VESUVIUS PLC

3 March 2022

Full Year Results for the twelve months ended 31 December 2021

Successful implementation of our growth strategy and 2021 cost inflation fully passed through by year-end

Vesuvius plc, a global leader in molten metal flow engineering and technology, announces its audited results for the twelve months ended 31 December 2021.

Financial summary	2021 (£m)	2020 (£m)	Year-on-year change	Underlying change(1)
Revenue	1,642.9	1,458.3	+13%	+18%
Trading Profit (2) (EBITA)	142.4	101.4	+40%	+50%
Return on Sales (2)	8.7%	7.0%	+170 bps	+190 bps
Operating Profit	132.7	74.3	+79%	
Headline Profit Before Tax (2)	137.3	91.6	+50%	
Profit Before Tax	127.6	64.5	+98%	
Profit	107.9	45.8	+136%	
Headline Earnings (2)	95.6	62.7	+53%	
Headline EPS (2) (pence)	35.3	23.2	+52%	
Statutory EPS (pence)	37.7	15.3	+146%	
Adjusted operating cash flow (2)	45.6	172.9	-74%	
Cash generated from operations	82.9	193.7	-57%	
Net Debt (2)	277.1	175.1	+58%	
Dividend (pence per share)	21.2p	17.4p	+22%	

(1) Underlying basis is at constant currency and excludes separately reported items and the impact of acquisitions and disposals.
(2) For definitions of non-GAAP measures, refer to Note 16 in the Condensed Group Financial Statements.

Full Year 2021 Highlights

- Revenue of £1,642.9m, an increase of 18% on an underlying basis, reflecting general market recovery and market share gains in the Flow Control and Foundry divisions, where sales increased on an underlying basis by 21% and 20%, respectively
- More moderate growth in Advanced Refractories (+11%) with priority given to price increases over volumes
- Cost inflation in 2021 fully passed through to customers by year-end but negative trading profit impact of £14m during the year due to timing differences between cost and price increases
- Despite the £14m above, trading profit increased 50% on an underlying basis to £142.4m, with return on sales up 190bps to 8.7%
- Proposed final dividend of 15.0p, bringing the full year dividend to 21.2p, 22% higher than in 2020
- Successful acquisition of the business of Universal Refractories reinforces our presence in the fast-growing Electric Arc Furnace sector in the USA
- Strategic capacity expansion in Flow Control in Asia and EMEA is on track to be operational from end 2022 and will support growth going forward
- Trade working capital/sales improved to 20.9% (12m average), versus 23.2% in 2020
- Net debt/EBITDA of 1.4x at 31 December 2021, despite acquisition of Universal Refractories
- Successful refinancing of our revolving credit facility which was increased in size from £300m to £385m
- 24% reduction in CO_2 equivalent ("CO_2e") per metric tonne of product packed for shipment since 2017

Comment from Patrick André, CEO:

"Both our end markets of Steel and Foundry remain positively oriented at the start of 2022. In 2021, Vesuvius demonstrated its ability to successfully pass-through cost inflation through price increases and will continue to do so in 2022, as necessary. Strategic R&D and capacity investments are proceeding as planned and will support market share gains going forward. While we remain concerned about the potential direct and indirect impacts of recent geopolitical events, which have led us to suspend our deliveries to Russian customers for the duration of hostilities, we are nevertheless confident that the Group will deliver a significant improvement in financial performance in 2022."

Presentation of Full Year 2021 Results

Vesuvius management will make a presentation to analysts and investors on 3 March, 2022 at 09.30 UK time at the London Stock Exchange, 10 Paternoster Square, London EC4M 7LS. For those unable to attend, the event will be livestreamed and can be accessed by clicking here. Participants can also join via an audio conference call. Please click here to register. Once registered, you will be provided with the information needed to join the conference, including dial-in numbers and passcodes. Be sure to save this information in your calendar.

For further information, please contact:

Shareholder/analyst enquiries:		
Vesuvius plc	Patrick André, Chief Executive	+44 (0) 207 822 0000
	Guy Young, Chief Financial Officer	+44 (0) 207 822 0000
	Euan Drysdale, Group Head of Corporate Finance	+44 (0) 7584 641 315
Media enquiries:		
MHP Communications	Andrew Jaques/ Rachel Farrington/Peter Lambie	+44 (0) 203 128 8570

About Vesuvius plc

Vesuvius is a global leader in molten metal flow engineering and technology principally serving process industries operating in challenging high-temperature conditions.

We develop innovative and customised solutions, often used in extremely demanding industrial environments, which enable our customers to make their manufacturing processes safer, more efficient and more sustainable. These include flow control solutions, advanced refractories and other consumable products and increasingly, related technical services including data capture.

We have a worldwide presence. We serve our customers through a network of cost-efficient manufacturing plants located close to their own facilities, and embed our industry experts within their operations, who are all supported by our global technology centres.

Our core competitive strengths are our market and technology leadership, strong customer relationships, well established presence in developing markets and our global reach, all of which facilitate the expansion of our addressable markets.

Our ultimate goal is to create value for our customers, and to deliver sustainable, profitable growth for our shareholders giving a superior return on their investment whilst providing each of our employees with a safe workplace where they are recognised, developed and properly rewarded.

We think beyond today to create solutions that will shape the future for everyone.

Forward looking statements

This announcement contains certain forward looking statements which may include reference to one or more of the following: the Group's financial condition, results of operations, cash flows, dividends, financing plans, business strategies, operating efficiencies or synergies, budgets, capital and other expenditures, competitive positions, growth opportunities for existing products, plans and objectives of management and other matters.

Statements in this announcement that are not historical facts are hereby identified as "forward looking statements". Such forward looking statements, including, without limitation, those relating to the future business prospects, revenue, working capital, liquidity, capital needs, interest costs and income, in each case relating to Vesuvius, wherever they occur in this announcement, are necessarily based on assumptions reflecting the views of Vesuvius and involve a number of known and unknown risks, uncertainties and other factors that could cause actual results, performance or achievements to differ materially from those expressed or implied by the forward looking statements. Such forward looking statements should, therefore, be considered in light of various important factors that could cause actual results to differ materially from estimates or projections contained in the forward looking statements. These include without limitation: economic and business cycles; the terms and conditions of Vesuvius' financing arrangements; foreign currency rate fluctuations; competition in Vesuvius' principal markets; acquisitions or disposals of businesses or assets; and trends in Vesuvius' principal industries.

The foregoing list of important factors is not exhaustive. When considering forward looking statements, careful consideration should be given to the foregoing factors and other uncertainties and events, as well as factors described in documents the Company files with the UK regulator from time to time including its annual reports and accounts.

You should not place undue reliance on such forward looking statements which speak only as of the date on which they are made. Except as required by the Rules of the UK Listing Authority and the London Stock Exchange and applicable law, Vesuvius undertakes no obligation to update publicly or revise any forward looking statements, whether as a result of new information, future events or otherwise. In light of these risks, uncertainties and assumptions, the forward looking events discussed in this announcement might not occur.

Vesuvius plc, 165 Fleet Street, London EC4A 2AE
Registered in England and Wales No. 8217766
LEI: 213800ORZ521W585SY02
www.vesuvius.com

Vesuvius plc

Full Year Results for the twelve months ended 31 December 2021

Vesuvius delivered a strong commercial performance in 2021, supported by the continued improvement in end markets and market share gains in Flow Control and Foundry.

According to the World Steel Association (WSA), crude steel production in the world excluding China and Iran increased by 13% in 2021. The regions which posted the highest growth were South America (+18%), India (+18%) and NAFTA (+17%).

Non-automotive Foundry end-markets across all regions also registered significant growth, with production in the mining & construction and general engineering end markets up 19% and 13%, respectively, according to Oxford Economics data. This was in contrast to global production of light vehicles and medium & heavy commercial vehicles which remained weak with growth of only 2% and 0.5%, respectively, according to IHS data. The disappointing automotive markets (representing c.36% of Foundry division sales) reflect the persistent global shortage of semi-conductors, which constrained the ability of OEMs to ramp-up production.

£m	2021 Reported	Acquisitions / Disposals	2021 Underlying	2020 Reported	Currency	Acquisitions / Disposals	2020 Underlying	Reported % Change	Underlying % Change
Revenue	1,642.9	-2.1	1,640.8	1,458.3	-68.7		1,389.6	+13%	+18%
Trading Profit	142.4	0.2	142.6	101.4	-6.6		94.8	+40%	+50%
Return on Sales	8.7%		8.7%	7.0%			6.8%	+170 bps	+190 bps

Group trading performance

In 2021, the Group generated revenues of £1,642.9m, an increase of 13% compared to 2020, on a reported basis. Underlying Group revenue, adjusted for the effects of currency translation and acquisitions/disposals, increased by 18%, made-up three quarters by volume, one quarter by price. Trading profit (adjusted EBITA) was £142.4m, an increase of 40% on a reported basis and 50% on an underlying basis. The Group achieved a return on sales of 8.7% in 2021, an increase of 170bps (190bps on an underlying basis). This strong performance was achieved despite the high cost inflation in items such as raw materials and freight, and the unwinding of the majority of temporary Covid-related cost savings which benefited our results in 2020.

Strategic progress

Vesuvius' core strategic objective is to deliver long-term sustainable and profitable growth. We have a clear strategy to achieve this objective centred around four key execution priorities. We continued to make progress on these priorities in 2021, and believe we are well-positioned to benefit from the continuing recovery in our end markets.

- **Reinforce our technology leadership**
    - Maintained our industry-leading level of R&D investment, with 2021 R&D spend of £30.3m, up from £26.7m in 2020 on a constant currency basis
- **Develop our technical offering and increase the penetration of our value-creating solutions**
    - Launched 27 new products in 2021, more than double the number launched in 2020
    - **Flow Control**: Air-Shield Technology, a technology that creates a better seal between the two plates of our ladle slide gate mechanism to increase both the yield and quality of steel produced
    - **Advanced Refractories**: Energy efficient Basilite spray, increasing tundish availability and reducing our customers CO2 emissions
    - **Foundry**: New FEEDEX FEF fluoride free sleeve range supporting foundries in reducing harmful emissions and hazardous waste

- **Capture growth in developing markets**
  - Launched £28m capacity expansion in Flow Control to serve fast growing developing markets
  - Strong developing market growth in all divisions, especially in fast-growing regions such as South America, South East Asia and India
  - Strong performance in China, with Flow Control and Advanced Refractories revenues growing 7% and 13%, respectively, versus a steel production decline of -3% and Foundry division revenues growing 12%
- **Improve our cost leadership and margins**
  - Return on sales increased to 8.7%, up 190bps (underlying) versus 2020
  - Full period impact of restructuring actions taken during 2020 delivered a £4.1m recurring benefit

Acquisition of Universal Refractories

In December 2021, we acquired the assets and substantially all of the liabilities of Universal Refractories, Inc. ("Universal"), a specialty refractory producer in the United States. Universal is a strategically important acquisition for Advanced Refractories, which reinforces Advanced Refractories' core tundish business and expands our presence amongst electric arc furnace ("EAF") steel producers in North America, while also further strengthening our Foundry business. Universal's unaudited revenue and EBITDA in the trailing 12 months to the end of October 2021 were $40.5m and $8.6m, respectively. The acquisition will generate attractive synergies and will be accretive to Group return-on-sales even before synergies are considered. We are targeting net synergies of c.$4.5m, which will be fully delivered by year-end 2023. The transaction valued Universal at US$57.1 million (£42.6 million) on a cash and debt free basis and was funded from Vesuvius' internal resources.

ESG – Significant progress in our sustainability roadmap

We have already made considerable progress towards achieving the nine intermediate ESG targets which we announced at our 2020 annual results.

KPI	Measure	Target	2021 progress vs. 2019
Safety	Lost Time Injury Frequency Rate below 1	<1	1.06
Energy Consumption	By 2025, reduce energy consumption per metric tonne of product packed for shipment (vs 2019)	-10%	-9.0%
CO_2e Emissions	By 2025, reduce (Scope 1 and Scope 2) energy CO2e emissions per metric tonne of product packed for shipment (vs 2019)	-10%	-16.5%
Waste Water	By 2025, reduce wastewater per metric tonne of product packed for shipment (vs 2019)	-25%	-2.8%
Solid Waste	By 2025, reduce solid waste (hazardous and sent to landfill) per metric tonne of product packed for shipment (vs 2019)	-25%	-21.8%
Recycled Material	By 2025, increase the proportion of recycled materials from external sources used in production	7%	6.2%
Gender diversity	By 2025, increase female representation in the Top Management (GEC plus their key direct reports)	30%	21%
Compliance training	Increase the percentage of targeted staff who complete Anti-Bribery and Corruption training annually	90%	100%
Supply chain	By the end of 2023, conduct sustainability assessments of suppliers covering at least 50% of Group spend	50%	52%

Since 2017 we have achieved a 24% reduction in CO_2 equivalent ("CO_2e") per metric tonne of product packed for shipment. We have achieved this result by reducing our energy consumption and switching our electricity sources to non-CO_2 emitting ones. For the first time in 2021, more than 50% of our electricity consumption now comes from non-carbon emitting sources.

