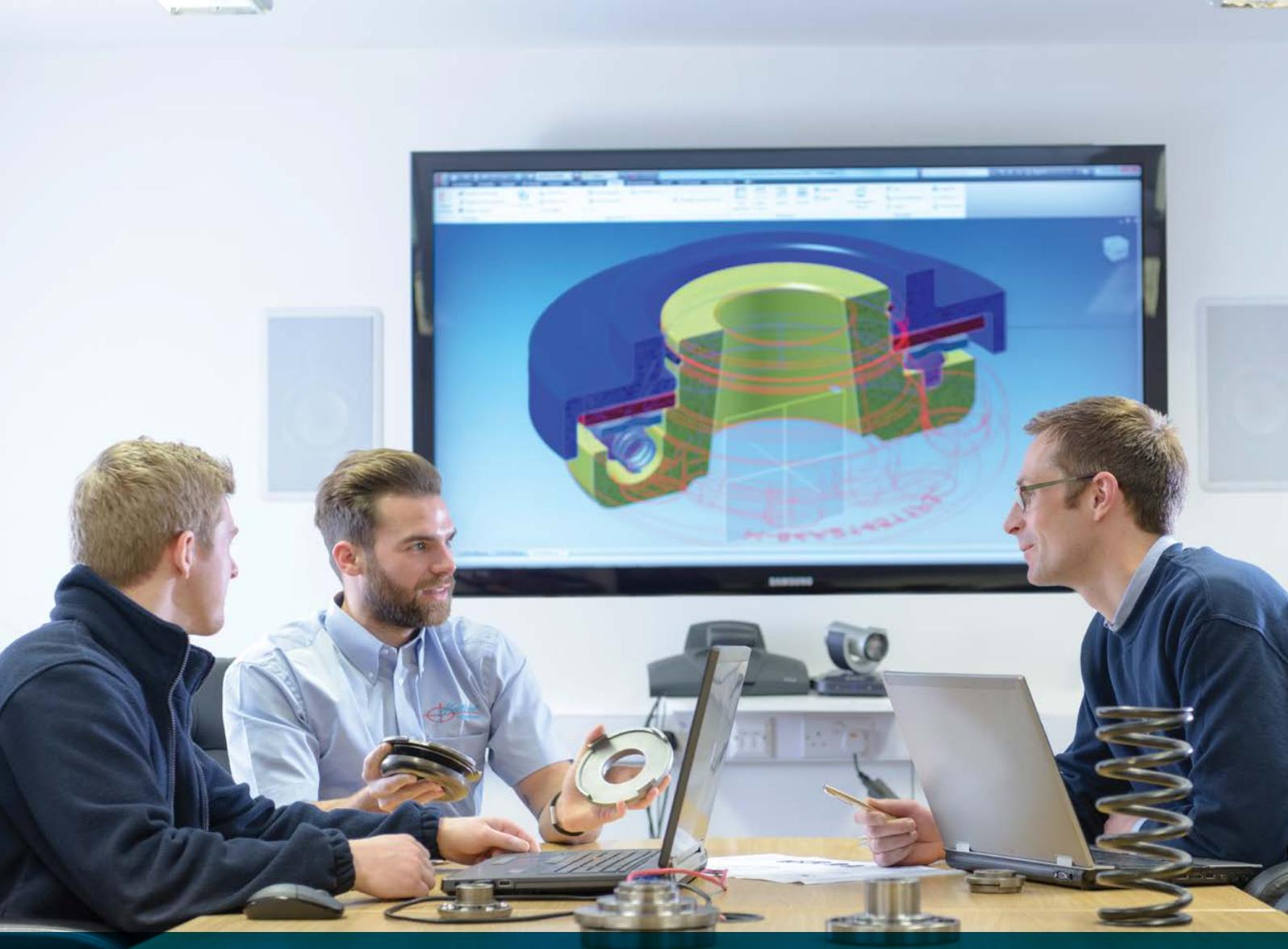




HELICAL
GROUP



INNOVATIVE TECHNOLOGY
FOR IMPROVING PERFORMANCE
AND REDUCING EMISSIONS



ABOUT HELICAL TECHNOLOGY GROUP

Helical Technology has been established for over 50 years and has a global presence with production facilities in the UK, India and China.

