

# GROWTH WITHIN OUR ENVIRONMENTAL AND ENERGY TRANSITION PORTFOLIO

Developing innovative solutions to energy transition and environmental challenges by building commercial opportunities from insight and strategy building, all the way through to implementation. For example, we are resolving complex engineering issues associated with the integration of renewables as well as playing a pivotal role in developing strategies across all modes of transportation to support low carbon transitions.

## OUR OPERATING SEGMENTS

### Energy and Environment

Governments, public agencies and businesses around the world trust Ricardo's expertise in solving the most complex environmental challenges. Our clients value our deep understanding of energy and environmental drivers, policy development and technical insights, and our ability to turn challenges into business opportunities.

 PAGE 42

### Rail and Mass Transit

We support our clients in navigating the rail industry's developmental, operational, commercial and regulatory demands. We work with governments, operators, infrastructure managers and manufacturers to ensure that railways deliver the highest possible value to their clients and to the wider community.

 PAGE 44

### Emerging Automotive and Industrial

Our strategic and technical experts define future technologies that are innovative and sustainable for all types of emerging mobility applications, from battery to fuel-cell technologies. We deliver solutions comprising energy-transition propulsion, driveline and controls design, optimisation and prototype development.

 PAGE 46

PORTFOLIO HIGHLIGHTS

**£244m**

Total revenue

**£285m**

Total order intake

**55%**

Total %  
Group turnover

## ENERGY AND ENVIRONMENT (EE)

Energy and Environment (EE) works with clients across a wide variety of sectors and geographies to deliver robust data-driven solutions to solve complex energy-transition and environmental challenges. Ricardo's depth of environmental and energy expertise provides support across the value chain, from policy and strategy to implementing solutions.



We work across the value chain to deliver solutions that support meaningful change to meet today's energy and environmental challenges.

### HIGHLIGHTS\*

**+50%**  
Order intake

2022/23	£111.5m
2021/22 (CC)	£74.4m
2021/22	£74.1m

**+54%**  
Order book

2022/23	£87.6m
2021/22 (CC)	£56.7m
2021/22	£57.0m

**+31%**  
Revenue

2022/23	£88.5m
2021/22 (CC)	£67.4m
2021/22	£67.2m

**+45%**  
Underlying operating profit

2022/23	£16.0m
2021/22 (CC)	£11.0m
2021/22	£11.0m

**+1.8pp**  
Underlying operating profit margin

2022/23	18.1%
2021/22 (CC)	16.3%
2021/22	16.4%

**+22%**  
Headcount

2022/23	971
2021/22	795

\* Prior period results have been restated to reflect the fact that a share of central plc costs are no longer included in the operating profit measure for operating segments. See [Note 5](#) to the Group Financial Statements.

### Strong demand drivers are underpinning growth

Our EE business is in a strong market position which provides confidence in our ability to capitalise on favourable market trends in policy and funding for climate change and energy decarbonisation. We have focused our portfolio on market-facing growth solutions that include policy, strategy and economics; water management; corporate sustainability; air quality and environmental management; and digital modelling. These growth solutions include both strategic and technical consulting expertise and are combined with our data-science and software-development capability, delivering repeatable and scalable growth, while expanding across our markets and regions.

As an example, we advise governments around the world on developing and implementing the policy measures needed to reduce the environmental impacts of different sectors in the most efficient and effective manner. This policy insight provided to international governments is valued by the private sector, where we provide strategic support to help companies respond to new and emerging policy measures – such as using our digital modelling tools to forecast the impacts of policies and strategies on the demand for energy in both the near and long term.

### The value and impact of our work

EE's work delivers significant improvements to the environment, helping to reduce the near and long-term impacts of climate change, as well as helping to substantially accelerate the energy transition, developing innovative solutions and deep technical insights needed to decarbonise energy generation, distribution and use. Critical to the value that our experts offer is the depth of expertise at each stage of the value chain, with our robust policy and strategy support enabling clients to undertake effective solution implementation.

For instance, Ricardo recently developed the evidence needed to inform negotiations and the subsequent strategy announcement by the International Maritime Organization on reducing maritime greenhouse gas emissions to zero by 2050. We also recently supported the update of the EU ITS Directive, which is targeting 1.1% annual CO<sub>2</sub> reductions and net benefits of EUR 158bn. This policy support will enable us to effectively support organisations around the world in implementing the solutions to meet these ambitions, which will include both technical consultancy and engineering.

