

Custom engineered multi-layered  
shielding solutions for automotive  
**Heat Shields**

Delivering **optimal thermal performance** in **emission control systems, turbochargers, engine parts** and **sensitive components**

# Automotive Heat Shields

Our automotive heat shields deliver optimal thermal performance in emission control systems, turbochargers, engine parts and protect sensitive components that are exposed to high temperature environments.

We collaborate with our customers to integrate a comprehensive range of heat shield cladding options combined with Morgan's portfolio of high performance products including:

- Superwool® Fibres
- WDS® Microporous insulation

Superwool Fibres and WDS Microporous deliver excellent insulating properties, increasing thermal efficiency and provide maximum heat retention within the exhaust system. This in turn reduces fuel costs and pollution levels.

Using our insulation products, the exhaust gas temperature remains high. The benefit of this is reduced exhaust pipe emissions, achieved by significantly reducing the light up time and improving vehicle fuel efficiency (during the cold start phase).

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# Thermal Ceramics

We innovate to meet the challenges of a changing world



## Safe and Reliable Products

Our products and systems protect lives and processes 24 hours a day and 365 days of each year.



## A Truly Global Footprint

We have operations on 5 Continents and in 30 Countries to efficiently serve our Customers.



## Commitment to Innovation

For you, for us, for our people and our planet our commitment to innovation is paramount in all we do.



## Trusted Engineering Services

Our global resources and dynamic engineering services efficiently support our Customers application demands.

The Thermal Ceramics business of Morgan Advanced Materials makes advanced ceramic products and systems for thermal insulation in high temperature environments. We engineer products and systems for equipment in demanding applications and for the safety of people.

Our solutions help customers, especially those operating energy intensive processes, to reduce energy consumption, emissions and operating costs.

## What we do in Transportation industries

Across our Morgan businesses, we are Tier 1, 2 and 3 suppliers of ceramics, components and systems to the Automotive market.

Our Thermal Ceramics business manufactures a range of materials and components to thermally insulate heat shields and exhaust after-treatment components, advanced fibre technology to prevent thermal runaway propagation in lithium-ion battery systems, and engineered fibres significantly increase brake friction pad stability improving fade and recovery characteristics.

We are at the forefront of technology, partnering with manufacturers to improve vehicle safety, performance, energy efficiency and comfort to create more fuel-efficient, safer vehicles.

Harnessing our world-class design expertise and specialist manufacturing capabilities, we work in partnership to develop competitive tailored solutions to meet the increasingly challenging and changing demands of the automotive market.

Morgan provides insulation solutions across the transportation sector - rail, aerospace, marine and other road vehicles, including heavy goods vehicles, buses, motorcycles and scooters.

# Heat Shields

Morgan's thermal acoustic Heat Shields are multi-layered products designed to provide optimum performance in high temperature environments.



CO<sub>2</sub> REDUCTION

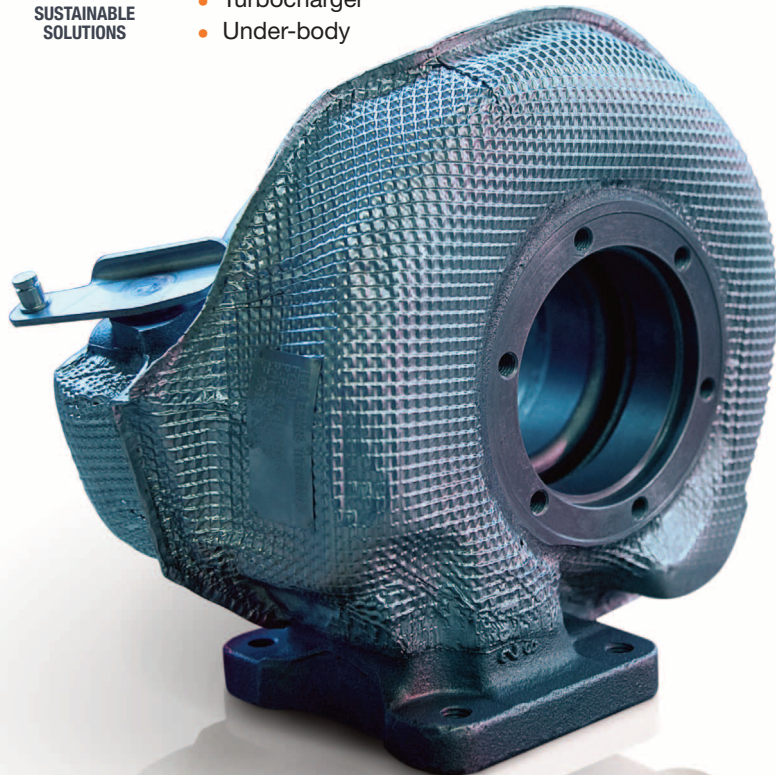
Engine compartments are becoming more compact requiring more efficient thermal management solutions that dissipate heat. Morgan heat shields combine thermal performance with superior material design providing high temperature resistance in these very demanding heat shield applications.