With a background in the design and manufacture of springs, valve rotators and actuators, the business is now a world leader in the design and manufacture of acoustic and EGR exhaust valves, and it has its own in-house Technical Centre.

Our company has evolved over the years to meet the growing demands of an increasingly global market. Today the family-owned business supplies clients across Europe, America and Asia from its headquarters and Technical Centre

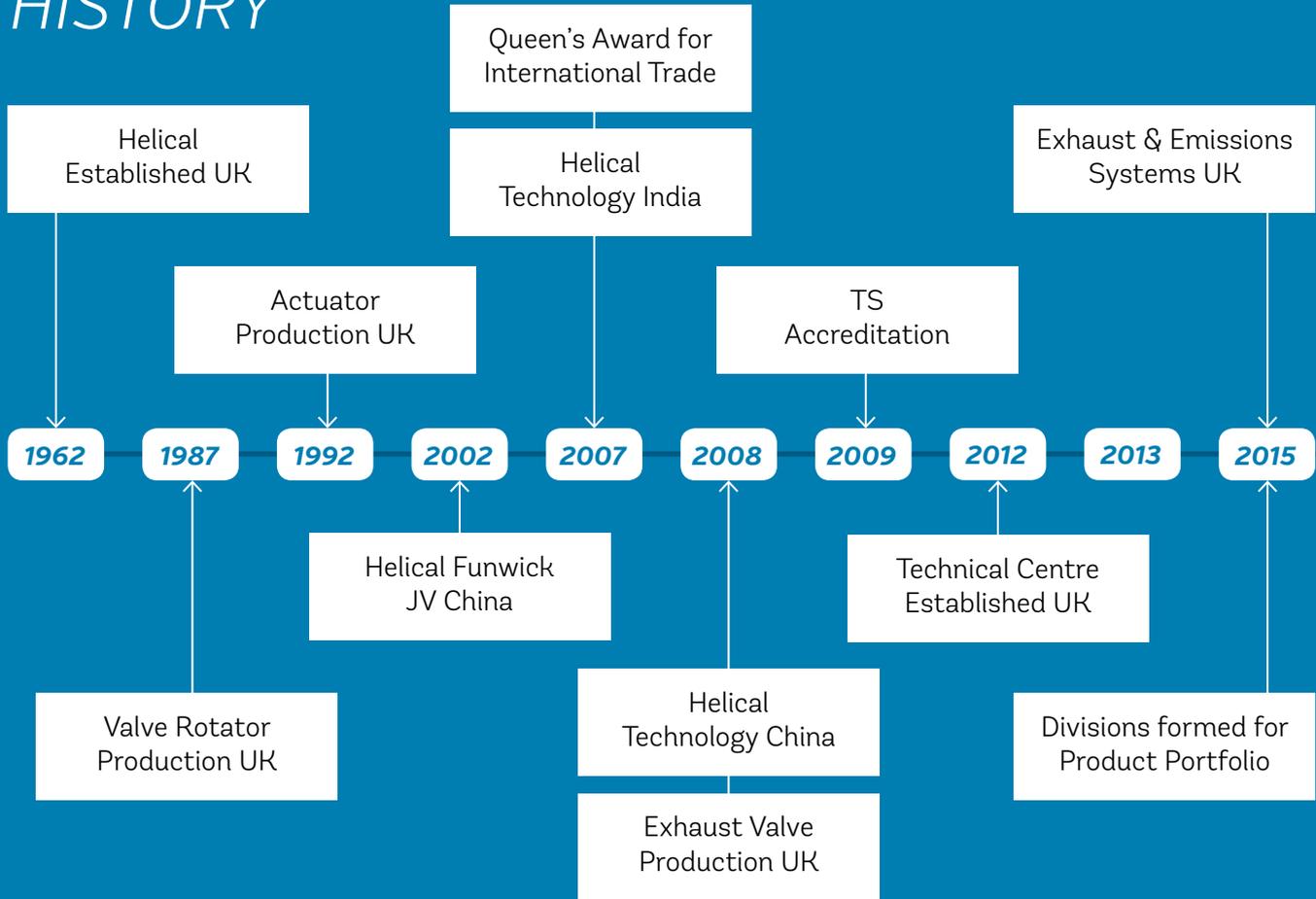
in Lancashire and from manufacturing subsidiaries in China and India.