We are also making systematic use of internal carbon pricing to assess capex decisions: We have integrated carbon pricing into our capex analysis to support the selection of more environmentally friendly production processes when investing in capacity increases. The internal cost of carbon is reviewed annually and has been set at €90/t CO_2 for 2022

In addition to the progress in relation to our own CO_2 emissions reduction targets, we r**einforced our R&D effort to develop products which improve the sustainability performance of our customers:** 80% of our new product development projects in 2021 focused on products designed to outperform existing marketed products in terms of sustainability outcomes. Examples of new product launches during 2021 which deliver environmental benefits are as follows

- **Flow Control:** we launched a new Composite Design Technology ("CDT") solution, the Surface Layer CDT, that allows us to design a broader range of shapes and sizes for our ladle slide gate plates and to use a greater proportion of recycled materials
- **Advanced Refractories:** we launched Basilite QuickStart, an energy-efficient tundish lining that increases productivity while also reducing energy costs and CO2 emissions
- **Foundry:** We launched the SEMCO formaldehyde-free coating, which helps our customers reduce emissions of harmful substances

As a consequence of this progress, we Improved our ESG ratings in 2021:

- MSCI ESG rating upgraded to 'A' from 'BBB'
- Ecovadis rating progressed from silver to gold, placing Vesuvius in the top 5% of companies that they assess

Foreign exchange

The net impact of average 2021 exchange rates compared to 2020 averages has been a 2021 headwind of £6.6m at the trading profit level, in particular due to a weakening of the domestic currencies in Turkey, Brazil, Argentina and India, relative to Sterling.

Cost inflation offset by price increases

The Group's trading profit in 2021 was negatively impacted by £14m of timing differences between the cost inflation in items such as raw materials and freight, and the price increases that we passed to our customers. By year-end, however, the inflation headwind had been fully eliminated. Costs continue to increase in 2022, but we remain confident in our ability to offset these with further price increases during the year.

Benefit from restructuring programmes completed in 2020

In 2021, we benefitted from £4.1m of restructuring savings, reflecting the full period impact of actions taken during 2020, broadly in-line with previous guidance.

Expansion of Flow Control capacity supports organic growth

The Group has commenced a £28m capacity expansion, to be operational from late 2022, in some of our most profitable product lines, to support future organic growth and market share gains:

- Significant investment at our Skawina Poland plant to serve EMEA, and in particular fast-growing markets in EEMEA
    - +35% expansion in EMEA Viso capacity
    - +100% expansion in EMEA Slide gate capacity
- +50% expansion in Viso capacity in Kolkata, India to serve the fast-growing markets of both India and South East Asia

Working capital
Our continued strong focus on working capital resulted in our average trade working capital/sales ratio for the trailing 12 months improving to 20.9% at December 2021, compared to 23.2% at December 2020.

This improvement was driven by a decrease in our debtor days from 77.1 to 73.8 (12m average) and an increase in our creditor days from 60.6 to 66.7 (12m average).

Inventory days declined slightly from 76.1 to 75.5 during the year, touching a low of 70.7 days in June, before increasing again in H2. This increase was due to the decision highlighted at our H1 results, to build-up raw material and finished goods inventories, to mitigate the risk of customer disruptions from the ongoing global supply chain and logistics challenges.

Tax
Our headline Effective Tax Rate ("ETR") for 2021 was 26.4% (2020: 26.9%). This resulted in a 2021 headline tax charge of £35.9m (2020: £24.4m).

Revolving credit facility ("RCF")
We successfully refinanced our RCF on 5 July 2021. We increased the size of the facility from £300m to £385m with a maturity date of 5 July 2025, with an option to extend this by a further year. An accordion feature also provides for an additional £100m of future borrowing, subject to our lending banks obtaining credit approvals at that time.

Financial position and liquidity
As at 31 December 2021, Net Debt was £277.1m, up from £175.1m at the end of 2020. Our adjusted operating cash flow was £45.6m, offset by £43.6m for the acquisition of Universal, including related excess working capital payment, £55.5m of dividends, £7.6m of net finance costs, and £30.1m of income taxes paid.

Our Net Debt/LTM EBITDA ratio was 1.4x at 31 December 2021, versus 1.1x at 30 June 2021 and 1.2x at the end of 2020. This provides us with significant headroom against our debt covenant limit of 3.25x net debt/LTM EBITDA. The increase in leverage during H2 reflects the Universal acquisition, which was funded with debt and the decision to build-up raw material and finished goods inventories during H2.
Our available committed liquidity was £456m at 31 December 2021, compared to £437m at 31 December 2020.

Quality, health and safety
The Board and the entire leadership team of Vesuvius place great emphasis on the importance of quality, health and safety in the workplace and in the communities in which we operate. Reliability in quality and delivery is vital to our customers as they use Vesuvius' products in critical areas of their own processes. The level of risk attached to a catastrophic failure is often such that, for people and equipment, no compromise can be accepted. We achieved a Lost Time Injury Frequency Rate (LTIFR) of 1.06 per million hours worked in 2021, our lowest frequency rate ever.

Exposure to hostilities between Russia and Ukraine
Our direct exposure to Russia and Ukraine is limited. We have 47 employees in these countries, which account for less than 3% of our Group revenues. We have no manufacturing assets in either country. However, we are concerned about the potential direct and indirect impacts of recent geopolitical events, which have led us to suspend our deliveries to Russian customers for the duration of hostilities.

Final Dividend
The Board has recommended a final dividend of 15.0 pence, bringing the total dividend for the year to 21.2 pence per share, which is a 22% increase on the total dividend for 2020 of 17.4 pence per share.

The Board has determined that this dividend is appropriate given the level of business activity in 2021. The Board considers that the Company has sufficient liquidity and overall balance sheet strength to justify payment, whilst maintaining flexibility to fund both organic and inorganic growth, as opportunities arise.

If approved at the Annual General Meeting on 18 May 2022, the final dividend will be paid on 27 May 2022 to shareholders on the register at the close of business on 19 April 2022. The last date for receipt of elections from shareholders for the Vesuvius Dividend Reinvestment Plan will be 6 May 2022.

Outlook
Both our end markets of Steel and Foundry remain positively oriented at the start of 2022.

In 2021, Vesuvius demonstrated its ability to successfully pass-through cost inflation through price increases and will continue to do so in 2022, as necessary.

Strategic R&D and capacity investments are proceeding as planned and will support market share gains going forward.

While we remain concerned about the potential direct and indirect impacts of recent geopolitical events, which have led us to suspend our deliveries to Russian customers for the duration of hostilities, we are nevertheless confident that the Group will deliver a significant improvement in financial performance in 2022.

Operational Review

Vesuvius comprises two Divisions, Steel and Foundry. The Steel Division operates as three business lines, Flow Control, Advanced Refractories and Sensors & Probes.

Steel Division

Steel production in the world excluding China and Iran, which accounts for approximately 90% of Vesuvius' sales, increased by 13% year-on-year with all geographies recording positive volume growth. Production growth was especially strong in India (+18%), South America (+18%) and NAFTA (+17%).

Vesuvius' Steel Division reported revenues of £1,171.5m in 2021, an increase of 12% compared to 2020. On an underlying basis, Steel Division revenue was up 17%, with particularly strong performance in the growing markets of South America, India, Vietnam and EEMEA (EMEA excluding EU 27 + UK), where we grew 55%, 34%, 32% and 18%, respectively.

Flow Control strongly outperformed the steel market in all regions, with underlying sales growth of 21% (3.5% price impact), versus global steel production growth of 13% (excluding China and Iran). In Advanced Refractories, we prioritised prices over volumes. As a whole, Steel Division revenues incorporate a moderate average positive price impact in 2021, as price increases were progressively implemented during the year to compensate for inflation in raw materials and freight costs.

Steel Division trading profit improved 34% to £102.0m, with return on sales expanding 140bps to 8.7%. Raw material and freight inflation were fully compensated for by year-end in both Flow Control and Advanced Refractories.

Steel Division	2021 (£m)	2020 (£m)	Change (%)	Underlying change (%)
Flow Control Revenue	648.7	561.3	+15.6%	+21.5%
Advanced Refractories Revenue	489.1	458.6	+6.7%	+11.0%
Steel Sensors and Probes Revenue	33.7	25.5	+32.0%	+42.7%
Total Steel Revenue	1,171.5	1,045.4	+12.1%	+17.4%
Total Steel Trading Profit	102.0	76.4	+33.6%	+41.6%
Total Steel Return on Sales	8.7%	7.3%	+140 bps	+150 bps

Flow Control

The Flow Control business unit supplies the global steel industry with consumable ceramic products, systems, robotics, digital services and technical services. These products are used to contain, control and monitor the flow of molten steel in the continuous casting process. The consumable ceramic products that Vesuvius supplies have a short service life (often a matter of a few hours) due to the significant wear caused by the extremely demanding environment in which they are used. These products must withstand extreme temperature changes, whilst resisting liquid steel and slag corrosion. In addition, the ceramic parts in contact with the liquid steel must not in any way contaminate it. The quality, reliability and consistency of these products and the associated robotic solutions and digital services we provide are therefore critical to the quality of the finished metal being produced and the productivity, profitability and safety of our customers' processes.

Flow Control Revenue	2021 (£m)	2020 (£m)	Change (%)	Underlying change (%)
Americas	217.0	182.9	+18.7%	+28.8%
Europe, Middle East & Africa (EMEA)	247.7	204.7	+21.0%	+26.2%
Asia-Pacific	184.0	173.7	+6.0%	+8.7%
Total Flow Control Revenue	648.7	561.3	+15.6%	+21.5%

In 2021, underlying revenues in the Group's Flow Control business increased by 21% year-on-year to £648.7m, driven by strong market recovery and market share gains in all regions.

In EMEA excluding Iran, revenues grew 26% compared to 2020 on an underlying basis, versus steel production growth of 12%. This outperformance was broad-based, with revenue growth exceeding 20% in both the EU 27+UK and EEMEA (EMEA excluding EU 27+UK).

In the Americas, underlying revenues grew 29%, outperforming steel production growth of 17%. This outperformance was mostly driven by revenue growth of 47% in South America, while revenue growth of 23% in NAFTA also outperformed steel production.

In Asia Pacific, revenues grew 9% on an underlying basis, versus steel production growth of 1%. Revenues in Vietnam, India and China grew 38%, 31% and 7%, respectively, versus steel production growth of 18%, 18% and -3%

Advanced Refractories

The Advanced Refractories business unit supplies complete value-added solutions to its customers including specialist refractory materials and advanced installation technologies which harness mechatronic solutions, computational fluid dynamics capabilities and lasers. The specialist refractory materials are subject to extreme temperatures, corrosion and abrasion, they are in the form of powder mixes, which are spray-applied or cast onto the vessel to be lined ('monolithics') and refractory shapes (e.g. bricks, pads, dams and other larger precast shapes). The service life of the products that Advanced Refractories supplies into the steel making process can vary (some a matter of hours and others for a period of years) based upon the type of refractory and the level of wear caused by the demanding environment in which they are used. An integral part of our success depends upon our best-in-class installation technologies which improve the consistency and performance of installed Vesuvius refractories as well as the high level of collaboration with our customers.

Advanced Refractories Revenue	**2021 (£m)**	**2020 (£m)**	**Change (%)**	**Underlying change (%)**
Americas	165.3	153.0	+8.0%	+13.4%
Europe, Middle East & Africa (EMEA)	187.7	187.8	-0.1%	+3.1%
Asia-Pacific	136.2	117.9	+15.5%	+20.6%
Total Advanced Refractories Revenue	489.1	458.6	+6.7%	+11.0%

Advanced Refractories reported revenues of £489.1m in 2021, an increase of 11% on an underlying basis. In a number of markets our growth lagged steel production increases, as priority was given to price increases over volumes, resulting in a temporary loss of market share.

On an underlying basis, revenues grew 13% in the Americas, with strong outperformance in South America, which grew 68% versus steel production growth of 18%.

In EMEA excluding Iran, revenues grew only by 3% during the period as we continued to exit unprofitable contracts and also led price increases during the first half of the year in product lines that were impacted by higher raw material costs.

In Asia Pacific, revenues grew 21% on an underlying basis driven by strong outperformance in India (+36%), Vietnam (+30%) and China (+13%).

Volumes in H2 were negatively impacted in NAFTA as we had to declare force majeure as a result of disruptions to raw material supply brought on by Hurricane Ida in the US. Alternative raw material supply and logistics support was obtained and no customer suffered interruption as a result.

Steel Sensors & Probes (formerly Digital Services)

The Steel Sensors & Probes business unit offers products to our customers to enable them to make their underlying processes more efficient and reliable. The business unit focuses on providing a range of products that enhance the control and monitoring of our customers' production processes, complementing Vesuvius' strong presence and expertise in molten metal engineering. This aims to create new technologies that can be integrated into expert process management systems. These products include temperature sensors, oxygen, hydrogen and sublance probes, iron oxide and metal sampling for the steel, aluminium and foundry industries. By using these technologies, customers can focus on critical parameters within their processes, enabling them to refine their production methods to improve quality, lower production costs and maximise efficiency.

Steel Sensors & Probes Revenue	2021 (£m)	2020 (£m)	Change (%)	Underlying change (%)
Americas	23.2	16.4	+41.1%	+56.3%
Europe, Middle East & Africa (EMEA)	10.1	8.9	+13.6%	+17.8%
Asia-Pacific	0.4	0.2	+109.1%	+116.5%
Total Steel Sensors & Probes Revenue	33.7	25.5	+32.0%	+42.7%

Revenues in Steel Sensors & Probes were £33.7m in 2021, representing an underlying increase of 43% year-on-year. The strong performance in the Americas was driven by new customer wins, especially in South America. In EMEA, we also performed well and continued to gain traction.