SUSTAINABLE SOLUTIONS

## Types of automotive Heat Shields

- Exhaust / DPF / GPF / SCR
- Engine compartment
- Turbocharger
- Under-body



## Heat Shield technologies and capabilities

### Metallic Heat Shields

- 3 layer or direct insulated Heat Shields with corrugated / plain sheets
- Lightweight and space critical engineered solutions
- Superior thermal and acoustical performance
- Complete assembly
- Austenitic stainless steel, ferritic stainless steel, inconel, titanium
- Two types of corrugating patterns (dimpled surface)



### RES – Rigid Enclosure System

- Stamping / Forming
- Metal cutting (manual + laser)
- Automated fibre cutting (Die tool + CNC knife)
- Spot welding
- Assembly



## Key advantages of our Heat Shields

- Lightweight and space critical engineered solutions
- Superior thermal and acoustical performance
- Safety edges - all automotive Heat Shields are designed with a safe edge feature
- Complete assembly development - automotive Heat Shields from Morgan are engineered, designed, developed and delivered to the customer's site for installation or completely assembled to the application
- Quick change tooling, durable crimping and / or welding assembly are all critical in automotive Heat Shield manufacture and delivery

## Flexible Heat Shields

- Systems manufactured with fabric inner and outer layer, can be used in combination with any insulation layer
- A wide range of fabric materials depending on thermal requirement
- Suitable for smaller volumes
- Does not require expensive tooling
- Easy installation and removal
- Short manufacturing lead time for prototypes and production



## Heat Shield Services

### Prototyping

Rapid prototype development reducing off tool lead times by optimising in-house process and tool design.

### Installation

Mounting tools for installation at the customer site including manufacturing and design with customer target TAKT time awareness.

### Simulation

Comprehensive support for thermal simulation.

### Engineering Services

Our engineering capabilities are available across the globe to any of our business partners.

Each region has an Engineering Services team to support your unique business and application needs locally with the experience of a global network and resources.

## Insulation Materials

### Superwool®

A low bio-persistence insulation fibre originally developed for the industrial market and applications. Available in a blanket, paper and 3D formed shape.

- Low thermal conductivity delivering better thermal performance than E-glass, ECR and Silica
- Lower cost option compared to ECR and Silica
- Durable in the most challenging of environments



### WDS® Flexible Contour

Reduces the necessary insulation thickness by a factor of 3-5 compared to standard insulation enabling thinner overall designs to be realised and achieved.

- Higher performance and strict regulations which become more important for Euro 6 and 7 standards (Safety and Performance)
- Surface temperature can be reduced efficiently, and hotspots can be eliminated
- Average improvement of 100°C in surface temperature reduction over Superwool

### 3D Shapes

- Manifolds
- Turbines
- Exhaust systems
- Exhaust collectors
- Insulated cast iron parts

# Partnering with us

We are the partner of choice for the automotive sector, both in the conventionally powered and electric vehicles market. Working with us, customers are able to push the boundaries of performance without compromising safety, heat or weight management.

Our custom solutions are developed using our patented Superwool® Fibre and WDS® Microporous materials. These technologies help vehicle designers achieve optimal thermal management and passive fire protection, throughout the engine, exhaust, control and battery systems.



Our innovations support effective emission control and enable customers to develop safer, more sustainable and better performing conventional, electric and hydrogen powered vehicles



## Benefits of partnering with Morgan

Harnessing our world-class design expertise and specialist manufacturing capabilities, we work in partnership with some of the world's largest tier-one automotive suppliers, developing competitive tailored solutions to meet the increasingly challenging demands of the sector. We are the forefront of technology helping manufacturers improve vehicle safety, performance, energy efficiency and comfort to create more fuel efficient, safer vehicles.