### Our performance in FY 2022/23

The continued demand for EE solutions has underpinned a very strong performance in FY 2022/23, with total revenue, including the results of businesses acquired in the year, up by 31%. Activity levels remained high throughout the year with a record order intake, resulting in an order book at 30 June 2023 of £88m, an increase of 54% on a constant currency basis, providing good visibility into the new financial year, which helps to underpin our growth strategy execution. On an organic basis, excluding the results of acquisitions, revenue and underlying operating profit grew by 20% and 30% (constant currency). The organic growth was driven by strong demand across multiple services, segments and geographies. In FY 2022/23 we secured multiple new contracts across our market-facing growth solutions, including the EU Mission Implementation Platform for Adaptation to Climate Change (MIP4Adapt), a significant contract for the European Commission. Through this contract, Ricardo's climate change experts are helping to accelerate Europe's transformation to a climate-resilient future. EE has continued to see substantial growth in the Middle East, with substantial demand for the environmentally focused development of digital solutions. This demand is driving high-value work for nationally critical environmental projects. Our reputation for managing air quality monitoring networks and modelling complex data sets also continues to be recognised by clients, with further substantive contracts.

EE's growth has also included E3-Modelling (E3M) and Aither Pty Ltd, having acquired the businesses in January and March 2023 respectively. E3M, which provides advanced empirical modelling services, focuses on the energy-environment nexus and is highly complementary to Ricardo's unique position at the intersection of the energy, environment and mobility agendas, providing digital modelling capabilities right across the Group. Aither Pty Ltd, an Australia-based natural-resources policy consultancy, strengthens our regional capabilities and significantly builds EE's global environmental portfolio in water and advisory services.

Building on the acquisition of Inside Infrastructure Pty Ltd in March 2022, these latest acquisitions demonstrate Ricardo's continued commitment to growing its global reach and extending its portfolio in Clean Energy and Environmental Solutions. Ricardo's existing water capabilities combined with Aither and Inside Infrastructure, have already started bidding

together with a strong pipeline of opportunities domestically in Australia, as well as in the Middle East. E3M and Aither have contributed £4.8m of revenue and £1.1m of underlying operating profit in the period since their acquisitions. Inside Infrastructure contributed £3.9m of revenue (FY 2021/22: £0.9m on a constant currency basis) and £0.9m of underlying operating profit (FY 2021/22: £0.1m on a constant currency basis).

### CASE STUDY

## INNOVATIVE DIGITAL CLIMATE SOLUTION TO SUPPORT UAE CLIMATE COMMITMENTS

Ricardo is supporting the Government of the United Arab Emirates (UAE) with the development of an innovative solution for the monitoring, reporting and verification of Greenhouse gas emissions (GHG) across the region.

The project utilises Ricardo's world-leading expertise in GHG inventories, combined with its extensive experience in climate change policy and environmental software development. The advanced digital solution will provide critical insights across a range of industries, supporting the Government in proactively driving forward the regions ambitious climate change commitments, which includes implementing its Net Zero 2050 plan. The project continues to demonstrate the Government of UAE's regional leadership in tackling the worsening effects of climate change.

The innovative GHG emission monitoring, reporting and verification solution will be presented as part of the UNFCCC 28th Conference of the Parties being hosted in the UAE; and Ricardo's experts are already working with a number of additional countries who will benefit from advanced GHG inventory support.

## RAIL AND MASS TRANSIT

Built on a unique foundation of strategic consultancy, complex engineering and safety assurance, we address critical challenges across every aspect of the rail industry.



We support our clients in navigating the rail industry's developmental, operational, commercial and regulatory demands.

### HIGHLIGHTS\*

**+1%**  
Order intake

2022/23	£89.2m
2021/22 (CC)	£87.9m
2021/22	£85.0m

**+5%**  
Order book

2022/23	£108.7m
2021/22 (CC)	£103.7m
2021/22	£109.1m

**-4%**  
Revenue

2022/23	£73.5m
2021/22 (CC)	£76.7m
2021/22	£74.3m

**-18%**  
Underlying operating profit

2022/23	£8.0m
2021/22 (CC)	£9.7m
2021/22	£9.4m

**-1.7pp**  
Underlying operating profit margin

2022/23	10.9%
2021/22 (CC)	12.6%
2021/22	12.7%

**-9%**  
Headcount

2022/23	514
2021/22	563

\* Prior period results have been restated to reflect the fact that a share of central plc costs are no longer included in the operating profit measure for operating segments. See [Note 5](#) to the Group Financial Statements.

