

Filtronic

Building a stronger connection

Initiation of coverage

Tech hardware & equipment

2 June 2021

Price **9.00p**

Market cap **£19m**

Net debt at end November 2020
(including £2.2m lease liabilities) 0.6

Shares in issue 214.2m

Free float 66.1%

Code FTC

Primary exchange AIM

Secondary exchange N/A

Share price performance



% 1m 3m 12m

Abs 0.0 2.9 (7.7)

Rel (local) (1.6) (4.5) (22.2)

52-week high/low 11.3p 7.2p

Business description

Filtronic is a designer and manufacturer of advanced RF communications products supplying a number of market sectors including mobile telecommunications infrastructure, public safety, defence and aerospace.

Next events

FY21 results August 2021

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In early 2020 Filtronic's management refocused the business on market niches where the company's expertise in designing and manufacturing high performance radio-frequency (RF) components and sub-systems operating at frequencies up to 180GHz can command a premium. Having doubled the RF manufacturing capacity in FY20, management's strategy, led by new CEO Richard Gibbs, is to broaden the customer base and product range. Generating higher revenues from the same cost base should deliver improved EBITDA margin.

Year end	Revenue (£m)	EBITDA (£m)	PBT* (£m)	EPS (p)	DPS (p)	P/E (x)
05/18	21.6	3.6	3.1	1.52	0.00	5.9
05/19	15.9	0.7	0.1	0.05	0.00	180.0
05/20	17.2	1.2	0.1	0.05	0.00	180.0
05/21e	16.0	1.6	0.3	0.12	0.00	76.9

Note: *PBT and EPS are normalised, excluding amortisation of acquired intangibles, exceptional items and share-based payments.

Applying specialist RF skills to growth markets

Filtronic is highly unusual in being an independent company that has MMIC design engineers, RF hardware designers, RF manufacturing engineers and RF system engineers. It is also one of the few companies in Europe that has the equipment required to manufacture high-frequency RF sub-systems in volume. This combination is rare, so even large telecoms groups outsource design and manufacture of the critical RF front-end section of 5G and public safety communications networks to Filtronic. Similarly, large defence groups outsource the design and manufacture of the RF transmit/receive (transceiver) modules for radar. Demand for Filtronic's products is benefiting from 5G network roll-out, investment in US public safety networks to safeguard citizens and an increase in UK defence spending with the emphasis on developing a more sophisticated threat response.

Improving manufacturing capacity utilisation

As part of the sales push, Filtronic has begun to deploy its transceiver modules in new applications including low latency banking networks, 5G test equipment, low earth orbit (LEO) satellite communications and trackside to train links. It is also creating a network of sales agents in the US to improve access to specifiers of public safety networks. Growing sales in this way not only improves capacity utilisation, potentially increasing EBITDA margin, but also reduces dependence on three key customers.

Valuation: Leveraged model potentially drives share price uplift

Comparing Filtronic's multiples with RF specialist peers, we note it is trading broadly in line with the mean on both prospective EV/sales and EV/EBITDA. This is reasonable in our opinion because our estimates predict the group's FY21 EBITDA margin will be at a small discount to the mean. Given the current underutilisation of manufacturing capacity, we see scope for successful execution of management's sales initiative to deliver revenue growth and improvement in EBITDA margin during FY22, potentially driving an uplift in the share price.

Investment summary

Company description: Applying RF skills to key market niches

Filtronic is headquartered in Leeds, UK, where it designs RF systems and sub-systems, with a facility in County Durham where sales, manufacturing and mmWave (30–300GHz) engineering are based and an assembly and sales facility in Maryland, US. It employs around 120 people. The company's primary products are high frequency transceivers (transmitter/receivers) for use in mobile telecommunications backhaul links, active electronically scanned array radars and emerging applications such as track-to-train communications and LEO satellite communications networks and tower-top amplifiers used in public safety communications networks.