- **Research and development**  
A dedicated team focused on innovating within the automotive industry, developing superior materials which excel in real-world applications.
- **Global manufacturing**  
Operations on five continents, where we collaborate with customers and deliver solutions in region to support the 'just in time' manufacturing model.
- **Supporting the reduction of carbon dioxide**  
Innovative solutions, designed and engineered to drive a reduction in emissions.

## Our expanding automotive business

### Products used in vehicles

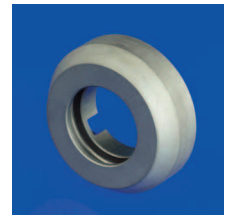
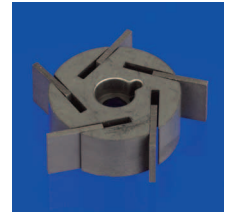
Morgan's ultrasonic sensors are used in personnel detection systems, enabling automotive manufactures to ensure that the airbags are deployed in the safest possible manner according to the passenger's position and meet stringent safety requirements.

### Hybrid vehicle cooling pumps

The properties of our ceramic materials is enabling the pump technology needed in electric and hybrid vehicles to circulate aggressive coolant through the Lithium-ion batteries, whilst also providing weight saving benefits.

### Carbon bearings, vanes and rotors

Our Seals and Bearings business also produces carbon / graphite vanes and rotors offer outstanding thermal and chemical resistance properties along with superb wear resistance. Applications include; Fuel Pumps, Water Pumps (Cooling / Heating), EGR Valves and Electric Vacuum Pumps.



# Together, we are working to reduce our environmental impact...

...together, we are working to deliver robust environmental, social & governance (ESG) practices, and together, we have defined **five** environmental, social, and governance (ESG) improvement objectives and targets to improve our performance as a Group...

## Reduce our environmental impact



CO<sub>2</sub> REDUCTION

- 1** Our aspiration is to be a CO<sub>2</sub> net zero business by 2050. Our 2030 target is to reduce our scope 1 and scope 2 CO<sub>2</sub> emissions by 50% (from a 2015 baseline). We will start to measure scope 3 emissions from 2023 onwards, with coverage increasing over time.
- 2** Our aspiration is to use water sustainably across our business. Our 2030 target is to reduce our overall water usage by 30% and reduce our water usage in high stress areas by 30% (from a 2015 baseline).



SAFETY PERFORMANCE

## Improve our safety performance

- 3** Our aspiration is to create an environment and culture with zero harm to our employees. Our 2030 target is a lost time accident rate below 0.1 (lost time accidents per 100,000 hours worked).



DIVERSITY AND INCLUSION

## Improve the diversity and inclusion of our business

- 4** Our aspiration is that our employee demographics reflect the communities that we operate in. Our 2030 target is for 40% female representation across our leadership population of our organisation.
- 5** Our aspiration is a welcoming and inclusive environment where our employees can grow and thrive. Our 2030 target is to attain a top quartile employee engagement score.

For more information please visit: [www.morganthermalceramics.com/sustainability-responsibility](http://www.morganthermalceramics.com/sustainability-responsibility)

#wearemorgan

## Morgan Advanced Materials

Significant trends shape our modern world, accelerating the demand for new and more sustainable advanced materials.

At Morgan Advanced Materials, we use advanced carbon and ceramics materials to support the move to a more sustainable world. Across our Morgan businesses, we are Tier 1, 2 and 3 suppliers of ceramics, components and systems to the Automotive market. Our people are driven to solve complex customer problems: from managing heat and enabling greener technologies, to supporting improved medical diagnostics and protecting life.

Our purpose is 'to use advanced materials to make the world more sustainable, and to improve the quality of life'. This purpose is underpinned by our safe, ethical and inclusive culture, embraced by our 7,800 employees spanning over 25 countries. Working across many industries and in a number of markets, we deliver the materials science and technologies the world needs now.

### Our global advantages

- Vertically integrated within the supply chain to provide our proprietary material solutions from our global manufacturing footprint
- Engineered and designed through partnership with automotive industry leaders to ensure demanding challenges achieved
- Global manufacturing locations strategically located in Americas, Asia and Europe, research and engineering technology teams and focused customer services

To learn more about our heat shield products, please contact us.

[www.morganthermalceramics.com](http://www.morganthermalceramics.com)  
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