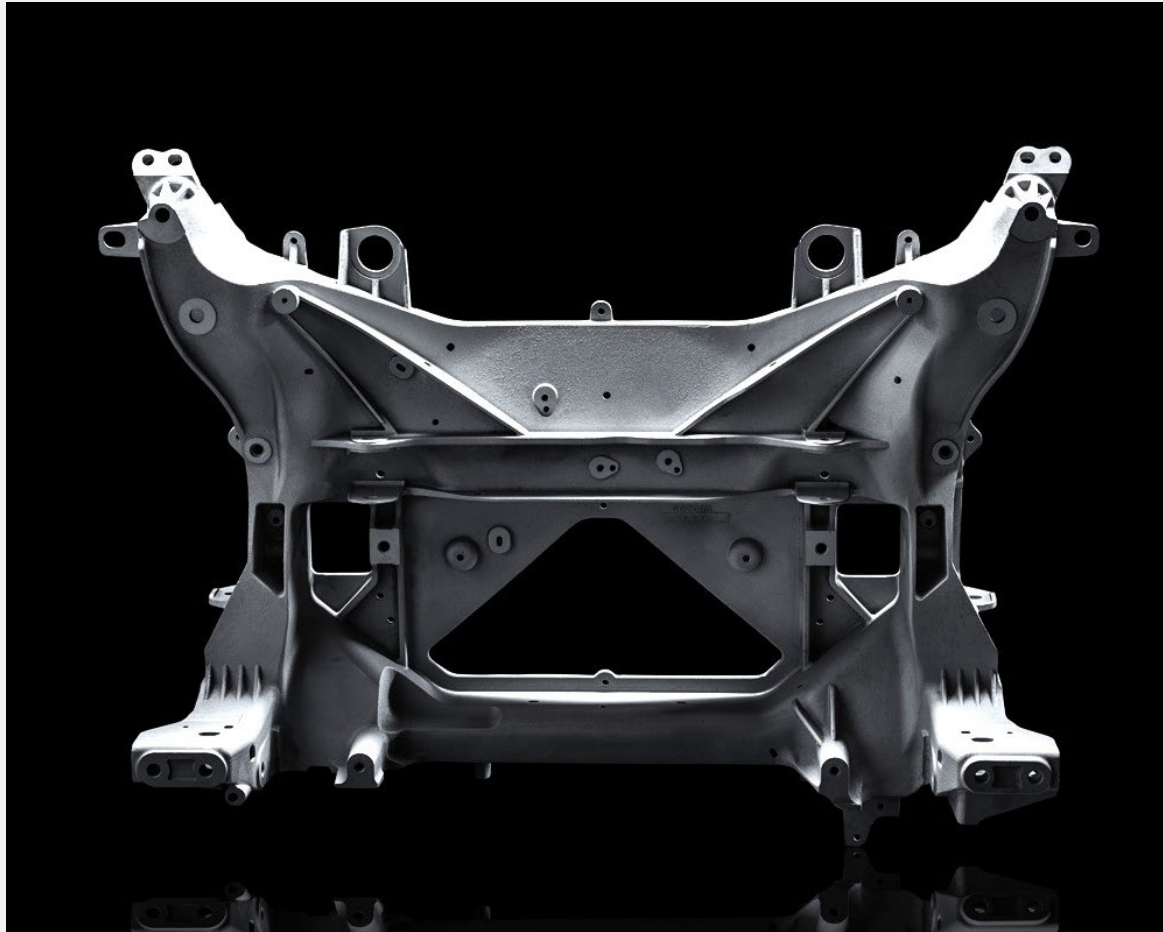
Project Key Demonstrator



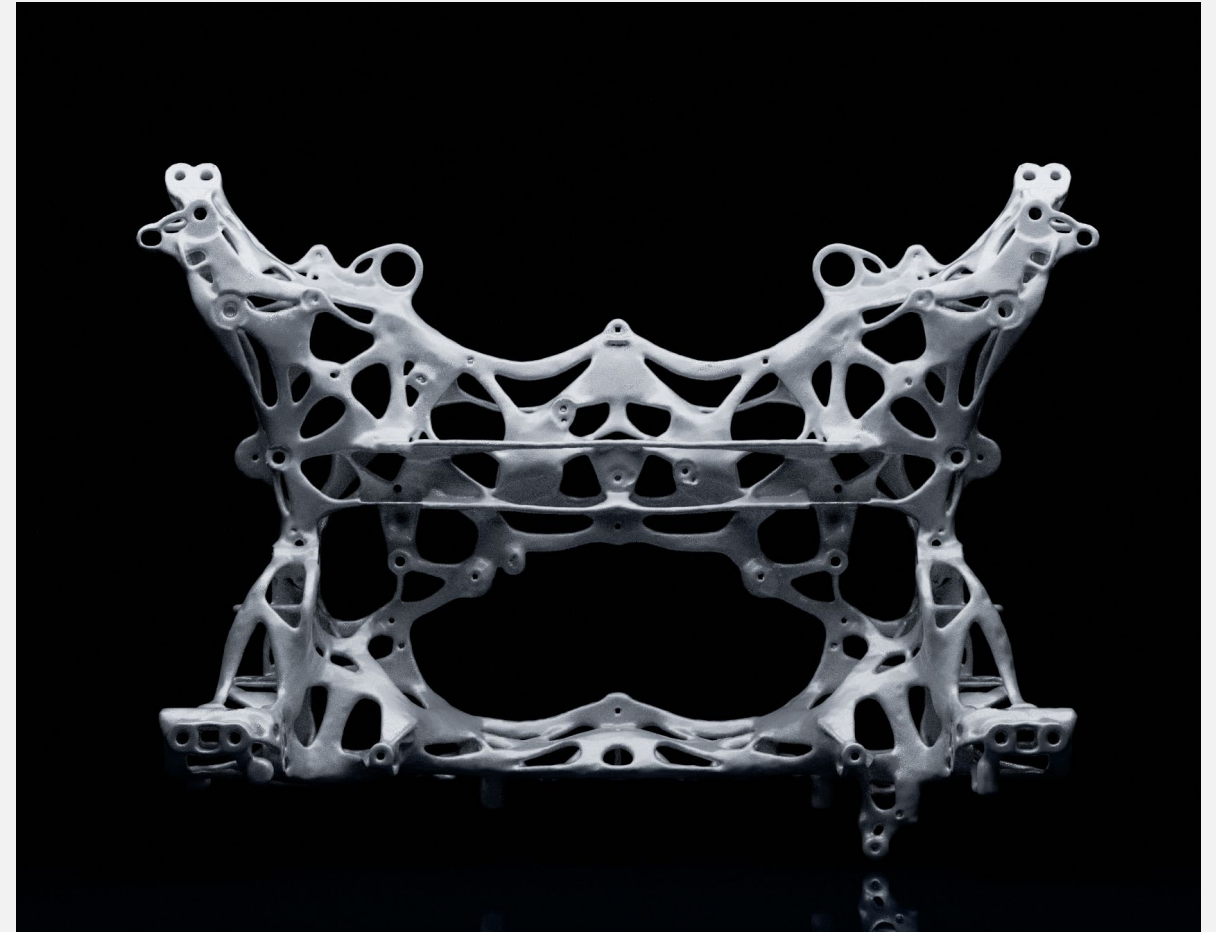
- AML Front & Rear subframes fully re-engineered
- Front as single casting, Rear two castings with extrusions



- 30% mass savings, all performance requirements met