Financials: Second-half recovery

Filtronic's end markets remained reasonably robust in H121, with the impact of the coronavirus pandemic on demand for customer's products resulting in only a 5% year-on-year revenue decrease to £7.1m. Adjusted EBITDA was flat at £0.6m because a higher proportion of defence-related work resulted in a lower cost of material to sales ratio. Net debt reduced by £0.1m during H121 to £0.6m at end November 2020 (including £2.2m lease liabilities). Management has not provided any formal guidance for FY21 other than noting in February it expects year-on-year growth in EBITDA. Our FY21 estimates assume revenues will be higher in H221 than H121 because order flow from the lead customer in the public safety market began to recover in December and the company announced a £1m+ contract for a new defence customer in January, giving only a £1.2m y-o-y drop in our forecast FY21 revenues to £16.0m. Assuming the cost of material/sales remains relatively low because of a higher proportion of defence and public safety revenues, this results in a £0.4m increase in FY21 EBITDA to £1.6m. As FY22 revenues are very sensitive to the rate of 5G roll-out outside China, we only present one year of estimates.

Valuation: Margin improvement to drive share price

Comparing Filtronic's multiples with those for its RF specialist peers, we note it is trading broadly in line with the mean on both prospective EV/sales and EV/EBITDA. This is reasonable in our opinion because our estimates predict the group's FY21 EBITDA margin will be 10.3%, which is at a small discount to the mean. Given the current underutilisation of manufacturing capacity, we see scope for successful execution of management's sales initiative to deliver revenue growth and improvement in EBITDA margin during FY22, potentially driving an uplift in the share price. The announcement of contract awards from new customers such as the battlefield communications award in January 2021, of new products such as the tower-top amplifier in May 2020 and of projects in emerging applications areas will signal to investors that the sales initiative is succeeding.

Sensitivities: Reducing customer concentration key

We believe the key sensitivities are: (1) customer concentration: Filtronic is extremely dependent on the relationship with three key customers, which collectively accounted for 87% of FY20 revenues; (2) the speed of 5G rollout outside China: Filtronic's major mobile telecommunications customer is based in Europe, so is unlikely to be supplying material volumes of telecommunications infrastructure to 5G projects in China, which is where the majority of 5G deployments have happened so far; (3) component availability: in common with other electronics companies, Filtronic has to contend with shortages of certain electronic components; and (4) recruitment: Filtronic is very dependent on the availability of engineers with master's degrees or doctorates in RF engineering. There are very few universities offering this training.

Company description: Enabling the future of RF, microwave and mmWave communication

History: Major beneficiary of 2G mobile telecoms boom

Filtronic was founded in 1977 to commercialise microwave technology developed at Leeds University. It was a major beneficiary of the development of mobile communications in the 1980s and 1990s. It listed in 1994 and by 2003 was manufacturing over 400,000 base station units and over 120m handset antennae. Since then, market consolidation and intense competition from companies based in Asia has resulted in a sequence of disposals, the last of which was the sale of the loss-making mobile base station antennae business in January 2020 for US\$5.5m (c £4.2m).

Filtronic today

Filtronic is highly unusual in being an independent company that has monolithic microwave integrated circuit (MMIC) design engineers, RF hardware designers, RF manufacturing engineers and RF system engineers. This combination of skills is rare outside large telecoms groups such as Ericsson, Huawei or Nokia, and even these often outsource RF front-end design because of a shortage of suitably experienced staff. Filtronic is also one of only a handful of companies in Europe that has the chip and wire bonding equipment required to manufacture high-frequency RF sub-systems in volume. This range of skills means defence and telecoms OEMs, which are increasingly operating as system integrators to give more flexibility over their cost bases, can outsource both design and manufacture of sub-systems to a single supplier.

First phase of strategy complete: Refocusing activities and expanding capacity

The sale of the mobile base station antennae business last year concluded Filtronic's involvement in high volume markets where it was no longer able to operate profitably. Management, led by new CEO Richard Gibbs, has refocused the company's activities on market niches where Filtronic's expertise in designing and manufacturing high-performance RF components and sub-systems operating at frequencies up to 180GHz can command a premium. The three main areas of activity are mobile telecommunications infrastructure, defence and aerospace and public safety, where equipment has to withstand harsh operating environments and meet demanding specifications.