### Capabilities across all disciplines

Ricardo's rail experts provide specialist engineering and assurance services to help clients navigate the industry's complex operational, commercial and regulatory demands. Our experts work across a rail project's life cycle to provide rail operators, infrastructure managers and original equipment manufacturers the highest safety, operational and environmental standards. Our rail expertise includes:

- **Railway systems engineering** – Systems engineering extends across technical activities that support our clients in realising the intended performance of a complete and integrated system
- **Operations and maintenance** – Disciplines that support operators in optimising day-to-day operations to deliver long-term efficiencies
- **Rail design and engineering** – From capturing requirements through to design, in-house manufacturing, and approvals, we provide end-to-end support that provides full project management
- **Independent assurance** – Undertaking a wide range of independent assurance and certification support, from assessing new products so that they meet industry standards to the assessment of the construction of entire railway systems

### Supporting the future needs of the rail industry

In addition to strong demand for Ricardo's core engineering and safety expertise across the global rail sector, we are also seeing an increasing demand to support industry and operational decarbonisation. This demand enables Ricardo to utilise both its sustainability and energy expertise to provide robust strategy and impactful implementation, and extends our delivery across the value chain. This has included a range of services, from insights into national and regional sustainable rail policy, through to the integration of clean energy solutions into rail infrastructure and rolling stock. Examples of delivering these services include research, strategy and investment requirements for the utilisation of green hydrogen in UK national rail operations, decarbonisation insights for regional government rail decarbonisation in countries across Asia Pacific and the integration of trackside renewable energy technology directly into rail infrastructure.

### Our performance in FY 2022/23

An order intake of £89.2m represents a 1% increase on FY 2021/22 on a constant currency basis, reflecting sustained demand for Rail and Mass Transit. The closing order book remains high at £108.7m, in line with the prior year.

During the year, we were successful in winning significant long-term project extensions across the Middle East and Australia in building our business in North America. Nevertheless, revenue reduced to £73.5m and represented a 4% reduction on the prior year on a constant currency basis – this is in line with expectations, as some large projects completed in the year and new projects won have not yet started.

The strong order book, which includes wins in new territories, provides growth opportunities for FY 2023/24 and beyond. For example, in Ireland we were awarded Designated Body (DeBo) status in November 2022, which enables us to offer clients in that market a broader range of accredited assurance services and access approximately three times the serviceable market (compared to non-DeBo status). This aligns with the full portfolio offered in established markets such as the UK, the Netherlands, Belgium, Denmark and Spain. In North America, we are helping regional governments and rail sector organisations to enhance industry safety standards. This includes securing key strategic and safety roles with new transit systems in Ottawa, Canada.

Underlying operating profit reduced by £1.7m (18%) on a constant currency basis. Underlying operating margin was 10.9% (FY 2021/22: 12.6% – constant currency). This was driven by the reduction in revenue, combined with investment in business development capability to drive order intake in Australia and new territories.

Following a review of subsidies provided during the pandemic, we have taken the decision to provide for the return of a £0.5m COVID-related subsidy to the Dutch government.

In addition, £0.7m of restructuring costs were recognised in the year within specific adjusting items (FY 2021/22: £1.0m). This was driven by the simplification of the management structure, aligned with our focus on core growth opportunities. The cash cost of the actions, which includes the cash cost of the actions accrued for at the end of FY 2021/22, was £1.1m (FY 2021/22: £0.3m).

In addition, following a review of subsidies provided during the pandemic, we have taken the decision to provide for the return of a £0.5m COVID-related subsidy to the Dutch government.

## CASE STUDY

# SHADOW OPERATOR FOR NEW 15KM METRO LINE IN MANILA

The city of Manila commissioned a new transit line, MRT-4, to connect the central business district with the eastern province of Rizal.

