# CIVIL AEROSPACE

We remain focused on delivering on all of our major programme commitments.

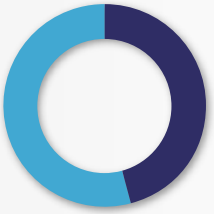
**Tony Wood**
President – Aerospace

## OVERVIEW

### Underlying revenue (£m)


**£6,655m**
Underlying revenue 2013

### Revenue mix 2013



- **46%** OE revenue
- **54%** Services revenue

### Revenue by sector 2013

- **57%** Wide-body
- **32%** Corporate and regional
- **11%** Narrow-body

### Highlights

- First flight of the Airbus A350 XWB powered by Trent XWB engines
- First flight of the Boeing 787-9 powered by Trent 1000 engines
- Major new Trent orders from JAL, IAG, Lufthansa, United, Singapore and Etihad
- Delivered the 3,000th BR700 series engine

### Key financial data

| | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|
| Order book £m* | 47,102 | 48,490 | 51,942 | 49,608 | **60,296** |
| | +8% | +3% | +7% | -4% | **+22%** |
| Engine deliveries* | 844 | 846 | 962 | 668 | **753** |
| Underlying revenue £m | 4,481 | 4,919 | 5,572 | 6,437 | **6,655** |
| | 0% | +10% | +13% | +16% | **+3%** |
| Underlying OE revenue £m | 1,855 | 1,892 | 2,232 | 2,934 | **3,035** |
| Underlying service revenue £m | 2,626 | 3,027 | 3,340 | 3,503 | **3,620** |
| Underlying profit before financing £m | 493 | 392 | 499 | 743 | **844** |
| | -13% | -20% | +27% | +49% | **+14%** |

* all years before 2012 include IAE order book and engine deliveries include IAE V2500.

## Rolls-Royce powers more than 30 types of commercial aircraft and has almost 13,000 engines in service around the world.

### What we do

The Civil aerospace segment is a major manufacturer of aero engines for the airliner and corporate jet markets. We have particular strengths in the wide-body market where Rolls-Royce has a 54 per cent share of aircraft on order. Demand for our products and services remains robust.

### 2013 financial review

The order book increased 22 per cent, including new orders of £18.9 billion (£10.3 billion in 2012). Trent engines and aftermarket services now constitute 73 per cent of the Civil aerospace order book.

Revenue increased three per cent, including three per cent growth in OE revenue. There was a 20 per cent increase in business jet engine deliveries and a small increase in Trent engines. Profit increased 14 per cent, reflecting higher volumes, the £112 million higher benefit from the restructured trading relationship with IAE and £26 million higher RRSA entry fees.

In 2014, we expect modest growth in revenue and good growth in profit.

### How we are performing

The airline industry saw global passenger traffic up around five per cent in 2013. Airlines in developed markets benefited from a modest economic recovery. In many developing markets there were significant increases in traffic supported by economic growth and market liberalisation.

**Civil Large Engines:** Nearly 1,400 Trent 700 engines for the Airbus A330 have been delivered to date and during 2013 Airbus delivered the 1,000th aircraft. The milestone aircraft and its Trent 700 engines were accepted by Cathay Pacific, the first airline to put the Trent 700 into service in 1995.

Important milestones were achieved in two major Civil Large Engine programmes. In June, the first flight of the new Airbus A350 XWB was powered by our Trent XWB engines. Then in September, the Boeing 787-9 version of the Dreamliner took to the skies for the first time, powered by our Trent 1000 engines.

Singapore Airlines Group placed a major order with us to power 50 Boeing 787 aircraft with Trent 1000 engines.

In July, we celebrated the first delivery of two new Rolls-Royce powered aircraft to the British Airways fleet – the Airbus A380 and the Boeing 787 Dreamliner.

In September, we announced that, due to the current regulatory environment, we would not proceed with a planned joint venture with United Technologies Corporation to develop an engine to power future mid-size aircraft. Rolls-Royce remains fully committed to this important market segment and we continue to invest in technologies that will enable us to take advantage of opportunities as they arise.

The Trent XWB will enter service in 2014 with Qatar Airways. This is the best-selling Trent engine yet, with more than 1,600 engines already on order.

Significant orders for the Trent XWB came from airlines in Europe, North America, the Middle East and Asia and these included a landmark first ever engine order for Rolls-Royce from Japanese airline JAL.

**Corporate and regional:** In our corporate and regional engine business, we delivered the 3,000th BR700 series engine. This engine series powers the Gulfstream G500 and G550, the Bombardier Global 5000 and Global 6000 (BR710), the Boeing 717 (BR715) and the Gulfstream G650 (BR725).

The first production version of the Cessna Citation X business jet flew in August, powered by our AE 3007C engines. Deliveries of the new aircraft are due to begin in early 2014.