In FY20 Filtronic invested over £1m in automated high precision die placement and wire bonding machinery, as well as high frequency electrical and environmental testing capacity at its site in County Durham, UK. This doubled capacity to a potential throughput of 3,000 transceivers per month, enabling Filtronic to scale up volumes to meet customer demand, for example for the 5G backhaul market or US public safety market. In addition, automating processes has helped Filtronic increase product yields to an average of 95%, reducing the need to rework the product before it leaves the facility. Management's focus is now on winning new business to increase the volume of product being manufactured at the site, thus improving operating margin by delivering higher revenues from the same cost base.

Second phase of strategy ongoing: Growing sales

Potential revenue growth is being achieved by broadening the customer base and product range. The diversification strategy is already showing signs of success. For example, in January 2021 Filtronic won a contract worth over £1m to develop and supply battlefield radio communications hardware to a new major UK defence customer and in May 2020 it launched a new tower-top amplifier for the public safety market. As part of the push to gain new clients, Filtronic is establishing a network of sales representatives in North America and Europe, beginning in H121 with the

appointment of Global Telecom Partners, which has a presence in the north-eastern US states and WTG Marketing, which is based in the South-Central region of North America. Management intends to appoint a further two US sales representatives by the end of CY21, to give access to around 200 telecoms systems engineers who specify public safety systems. We note that Richard Gibbs was previously group sales and marketing director of E2V Technologies.

Markets addressed

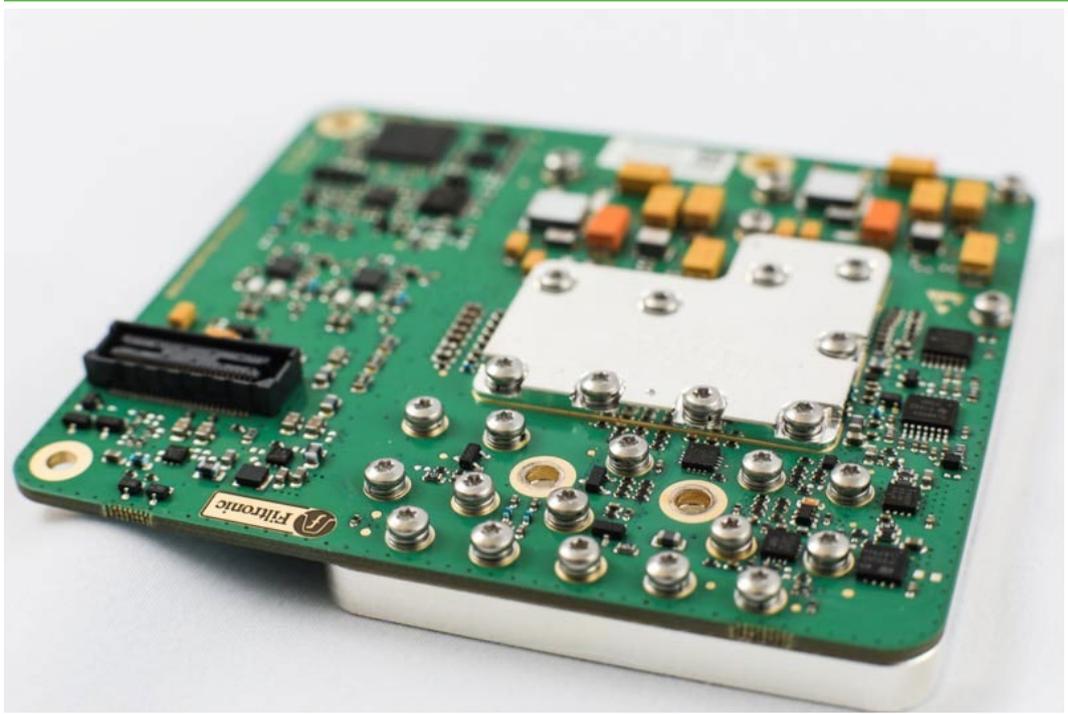
Filtronic's three main areas of activity are mobile telecommunications infrastructure, defence and aerospace and public safety, where equipment has to withstand harsh operating environments and meet demanding specifications. As part of management's sales initiative, Filtronic has begun to deploy its transceiver modules in new applications including low latency banking networks, wireless point-to-multipoint networks, 5G test equipment, LEO satellite communications and trackside to train links.