Given the high complexity of the project, Ricardo was appointed as a 'Shadow Operator'. Our Rail experts are advising the technology and design teams on the day-to-day needs of the eventual railway operator, including guidance on operational risks and safety hazards, developing passenger flow models, and advising on recruitment and work scheduling.



## EMERGING AUTOMOTIVE AND INDUSTRIAL

Emerging Automotive and Industrial is a trusted partner for the next generation of sustainable mobility. Leveraging expertise in power electronic systems and propulsion systems, software and digital technologies for connected, autonomous vehicles, we deliver clean, efficient and integrated propulsion and energy solutions to support our clients in their energy transitions.



Specialists in energy transition propulsion, driveline, and controls design, optimisation, and prototype development.

### HIGHLIGHTS\*

**-19%**  
Order intake

2022/23	£84.3m
2021/22 (CC)	£104.6m
2021/22	£101.3m

**+3%**  
Order book

2022/23	£55.0m
2021/22 (CC)	£53.3m
2021/22	£55.4m

**+16%**  
Revenue

2022/23	£82.3m
2021/22 (CC)	£71.1m
2021/22	£69.1m

**+279%**  
Underlying operating profit

2022/23	£10.6m
2021/22 (CC)	£2.8m
2021/22	£2.7m

**+9.0pp**  
Underlying operating profit margin

2022/23	12.9%
2021/22 (CC)	3.9%
2021/22	3.9%

**-20%**  
Headcount

2022/23	435
2021/22	542

\* Prior period results have been restated to reflect the fact that a share of central plc costs are no longer included in the operating profit measure for operating segments. See [Note 5](#) to the Group Financial Statements.

### We solve the most complex mobility challenges

From strategic planning and policy, concept to manufacture, we work with clients across the globe in key automotive and industrial transport sectors: passenger and light vehicles, commercial vehicles, off-highway vehicles, motorcycles, marine and aerospace as well as stationary power generation and infrastructure. We bring sustainable mobility solutions to the market quicker while enhancing the overall performance across key transport sectors.

- **Electrification** – We enable our clients to de-risk electric vehicle (EV) development, while reducing time, cost and navigating stringent policies. We provide solutions across power electronics, emachines, edrives and batteries to accelerate EV adoption
- **Hydrogen fuel cell development** – We specialise in design and integration of fuel cell systems to decarbonise commercial vehicle, off-highway, aerospace, and marine applications.
- **Sustainable fuels** – We help clients navigate changing legislations, identify, and implement sustainable fuel solutions including hydrogen, biofuels, and synthetic fuels to reduce emissions across a wide range of transport applications
- **Hybrid** – We support the decarbonisation of transport through the design, development and implementation of hybridised powertrain and driveline systems.

### A rapid shift to decarbonised sustainable transport technology

Zero emission propulsion is driving transformational change in all forms of transport driven by increased emissions regulation, country specific bans of fossil fuel vehicles and increasing consumer adoption of electrified vehicles. Across mobility, there are many propulsion technologies, working towards different time frames and different applications by industry, geography and application. Furthermore, new mobility solutions will only become viable for all stakeholders if energy sources are resilient, convenient and cost-effective at the point of need.

Our expertise supports the solution delivery across the value chain from policy, strategy and advisory services to design, engineering, testing and niche production and product launch. We develop strategies for the transport sector which address the biggest challenges of reducing green house gas emissions and we strive to deliver a better world through solutions that take a whole life cycle carbon neutral approach. As an example, Ricardo is working with the Sustainable Hydrogen Powered Shipping consortium (sHYpS) to design and develop hydrogen fuel cell propulsion technologies to power the next generation of zero emissions passenger ships. The project involving 13 partners in six European countries will accelerate the adoption of hydrogen as a renewable fuel in the maritime industry. The work has been funded by UK Research and Innovation (UKRI) under the UK Government's Horizon Europe funding guarantee.

### Our performance in FY 2022/23

Emerging Automotive and Industrial built on its return to growth and delivered a good performance in both revenue and underlying operating profit in FY 2022/23. Revenue was up 16% and operating profit increased by 279% on an underlying basis. Headline operating profit margin was 12.9% up by 9.0pp, with the positive impact of volumes and the restructuring which was executed in H2. Throughout the year, we secured a number of significant contracts in both the US and Europe including Cranfield Aerospace Solutions, Toyota Hilux and Kalmar.