**Services:** Revenue from services for civil airliners increased by three per cent in 2013, reflecting continued growth in the fleet of widebodied engines. More than 1,100 aircraft in service are covered by TotalCare.

Some 1,500 business aircraft are covered by CorporateCare® and in 2013 more than 70 per cent of customers for new Rolls-Royce powered business jets enrolled in CorporateCare.

### Future priorities and opportunities

In 2014, particular priority will be given to supporting the smooth entry into service of the Airbus A350 XWB. Rolls-Royce is the sole engine supplier for this new aircraft, and orders for the Trent XWB represent 53 per cent of the Civil aerospace order book.

Significant management attention will continue to be paid to financial performance, in particular reducing costs and improving inventory turn.

Developing new technology for future engine programmes and enhancing existing products remains a major priority.

**Market outlook:** We estimate that the global civil engine market will be worth approximately US$1,750 billion over the next 20 years, with US$1,050 billion being for original equipment and US$700 billion of aftermarket services. Over half of this value comprises engines for twin aisle airliners and large business jets, where Rolls-Royce is currently the number one engine supplier in terms of market share. *Our forecasts are based on our own internal forecasting tools, data from Ascend Online Fleets and airline schedules from Official Airline Guide (OAG).*

# DEFENCE AEROSPACE

We are focused on managing costs to ensure we can effectively compete and win in today's challenging market.

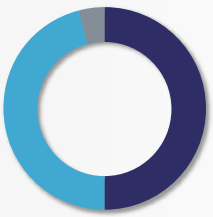
**Tom Bell**
President – Defence aerospace

## OVERVIEW

### Underlying revenue (£m)


**£2,591m**
Underlying revenue 2013

### Revenue mix 2013



- 50% OE revenue
- 46% Services revenue
- 4% Development

### Revenue by sector 2013

- 38% Combat
- 48% Transport
- 14% UAV/trainer

### Highlights

- TP400-powered A400M entered service
- MissionCare contract for Saudi Arabian EJ200 engines secured
- 1,500th AE 2100 engine delivered
- Upgraded AE 1107 engines for V-22 Osprey
- T56 enhancement kits gained first sales
- Delivered 40th Rolls-Royce LiftFan for F-35B Lightning II fighter programme
- RTM322 helicopter engine programme sold to Turbomeca

### Key financial data

| | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|
| Order book £m | 6,451 | 6,506 | 6,035 | 5,157 | **4,071** |
| | +17% | +1% | -7% | -15% | **-21%** |
| Engine deliveries | 662 | 710 | 814 | 864 | **893** |
| Underlying revenue £m | 2,010 | 2,123 | 2,235 | 2,417 | **2,591** |
| | +19% | +6% | +5% | +8% | **+7%** |
| Underlying OE revenue £m | 964 | 1,020 | 1,102 | 1,231 | **1,385** |
| Underlying service revenue £m | 1,046 | 1,103 | 1,133 | 1,186 | **1,206** |
| Underlying profit before financing £m | 253 | 309 | 376 | 395 | **438** |
| | +13% | +22% | +22% | +5% | **+11%** |

## We are the second largest provider of defence aero-engine products and services globally, with around 16,000 engines in service with over 160 military customers in more than 100 countries.

### What we do

Our engines power aircraft in every major market sector including transport, combat, patrol, trainers, helicopters, and unmanned aerial vehicles.

### 2013 financial review

The Defence order book declined 21 per cent (15 per cent decrease in 2012) reflecting continued budgetary pressures on our major customers. The net order intake of £1.6 billion was five per cent higher than the previous year. Revenue increased seven per cent, reflecting a 13 per cent increase in OE and a two per cent increase in services. Strong OE growth was driven by higher export sales, particularly of our EJ200 and Adour engine programmes. Profit increased 11 per cent due to higher volumes and lower R&D spending.

In 2014, we expect a decline in revenue and profit of between 15-20 per cent before growth resumes in 2015. This one year decline is the consequence of well publicised cuts in defence spending among major customers, and the completion of the delivery phase of a number of major export programmes. After two record years, this re-basing, supported by cost reduction programmes, will position the business well for future growth.

### How we are performing

2013 was a challenging year as traditional markets continued to experience unprecedented budgetary pressures. While this environment creates risks for existing business, it also presents opportunities for us to develop innovative solutions to meet the evolving needs of our customers. Nowhere is this more evident than in the area of services where we have the opportunity to help customers manage their budgets and costs more efficiently.

We also continue to pursue new equipment sales opportunities in global markets such as Asia and the Middle East where budgets are less constrained.

MissionCare contracts worth £492 million were secured in 2013. These included the first MissionCare contract for the support of EJ200 engines in Saudi Arabia.

In order to get closer to our customers, we are expanding our presence at operational bases. During 2013, we opened a new support facility at RAF Marham in the UK and announced another at Tinker Air Force Base in the US.