Foundry Division

The Foundry Division is a world leader in the supply of consumable products, technical advice and application support to the global foundry industry to improve the performance and quality of ferrous and non-ferrous castings. Vesuvius operates under the brand FOSECO in the foundry market. The foundry process is highly sequential and is critically dependent on consistency of product quality and productivity optimisation. Working alongside customers at their sites, our engineers provide on-site technical expertise in addition to advanced computational fluid dynamics capabilities to develop the best customised solutions. The conditioning of molten metal, the nature of the mould used and, especially, the design of the way metal flows into the mould are key parameters in a foundry, determining both the quality of the finished castings and the labour, energy and metal usage efficiency of the foundry. Vesuvius' products and associated services to foundries improve all of these parameters.

Foundry Division	2021 (£m)	2020 (£m)	Change (%)	Underlying change (%)
Foundry Revenue	471.4	412.9	+14.2%	+19.9%
Foundry Trading Profit	40.4	25.0	+61.2%	+78.7%
Foundry Return on Sales	8.6%	6.1%	+250 bps	+280 bps

Non-automotive Foundry end-markets across all regions saw significant growth in 2021, with production in the mining & construction and general engineering end markets up 19% and 13%, respectively, according to Oxford Economics data. This was in contrast to global production of light vehicles and medium & heavy commercial vehicles which remained weak with growth of only 2% and 0.5%, respectively, according to IHS data. The disappointing automotive markets (representing c.36% of Foundry division sales) reflect the persistent global shortage of semi-conductors, which constrained the ability of OEMs to ramp-up production.

Compared to 2019, mining & construction and general engineering are both up 12%, while global light vehicle production is down 14% and medium & heavy commercial vehicles is down 4%.

Vesuvius' Foundry Division reported revenues of £471.4m in 2021, an increase of 14% compared to 2020. On an underlying basis, Foundry Division revenue was up 20%.

The Foundry Division also achieved meaningful margin recovery, with trading profit growing 79% on an underlying basis to £40.4m, as Return on Sales increased 250bps to 8.6% in 2021. Profitability was impacted by the time lag we experienced between cost increases and selling price rises, although this was successfully eliminated by year-end.

In H2 our volumes were negatively impacted as automotive production slowed further. In addition, we experienced operational issues at two important plants in Germany and the USA. Both these factors are temporary in nature and are expected to be eliminated during 2022.

Foundry Revenue	2021 (£m)	2020 (£m)	Change (%)	Underlying change (%)
Americas	100.5	85.6	+17.4%	+27.1%
Europe, Middle East & Africa (EMEA)	199.3	177.0	+12.6%	+17.3%
Asia-Pacific	171.7	150.3	+14.2%	+19.1%
Total Foundry Revenue	**471.4**	**412.9**	**+14.2%**	**+19.9%**

Foundry revenues in the Americas grew 27% year-on-year on an underlying basis, driven by 15% growth in NAFTA, and very strong performance in South America, which was up 68%.

In EMEA, underlying revenues increased by 17%, with EEMEA (EMEA excluding EU 27+UK) growing at 18%.

In Asia Pacific, we benefitted from continued strong performance in China, where revenues grew 12% and India where revenues grew 36%.

Financial Review

The following review considers a number of our financial KPIs and sets out other relevant financial information.

Basis of Preparation

All references in this financial review are to headline performance unless stated otherwise. See Note 4.1 to the Group Financial Statements for the definition of headline performance.

Introduction

The year 2021 was still impacted by the continued global pandemic and while we are not yet free from the effects, we are pleased with the performance of the Group during the year.

The combination of a recovery in our operating performance and focus on working capital management provided the capital for allocation across all of our priority areas. We invested in organic and inorganic growth, while also paying an attractive dividend to our shareholders. This was possible despite a backdrop of challenging raw material price increases and global supply chain disruption.

2021 performance overview

Positive trends in our key end markets of steel and foundry led to an increase in reported revenue of £184.6m over the prior year and by £251.2m on an underlying basis (+18.1%).

Key challenges this year were the implementation of price increases to offset the significant raw material cost increases and management of temporary supply chain related friction costs. Alongside this we continued to deliver on our planned restructuring programme in support of reducing operating expenses.

Trading profit for the year 2021 was £142.4m, 50.4% higher than the prior year on an underlying basis. Return on sales was 8.7%, higher than the prior year by 190 bps on an underlying basis.

The aforementioned supply chain disruptions led to a conscious build-up of inventory to ensure security of supply but despite this our average trade working capital to sales ratio for the prior 12 months improved further to 20.9% at December 2021.

The Group's cash conversion in 2021 of 32% was lower largely due to the impact of the increase in absolute working capital to sustain revenue growth as well as higher investments in capex.

Dividend

The Board has recommended a final dividend of 15.0 pence per share to be paid, subject to shareholder approval, on 27 May 2022 to shareholders on the register at 19 April 2022. When added to the 2021 interim dividend of 6.2 pence per share paid on 17 September 2021, this represents a full-year dividend of 21.2 pence per share.
It remains the Board's intention to deliver long-term dividend growth, provided this is supported by underlying earnings, cash flows, capital expenditure requirements and the prevailing market outlook.

Key Performance Indicators

We have identified a number of KPIs against which we have consistently reported. As with prior years, we measure our results on an underlying basis, where we adjust to ensure appropriate comparability between periods, irrespective of currency fluctuations and any business acquisitions and disposals.
This is done by:

- Restating the previous period's results at the same foreign exchange (FX) rates used in the current period
- Removing the results of disposed businesses in both the current and prior years
- Removing the results of acquired businesses in both the current and prior years

Therefore, for 2021, we have:

- Retranslated 2020 results at the FX rates used in calculating the 2021 results
- Removed the results of Universal, which was acquired during 2021

Objective: Deliver profitable growth

KPI: Underlying revenue growth

Reported revenue for 2021 was £1,642.9m, which equated to £1,640.8m on an underlying basis. Reported revenue for 2020 was £1,458.3m, which equated to £1,389.6m on an underlying basis. 2021 underlying revenue increased by 18.1% year-on-year. The increase in revenue has been driven by a recovery across most geographies in both steel and foundry end-markets versus 2020 and price increases.

£m	**2021 Revenue**			2020 Revenue				% change	
	As reported	Acquisitions / (disposals)	Underlying	As reported	Currency	Acquisition/ Disposals	Under lying	Reported	Underlying
Steel	**1,171.5**	**(2.1)[1]**	**1.169.4**	1,045.4	(48.9)	-	996.5	12.1%	17.4%
Foundry	**471.4**	-	**471.4**	412.9	(19.8)	-	393.1	14.2%	19.9%
Total Group	**1,642.9**	**(2.1)**	**1,640.8**	1,458.3	(68.7)	-	1,389.6	12.7%	18.1%

Note 1. Impact of Universal acquisition

Objective: Generate value for our shareholders

KPI: Trading profit and Return on Sales

We continue to measure underlying trading profit of the Group as well as trading profit as a percentage of sales, which we refer to as our Return on Sales or RoS.

Trading profit for 2021 was £142.4m and Return on Sales was 8.7%. On an underlying basis, trading profit increased by 50.4% and Return on Sales by 190 bps. The increase in trading profit and Return on Sales is due to higher revenue, ongoing delivery of benefits from the restructuring programme and income from recurring recovery of overpaid taxes to and from the Brazilian entities partially offset by temporary friction costs linked to supply chain disruptions.

Profit increased by 41.6% on an underlying basis, to £102.0m during the period. Return on Sales in the Foundry division increased by 280 bps year-on-year on an underlying basis, to 8.6% in 2021. Trading profit was £40.4m representing a 78.7% increase on an underlying basis versus prior year.

£m	**2021 Trading profit**			2020 Trading profit				% change	
	As reported	Acquisitions / (disposals)	Underlying	As reported	Currency	Acquisition /Disposals	Underlying	Reported	Underlying
Steel	**102.0**	**0.2**[1]	**102.3**	76.4	(4.2)	-	72.2	33.6%	41.6%
Foundry	**40.4**	**-**	**40.4**	25.0	(2.4)	-	22.6	61.3%	78.7%
Total Group	**142.4**	**0.2**	**142.6**	101.4	(6.6)	-	94.8	40.4%	50.4%

Note 1. Impact of Universal acquisition

KPI: Headline PBT and Headline EPS

Headline profit before tax (PBT) and headline earnings per share (EPS) are used to measure the underlying financial performance of the Group. The main difference between trading profit and PBT is net finance costs which were £6.4m in 2021, £4.5m lower than 2020.

Our Headline PBT was £137.3m, 49.9% higher than last year on a reported basis. On a reported basis, after the inclusion of separately reported expenses of £9.7m (2020: £27.1m), our PBT of £127.6m was 97.8% higher than last year. Headline EPS from continuing operations at 35.3p was 52.2% higher than 2020.

KPI: Return on invested capital (ROIC)

From 2022 onwards, the Group intends to use ROIC as its key measure of return from the Group's invested capital. RONA performance measure will be replaced with ROIC which provides a more complete measure of Vesuvius's returns. ROIC is calculated as trading profit less amortisation of acquired intangibles plus share of post-tax profit of joint ventures and associates for the previous 12 months after tax, divided by the average invested capital (total assets excluding cash plus non interest bearing liabilities), at constant currency (being the average over December and the previous year end invested capital).

Our ROIC for 2021 was 7.5% (2020: 4.9%).

Objective: Maintain an efficient capital structure

KPI: Free cash flow and working capital

Fundamental to ensuring that we have adequate capital to execute our corporate strategy is converting our profits into cash, partly through strict management of our working capital. The Group generated adjusted operating cash flow of £45.6m (2020: £172.9m), and a cash conversion rate of 32% (2020: 171%) in the period. 2021 cash conversion was impacted by growing working capital to sustain revenue growth and higher investments in capex. Free cash flow from continuing operations was £(0.3)m in 2021 (2020: £113.5m).

We measure working capital both in terms of actual cash flow movements, and as a percentage of sales revenue. Trade working capital as a percentage of sales in 2021 was 20.9% (2020: 23.2%), measured on a 12-month moving average basis. In absolute terms on a constant currency basis trade working capital increased by £106.0m in 2021.

KPI: Net debt and interest cover

Following the refinancing of the Group's syndicated bank facility on 5th July 2021, the Group had committed borrowing facilities of £706.3m as at 31st December 2021 (2020: £586.6m), of which £308.1m was undrawn (2020: £246.6m).

Net debt at 31 December 2021 was £277.1m, a £102.0m increase from, 31 December 2020. The increase is mainly comprised of £45.6m from operations and a favourable foreign exchange impact of £13.8m, offset by payments of income taxes of £30.1m, net finance costs of £7.6m, the acquisition of the business of Universal Refractories, Inc for £43.6m, including related excess working capital payment, dividends of £55.5m, and £17.1m of additional leases.

At the end of 2021, the net debt to EBITDA ratio was 1.4x (2020: 1.2x) and EBITDA to interest was 30.5x (2020: 14.5x). These ratios are monitored regularly to ensure that the Group has sufficient financing available to run the business and fund future growth.

The Group's debt facilities have two financial covenants: the ratios of net debt to EBITDA (maximum 3.25x limit) and EBITDA to interest (minimum 4x limit). Certain adjustments are made to the net debt calculations for bank covenant purposes, the most significant of which is to exclude the impact of IFRS 16.

During 2021 Vesuvius has recognised a further £3.5m (2020: £1.7m) of income and interest of £1.9m (2020: £1.2m) in relation to further recoveries of overpaid indirect taxes, and interest, by the Brazilian entities within the Group. The amounts recognised do not represent the full amount of income and interest claimed as we do not yet have clarity on the ability of the Group to fully utilise these credits. The amounts recognised have been presented as headline trading profit and finance income given their recurring nature as the original indirect tax expenses were incurred over a prolonged period and partial recovery has taken place in the past two years.

Objective: Think beyond in innovation

KPI: Total R&D Spend

We believe that our market-leading product technology and services deliver fundamental value to our customers and that the primary mechanism to deliver that value is to invest significantly in research and development. In 2021 we spent £30.3m on R&D activities (2020: £26.7m at constant 2021 currency), which represents 1.8% of our revenue (2020: 1.9%).

Financial Risk Factors

The Group undertakes regular risk reviews and, as a minimum, a full risk assessment process twice a year. As in previous years this included input from the Board in both the assessment of risk and the proposed mitigation. We consider the main financial risks faced by the Group as being those posed by a decline in our end-markets, leading to reduced revenue and profit as well as potential customer default. We also monitor carefully the challenges that come from broader financial uncertainty, which could bring lack of liquidity and market volatility. Important but lesser risk exists in interest rate movements, foreign exchange rate movements and cost inflation, but these are not expected to have a material impact on the business after considering the controls we have in place. See Note 25 to the Group Financial Statements.

Our key mitigation of end-market risk is to manage the Group's exposure through balancing our portfolio of business geographically and to invest in product innovation. We do so through targeted capital investment in new and growing businesses and a combination of capital and human resource in emerging markets. When considering other financial risks, we mitigate liquidity concerns by financing, using both the bank and private placement markets. The Group also seeks to avoid a concentration of debt maturities in any one period to spread its refinancing risk. Following the refinancing of the Group's syndicated bank facility on 5th July 2021, our liquidity stood at £455.7m at 31st December 2021. We define liquidity as undrawn committed debt facilities plus our cash on balance sheet, less the cash in China which is used as collateral against an equivalent loan from Standard Chartered.

Restructuring

In 2021, we benefitted from £4.1m of restructuring savings related to a full period impact of actions taken during 2020. During the year, we reported nil restructuring costs (2020: £6.1m) within separately reported items. We are carrying forward a restructuring provision of £5.0m.