Order intake declined by 19% year-on-year, on a constant currency basis, reflecting the market challenges in the automotive industry resulting in timing uncertainties in new electrification and integrated mobility projects. Our order intake was geographically diverse with c.30% coming from North America, c.60% from EMEA and c.10% from Asia.

We expect a level of market uncertainty to continue as we move into Q1 FY 2023/24 but to grow thereafter as new projects become active and we win new contracts.

### CASE STUDY

## FUEL CELL POWERED TERMINAL TRACTOR

Kalmar offers a range of cargo handling solutions and services to ports, terminals, distribution centres and to heavy industry. To meet legislation requirements, manufacturers must shift to zero emission technologies

Ricardo supported Kalmar, in partnership with Toyota Tsusho America, with the design, integration and assembly of fuel cells into the Kalmar Ottawa platform. The project aims to offer Kalmar clients extended operational uptime and reduce the need for new investment in electrical grid infrastructure. Utilising extensive experience and design expertise in fuel cell systems and integration, Ricardo integrated a fuel cell system to deliver cleaner and more efficient propulsion.



# GROWTH WITHIN OUR ESTABLISHED MOBILITY PORTFOLIO

Engineering a better future through our traditional engineering and technical consulting services, with niche specialisms in manufacturing and industrial engineering, designing solutions from concept right through to production. Established Mobility's growth is driven by increasing demands in continuously improving the performance of traditional mobility solutions to reduce the impacts of climate change.

## OUR OPERATING SEGMENTS

---

### Performance Products

Ricardo specialises in the design, manufacture and assembly of specialised engine and propulsion systems delivered at niche volumes to our clients in the motorsport, high-performance vehicle, defence and aerospace industries.

### Defense

A trusted engineering services partner for clean, efficient, integrated propulsion and energy systems with a deep legacy in partnering with the US military in the transition of innovative technologies from science to application.

### Established Automotive and Industrial

With over a century of propulsion design and development, we deliver transportation solutions from strategic planning to concept. We work across key transportation industries to bring solutions to market more quickly, while enhancing performance.

 PAGE 50

 PAGE 52

 PAGE 54

PORTFOLIO HIGHLIGHTS

**£201m**

Total revenue

**£237m**

Total order intake

**45%**

Total %  
Group turnover

## PERFORMANCE PRODUCTS

Performance Products (PP) is responsible for the manufacture and assembly of niche high-quality products, including engines, transmissions and other performance-critical driveline and powertrain products. We also provide industrial engineering services for clients around the globe to enable designs to successfully move from concept to series production.



Engineering specialists in transmission design and niche-volume manufacturing.

### HIGHLIGHTS\*

**+54%**  
Order intake

2022/23	£115.3m
2021/22 (CC)	£75.1m
2021/22	£75.1m

**+58%**  
Order book

2022/23	£81.3m
2021/22 (CC)	£51.3m
2021/22	£51.3m

**+15%**  
Revenue

2022/23	£84.7m
2021/22 (CC)	£73.7m
2021/22	£73.7m

**+2%**  
Underlying operating profit

2022/23	£9.0m
2021/22 (CC)	£8.8m
2021/22	£8.8m

**-1.3pp**  
Underlying operating profit margin

2022/23	10.6%
2021/22 (CC)	11.9%
2021/22	11.9%

**+8%**  
Headcount

2022/23	355
2021/22	330

\* Prior period results have been restated to reflect the fact that a share of central plc costs are no longer included in the operating profit measure for operating segments. See [Note 5](#) to the Group Financial Statements.

### Recognised for our global expertise in industrial engineering and niche production

We are a trusted engineering partner for our clients across the motorsports, high-performance vehicles, aerospace and defence sectors. We provide expert design, engineering, manufacturing, assembly and test capabilities for engines and transmissions. With decades of experience, our technical experts support our clients in bringing their cutting-edge innovations to market.