- 100% recycled content. No loss of mechanical properties



Current Subframe Design Developed
By Sarginsons 35kg to 28kg



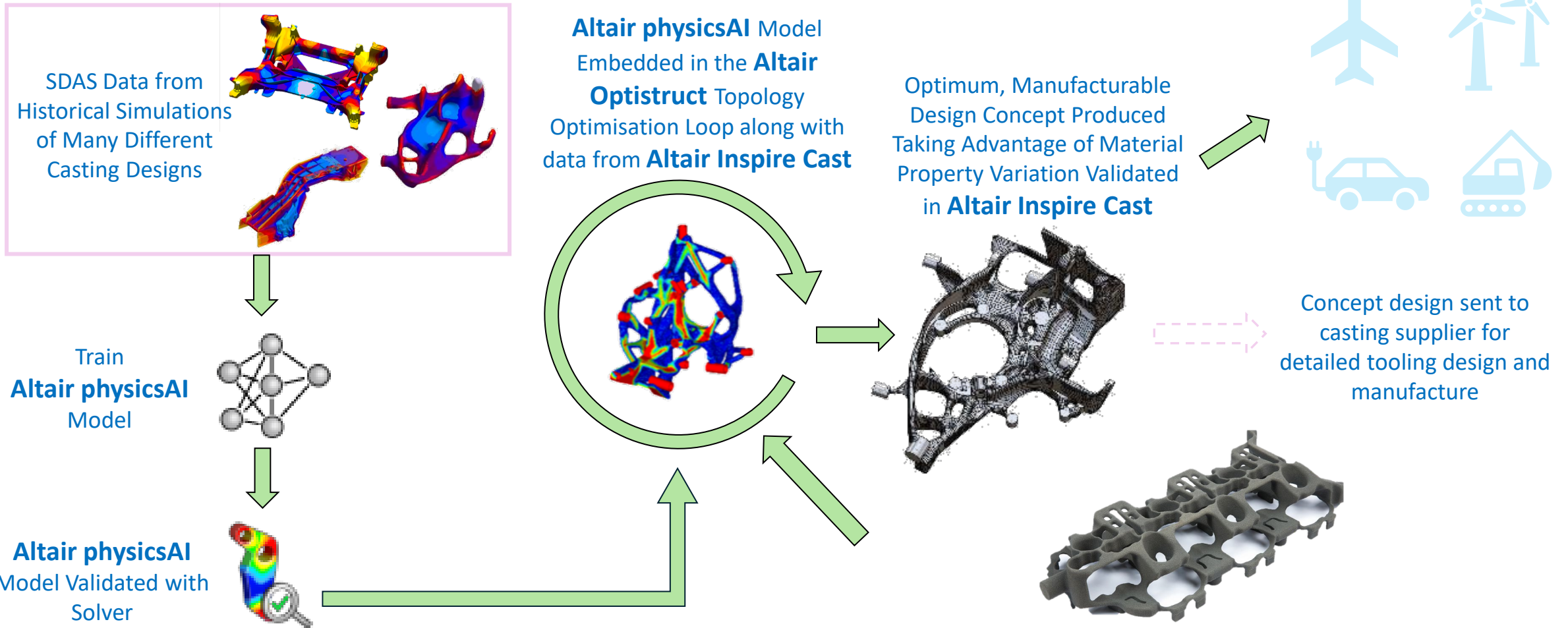
Representative Optimised Subframe Design using
PIVOT template – up to 50% mass reduction