Vacant site remediation
The Group owns a number of disused properties in the US, which do not form part of our trading operations. In 2020 costs of £10.3m (2021: nil) were incurred at one of these sites to address the significant increase in the volume of water run-off occurring in recent years. We engaged waste management specialists and have taken actions to reduce the level of water. We are in contact with the relevant regulatory authorities and are currently implementing remediation solutions, including installation of a treatment facility. These non-recurring costs were treated as a separately reported item in 2020. There was no impact upon headline performance.

Taxation
A key measure of tax performance is the headline Effective Tax Rate ("ETR"), which is calculated on the income tax associated with headline performance, divided by the headline profit before tax and before the Group's share of post-tax profit of joint ventures. The Group's headline ETR, based on the income tax costs associated with headline performance of £35.9m (2020: £24.4m), was 26.4% (2020: 26.9%).

The Group's total income tax costs for the period include a credit on separately reported items of £16.2m (2020: £5.7m) which primarily relates to a credit of £16.0m (2020: £nil) following the recognition of certain US deferred tax assets.

A tax credit reflected in the Group Statement of Comprehensive Income in the year amounted to £13.0m (2020: £3.2m debit) which primarily comprises a £12.5m credit (2020: £2.8m debit) in respect of tax on net actuarial gains and losses on employee benefits, inclusive of the buy-in of the UK pension scheme and the restatement of UK deferred tax from 19% to 25%.

We expect the Group's headline effective tax rate on headline profit before tax and before the share of post-tax profits from joint ventures to be between 27% and 28% in 2022.

Capital expenditure
Capital expenditure in 2021 was £67.4m (2020: £59.0m) of which £47.2m was in the Steel Division (2020: £45.9m) and £20.2m in the Foundry Division (2020: £13.1m). Capital expenditure on revenue-generating customer installation assets, primarily in Steel, was £5.7m (2020: £8.7m).

Pensions
The Group has a limited number of historical defined benefit plans located mainly in the UK, USA, Germany and Belgium. The main plans in the UK and USA are largely closed to further benefits accrual and all of the liabilities in the UK have now been insured following a buy-in agreement with Pension Insurance Corporation plc ("PIC") during December 2021. The Group's net pension liability at 31 December 2021 was £77.0m (2020: £2.1m liability). The increase in the liability and resulting charge of £80m through other comprehensive income, is largely due to the reduction of the surplus for the UK Plan following the pension insurance buy-in agreement with PIC. This final buy-in agreement secures an insurance asset from PIC that matches the remaining pension liabilities of the UK Plan, with the result that the Company no longer bears any investment, longevity, interest rate or inflation risks in respect of the UK Plan. This increase in liability has been partially offset by an increase in bond yields resulting in a reduction in the value of German and US liabilities.

Corporate activity
In December 2021, the Group acquired the assets and substantially all of the liabilities of Universal Refractories Inc. ("Universal"), a specialty refractory producer based in Pennsylvania, USA, which is focused on tundish (steel continuous casting) applications as well as consumable products for the foundry industry.

Universal's unaudited revenue and EBITDA in the trailing 12 months to October were US$40.5m and US$8.6m, respectively. The acquisition will generate attractive synergies and will be accretive to Group return-on-sales even before synergies are considered.

The transaction valued Universal at US$57.1 million (£42.6 million) on a cash and debt free basis and was funded from Vesuvius' internal resources.

The Group expects the acquisition to be highly synergistic. The acquisition significantly expands Vesuvius' North American presence amongst electric arc furnace steel producers in the Group's focus area of steel tundish applications, while also further strengthening the foundry business.

In the period since acquisition, Universal has contributed £2.1m to revenue and £(0.2)m to operating profit. In accordance with IFRS3, the acquired inventory was revalued to fair value less costs to sell, resulting in a reduction to operating profit of £0.6m.

Principal Risks and Uncertainties

Risk Management
The Board exercises oversight of principal risks through a specific review of the way in which the Group manages those risks. This process provides the Board with a clear understanding of the individuals within the business responsible for the management of each specific risk and the mitigation in place to address it. The Board also reviews and establishes the Group's risk appetite for those issues identified as principal risks and the associated adequacy of the steps being taken to mitigate them.

The Board has overall responsibility for establishing and maintaining a system of risk management and internal control, and for reviewing its effectiveness. The Group undertakes a continuous process of risk identification and review, which includes a formal process, conducted annually for mapping risks from the bottom up, with each major business unit and key operational, senior functional and senior management staff identifying their principal risks. This assessment undergoes a formal review at half-year. The results are compiled centrally to deliver a coordinated picture of the key operational risks identified by the business. These risks are then reviewed by the Group Executive Committee. As part of this process, each Director contributes their individual view of the top-down strategic risks facing the Group – drawing on the broad commercial and financial experience they have gained both inside and outside the Group. The results of this assessment are then overlaid on the internal assessment of risks to build a comprehensive analysis of existing and emerging risk. The process extends to cover both financial and non-financial risks, and considers the risks associated with the impact of the Group's activities on employees, customers, suppliers, the environment, local communities and society more generally.

Risk Mitigation
The Principal Risks identified are actively managed in order to mitigate exposure. Senior management 'owners' have been identified for each principal risk, and they manage the mitigations of that specific risk and contribute to the analysis of its likelihood and materiality. This analysis is reported to the Board. The risks are analysed in the context of our business structure which gives protection against a number of principal risks we face with diversified currencies, a widespread customer base, local production matching the diversity of our markets and intensive training of our employees. Additionally, we seek to mitigate risk through contractual measures. Where cost-effective, the risk is transferred to insurers. Our processes are not designed to eliminate risk, but to identify our principal risks and seek to reduce them to a reasonable level in the context of the delivery of the Group's strategy.

Principal Risks
The risks identified are those the Board considers to be the most relevant to the Group in relation to their potential impact on the achievement of its Strategic Objectives. All of the risks set out on these pages could materially affect the Group, its businesses, future operations and financial condition, and could cause actual results to differ materially from expected or historical results. The Group continues to focus on risk mitigation, and whilst, as identified above, certain elements of the Group's risks have manifested in 2021 as a result of the continuing Covid pandemic, the Principal Risks remain the same. These risks are not the only ones that the Group will face. Some risks are not yet known and some currently not deemed to be material could become so.

Changes to Risk in 2021
The effects of the COVID-19 pandemic continued to be felt in certain geographies and disciplines of the business in 2021. Managing the physical risks to our staff, and in our interactions with customers continued to be a priority, where our protocols for remote working, social distancing, and management of production processes continued to be

followed. As with many companies, Vesuvius was exposed to post-Covid disruptions in global trade, which placed supply chains under stress and affected elements of the Group's financial performance. Against the backdrop of the continuing pandemic, and its development during the year, the Board continued to focus on the Group's existing risks, and the processes to mitigate and manage them. It also remained alert to other emerging risks. The Board noted again the increasing presence of cyber threats to business in general. Other emerging risks were assessed, with the Board considering security of raw material supply, business disruption driven by increasing inflation and interest rates, and the continuing work required to ensure that the Group's decentralised management and talent pipeline can deliver the consistent profitable growth identified in the Group's strategy. It was noted that a number of these and other issues were already addressed in the Group's principal risks and by related mitigation activities.

Issues identified in certain of the Group's Principal Risks materialised during the year. The Group's existing measures in mitigation were initiated and additional actions taken specific to the challenges posed by the continuing COVID-19 pandemic. These were most notably:

- Business interruption: With the mandatory shutdowns of 2020 predominantly behind us, our manufacturing operations remained operational throughout the year with enhanced health and safety protocols in place, in each case in line with prevailing national rules. Remote working remained the norm in many countries, with more than 1,500 people still working from home at year end. Vesuvius also experienced the effects of the global trade disruption, seeing significant increases in price for freight and raw materials, and disrupted logistics, affecting the predictability of our global supply chain. Our central purchasing team focused on addressing these issues, but two product line supply interruptions were experienced.

- End Market Risk: Whilst end markets began to pick up at the end of 2020, with overall demand continuing to grow during the year, our end markets did not return fully to pre-pandemic levels. We also saw significant raw material price increases throughout the year. The Group's diversified sourcing strategy helped mitigate this challenge, with raw-material costs offset by the implementation of price increases.

- People, Culture and Performance: Across the Group, our people continued to work in difficult circumstances and lockdowns affected different parts of the business. The protocols put in place in 2020 – access to virtual IT tools to support remote working, increased PPE provision and changes to site working conditions – remained in force for all of the year. Internal communication remained a focus, building on the success of the processes put in place in early 2020. Once again, the focus on Values was maintained, with our Living the Values Awards competition running again on a 'virtual' basis, with the Group's senior leadership participating to celebrate the stories and achievements of our values finalists. Our annual Senior Leaders' conference was held in person, with enhanced health and safety protocols in place for those who could travel, and with a significant number of staff who could not travel joining remotely.

- Health and Safety: Our very strong focus on health and safety and the consistency of its application across the Group continued to place us extremely well to respond to the pandemic's challenges. In certain jurisdictions our workforce was affected more acutely than in others with the development of the Omicron variant, but operations were managed carefully to ensure security of supply for our customers. It is clear that the Covid pandemic has introduced shifts in working patterns and trading environment that will not unwind for several months, and in some cases much longer. The Board continues to monitor these changes, and in particular the disruption that they could drive for global businesses and, in particular, for supply chain security. Consequently, the mitigations established by the Group to address its principal risks will remain strongly relevant as 2022 progresses.

Despite these challenges, the Board has not identified any overall material change to the Group's identified principal risks and uncertainties, albeit that within those risks a number of issues manifested themselves in 2021. No new principal risks were identified during the year. As such, the Group's statement of Principal Risk and Uncertainties was unchanged in 2021 from 2020.

The crisis unfolding in Ukraine since the end of the year, has the potential to generate direct and indirect impacts that are reflected in our Principal Risks, namely End Market Risks, Protectionism and Globalisation and Business Interruption. Whilst we are concerned about the potential impact, we will put our mitigation strategies into action in order to minimise any impact on Vesuvius.

Climate Change

The Group's overall risk management processes also incorporate consideration of the potential impact of climate-related risks on the Group. The Group does not regard climate change itself to represent a material stand-alone risk for the Group's operations. Whilst a significant proportion of the Group's revenue is generated from Steel manufacture and automotive castings, industries that are under transition as a result of their focus on improving environmental performance, we believe these changes will be positive for the Group. The opportunities in the Group's business strategy, which is founded on helping our customers to improve their manufacturing efficiency and the quality of their products – and therefore reduce their climate impact – will play a critical part in the development of the Group going forward. The Group recognises that climate change could present further uncertainty for the Group in terms of increased regulation, evolution of the geographical distribution of our customer base and the costs of meeting more onerous disclosure requirements. The risks we associate with our sustainability performance and our end customer's sustainability transition – badged as ESG – are identified as a separate element of the Group risk register, recognising the work Vesuvius can do to mitigate the environmental impact of our customers' processes. Other elements of this risk are incorporated into the appropriate Principal Risk and Uncertainties that the Group has identified. The Group continues to focus internally on the action we can take to drive our business' sustainability. In 2021, the Group made further progress on its sustainability KPIs and continued work on the Sustainability initiative announced in 2020. Under this initiative the Group will seek to drive a lower CO2 intensity, reduce energy usage, and take the steps necessary to meet the target set of being emissions net zero by 2050.

Principal risks and uncertainties:

Risk	Potential impact	Mitigation
End market risks *Vesuvius suffers an unplanned drop in demand, revenue and/ or margin because of market volatility beyond its control*	• Unplanned drop in demand and/or revenue due to reduced production by our customers • Margin reduction • Customer failure leading to increased bad debts • Loss of market share to competition • Cost pressures at customers leading to use of cheaper solutions	• Geographic diversification of revenues • Product innovation and service offerings securing long-term revenue streams and maintaining performance differential • Increase in service and product lines by the development of the Technical Services offering • R&D includes assessment of emerging technologies • Manufacturing capacity rationalisation and flexible cost base • Diversified customer base: no customer is greater than 10% of revenue • Robust credit and working capital control to mitigate the risk of default by counterparties
Protectionism and globalisation *The Vesuvius business model cannot adapt or respond quickly enough to threats from protectionism and globalisation*	• Restricted access to market due to enforced preference of local suppliers • Increased barriers to entry for new businesses or expansion • Increased costs from import duties, taxation or tariffs • Loss of market share • Trade restrictions	• Highly diversified manufacturing footprint with manufacturing sites located in 26 countries • Strong local management with delegated authority to run their businesses and manage customer relationships • Cost flexibility • Tax risk management and control framework together with a strong control of inter-company trading