Our collaborative approach, with clients and production partners alike, enables us to deliver tried and tested solutions that perform without compromise in the most challenging conditions. Dedicated design teams for each product line are focused on a continuous process of development and improvement, while extensive on-site testing facilities ensure each component and system conforms to our exacting standards.

We are proud to have achieved the very highest international quality and environmental accreditations, and we think you'll find evidence of our commitment to excellence in every aspect of our business.



HISTORY



GLOBAL LOCATIONS

Helical Technology Headquarters (UK)

- Independent family-owned company
- Established 1962
- Lytham, UK
- Valve Rotators
- Exhaust Valves
- Springs

Helical Technology Technical Centre (UK)

- Independent family-owned company
- Established 2012
- Warton, UK
- Engine and Exhaust Testing
- Actuators
- Exhaust Systems

Helical Funwick Engineering (China)

- Joint venture UK/China
- Established 2002
- Kunshan, China
- Actuators

Helical Engineering Kunshan (China)

- Subsidiary
- Established 2008
- Kunshan, China
- Valve Rotators

Helical Auto Technology (India)

- Subsidiary
- Established 2007
- Pune, India
- Actuators
- Valve Rotators

OVERVIEW OF HELICAL'S PRODUCTS AND SERVICES

EXHAUST VALVES

Helical develops and manufactures exhaust valves for many of the world's leading performance and luxury car brands.



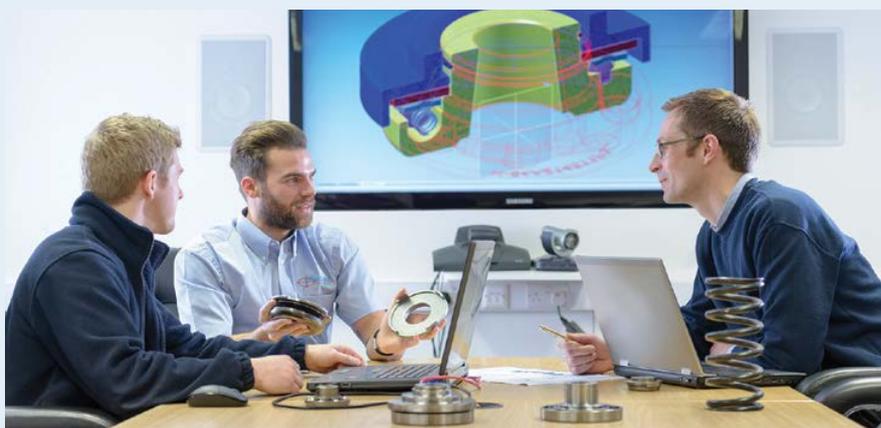
ACTUATORS

Our actuators for turbochargers enable fast and precise control, reducing vehicle emissions.



VALVE ROTATORS

Helical valve rotators for large diesel and gas engines help to keep valves cleaner, reducing carbon build-up and so lowering engine emissions - as well as extending the life of key engine and valve gear components.



EXHAUST SYSTEMS

Design and fabrication of development samples and prototypes of bespoke exotic exhaust systems for luxury and performance cars, and other road/off-road vehicle applications.



TECHNICAL CENTRE

The Warton Technical Centre offers a range of test facilities for vehicles, engines and components, including low and ultra-low emission vehicle technologies such as hybrid and electric.



R&D

Helical develops innovative concept designs of products and prototypes for premium automotive and other clients.





EXHAUST VALVES

EXHAUST VALVES

Helical Technology is the UK's foremost producer of high specification engine control systems supplied to many of the world's leading vehicle makers, manufacturing valves for some of the most technically advanced and difficult applications.

We design, develop, validate, and manufacture a complete range of exhaust and emissions systems - from manifold to tailpipe. Helical offers a total service of R&D, design, testing and manufacture, under one roof.

Our purpose-built Warton Technical Centre houses physical and simulation testing facilities for vehicles, engines, systems, sub-systems and components, to reduce development lead times and ensure a swift, professional response. The Centre has been developed with the sole aim to provide advanced exhaust engineering to the automotive sector. This facility has been created to reduce critical product development times and to minimise development costs with a lean development cycle. Warton Technical Centre is a one-stop-shop, delivering high quality test and development support with rigid quality at competitive prices.