- **Industrial engineering** – From start-ups to established multi-nationals, we apply our range of industrialisation consultancy services to help clients navigate all manner of niche volume production challenges
- **Powertrain systems production** – Our full-service solutions are tailored to the requirements of our clients, enabling us to deliver proven, cost-effective powertrain solutions for the world's most demanding niche applications, from series engine supply to niche volume assembly programmes
- **Driveline production** – We develop and deliver quality, cost-effective driveline and transmission solutions for the world's most demanding high-performance and specialised applications, providing our clients with a complete end-to-end service tailored to their requirements. Ricardo accommodates niche volume programmes of any size, from single prototype builds through to automated production lines

### Accelerated adoption of green propulsion

Operators are presented with the challenge of decarbonising their product portfolios while meeting the expected performance specifications and volume requirements associated with these platforms. Our green propulsion solutions support the next generation of specialist vehicles with the development and production of zero emissions technologies, including fully integrated electric drive units (EDU) and battery solutions.

We are helping our clients decarbonise their portfolios without compromising on performance or quality by utilising our significant expertise in high performance automotive, combined with our experience in developing solutions for Formula E and electric vehicle (EV) demonstrators.

### Our performance in FY 2022/23

PP has had a record year for order intake. This reflects a number of significant contract extensions as well as new clients attracted to the business. The most significant of these contract awards was the extension of engine supply to McLaren until 2030, the extension of transmission supply to the Porsche Cup programme until 2028, the continuation of transmission supply to Bugatti and a new multi year transmission supply programme to Singer Vehicles, based in California.

Revenue from continuing operations in FY 2022/23 was £84.7m. McLaren engine volumes continued to increase in the year with the launch of the new hybrid V6 Artura. Transmission volumes and revenue also remained strong, with continuing deliveries to Bugatti, Porsche, Aston Martin and several top tier motorsport programmes. In addition, the expected recovery of the aerospace sector was evident over the year, along with continued success in supplying industrial engineering consultancy services.

Underlying operating profit from continuing operations was £9.0m, improving marginally on last year's result despite a number of significant cost increases that impacted the business during the year, including materials, energy and purchased parts. Underlying operating profit margin was 10.6% compared to 11.9% in the prior period.

We continue to develop our portfolio of existing powertrain (engine) and drivetrain (transmission) products during the year as well as new projects in the zero emission propulsion space, including electric drive units, industrial engineering services in EV production and concept work around battery systems and electric machines.

The after-effects of COVID-19, and subsequently the conflict in Ukraine, remained a source of some disruption in the supply chain. However, our rigorous process management and tools ensured that client deliveries were protected.

### CASE STUDY

## SUPPORTING EFFECTIVE PRODUCTION RAMP-UP FOR MANUFACTURER OF PEM ELECTROLYSERS

Ricardo supported an established manufacturer of proton exchange membrane (PEM) electrolyzers that was facing the challenges associated with transitioning to producing higher manufacturing volumes.

Ricardo performed a manufacturing-site audit to rapidly measure and assess the manufacturer's operation. A benchmarking exercise was performed to identify areas of improvement in its production processes. This assessment was used to prioritise actions to support production ramp-up and increase both control and yield from critical processes.

Several key areas for improvement were identified that could be delivered immediately and in the longer term to enable the manufacturer to continue to deliver a quality product at increased volumes.



## DEFENSE

Defense continues to provide solutions to meet the challenges our clients face in the integration of logistics and field support for complex and diverse systems. The demand for our services has increased as a result of escalating world conflict and the challenges arising in a contested logistic environment. Our wide range of engineering and software solutions provides system-integration engineering for the US Army's ground inventory, and we are the data-replication agent for the US Navy. We also specialise in niche manufacturing, adapting commercial industry products to deliver innovative sector applications that protect people and infrastructure.



Trusted expertise in delivering wide-ranging integrated mobility systems while optimising safety and addressing environmental concerns.

### HIGHLIGHTS\*

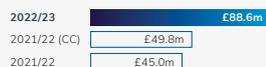
**+40%**  
Order intake



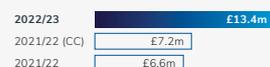
**-9%**  
Order book



**+78%**  
Revenue



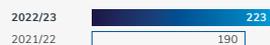
**+86%**  
Underlying operating profit



**+0.6pp**  
Underlying operating profit margin



**+17%**  
Headcount



\* Prior period results have been restated to reflect the fact that a share of central plc costs are no longer included in the operating profit measure for operating segments. See [Note 5](#) to the Group Financial Statements.