Product quality failure *Vesuvius staff/contractors are injured at work or customers, staff or third parties suffer physical injury or financial loss because of failures in Vesuvius products*	• Injury to staff and contractors • Product or application failures lead to adverse financial impact or loss of reputation as technology leader • Incident at customer plant caused manufacturing downtime or damage to infrastructure • Customer claims from product quality issues	• Quality management programmes including stringent quality control standards, monitoring and reporting • Experienced technical staff knowledgeable in the application of our products and technology • Targeted global insurance programme • Experienced internal legal function controlling third-party contracting
Complex and changing regulatory environment *Vesuvius experiences a contracting customer base or increased transaction and administrative costs due to compliance with changing regulatory requirements*	• Revenue reduction from reduced end-market access • Disruption of supply chain and route to market • Increased internal control processes • Increased frequency of regulatory investigations • Reputational damage	• Compliance programmes and training across the Group • Internal Audit function • Experienced internal legal function including dedicated compliance specialists • Global procurement category management of strategic raw materials
Failure to secure innovation *Vesuvius fails to achieve continuous improvement in its products, systems and services*	• Product substitution by customers • Increased competitive pressure through lack of differentiation of Vesuvius offering • Commoditisation of product portfolio through lack of development • Lack of response to changing customer needs • Loss of intellectual property protection	• Enduring and significant investment in R&D, with market-leading research • A shared strategy for innovation throughout the Group, deployed via our R&D centres • Stage gate process from innovation to commercialisation to foster innovation and increase alignment with strategy • Programme of manufacturing and process excellence • Quality programme, focused on quality and consistency • Stringent intellectual property registration and defence
Business interruption *Vesuvius loses production capacity or experiences supply chain disruption due to physical site damage (accident, fire, natural disaster, terrorism) or other events such as industrial action, cyber attack or global health crises*	• Loss/closure of a major plant temporarily or permanently impairing our ability to serve our customers • Damage to or restriction in our ability to use assets • Denial of access to critical systems or control processes • Disruption of manufacturing processes • Inability to source critical raw materials	• Diversified manufacturing footprint • Disaster recovery planning • Business continuity planning with strategic maintenance of excess capacity • Physical and IT control systems security, access and training • Cyber risks integrated into wider risk-management structure • Well-established global insurance programme • Group-wide safety management programmes • Dual sourcing strategy and development of substitutes

People, culture and performance *Vesuvius is unable to attract and retain the right calibre of staff, fails to instil an appropriate culture or fails to embed the right systems to drive personal performance in pursuit of the Group's long-term growth*	• Organisational culture of high performance is not achieved • Staff turnover in growing economies and regions • Stagnation of ideas and development opportunities • Loss of expertise and critical business knowledge • Reduced management pipeline for succession to senior positions	• Internal focus on talent development and training, with tailored career-stage programmes and clear performance management strategies • Contacts with universities to identify and develop talent • Career path planning and global opportunities for high-potential staff • Internal programmes for the structured transfer of technical and other knowledge • Clearly defined Values underpin business culture
Health and safety *Vesuvius staff or contractors are injured at work because of failures in Vesuvius' operations, equipment or processes*	• Injury to staff and contractors • Health and safety breaches • Manufacturing downtime or damage to infrastructure from incident at plant • Inability to attract the necessary workforce • Reputational damage	• Active safety programmes, with ongoing wide-ranging monitoring and safety training • Independent safety audit team • Quality management programmes including stringent manufacturing process control standards, monitoring and reporting
Environmental, social and governance (ESG) criteria *Vesuvius fails to capitalise on the opportunity to help its customers significantly reduce their carbon emissions as environmental pressure grows on the Steel Industry or Vesuvius fails to meet the expectations of its various stakeholders including employees and investors*	• Loss of opportunity to grow sales • Loss of opportunity to increase margin • Loss of stakeholder confidence including Investors • Reputational damage	• Development and implementation of a new Sustainability initiative, which includes stretching targets focused on reducing the Group's Energy usage, CO2 emissions, waste and recycled materials • R&D focus on products that assist customers to reduce carbon emissions and improve their own sustainability measures • Skilled technical sales force to develop efficient solutions for our customers • Globally disseminated Code of Conduct sets out standards of conduct expected and ABC Policy adopted with a zero tolerance regarding bribery and corruption • Internal Speak up mechanisms to allow reporting of concerns • Extensive use of due diligence to assess existing and potential business partners and customers

Group Income Statement

For the year ended 31 December 2021

	Notes	2021 [1] Headline performance £m	2021 [1] Separately reported items £m	2021 Total £m	2020 [1] Headline performance £m	2020 [1] Separately reported items £m	2020 Total £m
Continuing operations							
Revenue	2	**1,642.9**	**-**	**1,642.9**	1,458.3	-	1,458.3
Manufacturing costs		**(1,222.8)**	**-**	**(1,222.8)**	(1,084.7)	-	(1,084.7)
Administration, selling and distribution costs		**(277.7)**	**-**	**(277.7)**	(272.2)	-	(272.2)
Trading profit	2	**142.4**	**-**	**142.4**	101.4	-	101.4
Amortisation of acquired intangible assets		**-**	**(9.7)**	**(9.7)**	-	(9.9)	(9.9)
Restructuring charges	3	**-**	-	-	-	(6.1)	(6.1)
Vacant site remediation costs		**-**	-	-	-	(10.3)	(10.3)
GMP equalisation charge	10	**-**	**-**	**-**	-	(0.8)	(0.8)
Operating profit/(loss)		**142.4**	**(9.7)**	**132.7**	101.4	(27.1)	74.3
Finance expense		**(13.7)**	**-**	**(13.7)**	(18.9)	-	(18.9)
Finance income		**7.3**	**-**	**7.3**	8.0	-	8.0
Net finance costs	4	**(6.4)**	**-**	**(6.4)**	(10.9)	-	(10.9)
Share of post-tax income of joint ventures and associates		**1.3**	**-**	**1.3**	1.1	-	1.1
Profit/(loss) before tax		**137.3**	**(9.7)**	**127.6**	91.6	(27.1)	64.5
Income tax (charge)/credits	5	**(35.9)**	**16.2**	**(19.7)**	(24.4)	5.7	(18.7)
Profit/(loss)		**101.4**	**6.5**	**107.9**	67.2	(21.4)	45.8
Profit/(loss) attributable to:							
Owners of the parent		**95.6**	**6.5**	**102.1**	62.7	(21.4)	41.3
Non-controlling interests		**5.8**	**-**	**5.8**	4.5	-	4.5
Profit/(loss)		**101.4**	**6.5**	**107.9**	67.2	(21.4)	45.8
Earnings per share — pence	6						
Total operations — basic				**37.7**			15.3
— diluted				**37.5**			15.2

(1) Headline performance is defined in Note 16.1 and separately reported items are defined in Note 1.4.

The above results were derived from continuing operations. The separately reported items would form part of Administration, selling & distribution costs if classified within headline performance, which including these amounts would total £287.4m (2020: £299.3m).

Group Statement of Comprehensive Income

For the year ended 31 December 2021

	2021 £m	2020 £m
Profit	**107.9**	45.8
Items that will not subsequently be reclassified to income statement:		
Remeasurement of defined benefit assets/liabilities	**(80.6)**	7.7
Income tax relating to items not reclassified	**12.5**	(3.2)
Items that may subsequently be reclassified to income statement:		
Exchange differences on translation of the net assets of foreign operations	**(31.4)**	(14.9)
Exchange differences on translation of net investment hedges	**14.4**	(9.7)
Net change in costs of hedging	**(1.2)**	0.4
Change in the fair value of the hedging instrument	**2.2**	(8.1)
Amounts reclassified from the Income Statement	**(0.7)**	6.3
Other comprehensive income/(loss), net of income tax	**(84.8)**	(21.5)
Total comprehensive income	**23.1**	24.3
Total comprehensive income attributable to:		
Owners of the parent	**17.7**	22.0
Non-controlling interests	**5.4**	2.3
Total comprehensive income	**23.1**	24.3

The above results were derived from continuing operations.

Group Statement of Cash Flows

For the year ended 31 December 2021

	Notes	2021 £m	2020 £m
Cash flows from operating activities			
Cash generated from operations	9	**82.9**	193.7
Interest paid		**(11.9)**	(18.9)
Interest received		**4.3**	5.2
Income taxes paid		**(30.1)**	(27.5)
Net cash inflow from operating activities		**45.2**	152.5
Cash flows from investing activities			
Capital expenditure		**(45.5)**	(40.5)
Proceeds from the sale of property, plant and equipment		**1.2**	1.1
Acquisition of subsidiaries and joint ventures, net of cash acquired		**(43.7)**	(1.4)
Dividends received from joint ventures		**1.0**	2.3
Net cash outflow from investing activities		**(87.0)**	(38.5)
Net cash (outflow)/inflow before financing activities		**(41.8)**	114.0
Cash flows from financing activities			
Proceeds from borrowings		**89.4**	320.4
Repayment of borrowings		**(31.4)**	(438.6)
Settlement of derivatives		**-**	1.4
Purchase of ESOP shares		**(1.1)**	-
Dividends paid to equity shareholders	7	**(55.5)**	(8.4)
Dividends paid to non-controlling shareholders		**(2.2)**	(1.9)
Net cash outflow from financing activities		**(0.8)**	(127.1)
Net decrease in cash and cash equivalents	8	**(42.6)**	(13.1)
Cash and cash equivalents at 1 January		**206.8**	222.1
Effect of exchange rate fluctuations on cash and cash equivalents	8	**(1.8)**	(2.2)
Cash and cash equivalents at 31 December		**162.4**	206.8
Free cash flow from continuing operations (Note 16.11)			
Net cash inflow from operating activities		**45.2**	152.5
Capital expenditure		**(45.5)**	(40.5)
Proceeds from the sale of property, plant and equipment		**1.2**	1.1
Dividends received from joint ventures		**1.0**	2.3
Dividends paid to non-controlling shareholders		**(2.2)**	(1.9)
Free cash flow[1]	16	**(0.3)**	113.5

(1) *For definitions of non-GAAP measures, refer to Note 16*

Group Balance Sheet

As at 31 December 2021

	Notes	**2021 £m**	2020 £m
Assets			
Property, plant and equipment		352.5	337.5
Intangible assets		696.8	696.1
Employee benefits - net surpluses	10	25.1	117.1
Interests in joint ventures and associates		12.8	12.1
Investments	15	0.5	0.7
Deferred tax assets		104.2	96.1
Other receivables		16.2	18.6
Total non-current assets		1,208.1	1,278.2
Cash and short-term deposits	8	169.1	209.7
Inventories		299.4	187.3
Trade and other receivables		445.2	369.9
Income tax receivable		7.6	3.7
Derivative financial instruments	15	0.1	0.2
Assets classified as held for sale		-	0.9
Total current assets		921.4	771.7
Total assets		2,129.5	2,049.9
Equity			
Issued share capital		27.8	27.8
Retained earnings		2,483.4	2,502.9
Other reserves		(1,467.6)	(1,451.3)
Equity attributable to the owners of the parent		1,043.6	1,079.4
Non-controlling interests		54.6	51.4
Total equity		1,098.2	1,130.8
Liabilities			
Interest-bearing borrowings	8	329.9	333.1
Employee benefits - net liabilities	10	102.1	119.2
Other payables		11.6	13.2
Provisions	14	32.6	34.0
Deferred tax liabilities		29.6	43.9
Derivative financial instruments	15	2.5	7.0
Total non-current liabilities		508.3	550.4
Interest-bearing borrowings	8	113.8	45.0
Trade and other payables		372.9	288.7
Income tax payable		18.1	12.2
Provisions	14	18.1	22.8
Derivative financial instruments	15	0.1	-
Total current liabilities		523.0	368.7
Total liabilities		1,031.3	919.1
Total equity and liabilities		2,129.5	2,049.9

Group Statement of Changes in Equity

For the year ended 31 December 2021

	Issued share capital £m	Other reserves £m	Retained earnings £m	Owners of the parent £m	Non-controlling interests £m	Total equity £m
As at 1 January 2020	**27.8**	**(1,427.5)**	**2,463.1**	**1,063.4**	**51.0**	**1,114.4**
Profit	**-**	**-**	**41.3**	**41.3**	**4.5**	**45.8**
Remeasurement of defined benefit liabilities/assets	-	-	7.7	7.7	-	7.7
Income tax relating to items not reclassified	-	-	(3.2)	(3.2)	-	(3.2)
Exchange differences on translation of the net assets of foreign operations	-	(12.7)	-	(12.7)	(2.2)	(14.9)
Exchange differences on translation of net investment hedges	-	(9.7)	-	(9.7)	-	(9.7)
Net change in costs of hedging	-	0.4	-	0.4	-	0.4
Change in the fair value of the hedging instrument	-	(8.1)	-	(8.1)	-	(8.1)
Amounts reclassified from the Income Statement	-	6.3	-	6.3	-	6.3
Other comprehensive (loss), net of income tax	**-**	(23.8)	4.5	(19.3)	(2.2)	(21.5)
Total comprehensive income (loss)	**-**	**(23.8)**	**45.8**	**22.0**	**2.3**	**24.3**
Recognition of share-based payments	-	-	2.4	2.4	-	2.4
Dividends paid (Note 7)	-	-	(8.4)	(8.4)	(1.9)	(10.3)
Total transactions with owners	**-**	**-**	**(6.0)**	**(6.0)**	**(1.9)**	**(7.9)**
As at 1 January 2021	**27.8**	**(1,451.3)**	**2,502.9**	**1,079.4**	**51.4**	**1,130.8**
Profit	**-**	**-**	**102.1**	**102.1**	**5.8**	**107.9**
Remeasurement of defined benefit liabilities/assets	-	-	(80.6)	(80.6)	-	(80.6)
Income tax relating to items not reclassified	-	-	12.5	12.5	-	12.5
Exchange differences on translation of the net assets of foreign operations	-	(31.0)	-	(31.0)	(0.4)	(31.4)
Exchange differences on translation of net investment hedges	-	14.4	-	14.4	-	14.4
Net change in costs of hedging	-	(1.2)	-	(1.2)	-	(1.2)
Change in the fair value of the hedging instrument	-	2.2	-	2.2	-	2.2
Amounts reclassified from the Income Statement	-	(0.7)	-	(0.7)	-	(0.7)
Other comprehensive income/(loss), net of income tax	**-**	(16.3)	(68.1)	(84.4)	(0.4)	(84.8)
Total comprehensive income (loss)	**-**	**(16.3)**	**34.0**	**17.7**	**5.4**	**23.1**
Recognition of share-based payments	-	-	3.1	3.1	-	3.1
Purchase of ESOP shares	-	-	(1.1)	(1.1)	-	(1.1)
Dividends paid (Note 7)	-	-	(55.5)	(55.5)	(2.2)	(57.7)
Total transactions with owners	**-**	**-**	**(53.5)**	**(53.5)**	**(2.2)**	**(55.7)**
As at 31 December 2021	**27.8**	**(1,467.6)**	**2,483.4**	**1,043.6**	**54.6**	**1,098.2**

Notes to the Group Financial Statements

1 Basis of preparation

1.1 Basis of preparation

The financial information in this preliminary announcement has been extracted from the audited Group Financial Statements for the year ended 31 December 2021 and does not constitute statutory accounts within the meaning of section 434 of the Companies Act 2006. The Group Financial Statements and this preliminary announcement were approved by the Board of Directors on 3 March 2022.