In-service fleets continue to benefit from technology enhancements, with the upgraded AE 1107 now providing 17 per cent more power for the V-22 Osprey aircraft. The latest T56 enhancement kits achieved Federal Aviation Authority (FAA) certification and recorded their first sales in the US, where fuel savings in the US Air Force C-130 fleet could amount to billions of dollars.

Our leading position in transport was underpinned by the entry into service of the A400M powered by TP400 engines, broadening our portfolio in a market where the Rolls-Royce powered C-130 is the leading player. This year we delivered our 1,500th AE 2100 engine for the C-130J.

The Rolls-Royce LiftSystem® continued to perform well as the F-35B Lightning II aircraft expanded its flight test programme and deliveries to the US Marine Corps accelerated. We delivered the 40th Rolls-Royce LiftFan and the 50th 3 Bearing Swivel Module (3BSM).

In order to concentrate our resources on markets where we can add greatest value, we sold our share in the RTM322 helicopter engine programme to Turbomeca, a Safran company, in September 2013. To further improve efficiency, we have reconfigured our organisation to bring us closer to our major customers.

We expect our services business to continue to grow as we continue to provide customers with greater capability.

### Future priorities and opportunities

We are focused on managing costs to ensure we maximise our ability to compete and win in an increasingly uncertain market.

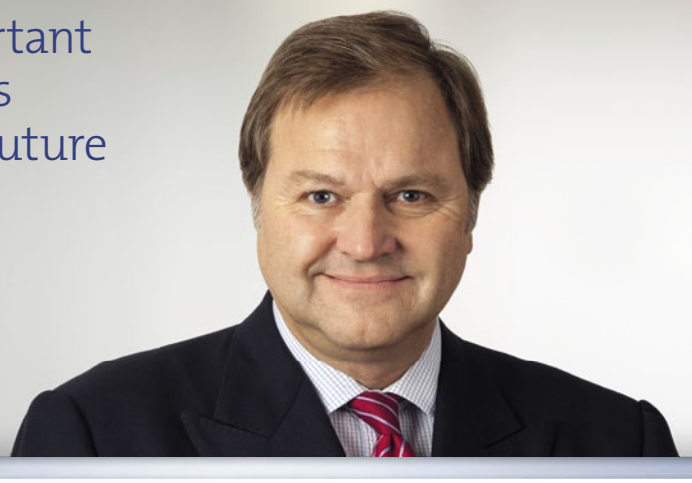
Our inclusion in the Hawk Advanced Jet Training System team to pursue the US Air Force T-X training contract provides just one of several paths to growth. Customers also continue to invest in their transport aircraft fleets, where we have a strong position. Defence applications for the Trent 700 should increase as the Airbus A330 tanker aircraft is selected by more military customers. The UK's fleet of tankers continues to expand with Rolls-Royce benefiting both as the engine supplier and as an AirTanker shareholder.

**Market outlook:** We estimate a business opportunity over the next 20 years of US$155 billion in original equipment and US$260 billion in services. *Source: Forecast International 2014.*

# MARINE

Innovation remains an important differentiator in the sector, as technology will address the future challenges related to the environment and the cost of owning and running vessels.

**Lawrie Haynes**
President – Marine and Nuclear

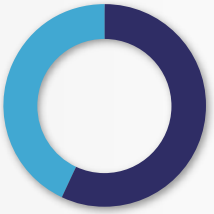


## OVERVIEW

**Underlying revenue (£m)**


**£2,527m**
Underlying revenue 2013

**Revenue mix 2013**



- 57% OE revenue
- 43% Services revenue

**Revenue by sector 2013**

- 37% Naval
- 15% Merchant
- 48% Offshore

### Highlights

- A range of world 'firsts' of LNG-powered vessel types delivered
- MT30 selected for the new UK MoD Type 26 Frigate
- £800 million contract agreed with UK MoD for provision of future nuclear submarine propulsion systems
- New UT 830 seismic survey vessel launched
- COSCO ordered new wave-piercing design of offshore vessels
- Third service centre in China opened

### Key financial data

| | 2009 | 2010 | 2011* | 2012 | 2013 |
|---|---|---|---|---|---|
| Order book £m | 3,526 | 2,977 | 2,737 | 3,954 | **3,996** |
| | -32% | -16% | -8% | +44% | **+1%** |
| Underlying revenue £m | 2,589 | 2,591 | 2,271 | 2,249 | **2,527** |
| | +17% | +0% | -12% | -1% | **+12%** |
| Underlying OE revenue £m | 1,804 | 1,719 | 1,322 | 1,288 | **1,438** |
| Underlying service revenue £m | 785 | 872 | 949 | 961 | **1,089** |
| Underlying profit before financing £m | 263 | 332 | 287* | 294 | **281** |
| | +44% | +26% | -14% | +2% | **-4%** |

* 2011 figures restated due to transfer of Bergen to Power Systems segment.