Mobile telecommunications infrastructure market

Ability to transmit at higher frequency E-band key to 5G deployment

One of the critical technologies required to address the demanding capacity requirements of 5G networks is the ability to transmit signals cost-effectively in the higher frequency E-band (71–86GHz). This is primarily because transmitting at this higher frequency band allows more data to be sent per second via mmWave backhaul links between mobile cell sites and the core fibre network. Using an mmWave backhaul link avoids the cost of connecting the cell sites to the fibre backbone with a fibre link. As with 4G networks, more than 50% of the cells in 5G networks are being connected back to the fibre backbone with wireless links rather than fibre (source: ABI Research, 2021). The proportion in each region depends on whether there is already fibre connectivity for backhaul, which is the case in urban parts of the US but not in much of India.

Exhibit 1: Morpheus transceiver module



Source: Filtronic

Filtronic has been designing and manufacturing E-band transceivers, devices which both transmit and receive wireless signals, for over a decade. By July 2020 the company had shipped a combined total of 50,000 units of different generation transceivers, contributing to it gaining the Queen's Award for Enterprise in May 2021. Its Morpheus modules, which were launched in February 2020, are 20% smaller and 50% lighter than the previous Orpheus modules. The Morpheus modules deploy a new generation of higher power amplifier MMICs designed in-house by Filtronic, which gives an immediate power advantage over amplifiers produced by competitors, which rely on standard MMICs from chip vendors. Both the Orpheus and Morpheus modules are designed for easy integration into OEM's outdoor units, giving OEMs the advantage of a rapid time-to-market while requiring minimal engineering resource.

Both the Orpheus and Morpheus modules have been qualified for deployment in the latest radio platforms specifically developed for 5G applications and have been field proven in wide-bandwidth, high-capacity applications up to 10Gbp per channel. During H121, Filtronic's lead telecoms OEM customer, which had been deploying Orpheus modules in its 5G backhaul equipment, started to deploy Morpheus modules in volume, although the switch was slower than management had initially expected because the coronavirus pandemic delayed customer qualification. The transition is now complete.

5G market growing quickly

Ericsson's Mobility Report, published in November 2020, predicts 5G subscription uptake will be significantly faster than that for 4G because of China's faster engagement with 5G and the earlier availability of devices from several vendors. The report estimates there were 220m 5G subscriptions globally at the end of 2020 and predicts this will rise to 3.5bn by the end of 2026, accounting for around 40% of all mobile subscriptions at that time. This is good news for infrastructure hardware providers such as Filtronic. A report from Research and Markets published in November 2020 predicted that the global market for millimetre-wave radios and transceivers for 5G backhaul would grow at a CAGR of 12.6% between 2020 and 2028 to reach over \$9bn by 2028. Based on the rate at which individual countries are scheduled to open up E-band spectrum for licensed transmissions, management estimates this market will grow at around 20% per year over the next two years. While the decision by the UK government to remove Huawei from the country's 5G networks does not immediately generate additional revenues for Filtronic, it changes the market landscape favourably by removing one of its customer's competitors from the field.

Critical communications market

The critical communications market encompasses sectors where highly reliable RF equipment is mission critical and often required equipment to work in harsh environments and in regions where conventional fibre networks are not accessible. Unlike the mobile telecommunications market, product life cycles in these sectors are much longer and are typically more than 10 years.

Public safety communications networks

Private, generally government-owned wireless networks are used for public safety communications networks. Because these networks provide critical communications for the emergency services, they require high reliability equipment to meet demanding specifications. Public safety networks continue to receive good levels of investment as government and quasi-governmental agencies continue to expand and upgrade existing networks to protect their citizens.