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Technical Approach & Innovation - Altair

Innovating the Design of Castings using Artificial Intelligence (AI) and Design Optimisation



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Technical Approach & Innovation - AML

PIVOT PARTNER INPUT

Casting Process Development

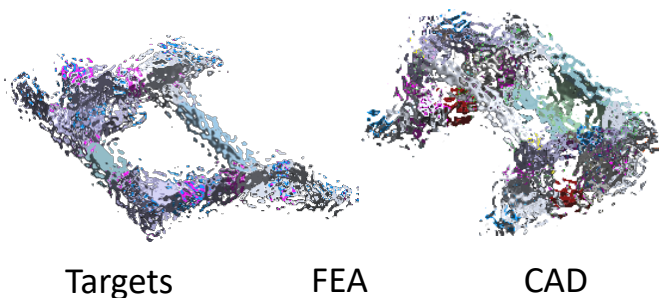
Part/Tool Design

Altair Software Development

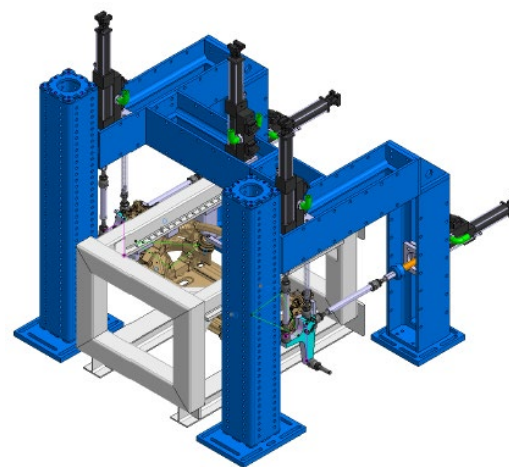
Secondary Alloy Development

ASTON MARTIN ACTIVITIES

Demonstrator Design



Subframe Testing & Validation



FEA Material characterisation



Software Training

RACING. GREEN.
Route to Net-Zero

Anodising & Bonding



Standards & Specifications

Future AML Applications



BENEFITS

Reduced CO₂ emissions

Reduced mass

Reduced time to market

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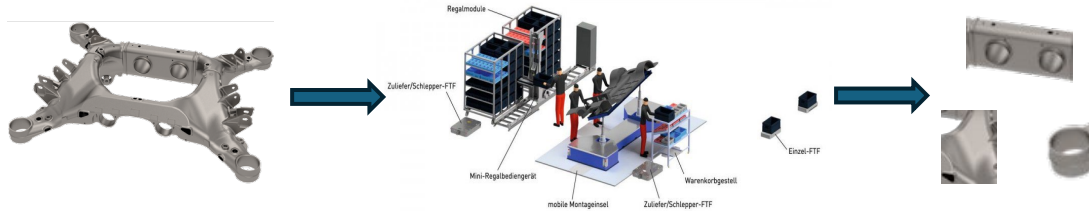
Brunel University London

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Technical Approach & Innovation - Gescrap

Pilot-Lines for process-scrap and end-of-life-scrap:

Dismantling instead of shredding

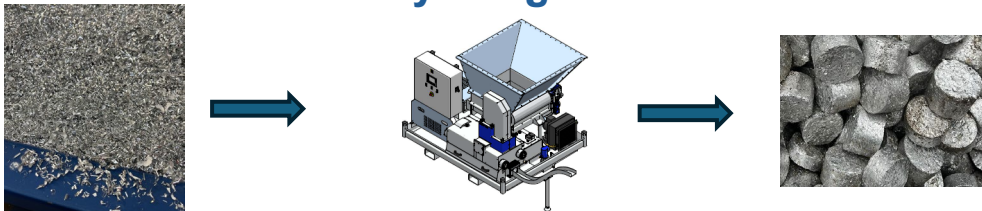


Alloy detection



QR Coding

Fully integrated



New value chain for end-of-life recycling:

Current State



Dismantling



Shredding



Export downgraded material

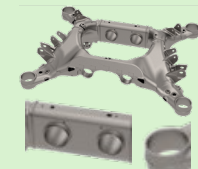
Post Project



Dismantling



Dismantling



Remelting high graded sec. material in the UK



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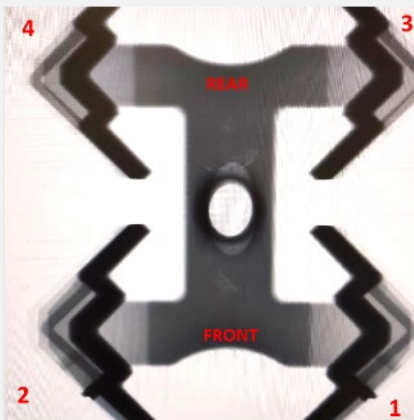
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Technical Approach & Innovation - Brunel

- Evaluate the effect of main impurity elements on the microstructure and mechanical properties of cast A356.2 aluminium alloys made from recycled scrap
- Evaluate the effect of additions on the microstructure and mechanical properties of cast A356.2 aluminium alloys
- Detailed characterisation of cast microstructures using advanced techniques to support modelling capability



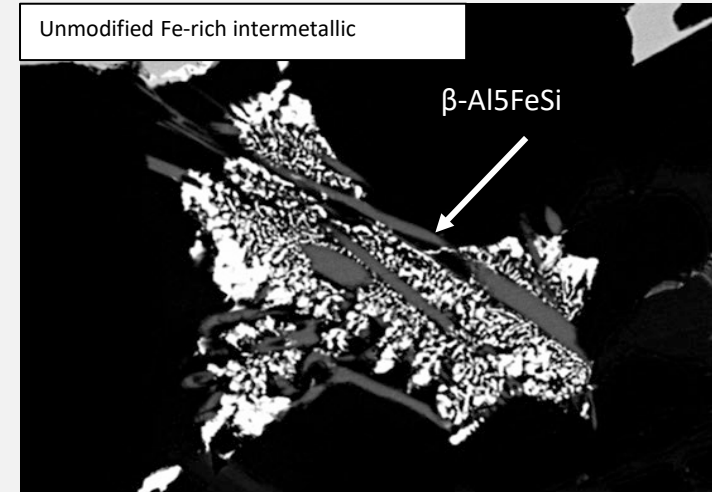
X-ray CT scanning



CT scan



Plastometry



modified structure of the Chinese script intermetallic



Iron intermetallic formations

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UK Supply Chain – Post Project Opportunities

- PIVOT governance structure covers all of casting supply chain
- UK exports scrap & reimports refined same material
- PIVOT develops UK aluminium circularity
- Huge opportunity for smelters
- Exploitable IP will upskill wider UK supply chain



Project is widely supported

For scale up needed to support volume manufacture in the UK alone, the added revenue generated is of the order of £220m with associated new jobs created of over 1,000.

Potential UK Supply Chain Jobs Created Outside of Consortium			
	TO/FTE	UK sales £Ms	FTE created
Other Casting Companies	£ 200,000	£ 64.50	323
Smelters	£ 200,000	£ 140.00	700
End of life dismantlers	£ 500,000	£ 15.00	30
		£ 219.50	1,053

Data from consortium members and <https://csimarket.com>

Gescrap

- Reshoring of aluminium circular economy will create associated jobs

Sarginsons

- Rapid growth supports upstream (e.g. toolmakers)
- Casting hub opportunity for higher volume UK foundries

Altair

- Multiple sector deployment of PIVOT software = additional UK jobs

PIVOT

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- Creation of a world-first one-stop-shop casting software to embed organic lightweighting, part performance and manufacturability at the concept phase
- A global casting hub to support the design and manufacture of complex mass production cast components
- Developing a UK based metal circularity for aluminium castings to allow for the shift toward secondary use
- New high strength alloy development with 100% recycled content
- Establishing a global template for future structural casting design and manufacture.

Whilst the PIVOT project is focused on the Auto sector, its decarbonisation principles can be adopted seamlessly into the wider transport sector and indeed all sectors utilising aluminium castings.