## The Marine segment has 4,000 customers and equipment installed on over 25,000 vessels worldwide, including those of 70 navies.

### What we do

We are leaders in the provision and integration of complex, mission-critical systems for offshore oil and gas, merchant and naval vessels. We are located in 35 countries, and have a global service network supporting our customers' operations around the clock.

Our advanced ship designs combine the latest technologies to offer highly-efficient solutions for ship owners and operators including a range of engines using liquefied natural gas (LNG).

### 2013 financial review

The order book increased one per cent including new orders of £2.7 billion (£3.3 billion in 2012). In 2013, we saw stable order inflow in our Merchant and Naval businesses. This was offset by weaker order flow in Offshore, where the phasing of projects has slowed growth in some of our key products. Revenue increased 12 per cent, reflecting higher sales in both new equipment and in services. Growth was particularly strong in Offshore and in Naval, offset by further weakening in our Merchant business, which declined 11 per cent. Profit decreased four per cent as volume growth was more than offset by pricing pressure and a less favourable mix. In 2013, profitability was also offset by investments in Marine to better position the business for future growth, including higher spending on R&D and restructuring costs.

In 2014, we expect a modest decline in revenue, with a modest increase in profit. The nuclear submarine business will be reported in the Energy and Nuclear segment going forward.

### How we are performing

The global shipbuilding industry has had a challenging year. Important factors driving the market continue to be ship efficiency, environmental performance and value for money.

**Merchant:** The adoption of LNG as a marine fuel is gaining momentum: the first LNG-powered cargo vessel of our Environship design took to the seas in May; the world's first LNG-powered cruise ferry entered service during the summer; and the world's first LNG-powered tug boat was delivered. We also won our first contract to convert a diesel-powered cargo ship to LNG. Bergen engines using LNG fuel are all provided via the Power Systems business segment.

**Naval:** Our MT30 gas turbine was successfully installed in the Royal Navy's new aircraft carrier, HMS Queen Elizabeth. The MT30 was also selected by BAE Systems for the UK's new Type 26 Frigate programme and has now been selected by navies in the UK, US and South Korea, across five types of ship. We delivered a new design of water jet to the US Navy's Littoral Combat Ship programme.

This year we opened a new facility in Derby, UK, to support our Submarine business. In February, we agreed an £800 million contract with the MoD for the provision of nuclear propulsion systems for the UK's submarine flotilla. A critical design gate was successfully passed by our new nuclear plant design, PWR 3.

**Offshore:** We delivered one of our most advanced vessels to date, when a UT 830 seismic survey ship was launched. It features a wealth of Rolls-Royce equipment integrated into our own vessel design. It is now at work identifying oil and gas reserves around the world.

Our wave-piercing hull design was chosen for the first time in Asia, when Chinese customer COSCO announced an order for two UT vessels, with options for four more. These will feature a range of Rolls-Royce equipment, and include MTU diesel gensets from our Rolls-Royce Power Systems AG subsidiary. Several contracts were won to supply our largest azimuth thrusters for drill ships.

We enhanced our technology portfolio through the acquisition of a Norwegian company, SmartMotor AS, a leader in permanent magnet technology.

**Services:** We offer customers a global service capability through a network of 37 workshops in 28 countries. With more than 1,100 service engineers, we provide round-the-clock support wherever our customers need it and offer not only repair and overhaul but also a growing number of vessel upgrades to improve efficiency. We also train our customers in the operation of our equipment in our training centres in Norway, Singapore and Brazil. This year, we opened our third workshop in southern China.

### Future priorities and opportunities

The key priorities for the Marine segment are to increase our competitiveness in a challenging market and continue to develop innovative technologies.

We will continue to develop the synergies between the Marine and Power Systems segments. We are working with a number of oil majors, in developing the availability of LNG. The aftermarket offers growth opportunities as we continue to utilise our growing global network of service engineers and workshops. In Submarines, our focus is on maintaining customer confidence by achieving our savings commitment to the MoD through increased operational efficiency.

**Market outlook:** We see a business opportunity over the next 20 years of US$270 billion for original equipment and US$125 billion for services (not including nuclear submarine business). *Based on our own forecasting tools.*

# ENERGY

We are capitalising on oil and gas demand. We will also grow our Civil Nuclear services globally and support the UK new build programme.