The auditors have reported on the Group Financial Statements for the years ended 31 December 2021 and 31 December 2020 under section 495 of the Companies Act 2006. The auditors' reports are unqualified and do not contain a statement under section 498(2) or (3) of the Companies Act 2006. The Group's statutory financial statements for the year ended 31 December 2020 have been filed with the Registrar of Companies and those for the year ended 31 December 2021 will be filed following the Company's Annual General Meeting.

The Group financial statements have been prepared in accordance with UK-adopted international accounting standards (IFRS) and with the requirements of the Companies Act 2006 as applicable to companies reporting under those standards. The financial statements have been prepared under the historical cost convention, with the exception of fair value measurement applied to defined benefit pension plans, investments and derivative financial instruments.

The same accounting policies, presentation and computation methods are followed in this preliminary announcement as in the preparation of the Group Financial Statements. The accounting policies have been applied consistently by the Group.

Basis of consolidation

The Group Financial Statements incorporate the financial statements of the Company and entities controlled by the Company (its 'subsidiaries'). Control exists when the Company has the power to direct the relevant activities of an entity that significantly affect the entity's return so as to have rights to the variable return from its activities. In assessing whether control exists, potential voting rights that are currently exercisable are taken into account. The results of subsidiaries acquired or disposed of during the year are included in the Group Income Statement from the effective date of acquisition or up to the effective date of disposal, as appropriate.

The principal accounting policies applied in the preparation of these Group Financial Statements are set out in the Notes. These policies have been consistently applied to all of the years presented, unless otherwise stated. Where necessary, adjustments are made to the financial statements of subsidiaries to bring their accounting policies into line with those detailed herein to ensure that the Group Financial Statements are prepared on a consistent basis. All intra-Group transactions, balances, income and expenses are eliminated on consolidation.

Non-controlling interests in the net assets of consolidated subsidiaries are identified separately from the Group's interest therein. Non-controlling interests consist of the amount of those interests at the date of the original business combination together with the non-controlling interests' share of profit or loss and each component of other comprehensive income, and dividends since the date of the combination. Total comprehensive income is attributed to the non-controlling interests even if this results in the non-controlling interests having a deficit balance.

Notes to the Group Financial Statements (continued)

1.2 Going concern

The Directors have prepared cash flow forecasts for the Group for a period in excess of 12 months from the date of approval of the 2021 financial statements. These forecasts reflect an assessment of current and future end-market conditions and their impact on the Group's future trading performance.

The analysis undertaken includes a plausible but severe downside scenario, based on an assumed protracted COVID-19 related demand impact, despite emerging confidence that the worst of the pandemic may be behind us. This downside scenario assumes a decline in business activity and profitability in 2022 and 2023 to the level achieved in H2 2020, the period half-year most severely impacted by COVID-19. On a full-year basis relative to 2021, this implies a c.14% decline in sales and a c.34% decline in Trading Profit. Even in this downside scenario, the forecasts show that the Group's maximum net debt / EBITDA (pre-IFRS 16 in-line with the covenant calculation) does not exceed 1.3x, compared to a leverage covenant of 3.25x.

The forecasts show that the Group will be able to operate within the current committed debt facilities and show continued compliance with the Company's financial covenants. On the basis of the exercise described above and the Group's available committed debt facilities, the Directors consider that the Group and the Company have adequate resources to continue in operational existence for a period of at least 12 months from the date of signing of these financial statements. Accordingly, they continue to adopt a going concern basis in preparing the financial statements of the Group and the Company.

1.3 Functional and presentational currency

The financial statements are presented in millions of pounds sterling, which is the functional currency of the Company, and rounded to one decimal place.

1.4 Disclosure of "separately reported items"

Columnar presentation
The Group has adopted a columnar presentation for its Group Income Statement, to separately identify headline performance results, as the Directors consider that this gives a useful view of the core results of the ongoing business. As part of this presentation format, the Group has adopted a policy of disclosing separately on the face of its Group Income Statement, within the column entitled 'Separately reported items', the effect of any components of financial performance for which the Directors consider separate disclosure would assist users both in a useful understanding of the financial performance achieved for a given year and in making projections of future results.

Separately reported items

Both materiality and the nature of the components of income and expense are considered in deciding upon such presentation. Such items may include, inter alia, the financial effect of exceptional items which occur infrequently, such as major restructuring activity (which may require more than one year to complete), significant movement in the Group's deferred tax balances such as was, for example, caused by the impact of US tax reform in 2017, items reported separately for consistency, such as amortisation charges relating to acquired intangible assets, profits or losses arising on the disposal of continuing or discontinued operations and the taxation impact of the aforementioned items reported separately.

The amortisation charge in respect of intangible assets recognised on business combinations is excluded from the trading results of the Group since they are non-cash charges and are not considered reflective of the core trading performance of the Group.

In its adoption of this policy, the Company applies an even-handed approach to both gains and losses and aims to be both consistent and clear in its accounting and disclosure of such items.

Notes to the Group Financial Statements (continued)

2 Segment information

Operating segments for continuing operations

The Group's operating segments are determined taking into consideration how the Group's components are reported to the Group's Chief Executive Officer, who make the key operating decisions and are responsible for allocating resources and assessing performance of the component. Taking into account the Group's management and internal reporting structure, the operating segments are Steel Flow Control, Steel Advanced Refractories, Steel Sensors & Probes and Foundry division. The principal activities of each of these segments are described in the Operational Review.

Steel Flow Control, Steel Advanced Refractories and Steel Sensors & Probes operating segments are aggregated into the Steel reportable segment. In determining that aggregation is appropriate, judgement is applied which takes into account the economic characteristics of these operating segments which include a similar nature of products, customers, production processes and margins.

Revenue from contracts with customers

Revenue comprises the fair value of the consideration received or receivable for goods supplied and services rendered to customers after deducting rebates, discounts and value-added taxes, and after eliminating sales within the Group. Revenue from contracts with customers is recognised when control of the goods or services are transferred to the customer, upon the completion of specified performance obligations, at an amount that reflects the considerations to which the Group expects to be entitled to in exchange for these consumable products and associated services.

2.1 Income statement

	2021					
	Flow Control	Advanced Refractories	Sensors & Probes	**Steel**	**Foundry**	**Total**
				£m	**£m**	**£m**
Segment revenue	648.7	489.1	33.7	**1,171.5**	**471.4**	**1,642.9**
at a point in time				**1,169.9**	**471.4**	**1,641.3**
Over time				**1.6**	**-**	**1.6**
Segment adjusted EBITDA *				**135.9**	**56.3**	**192.2**
Segment depreciation				**(33.9)**	**(15.9)**	**(49.8)**
Segment trading profit				**102.0**	**40.4**	**142.4**
Return on sales margin				*8.7%*	*8.6%*	*8.7%*
Amortisation of acquired intangible assets						**(9.7)**
Operating profit						**132.7**
Net finance costs						**(6.4)**
Share of post-tax profit of joint ventures						**1.3**
Profit before tax						**127.6**
Capital expenditure additions				47.2	20.2	67.4
Inventory				248.1	51.3	299.4
Trade debtors				267.5	84.7	352.2
Trade creditors				(191.3)	(62.5)	(253.8)

Notes to the Group Financial Statements (continued)

	2020					
	Flow Control	Advanced Refractories	Sensors & Probes	**Steel**	**Foundry**	**Total**
				£m	**£m**	**£m**
Segment revenue	561.3	458.6	25.5	**1,045.4**	**412.9**	**1,458.3**
at a point in time				**1,035.7**	**412.9**	**1,448.6**
Over time				**9.7**	**-**	**9.7**
Segment adjusted EBITDA *				**110.6**	**41.4**	**152.0**
Segment depreciation				**(34.2)**	**(16.4)**	**(50.6)**
Segment trading profit				**76.4**	**25.0**	**101.4**
Return on sales margin				*7.3%*	*6.1%*	*7.0%*
Amortisation of acquired intangible assets						**(9.9)**
Restructuring charges						**(6.1)**
Vacant site remediation costs						**(10.3)**
GMP equalisation charge						**(0.8)**
Operating profit						**74.3**
Net finance costs						**(10.9)**
Share of post-tax profit of joint ventures						**1.1**
Profit before tax						**64.5**
Capital expenditure additions				45.9	13.1	59.0
Inventory				151.0	36.3	187.3
Trade debtors				225.6	76.4	302.0
Trade creditors				(131.1)	(54.6)	(185.7)

* Adjusted EBITDA is defined in note 16.13

3 Restructuring charges

There were no restructuring charges in 2021. Restructuring charges of £6.1m in 2020 related to the completion of the programme first announced in March 2018, which was predominantly focused on rationalising our manufacturing footprint, consolidating production and streamlining various back-office functions. The charges reflected redundancy costs of £2.7m, plant closure costs of £1.8m, asset write-offs of £1.5m and consultancy fees and travel of £0.1m. The utilisation of costs continues in line with the phased timings for the programmes to be completed.

Cash costs of £4.0m (2020: £16.7m) (Note 14) were incurred in the year in respect of previously announced restructuring programmes, leaving provisions made but unspent of £5.0m (Note 14) as at 31 December 2021 (2020: £9.2m).

4 Net finance costs

	2021 £m	2020 £m
Interest payable on borrowings		
Loans, overdrafts and factoring arrangements	**10.7**	15.6
Interest on lease liabilities	**1.5**	1.8
Amortisation of capitalised borrowing costs	**0.8**	0.5
Total interest payable on borrowings	**13.0**	17.9
Interest on net retirement benefits obligations	**(0.3)**	(0.1)
Adjustments to discounts on provisions and other liabilities	**0.7**	1.0
Adjustments to discounts on receivables	**(0.3)**	(0.5)
Finance income	**(6.7)**	(7.4)
Total net finance costs	**6.4**	10.9

Within the table above, total finance costs are £13.7m (2020: £18.9m) and total finance income is £7.3m (2020: £8.0m). Net finance costs are £6.4m (2020: £10.9m).

5 Income tax

The Group's headline effective tax rate, based on the income tax costs associated with headline performance of £35.9m (2020: £24.4m), was 26.4% (2020: 26.9%).

The Group's total income tax costs include a credit on separately reported items of £16.2m (2020: £5.7m), comprising a credit of £16.0m (2020: £nil) relating to the recognition of US deferred tax assets, a credit of £0.2m (2020: £2.3m credit) relating to the amortisation of intangible assets, a credit of £nil (2020: £1.1m) relating to restructuring charges and a credit of £nil (2020: £2.3m) related to vacant site remediation costs.

The net tax credit reflected in the Group Statement of Comprehensive Income in the year amounted to £13.0m (2020: £3.2m debit), comprising: A £12.5m credit (2020: £2.8m debit) in respect of tax on net actuarial gains and losses on the employee benefits, inclusive of the buy-in of the UK pensions scheme and the restatement of UK deferred tax from 19% to 25%; and a £0.5m credit (2020 £nil) in respect of exchange adjustments and £nil (2020: £0.4m debit) relating to other temporary timing differences.

6 Earnings per share ("EPS")

6.1 Earnings for EPS

Basic and diluted EPS from continuing operations are based upon the profit attributable to owners of the parent, as reported in the Group Income Statement. The table below reconciles these different profit measures.

	2021 **£m**	2020 £m
Profit attributable to owners of the parent	**102.1**	41.3
Adjustments for separately reported items:		
Amortisation of intangible assets	**9.7**	9.9
Restructuring charges	**-**	6.1
Vacant site remediation costs	**-**	10.3
GMP equalisation charge	**-**	0.8
Income tax (credit)/charge	**(16.2)**	(5.7)
Headline profit attributable to owners of the parent	**95.6**	62.7

6.2 Weighted average number of shares

	2021 **millions**	2020 millions
For calculating basic and headline EPS	**270.5**	269.9
Adjustment for dilutive potential ordinary shares	**1.8**	1.7
For calculating diluted and diluted headline EPS	**272.3**	271.6

For the purposes of calculating diluted and diluted headline EPS, the weighted average number of ordinary shares is adjusted to include the weighted average number of ordinary shares that would be issued on the conversion of all potentially dilutive ordinary shares expected to vest, relating to the Company's share-based payment plans. Potential ordinary shares are only treated as dilutive when their conversion to ordinary shares would decrease EPS or increase loss per share.