ACOUSTIC EXHAUST VALVES

- Exhaust valves are fitted as an integral part of a vehicle's exhaust system, opening and closing to control the gas flow and optimising engine back-pressure for improved performance and acoustic control.
- 100% control of valve position
- Tuneable NVH characteristics
- Controllable back-pressure

EGR EMISSION CONTROL EXHAUST VALVES

NOx emission reduction using Exhaust Gas Recirculation (EGR).

Conventional High Pressure Loop EGR

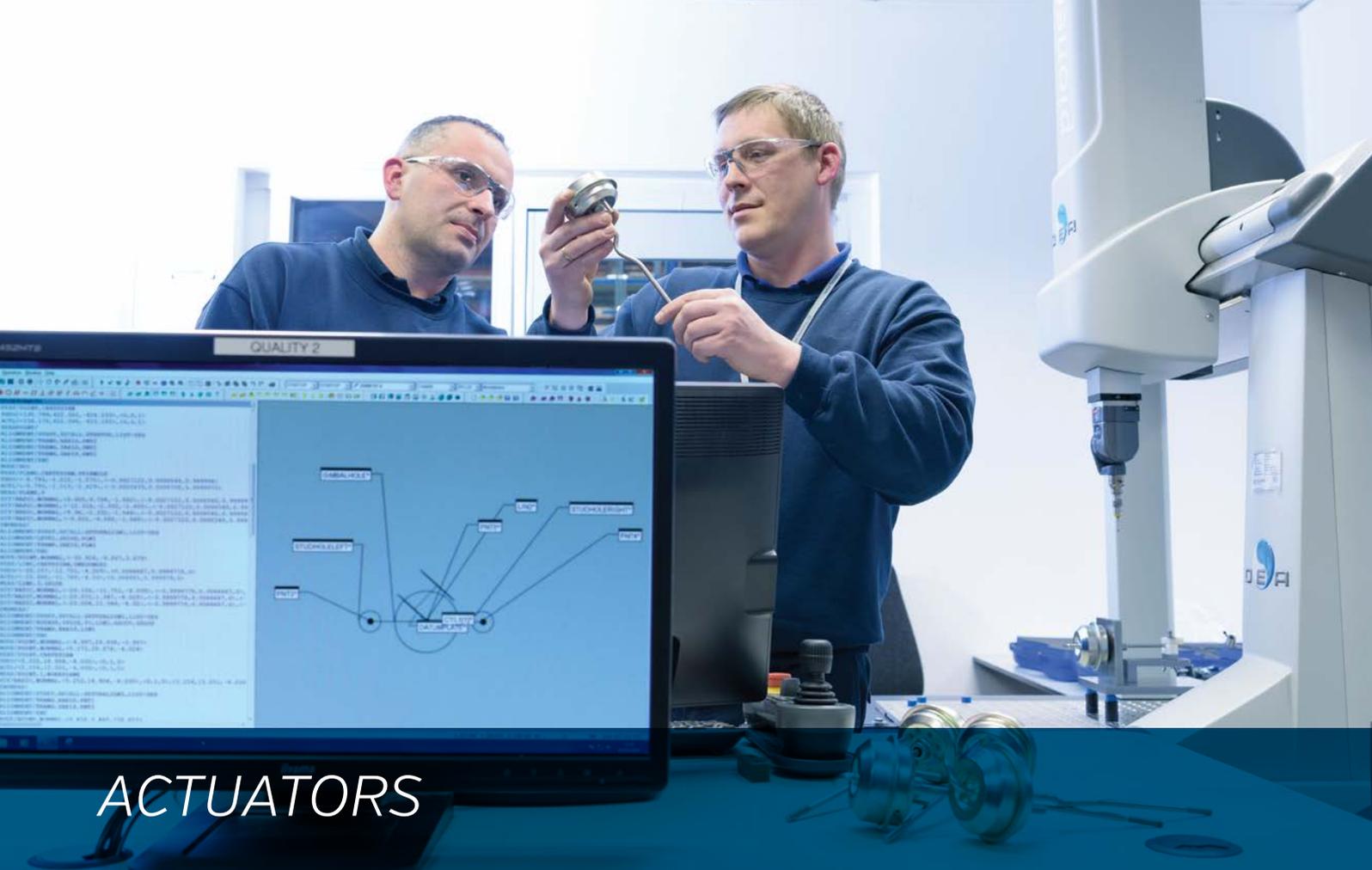
- Reduces turbo effectiveness
- Re-circulation at high loads difficult without variable-geometry turbocharger
- Can lead to increase in particulate matter