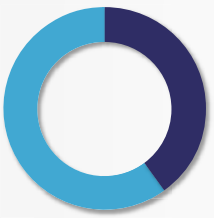
**Andrew Heath**
President – Energy

## OVERVIEW

**Underlying revenue (£m)**


**£1,048m**
Underlying revenue 2013

**Revenue mix 2013**



- 40% OE revenue
- 60% Services revenue

**Revenue by market sector 2013**

- 68% Oil and gas
- 21% Power generation
- 11% Civil Nuclear/other

### Highlights

- 33 RB211s ordered for oil and gas applications
- Major service contract secured with Petrobras
- New Santa Cruz, Brazil, assembly plant operational
- Signed tripartite agreement with Rosatom and Fortum to assess nuclear reactor design for UK new build
- Renewed agreement with Westinghouse to provide nuclear inspection services in the US

### Key financial data

| | 2009 | 2010 | 2011* | 2012 | 2013 |
|---|---|---|---|---|---|
| Order book £m | 1,262 | 1,180 | 1,420 | 1,290 | **1,469** |
| | +1% | -6% | +20% | -9% | **+14%** |
| Engine deliveries | 87 | 95 | 48 | 49 | **56** |
| Underlying revenue £m | 1,028 | 1,233 | 1,083 | 962 | **1,048** |
| | +36% | +20% | -12% | -11% | **+9%** |
| Underlying OE revenue £m | 558 | 691 | 527 | 344 | **415** |
| Underlying service revenue £m | 470 | 542 | 556 | 618 | **633** |
| Underlying profit before financing £m | 24 | 27 | 16 | 19 | **26** |
| | +1300% | +13% | -41% | +19% | **+37%** |

* 2011 figures restated due to transfer of Bergen to Power Systems segment.

## Energy has sold 4,600 gas turbines with 180 million operating hours recorded.

## Rolls-Royce has over 50 years of experience in the nuclear industry.

### What we do

Our Energy segment supplies customers with aero-derivative gas turbines, compressors and related services.

In Civil Nuclear, we provide products and services spanning the nuclear reactor life-cycle from concept design and installation to obsolescence management and plant life extension. We have a strong position in nuclear instrumentation and control systems.

### 2013 financial review

The order book increased by 14 per cent with new orders of £1.1 billion (£0.8 billion in 2012). The business saw a strong recovery in order intake in oil and gas. Power generation markets remain suppressed. In Civil Nuclear, we continue to extend the suite of products and services that we offer to nuclear utilities to enable them to achieve safe, efficient and reliable lifetime reactor operations. Revenue increased nine per cent, driven by higher OE volumes in our oil and gas business. Profit increased by £7 million, reflecting higher volumes, partially offset by strong pricing pressure and continued investment in our Civil Nuclear business. We continue to work to improve the financial performance of the business. In 2014, Energy will include nuclear submarines to form our Energy and Nuclear business. We expect good growth in revenue and profit, with further improvement in the return on sales.

### How we are performing

**Oil and gas:** In total, 33 RB211 gas turbines were ordered for oil and gas applications, 22 of which were for pipeline compression projects. This includes a US$175 million contract from Asia Gas Pipeline for 12 units.

Our new purpose-built packaging, assembly and test facility in Santa Cruz, Brazil, became operational and the first units were delivered to Petrobras for use in its deepwater offshore production activities.

**Power generation:** Demand continued to be subdued for new power generation capacity in mature economies. Seven Trent 60 units were ordered, including five for the SARB offshore oilfield project in the UAE.

We released enhanced power ratings for the Trent 60 gas turbine, consolidating its position as the most powerful aero derivative available.

**Services:** We continue to strengthen both our aftermarket products and services capability as well as our penetration of the installed fleet, resulting in a six per cent year-on-year increase in aftermarket revenue.

Currently 24 per cent of the core engine fleet is under long-term service agreements. During the year we received several new major service contracts including a US$138 million five-year contract from Petrobras to support 15 of its RB211 industrial gas turbine power generation units installed on four oil platforms operating in the Campos Basin.

**Civil Nuclear:** We strengthened our strategic relationships during the year with AREVA, Westinghouse, Hitachi, EDF and Rosatom.

Our acquisition of PKMJ Technical Services in the US means we now provide services to every nuclear utility in the US and Canada.

We continued to deliver the instrumentation and control (I&C) upgrade for EDF's fleet of 1,300MW nuclear reactors in France and provided I&C systems and components for seven new nuclear reactors currently under construction in China.

### Future priorities and opportunities

Our focus is on growing our market position in oil and gas, including opportunities in pipelines and LNG. In power generation, we will benefit from any recovery in industrial demand for electricity.

In Civil Nuclear our priorities will continue to be satisfying our customers, winning new orders and high-quality delivery. Improving operational efficiency will be a key feature for the Nuclear business during 2014.

We will assess potential investments in high-value manufacturing in order to contribute positively to a successful new build programme for the UK.

In international markets, we will extend the suite of products and services that we offer to nuclear utilities to enable them to achieve safe, efficient and reliable lifetime nuclear reactor operations.