6.3 Per share amounts

		2021 **pence**	2020 pence
Earnings per share	- basic	**37.7**	15.3
	- headline	**35.3**	23.2
	- diluted	**37.5**	15.2
	- diluted headline	**35.1**	23.1

7 Dividends

	2021 £m	2020 £m
Amounts recognised as dividends and paid to equity holders during the period		
Interim dividend for the year ended 31 December 2020 of 3.1p per ordinary share	**-**	8.4
Final dividend for the year ended 31 December 2020 of 14.3p per ordinary share	**38.7**	-
Interim dividend for the year ended 31 December 2021 of 6.2p per ordinary share	**16.8**	-
	55.5	8.4

A proposed final dividend for the year ended 31 December 2021 of £40.5m (2020: £38.7m), equivalent to 15.0 pence (2020: 14.3 pence) per ordinary share, is subject to approval by shareholders at the Company's Annual General Meeting on 18 May 2022 and has not been included as a liability in these financial statements. If approved by shareholders, the dividend will be paid on 27 May 2022 to holders of ordinary shares on the register on 19 April 2022.

8 Reconciliation of movement in net debt

	Balance as at 1 Jan 2021 £m	**Foreign exchange adjustments £m**	**Fair value gains/ (losses)**	**Non-cash movements[1] £m**	**Cash flow £m**	**Balance as at 31 Dec 2021 £m**
Cash and cash equivalents						
Cash at bank and in hand	**169.7**	**(1.9)**	**-**	**-**	**1.3**	**169.1**
Short term deposits	**40.0**	**-**	**-**	**-**	**(40.0)**	**-**
Bank overdrafts	**(2.9)**	**0.1**	**-**	**-**	**(3.9)**	**(6.7)**
	206.8	**(1.8)**	**-**	**-**	**(42.6)**	**162.4**
Borrowings, excluding bank overdrafts	**(376.5)**	**11.3**	**-**	**(17.1)**	**(58.0)**	**(440.3)**
Capitalised borrowing costs	**1.4**	**-**	**-**	**1.9**	**-**	**3.3**
Derivative financial instruments	**(6.8)**	**-**	**4.3**	**-**	**-**	**(2.5)**
Net debt	**(175.1)**	**9.5**	**4.3**	**(15.2)**	**(100.6)**	**(277.1)**

(1) £17.1m (2020: £15.7m) of new leases were entered into during the year.

9 Cash generated from operations

	2021 £m	2020 £m
Operating profit	**132.7**	74.3
Adjustments for:		
Amortisation of intangible assets	**9.7**	9.9
Restructuring charges	**-**	6.1
Vacant site remediation costs	**-**	10.3
GMP equalisation charge	**-**	0.8
Trading Profit	**142.4**	101.4
(Profit)/Loss on disposal of non-current assets	**0.4**	1.3
Depreciation	**49.8**	50.6
Defined benefit retirement plans net charge	**6.4**	6.7
Net decrease/(increase) in inventories	**(113.5)**	21.7
Net decrease/(increase) in trade receivables	**(53.5)**	3.4
Net increase/(decrease) in trade payables	**70.6**	12.4
Net decrease/(increase) in other working capital	**(5.5)**	23.8
Outflow related to restructuring charges	**(4.0)**	(16.7)
Defined benefit retirement plans cash outflows	**(7.2)**	(9.0)
Vacant site remediation costs paid	**(3.0)**	(1.9)
Cash generated from operations	**82.9**	193.7

10 Employee benefits

The net employee benefits liability as at 31 December 2021 was £77.0m (2020: £2.1m) derived from an actuarial valuation of the Group's defined benefit pension and other post-retirement obligations as at that date.

The increase in the balance sheet liability is due to the UK Plan final pension insurance buy-in agreement with Pension Insurance Corporation plc (PIC). This buy-in secures an insurance asset from PIC that matches the remaining pension liabilities of the UK Plan, with the result that the Company no longer bears any investment, longevity, interest rate or inflation risks in respect of the UK Plan.

The increase in liability has been partially offset by a decrease in liabilities due to an increase in bond yields resulting in a reduction in the value of German and US liabilities.

As disclosed in note 26 of the 2021 Annual Report and Financial Statements, the above amounts may materially change in the next 12 months if there is a change in assumptions.

	2021 £m	2020 £m
Employee benefits — net surpluses		
UK defined benefit pension plans	**23.7**	116.4
ROW defined benefit pension plans	**1.4**	0.7
Net surpluses	**25.1**	117.1
Employee benefits — net liabilities		
UK defined benefit pension plans	**(1.6)**	(1.8)
US defined benefit pension plans	**(21.9)**	(25.9)
Germany defined benefit pension plans	**(53.3)**	(63.1)
ROW defined benefit pension plans	**(18.3)**	(21.4)
Other post-retirement benefit plans	**(7.0)**	(7.0)
Net liabilities	**(102.1)**	(119.2)
Total liabilities	**(77.0)**	(2.1)

The expense recognised in the Group Income Statement in respect of the Group's defined benefit retirement plans and other post-retirement benefit plans is shown below.

		2021 £m	2020 £m
In arriving at trading profit	— within other manufacturing costs	**1.8**	1.7
(as defined in Note 16)	— within administration, selling and distribution costs	**4.6**	5.0
In arriving at profit before tax	— guaranteed minimum pension equalisation charge	**-**	0.8
	— within net finance costs	**(0.3)**	(0.1)
Total net charge		**6.1**	7.4

11 Contingent liabilities

Vesuvius has extensive international operations and is subject to various legal and regulatory regimes, including those covering taxation and environmental matters.

Certain of Vesuvius' subsidiaries are subject to legacy matter lawsuits, predominantly in the US, relating to a small number of products containing asbestos manufactured prior to the acquisition of those subsidiaries by Vesuvius. These suits usually also name many other product manufacturers. To date, Vesuvius is not aware of there being any liability verdicts against any of these subsidiaries. Each year a number of these lawsuits are withdrawn, dismissed or settled. The amount paid, including costs, in relation to this litigation has not had a material adverse effect on Vesuvius' financial position or results of operations.

As the settlement of many of the obligations for which reserve is made is subject to legal or other regulatory process, the timing and amount of the associated outflows is subject to some uncertainty (see Note 30 of the 2021 Annual Report and Financial Statements for further information). The amount paid, including costs in relation to this litigation, has not had a material effect on Vesuvius' financial position or results of operations in the current period.

12 Related parties

The nature of related party transactions in 2021 are in line with those transactions disclosed in Note 34 of the 2021 Annual Report and Financial Statements. All transactions with related parties are conducted on an arm's length basis and in accordance with normal business terms. Transactions with joint ventures and associates are consistent with those disclosed in Note 34 of the 2021 Annual Report and Financial Statements. Transactions between related parties that are Group subsidiaries are eliminated on consolidation.

Transactions with joint ventures and associates	**2021** **£m**	2020 £m
Sales to joint ventures	**4.8**	3.8
Purchases from joint ventures	**31.5**	26.7
Purchases from associates	**-**	0.3
Dividends received from joint ventures	**1.0**	2.3
Trade payables owed to joint ventures	**10.3**	5.5
Trade receivables owed by joint ventures	**1.3**	0.6

13 Acquisitions and divestments

Universal Refractories

On 6 December 2021, Vesuvius plc acquired the trade and assets of Universal Refractories Inc. (URI), a specialty refractory producer based in Pennsylvania, USA, which is focused on tundish (steel continuous casting) applications as well as consumable products for the foundry industry. It has become part of the Group's Steel Advanced Refractories business unit, with the exception of the ladle liners business which has been absorbed by our Foundry Division (<10% of sales). The transaction valued URI at an enterprise value of $57.1m (£42.6m) on a cash and debt-free basis and was funded from Vesuvius' internal resources.

Given timing of the acquisition final valuations have not all been completed but the provisional fair values of the assets and liabilities recognised as a result of the acquisition are as follows:

	Book value	Fair value adjustments	Adjusted value
	£m	**£m**	**£m**
Property, plant and equipment	4.5	6.9	11.4
Intangible asset (customer relationships, know-how and noncompete agreements)	-	12.2	12.2
Inventories	5.0	1.1	6.1
Receivables	5.5	-	5.5
Payables	(1.9)	-	(1.9)
Borrowings	(5.4)	-	(5.4)
Deferred tax	-	(3.0)	(3.0)
Net identifiable assets acquired	7.7	17.2	24.9
Goodwill			13.3
Consideration			**38.2**

The goodwill is attributable to URI's reputation in the marketplace and the synergies that Vesuvius expects to gain from its integration It is expected to be tax deductible.

The decision to acquire URI was driven by its long-standing customer relationships and know-how. The identifiable intangible assets acquired are customer relationships, know-how and noncompete agreements. The fair value of these intangibles is provisional pending final valuations. A deferred tax liability of £3.0m has been provided in relation to these fair value adjustments.

In the period since acquisition, URI has contributed £2.1m to revenue and £(0.2)m to operating profit. In accordance with IFRS3, the acquired inventory was revalued to fair value less costs to sell, resulting in a reduction to operating profit of £0.6m. If the acquisition had occurred on the first day of the financial year, it is estimated that the revenue and operating profit from the acquisition would have been £31.2m and £6.8m respectively. On acquisition, URI was subsumed into the Steel Advanced Refractories activities business unit and the Foundry Division and goodwill is monitored at the level of the Steel Advanced Refractories operating segment.

The net cash outflow on acquisition was £43.6m, including related excess working capital payment, the business was acquired on a cash and debt free basis. In accordance with IFRS3 we disclose above consideration of £38.2m and borrowings repaid immediately prior to acquisition of £5.4m. Receivables of £5.5m are expected to be collected. Acquisition-related costs of £1.3m were included in administrative expenses in the Income statement.

The Group did not acquire any material interests in any companies other than URI during the year ended 31 December 2021; however, contingent consideration of £0.1m was paid during 2021 in respect of the previous acquisition of Ecil Met Tec.

The Group did not acquire any material interests in any companies in the year ended 31 December 2020; however contingent consideration of £1.4m was paid during the year in respect of the previous acquisition of Ecil Met Tec.

14 Provisions

	Disposal and closure costs £m	Restructuring charges £m	Other £m	Total £m
As at 1 January 2021	**42.2**	**9.2**	**5.4**	**56.8**
Exchange adjustments	0.4	(0.2)	(0.1)	0.1
Charge to Group Income Statement – trading profit	7.4	-	9.2	16.6
Adjustment to discount	0.7	-	-	0.7
Cash spend	(8.9)	(4.0)	(10.6)	(23.5)
As at 31 December 2021	**41.8**	**5.0**	**3.9**	**50.7**

In assessing the probable costs and realisation certainty of provisions, or related assets, reasonable assumptions are made. Changes to the assumptions used could significantly alter the Directors' assessment of the value, timing or certainty of the costs or related amounts.

15 Financial instruments

The Group's financial assets and liabilities are measured as appropriate either at amortised cost or at fair value through other comprehensive income or at fair value through profit and loss.

IFRS 13 Fair Value Measurement requires classification of financial instruments within a hierarchy that prioritises the inputs to fair value measurement. The three levels of the fair value hierarchy are:

Level 1 – Unadjusted quoted prices in active markets for identical assets or liabilities;
Level 2 – Inputs other than quoted prices that are observable for the asset or liability, either directly or indirectly;
Level 3 – Inputs that are not based on observable market data.

The following table summarises Vesuvius' financial instruments measured at fair value, and shows the level within the fair value hierarchy in which the financial instruments have been classified:

	2021		2020	
	Assets £m	**Liabilities £m**	Assets £m	Liabilities £m
Investments (Level 2)	**0.5**	**-**	0.7	-
Derivatives not designated for hedge accounting purposes (level 2)	**0.1**	**(0.3)**	0.2	-
Derivatives designated for hedge accounting purposes (level 2)	**-**	**(2.3)**	-	(7.0)

All of the derivative financial instruments not designated for hedge accounting purposes reported in the table above will mature within a year of the balance sheet date. There were no transfers between fair value hierarchies during the period. The method for determining the hierarchy and for valuing the financial instruments is consistent with that used at year-end, as disclosed in Note 25 of the 2020 Annual Report and Financial Statements. Fair value disclosures have not been made in respect of other financial assets and liabilities on the basis that the carrying amount is deemed to be a reasonable approximation of fair value.

The Group's Treasury department, acting in accordance with policies approved by the Board, is principally responsible for managing the financial risks faced by the Group. The Group's activities expose it to a variety of financial risks, the most significant of which are market risk and liquidity risk. The condensed interim financial statements do not include all financial risk management information and disclosures required in the annual financial statements; they should be read in conjunction with the Group's 2021 Annual Report and Financial Statements, in which further details of these financial risks were disclosed in Note 25. There have been no changes in the risk management policies since year-end.

In June 2020 the Group executed a $86m Cross currency interest rate swap ('CCIRS'). The effect of this is to convert the $86m Private Placement Notes issued in June 2020 into €76.6m. The timing and amount of the US Dollar cashflows under the CCIRS exactly mirror those of the Private Placement Notes and the maturity date of the CCIRS also matches the repayment date of the Notes. The CCIRS would by default be revalued through the Income Statement; however as it is in a designated hedging relationship it is instead revalued through Other Comprehensive Income. More specifically, the US Dollar exposure is designated as a cashflow hedge of the underlying Private Placement Notes and the Euro exposure is designated as a net investment hedge of part of the Group's foreign operations. The CCIRS is presented as a non-current asset or liability as it is expected to be settled more than 12 months after the end of the reporting period.