### Industry expertise across the entire defence system life cycle and product sustainment

We have a deep legacy in partnering with the US armed forces in the transition of innovative technologies from science to application, with a proven track record of successfully fielding, integrating and managing systems across the acquisition life cycles. Our primary operations are located in the USA, and we provide both product and technical service solutions to solve complex integration challenges across various defence platforms.

- **Technical service solutions** – We address the challenges our clients face in the maturation and integration of complex systems for legacy and emerging mobility platforms. With our depth of knowledge in military-system life cycle sustainment, combined with our digital engineering and software development capabilities, we integrate modernisation solutions across the US Department of Defense (DoD) and allied forces
- **Solution products** – We develop and deliver integrated products in response to identified client needs. We also develop complete integrated solutions as a lead systems integrator
- **Field service solutions** – We improve capabilities to support and sustain systems in the field throughout their life cycle to include life cycle sustainability analysis, electronic technical manual development, provisioning, total package fielding (TPF) and new equipment training (NET)

### Transition of commercial and technology innovation to client application

The US DoD continues to move away from its traditional approach centred on original equipment manufacturers (OEM), with a strong focus on accelerating the transition of innovations to the fleet of vehicles in the field. It is also increasingly focused on decarbonisation and its net zero plans.

The work that we do in Defense concerns the improvement of safety to the US Army and allied forces, delivering solutions that support the energy transition, significantly reducing fossil-fuel usage and carbon emissions. One example is Ricardo's work with the US Marine Corps to develop capabilities that are aligned with the Department of the Navy's climate strategy to improve the management of energy, the security of energy resources and reduce its carbon footprint.

### Our performance in FY 2022/23

Defense's order intake grew by £24.1m on a constant currency basis in FY 2022/23. Over the year, we received \$50m of orders from the US Army to provide antilock brake system/electronic stability control (ABS/ESC) retrofit kits to improve the safety of operation of the US Army's high mobility multi-purpose wheeled vehicle (HMMWV). Two contracts were extended beyond the original end date to ensure the continuance of Ricardo Defense in maintaining and updating Army mobility systems. Significant programmes included transitioning a commercial vehicle to the Army's inventory and providing an extended data-management enabler across the Navy's primary communications fleet.

Revenue increased by 78% year-on-year on a constant currency basis. Revenue growth was driven by increased ABS/ESC volumes – in total, we delivered 8,707 ABS/ESC kits in FY 2022/23 compared to 3,602 the previous year, including both retrofit kits and kits for new production vehicles – and a rise in orders for our technical and field support solutions.

Underlying operating profit of £13.4m was an increase of 86% compared to FY 2021/22 on a constant currency basis. Underlying operating profit margin increased by 0.6 basis points to 15.1%.

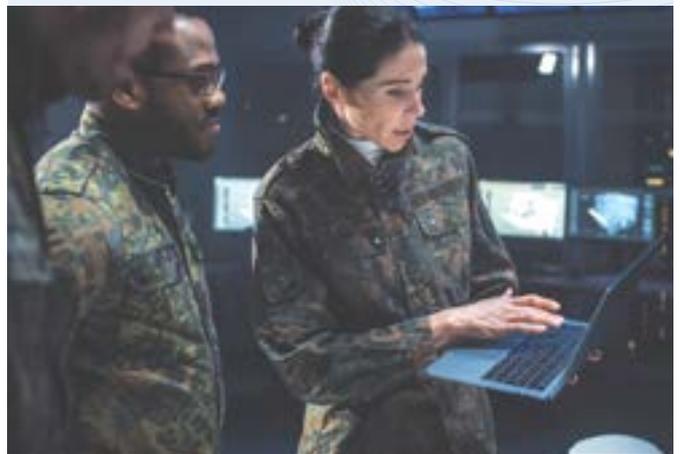
With the establishment of our digital acquisition framework – which enables an integrated management of US Army technical procurement initiatives – we can provide integrated solutions to our clients that cover the entire procurement life cycle for their vehicle platforms, from concept design and development through to production and sustainment through-life support.

Ricardo Defense continues to work with the US Marine Corps to develop and demonstrate capabilities to improve the management of energy supplies and better secure energy resources to reduce the US DoD's overall carbon footprint. Ricardo has expanded the work scope to develop an energy utilising dashboard to augment and deploy a metering and monitoring system. This enables the US Marine Corps to analyse changing electrical demand and logistical fuel constraints so that operators can make better informed command-and-control decisions on fuel and energy resiliency.