**Market outlook:** In the oil and gas, and power generation sectors, the Group's 20-year forecast values demand for total aero-derivative gas turbine and compressor systems at more than US$60 billion and associated services at around US$60 billion. *Sources: McCoy Power reports, LEK Consulting, Booz & Co., IEA, Infield Systems and our own forecasting tools.* We estimate a demand for nuclear mission-critical equipment, systems, engineering and support services of US$610 billion over the next 20 years. *Based on nuclear capacity forecasts from the International Energy Agency, the World Nuclear Association, the International Atomic Energy Agency and the US Department of Energy.*

# POWER SYSTEMS

2013 proved a challenging year. However, in 2014 we expect most markets to stabilise.

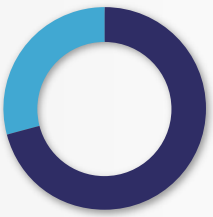
**John Paterson**
President – Marine and Industrial Power Systems

## OVERVIEW

**Underlying revenue (£m)**


**£2,831m**
Underlying revenue 2013

**Revenue mix 2013**



- 71% OE revenue
- 29% Services revenue

**Revenue by market sector 2013**

- 35% Marine
- 26% Industrial
- 27% Energy
- 12% Defence and other

### Highlights

- MTU Powerpacks ordered for UK Intercity Express Programme
- Fjord Line ordered Bergen engines for cruise ferries
- Upgraded Series 1163 engines introduced
- UK MoD selects MTU gensets alongside MT30 gas turbine
- Polish partnership to be created to supply and maintain cogeneration plants
- Mining trucks powered by MTU delivered to Rio Tinto in Australia

### Key financial data

| | 2012 | 2013 | Change |
|---|---|---|---|
| Order book £m | 1,823 | **1,927** | +5.7% |
| Underlying revenue £m | 2,846 | **2,831** | -0.5% |
| Underlying OE revenue £m | 1,938 | **2,004** | +3.4% |
| Underlying services revenue £m | 908 | **827** | -8.9% |
| Underlying profit before financing £m | 293 | **294** | +0.3% |

The table above shows a trading comparison as if both Tognum and Bergen Engines had been fully consolidated in 2012 as well as in 2013.

## Rolls-Royce and Daimler AG each has a 50 per cent shareholding in Rolls-Royce Power Systems Holding GmbH.

Power Systems is based in Friedrichshafen in Southern Germany and, together with its worldwide subsidiaries, employs around 11,000 people. It specialises in reciprocating engines, propulsion systems and distributed energy systems. The company previously operated under the name of Tognum AG. In 2013, Bergen Engines AS, including its subsidiaries, was contributed to the business.

### What we do

The product portfolio includes MTU-brand high-speed engines and propulsion systems for ships, for heavy land, rail and defence vehicles, and for the oil and gas industry. Under the MTU Onsite Energy brand, the company markets diesel and gas gensets for applications such as emergency, base load, peak load or cogeneration. Bergen Engines AS manufactures medium-speed engines for marine and power generation applications. L'Orange completes the portfolio, producing fuel injection systems for large engines.

### 2013 financial review

The order book increased 6 per cent, with new orders of £2.7 billion (£2.8 billion in 2012). The final quarter of 2013 saw strong sales, driven by the pre-purchase of engines for industrial, including agricultural, applications ahead of the introduction of tighter environmental standards in Europe. Marine revenue is well supported by demand from navies in Asia and the US. In defence, major programmes to power military tanks provide stability despite continued pressure on government spending. Revenue decreased 0.5 per cent with good growth in the Marine and Industrial divisions offset by lower revenue in oil and gas, medium-speed engines and lower aftermarket sales. Profit increased 0.3 per cent, reflecting a strong second half.

In 2014, we expect modest growth in revenue and good growth in profit driven by growth in marine and land power systems markets.

### How we are performing

2013 proved a challenging year. Headwinds confronting the business included the Eurozone crisis, US fiscal challenges and slowing of growth in emerging countries. General nervousness about the global economic environment led to constrained order activity within the market.

Despite these adverse market conditions, a number of significant orders and contracts were achieved.

As outlined in the Marine segment review, Power Systems also benefited from contracts awarded by Chinese customer COSCO and from the UK MoD for the generator sets of the Royal Navy's future Type 26 Frigate. The Type 26 propulsion system will consist of a combination of four MTU diesel gensets and a Rolls-Royce MT30 gas turbine. These examples highlight the synergies and benefits of complementary product portfolios.

MTU introduced the upgraded Series 1163 marine engines for IMO Tier II and IMO Tier III emission standards. These are cleaner and more fuel-efficient than the previous generation and offer a better power-to-weight ratio.