Long Loop EGR using Helical's Low Pressure (LP) EGR Valve

- No loss of turbo effectiveness, improved MPG
- EGR already been filtered via DPF
- Can be used in conjunction with High Pressure Loop (HPL) EGR

Helical's LPEGR Valve

- Fast response <170 milliseconds both directions
- Can be made to various diameters
- Robust design and quiet operation



ACTUATORS

The gradual worldwide introduction of new automotive emissions standards has created the need to equip new vehicles, both petrol and diesel, with ever more precise control systems.

Pneumatic

Our pneumatic pressure and vacuum actuators for turbochargers enable fast and precise control, reducing harmful emissions while withstanding extremes of temperature, vibration and environment.

All our actuators go through the procedures of leak testing, hysteresis, extremes of temperature and vibration testing.

We also design and produce pressure and vacuum actuators with and without position sensors. Position sensors give feedback to the engine's ECU in order to precisely control emission levels.

We are the only actuator manufacturer to design and produce springs in-house, reducing costs and time to market.

Our actuators are low cost relative to their performance, reliability and longevity. Each actuator is tailor-made for a specific application.

Actuators for turbocharger applications

- Over 44 million actuators sold to date
- Adding value and varied commodities
- Over 25 years experience
- Largest actuator manufacturer in India and China
- Supplied to leading turbo manufacturers all over the world
- Supplied to well known top OEM brands
- Global sourcing strategy enabling competitive advantage





VALVE ROTATORS

Valve rotator applications

Rotators are used in large diesel and gas engines in the following sectors:

- Marine
- Locomotives
- Power generation
- Trucks
- Large off-road vehicles
- Various specialised vehicles and engines

Benefits of valve rotators

- Each time a valve opens, the valve rotator turns the valve slightly
- This prevents the valves sticking due to carbon build up
- It allows the inlet and exhaust valves to be heated and cooled symmetrically
- Fitted to the top or bottom of the valve spring, the valve rotator helps to keep valves cleaner, reducing carbon build-up and so lowering engine emissions
- Valve rotators extend the life of key engine and valve gear components
- They help to reduce the amount of carbon deposits on the valve and prevent carbon build-up on the valve seat

- Cleaner valves reduce engine emissions and prevent burning and guttering of the valve face and seat
- Valve rotators reduce thermal gradient and stress, reducing the need for high-cost nimonic steel valves

Helical valve rotators

Helical valve rotators operate by means of the increase in valve spring loads from valve closed to valve open. Our rotators can be manufactured in sizes ranging from 25mm to 150mm diameter. Each one is tailor-made for a specific engine application. We have the design expertise and flexibility to complete the development cycle rapidly from design to prototype stage, and then to on-time delivery of serial production.

All our valve rotators are tested to meet customers' overspeed, overload and temperature specifications. We have test rigs for engines up to 460mm cylinder diameter.

Our rotators must have a long life span, extending to tens of thousands of hours. The quality and design of our rotators allow us to meet the demands of the toughest applications.



EXHAUST SYSTEMS

Helical has the capability to design and develop bespoke exhaust systems for luxury and performance cars, and other on-highway and off-highway vehicle applications.

We are developing a specialism in manufacturing prototype exhaust systems from lightweight and durable materials such as titanium and inconel for premium, luxury and performance cars.

Helical can fabricate bespoke development samples and prototype exhaust systems and components in low volumes.

We have employees with many years' experience of working in the area of exhaust systems design.

Helical is a world leader in the design and manufacture of exhaust system components such as exhaust valves.