With the exception of the CCIRS the fair value of Derivatives outstanding at 31 December 2021 has been booked through the Income Statement. All of the fair values shown in the table above are classified under IFRS 13 as Level 2 measurements which have been calculated using quoted prices from active markets, where similar contracts are traded and the quotes reflect actual transactions in similar instruments. All of the derivative assets and liabilities not designated for hedge accounting purposes reported in the table above will mature within a year of the balance sheet date.

As at 31 December 2021, €224m and $60m of borrowings were designated as hedges of net investments in €224m and $60m worth of overseas foreign operations. In addition, the €76.6m CCIRS liability has been designated as a net investment hedge of a further €76.6m worth of overseas foreign operations.

As the value of the borrowings and the CCIRS liability exactly matches the designated hedged portion of the net investments, the relevant hedge ratio is 1:1. The net investment hedges are therefore 100% effective with no ineffectiveness. It is noted that hedge ineffectiveness would arise in the event there were insufficient euro-denominated overseas foreign operations to be matched against the €76.6m CCIRS liability.

As at 31 December 2021, the Group had $146m, €198m and £28m (£302.3m in total) of US Private Placement Loan Notes (USPP) outstanding, which carry a fixed rate of interest, representing 74% of the Group's total borrowings outstanding at that date. The interest rate profile of the Group's borrowings is detailed in the tables below.

	Fixed rate £m	Floating rate £m	Total £m
Sterling	**28.0**	**76.4**	**104.4**
US dollar	**107.9**	**1.2**	**109.1**
Euro	**166.4**	**27.2**	**193.6**
Capitalised arrangement fees	**(1.2)**	**(2.1)**	**(3.3)**
As at 31 December 2021	**301.1**	**102.7**	**403.8**
Sterling	-	43.3	43.3
US dollar	106.8	0.3	107.1
Euro	160.8	31.5	192.3
Other	-	0.5	0.5
Capitalised arrangement fees	(1.3)	(0.1)	(1.4)
As at 31 December 2020	266.3	75.5	341.8

On 5 July 2021, the Group entered a new syndicated bank facility for £385.0m. On the same date the previous syndicated bank facility for £300.0m was cancelled. The new facility expires in July 2025 subject to a one-year extension option exercisable in 2022 at the discretion of the Group and of the lending banks. On 5 July 2021 the Group replaced its £14.0m and €26.0m drawdowns under the previous facility with equivalent short-term drawdowns under the new facility. Drawdowns under the new facility reference SONIA for GBP drawdowns and EURIBOR for EUR drawdowns.

The maturity analysis of the Group's non-derivative financial liabilities is shown in the tables below.

As at 31 December 2021	**Within one year**	**Between 1-2 years**	**Between 2-5 years**	**Over 5 years**	**Total contractual cash flows**	**Carrying amount**
	£m	**£m**	**£m**	**£m**	**£m**	
Trade payables	**253.8**	**-**	**-**	**-**	**253.8**	**253.8**
Loans & overdrafts	**37.4**	**9.6**	**178.2**	**235.0**	**460.2**	**407.1**
Lease liabilities	**11.6**	**9.2**	**13.4**	**13.2**	**47.4**	**39.9**
Capitalised arrangement fees	**-**	**-**	**-**	**-**	**-**	**(3.3)**
Derivative liability	**(0.6)**	**(0.6)**	**(0.6)**	**0.2**	**(1.6)**	**2.6**
Total financial liabilities	**302.2**	**18.2**	**191.0**	**248.4**	**759.8**	**700.1**

As at 31 December 2020	Within one year	Between 1-2 years	Between 2-5 years	Over 5 years	Total contractual cash flows	Carrying amount
	£m	£m	£m	£m	£m	
Trade payables	185.7	-	-	-	185.7	185.7
Loans & overdrafts	44.7	84.2	80.5	187.4	396.8	343.2
Finance leases	11.2	9.1	11.1	12.9	44.3	36.3
Capitalised arrangement fees	-	-	-	-	-	(1.4)
Derivative liability	(0.5)	(0.4)	2.7	1.4	3.2	7.0
Total financial liabilities	241.1	92.9	94.3	201.7	630.0	570.8

16 Alternative Performance Measures

The Company uses a number of alternative performance measures (APMs) in addition to those reported in accordance with IFRS. The Directors believe that these APMs, listed below, are important when assessing the underlying financial and operating performance of the Group and its divisions, providing management with key insights and metrics in support of the ongoing management of the Group's performance and cash flow. A number of these align with KPIs and other key metrics used in the business and therefore are considered useful to also disclose to the users of the financial statements. The following APMs do not have standardised meaning prescribed by IFRS as adopted by the EU and therefore may not be directly comparable with similar measures presented by other companies.

16.1 Headline performance

Headline performance, reported separately on the face of the Group Income Statement, is from continuing operations and before items reported separately on the face of the Group Income Statement.

16.2 Underlying revenue, underlying trading profit and underlying return on sales

Underlying revenue, underlying trading profit and underlying return on sales are the headline equivalents of these measures after adjustments to exclude the effects of changes in exchange rates, business acquisitions and disposals. Reconciliations of underlying revenue and underlying trading profit can be found in the Financial Summary. Underlying revenue growth is one of the Group's key performance indicators and provides an important measure of organic growth of Group businesses between reporting periods, by eliminating the impact of exchange rates, acquisitions, disposals and significant business closures.

16.3 Return on sales ('ROS')

ROS is calculated as trading profit divided by revenue. It is one of the Group's key performance indicators and is used to assess the trading performance of Group businesses. A reconciliation of ROS is included in Note 2.

16.4 Trading profit/adjusted EBITA

Trading profit/adjusted EBITA is defined as operating profit before separately reported items. It is one of the Group's key performance indicators and is used to assess the trading performance of Group businesses. It is also used as one of the targets against which the annual bonuses of certain employees are measured.

16.5 Headline profit before tax

Headline profit before tax is calculated as the net total of trading profit, plus the Group's share of post-tax profit of joint ventures and total net finance costs associated with headline performance. It is one of the Group's key performance indicators and is used to assess the financial performance of the Group as a whole.

16.6 Headline effective tax rate ('ETR')

The Group's headline ETR is calculated on the income tax costs associated with headline performance, divided by headline profit before tax and before the Group's share of post-tax profit of joint ventures.

16.7 Headline earnings

Headline earnings is profit after tax before separately reported items attributable to owners of the parent.

16.8 Headline earnings per share

Headline earnings per share is calculated by dividing headline profit before tax less associated income tax costs, attributable to owners of the parent by the weighted average number of ordinary shares in issue during the year. It is one of the Group's key performance indicators and is used to assess the underlying earnings performance of the Group as a whole. It is also used as one of the targets against which the annual bonuses of certain employees are measured. Headline earnings per share is disclosed in Note 6.

16.9 Adjusted operating cash flow

Adjusted operating cash flow is cash generated from operations before restructuring and vacant site remediation costs but after deducting capital expenditure net of asset disposals. It is used in calculating the Group's cash conversion.

	2021	2020
	£m	£m
Cash generated from operations	**82.9**	193.7
Add: Outflows relating to restructuring charges	4.0	16.7
Less: Capital expenditure	(45.5)	(40.5)
Add: Vacant site remediation costs	3.0	1.9
Add: Proceeds from the sale of property, plant and equipment	1.2	1.1
Adjusted operating cash flow	**45.6**	172.9
Trading Profit	**142.4**	101.4
Cash Conversion	**32%**	171%

16.10 Cash conversion

Cash conversion is calculated as adjusted operating cash flow divided by trading profit. It is useful for measuring the rate at which cash is generated from trading profit. It is also used as one of the targets against which the annual bonuses of certain employees are measured. The calculation of cash conversion is detailed in Note 16.9 above

16.11 Free cash flow

Free cash flow is defined as net cash flow from operating activities after net outlays for the purchase and sale of property, plant and equipment, dividends from joint ventures and dividends paid to non-controlling shareholders. It is one of the Group's KPIs and is used to assess the underlying cash generation of the Group and is one of the measures used in monitoring the Group's capital. A reconciliation of free cash flow is included underneath the Group Statement of Cash Flows.

16.12 Average trade working capital to sales ratio

The average trade working capital to sales ratio is calculated as the percentage of average trade working capital balances to the total revenue for the previous 12 months, at constant currency. Average trade working capital (comprising inventories, trade receivables and trade payables) is calculated as the average of the 13 previous month-end balances. It is one of the Group's key performance indicators and is useful for measuring the level of working capital used in the business and is one of the measures used in monitoring the Group's capital.

	2021	2020
	£m	£m
Average trade working capital	**344.2**	337.8
Total revenue	**1,642.9**	1,458.3
Average trade working capital to sales ratio	**20.9%**	23.2%

16.13 Adjusted earnings before interest, tax, depreciation and amortisation (adjusted EBITDA)

Adjusted EBITDA is calculated as the total of trading profit before depreciation and amortisation of non-acquired intangibles charges. It is used in the calculation of the Group's interest cover and net debt to adjusted EBITDA ratios. A reconciliation of adjusted EBITDA is included in Note 2.

16.14 Net interest payable on borrowings

Net interest payable on borrowings is calculated as total interest payable on borrowings less finance income, excluding interest on net retirement benefit obligations, adjustments to discounts and any item separately reported. It is used in the calculation of the Group's interest cover ratio.

	2021 **£m**	2020 £m
Total interest payable on borrowings (note 4)	**13.0**	17.9
Finance income (note 4)	**(6.7)**	(7.4)
Net interest payable on borrowings	**6.3**	10.5

16.15 Interest cover

Interest cover is the ratio of adjusted EBITDA to net interest payable on borrowings for the last 12 months. It is one of the Group's key performance indicators and is used to assess the financial position of the Group and its ability to fund future growth. This measure is also a component of the Group's covenant calculations.

	2021 **£m**	2020 £m
Adjusted EBITDA (note 2)	**192.2**	152.0
Net interest payable on borrowings	**6.3**	10.5
Interest cover	**30.5x**	14.5x

16.16 Net debt

Net debt comprises the net total of current and non-current interest-bearing borrowings (including IFRS16 lease liabilities), cash and short-term deposits and derivative financial instruments. Net debt is a measure of the Group's net indebtedness to banks and other external financial institutions. A reconciliation of the movement in net debt is included in Note 8.

16.17 Net debt to adjusted EBITDA

Net debt to adjusted EBITDA is the ratio of net debt at the year-end to adjusted EBITDA for the last 12 months. It is one of the Group's key performance indicators and is used to assess the financial position of the Group and its ability to fund future growth and is one of the measures used in monitoring the Group's capital.

	2021 **£m**	2020 £m
Net debt (note 8)	**277.1**	175.1
Adjusted EBITDA (note 2)	**192.2**	152.0
Net debt to adjusted EBITDA	**1.4x**	1.2x

Notes to the Group Financial Statements (continued)

16.18 Return on invested capital (ROIC)

From 2022 onwards, the Group intends to use ROIC as its key measure of return from the Group's invested capital. RONA performance measure will be replaced with ROIC which provides a more complete measure of Vesuvius's returns. ROIC is calculated as trading profit less amortisation of acquired intangibles plus share of post-tax profit of joint ventures and associates for the previous 12 months after tax, divided by the average invested capital (total assets excluding cash plus non interest bearing liabilities), at constant currency (being the average over December and the previous year end invested capital).

	2021 **£m**	2020 £m
Average invested capital	**1,329.1**	1,300.3
Trading profit (note 16.4)	142.4	94.8
Amortisation of acquired intangible assets	(9.7)	(9.9)
Share of post-tax profit from joint ventures and associates	1.3	1.1
Tax on trading profit and amortisation of acquired intangible assets	(35.1)	(22.8)
	98.9	63.2
ROIC	**7.5%**	4.9%

16.19 Constant currency

Figures presented at constant currency represent 2020 amounts retranslated at average 2021 exchange rates.

16.20 Liquidity

Liquidity is the Group's cash and short term deposits plus undrawn committed debt facilities less cash used as collateral on loans.

	2021 **£m**	2020 £m
Cash and short term deposits	**169.1**	209.7
Undrawn committed debt facilities	**308.1**	246.6
Cash used as collateral on loans	**(21.0)**	(19.0)
Gross up of cash in notional pools	**(0.5)**	-
Liquidity	**455.7**	437.3

16.21 Last twelve months ('LTM')

Some results are presented or calculated using data from the last twelve months from the reference date.

17 Exchange rates

The Group reports its results in pounds sterling. A substantial portion of the Group's revenue and profits are denominated in currencies other than pounds sterling. It is the Group's policy to translate the income statements and cash flow statements of its overseas operations into pounds sterling using average exchange rates for the year reported (except when the use of average rates does not approximate the exchange rate at the date of the transaction, in which case the transaction rate is used) and to translate balance sheets using year-end rates. The principal exchange rates used were as follows:

	Income and expense Average rates			**Assets and liabilities Year-end rates**		
	2021	2020	**Change**	**2021**	2020	**Change**
US Dollar	1.38	1.28	**7.8%**	1.35	1.37	**(1.5%)**
Euro	1.16	1.12	**3.6%**	1.19	1.12	**6.2%**
Chinese Renminbi	8.87	8.85	**0.2%**	8.61	8.89	**(3.1%)**
Japanese Yen	151.06	137.01	**10.3%**	155.69	141.16	**10.3%**
Brazilian Real	7.42	6.61	**12.3%**	7.54	7.1	**6.2%**
Indian Rupee	101.67	95.1	**6.9%**	100.75	99.86	**0.9%**
South African Rand	20.32	21.08	**(3.6%)**	21.64	20.08	**7.8%**