### CASE STUDY

## DIGITAL DATA FILE MANAGEMENT FOR THE US NAVY

The US Navy hosts a set of software services on the deployed fleet that provides for the transfer of technical data for maintainers and supply chain managers. Ricardo has developed an enterprise software solution that incorporates file transfer and messaging capabilities. We have demonstrated exceptional success by providing comprehensive sustainment and product improvement and by introducing new capabilities with each software release. These software products are deployed across the surface and subsurface fleet of the US Navy.



## ESTABLISHED AUTOMOTIVE AND INDUSTRIAL

Established Automotive and Industrial is a trusted partner for OEMs and tier one suppliers across the transportation industry. With over 100 years of engineering experience in the design, building and testing of conventional powertrains, it is helping global clients with bridging technologies to support the shift to decarbonised transport solutions. Demand for Established A&I services is driven by global decarbonisation targets and compliance with emissions standards, especially in heavy duty and defence markets.



Trusted expertise in delivering efficient, integrated propulsion systems while addressing environmental concerns.

### HIGHLIGHTS\*

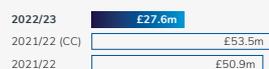
**-2%**  
Order intake



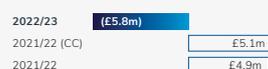
**+7%**  
Order book



**-48%**  
Revenue



**-214%**  
Underlying operating profit



**-30.5pp**  
Underlying operating profit margin



**-25%**  
Headcount



\* Prior period results have been restated to reflect the fact that a share of central plc costs are no longer included in the operating profit measure for operating segments. See [Note 5](#) to the Group Financial Statements.

### Industry expertise across the transport industry from concept to production

We have deep experience in partnering with OEMs and tier one suppliers across automotive, commercial vehicle, off highway, defence and marine market sectors. We apply innovative tools and processes – refined over a century of mobility engineering experience – to enable faster design and validation of efficient propulsion systems and reduced whole life costs. This includes systems optimisation, design upgrades of existing platforms and complete clean sheet vehicle design through to production.

- **Propulsion systems engineering** – design, development, testing and calibration of conventional powertrain and drivetrain solutions
- **Rapid realisation** – rapid prototype, demonstrators and ultra low volume vehicles from concept to manufacture

### Transition to zero emissions propulsion

Our expertise in internal combustion engine design is facilitating energy transition and decarbonised transport by adapting traditional combustion technologies to apply innovative and sustainable fuels, such as hydrogen. We are helping clients with this transition by navigating challenges relating to changes in emissions legislation, such as Euro 7, where the Ricardo Vehicle Emissions Research Centre (VERC) and Advanced Propulsion Research Centre (APRC) support clients achieve such standards.

### Our performance in FY 2022/23

Established Automotive and Industrial order intake was £36.2m, a decrease of 2% on a constant currency basis in FY 2022/23. Significant programmes included a highly customised fleet of vehicles for London's Metropolitan Police, driveline systems development for defence vehicle applications in Asia Pacific as well as engine calibration work for off-highway machines and passenger car vehicles to ensure compliance with future emissions legislation.

Revenue decreased by 48% year-on-year on a constant currency basis. Revenue decline was driven by the reduced demand for services in this area which led to management implementing the structural changes announced in the first half and carried out in the second half.

Underlying operating loss was £5.8m, a decrease of 214% compared to FY 2021/22 on a constant currency basis. Underlying operating profit margin decreased by 31pp. Operating profit performance is expected to improve in FY 2023/24, due to the significant restructuring actions taken in order to rebase the business appropriately.

### CASE STUDY

## NEXT GENERATION ENGINE FOR LIGHT DUTY VEHICLES

Ricardo worked with Achatés Power to develop the next generation of opposed piston gasoline compression ignition engines for light duty vehicles. Funded by the US Government's ARPA-E, the project 'BERYL' aims to create a fuel efficient, lightweight engine that offers improved efficiency, while meeting emissions targets.

Ricardo has undertaken design and systems integration, achieving a target of 60% weight reduction. The team expects that, when fully developed, this engine will achieve an improvement of up to 20% over baseline in fuel economy and deliver an unadjusted corporate average fuel economy and combined 35 MPG for a full sized pickup truck, alongside diesel like torque from a gasoline engine.