For the British Intercity Express Programme, MTU received orders of rail Powerpacks with Series 1600 engines. The Powerpacks will drive Hitachi's future high-speed trains which are scheduled to go into service from 2017 on Great Western Main Line and East Coast Main Line routes. Twenty locomotives built by Chinese manufacturer, Dalian Locomotive & Rolling Stock and powered by MTU engines went into service in Argentina.

China-based Xiangtan Electric Manufacturing Corporation shipped its first ever export of mine dump trucks to the Pilbara mine site in Australia for Rio Tinto. Each of the 230 metric-ton trucks is powered by an MTU mining engine.

The Fjord Line shipping company ordered Bergen gas-powered engines. Its Stavangerfjord and Bergensfjord cruise ferries, both 170 metres long, are each to be equipped with four Bergen B-gas engines. The engines ensure that these ships already meet future IMO Tier III limits as well as satisfying mandatory EU regulations projected for 2015, for sulphur emissions from ferries.

In addition to these contract wins, we continue to build capacity through joint ventures and partnerships. L'Orange has established a consortium with Hoerbiger, for the supply of equipment for large-scale diesel and dual-fuel engines for the Asian market. Onsite Energy and regional Polish energy supplier Kogeneracja Zachód intend to form a partnership for the supply and maintenance of cogeneration plants. Over the coming years, both companies plan on working exclusively with each other to supply small- to medium-sized Polish cities with environmentally-friendly energy from CHP plants.

### Future priorities and opportunities

Our long-term growth relies on five pillars: power; propulsion; services; regional expansion and, the product portfolio.

In 2014, we expect most markets to stabilise. although some segments are expected to remain difficult. This leads us to expect continued volatility in revenues. Overall we expect to see a positive performance primarily driven by marine applications.

We will invest in future technologies to maintain our technological leadership. We are configuring our different engine series to meet tougher emission standards. At the same time we will improve efficiency and keep a focus on costs and cash in all other areas.

**Market outlook:** We estimate the total market opportunity for high-speed engine original equipment over the next ten years to be €280 billion. *The forecast data is taken from a range of sources including: Global Insight; Oxford Economics, Diesel and Gas Turbine Worldwide, Clarkson Research and our own internal forecasting tools.*

# ENGINEERING AND TECHNOLOGY

We continued our commitment to recruit and develop the very best engineers and scientists.

**Colin Smith CBE**
Director – Engineering and Technology

In 2013, we invested £1,118 million in gross research and development (R&D) of which £746 million was funded by the Group, prior to receipts from risk and revenue sharing arrangements.

We continually pursue innovation that will improve the performance of our power systems and benefit our customers.

We have developed and actively deployed a new innovation portal to improve the exchange of ideas around the world as we invest to improve the efficiency of our global R&D footprint.

### People

We have an engineering resource inside the Group of around 16,600 engineers. Many work as integrated teams across borders on our major programmes and a number of our top engineers, or Rolls-Royce Fellows, are recognised as world-renowned experts in their fields.

We continued our commitment to recruit and develop the very best engineers and scientists, and the first cohort of our evolving internal Specialist Academy has graduated in October 2013. The Academy has been designed for technologists who have the potential to join the Rolls-Royce Fellowship at the very top of our specialist career ladder.

### Research and technology

World-class technology gives us competitive product performance. We generate the largest number of patents of any UK company, 549 new patent applications were approved for filing in 2013 (including Rolls-Royce Power Systems AG). To further expand our capabilities, we acquired Hyper-Therm HTC, a US-based specialist in ceramic materials; and SmartMotor, a world leader in permanent-magnet machines and drives technology, headquartered in Norway. In addition, we acquired from GKN the 49 per cent of Composite Technology and Applications Limited (CTAL) that we did not already own, giving us 100 per cent ownership. CTAL is engaged in the development of composite fan blades and containment cases for the next generation of advanced turbofan engines.

In 2013, we further increased our investment in early-stage research and technology to about 20 per cent of the net R&D spend. We have good visibility of stable, long-term government match-funding for research investments in aerospace technologies following the creation in the UK of the Aerospace Technology Institute, and in the EU through the Clean Sky 2 Joint Technology Initiative in Horizon 2020 and continuous German support via Luftfahrtforschungsprogramm (LuFo) V.

### University Technology Centres

In addition to our significant in-house R&D capability, we pursue advanced technologies via a global network of 29 University Technology Centre (UTC) partnerships. Each centre is part-funded by the Group and works closely with our engineering teams, undertaking specialist work led by world-class academics. In 2013, Nanyang Technological University joined this network with the launch of the Rolls-Royce@NTU Corporate Lab, a joint investment of SGD$75 million (£38.5 million) between Rolls-Royce, Nanyang University and the National Research Foundation (NRF) of Singapore.

Our model of developing technology through collaboration with academia and other partners was recognised by the German Fraunhofer Institute for Production Technology which benchmarked 160 European companies: Rolls-Royce was one of five companies to receive the 'Successful Practices' award in technology management in 2013.