TECHNICAL CENTRE

The Warton Technical Centre was built in 1991 as a European Research and Development Centre, providing engineering support to the exhaust industry. Helical has further invested in the facility, which is now used by automotive manufacturers, motorsport teams and component suppliers for vehicle, powertrain, and increasingly, emissions testing.

The Warton Technical Centre offers a range of facilities including 15 test and NVH cells and a calibrated test track, for vehicles and components, including low and ultra-low emission vehicle technologies such as hybrid and electric.

We offer:

- Durability testing
- Validation programmes
- Evaluation work
- Emissions testing (Horiba MEXA)
- R&D programmes
- NVH data acquisition and development
- Consultancy
- Prototype development

For:

- Powertrains with a range of fuels eg. gasoline, diesel, gas and dual-fuel (Compressed Natural Gas (CNG) and Liquid Natural Gas (LNG))
- Exhaust systems
- Hybrid and electric components
- Gearboxes

Services

- Acoustic acquisition & analysis (LMS TestLab hardware & software)
- Engine calibration (INCA, ATI & CANalyser hardware & software)
- Structural diagnostics & evaluation
- Heavy duty & passenger vehicle emissions measurements
- Mechanical & thermal fatigue analysis & durability testing
- Climatic & environmental testing
- Materials analysis

Facilities

- Engine test cells x 12
- Semi-anechoic engine dyno test cells x 2
- Semi-anechoic vehicle chassis dyno test cell x 1
- Vibration shakers x 5
- Hydraulic actuators
- Climatic chambers x 2
- Natural gas burners x 5
- Environmental chambers x 7
- Drive-by noise test track
- Cold flow rig tester
- Manufacture and modification
- Vehicle workshops
- Pre & post inspection
- Serviced offices and warehouse



R&D

BLUE SKY PRODUCT DEVELOPMENT

This Special Projects team undertakes our most ambitious assignments. Our skilled team is focused on designing and developing innovative mechatronic engineering solutions – often in collaboration with our development partners.

ELECTRICAL ACTUATORS

An example of a product in research and development is an electrical actuator. Rotary or linear designs can be

made as required, with or without built-in intelligence. We have the design expertise and flexibility to complete the development cycle rapidly from design to prototype stage, and then to on-time delivery of serial production.

PROTOTYPE CAPABILITIES

- Full CNC tool room for rapid tooling
- 75 tonne press work including pierce and lip tooling
- 2D Mazak laser cutting CNC
- Manifold building
- 3 axis CNC electric mandrel tube bending (31.2-76mm ID)
- Pittsburgh lock seam with interleaf
- Bode welder

- 10 tonne press case
- Spun end caps/moon end seamer
- Box pan folder & press brake
- 2 metre guillotine
- 2 x Eagle sizing machines
- Titanium component and system fabrication
- 3D printing extruded ABS (FDM process) & laser cured resin [stereolithography process]

HELICAL SUPERCAR PROJECT

Helical has built two bespoke supercars inspired by the TVR Cerbera Speed 12. The Mk1 GT Racecar is naturally-aspirated, the Mk2 GT Roadcar is turbocharged. The Speed 12 Turbo features a twin-turbo 6.0-litre dry sump V12 engine developing 1012bhp, resulting in a 0-60mph time of 2.9 seconds and a top speed in excess of 218mph.

Helical's venture into automobile construction has provided the opportunity to embrace many new technologies such as composite body panel manufacture as well as providing an opportunity to continue

development on Helical's acoustic electronic exhaust valves, titanium exhaust system, sound enhancement technologies and other blue sky R&D projects.

The supercars can test the product design iterations in real-life scenarios, where the driving dynamics factor is added to what standard test equipment can simulate – in other words the supercars act as dynamic test rigs.

Modern turbocharged engines have lost the desired sound quality that customers yearn for and Helical is striving to develop a natural pleasing normally aspirated V-engine sound from today's modern turbocharged engines.



QUALITY

Helical operates a Quality Management System compliant with the international standards ISO 9001 and TS 16949.



TS 632333-000



ENVIRONMENT

Helical operates an Environmental Management System compliant with the international standard ISO 14001.



Helical: Headquarters, UK

Helical Technology, Lytham St Annes
Lancashire, FY8 5AQ, UK

T +44 (0)3333 44 45 46

E sales@helical-technology.co.uk

W www.helical-technology.com