### Research and development

Flight test results have shown the Trent XWB to be the world's most efficient large, civil, aero engine.

The Trent 1000 Package C received EASA certification in September and a few weeks later powered the newest version of the Dreamliner, the Boeing 787-9 on its first flight from Seattle, USA.

The Joint Strike Fighter F-35B, with short take -off and vertical landing (STOVL) capability provided by the Rolls-Royce LiftSystem®, successfully completed its second set of carrier trials aboard the USS Wasp in August 2013. In September, the T56 engine Series 3.5 technology enhancement program received FAA approval and has now been chosen to power the 'Hurricane Hunter' aircraft of the US National Oceanic and Atmospheric Administration.

In 2013, we received the Green Ship Technology Award for our Environship concept – a design for cargo ships that reduces $CO_2$ emissions by up to 40 per cent compared to similar diesel powered vessels.

### Gross research and development (£m)

# OPERATIONS

## Record levels of investment continue to drive improvements in product and operational performance.

**Alain Michaelis**
Operations Director

Our teams around the world focus on improvement in all the classical operational metrics – safety, quality, cost, on-time delivery, inventory – while at the same time ensuring that the next generation of advanced products and processes are successfully industrialised.

Our operations employ 25,000 people in 17 countries at 85 Rolls-Royce facilities. In addition, 33 joint venture facilities, seven manufacturing technology partnerships and over 70 significant suppliers help us to meet customer demand.

### Developing our capacity

This year we have extended our own capacity and capability. This included our new turbine blade factory in Rotherham, UK and our new 17,000 square metre, state-of-the-art discs manufacturing facility in Washington, UK, that has now started production. When fully operational later this year, it will have the capacity to manufacture over 2,000 fan and turbine discs annually. We are also taking steps to adjust capacity where market segments are contracting or demanding a lower price point. Although our diverse portfolio helps us balance growing and shrinking segments, we do expect an ongoing need to adjust capacity through plant renewal and closures.

### Advanced manufacturing

We apply advanced technologies, methods and processes to deliver 'best in class' manufacturing performance through our Rolls-Royce Production System and the Advanced Manufacturing network, which has developed over the past five years.

The advanced centres in this network bring together university, government and industrial partners to provide a realistic testing ground for new industrial techniques that improve yield and reduce costs. These have proved to be successful both for Rolls-Royce and our supplier partners.

The Advanced Forming Research Centre in Glasgow, UK, the National Composites Centre in Bristol, UK and the Manufacturing Technology Centre in Coventry, UK, are expanding their facilities and the new Commonwealth Centre for Advanced Manufacturing in Richmond, USA, is now fully operational.

Our future Advanced Remanufacturing and Technology Research Centre in Singapore and High Temperature Components Centre of Excellence in the UK will ensure we lead in high-performance, low-emission turbine technology.

Our processes will increasingly include powder-based manufacturing, additive layer manufacturing technologies and ultra-high temperature materials. 'Knowledge-based manufacturing' is another developing area. Here, we will use dynamic computer models to design and verify processes. These approaches will increase design flexibility, speed of manufacture and performance.

### Suppliers

Strong relationships with our suppliers are critical to our performance. We work closely to align our strategies as well as assessing performance through our Supplier Advanced Business Relationship (SABRE) requirements.

Rolls-Royce has taken a leading role in the establishment of the Aerospace Engine Supplier Quality Committee. Through this body, gas turbine engine makers and their suppliers – with input from regulatory agencies – aim to agree a set of common industry-wide standards. These will help remove variability and waste, enabling the aerospace supply chain to be leaner and more competitive.

To support UK suppliers in the global aerospace market, Rolls-Royce is sponsoring the UK Government-backed Sharing in Growth programme. It is a £110 million programme of intensive supplier development training and is expected to secure at least 5,000 high-value manufacturing jobs in aerospace. We are also supporting a £76 million Sharing in Growth programme in the nuclear industry.

We continue to seek new capabilities in emerging markets across the world through our supplier development groups. These help drive competition with our existing internal plants and suppliers, and also allow us to develop new markets – Brazil (Energy) and China (Marine) being good examples. We expect the proportion of our supplier spend in emerging markets to increase.

### Information technology

In 2013, we invested over £100 million in IT, continuing with the modernisation of our IT infrastructure and also launching our Shop Floor IT modernisation programme. We have launched an Integrated Production Systems programme to address the need for simplified, globally scalable and secure systems. The programme will improve delivery to the customer whilst improving efficiency and reducing operating costs. We are also investing in our customer systems to improve the customer experience through the use of portals and digital workflow.

**£687 million**

**Expenditure in 2013 on property, plant and equipment.**

We are delivering customer and business benefits as we continue to invest at record levels and transform our industrial infrastructure.