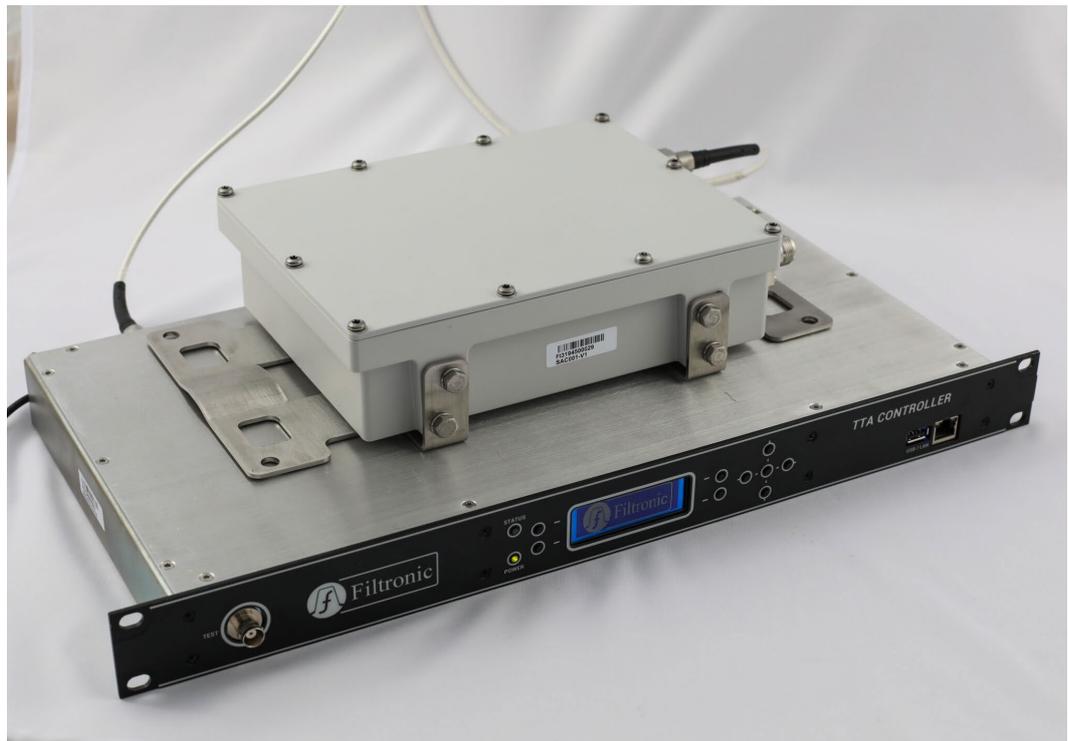
Filtronic has been providing a range of high-performance filters and combiners to public safety networks in the US and other regions where Land Mobile Radio networks have been used for several years. Having established a position of trust with its lead customer, it seeks to grow its offering to this key market in the coming years as the trend from mainly voice to full data networks

grows. A recent example of this was the launch in May 2020 of a range of tower top amplifier systems for use in two-way radio networks in the 700Mhz and 800Mhz public safety bands, particularly the P25 network for first responders in the US. A key feature of this platform is smart redundancy, where the system continuously monitors the health of the amplifiers. In the case of a failure in one of the amplifiers the system can continue to operate using the spare amplifier. If both amplifiers are lost the system will function in a bypass mode. The units are compact (229 x 173 x 51 mm) and light (weighing less than 3.6kg), reducing tower loading, and are designed to withstand lightning strikes. The systems are among a limited number on the market which are fully compliant with stringent US public safety specifications. Following rigorous testing, Filtronic's lead public safety communications customer formally approved the product range and added the systems to its catalogue, resulting in initial sales during H121.

Market growth driven by requirement to augment voice with data

A report issued by ResearchAndMarkets in March 2021 predicted that the global mission critical communication market would reach \$32.6bn by 2028, growing with 9.8% CAGR between 2021 and 2028. This market not only includes ultra-reliability, low-latency and/or high bandwidth public safety networks, where Filtronic has many years of experience, but also dedicated networks for specific industries such as rail transportation, utilities, mining, manufacturing and the oil & gas industry. As discussed below, Filtronic is beginning to provide sub-systems for some of these additional sectors. Mission-critical communications networks increasingly need to support the transmission of data and machine-to-machine (Internet-of-things) communication as well as just voice.

Exhibit 2: Tower-top amplifier



Source: Filtronic

Defence and aerospace

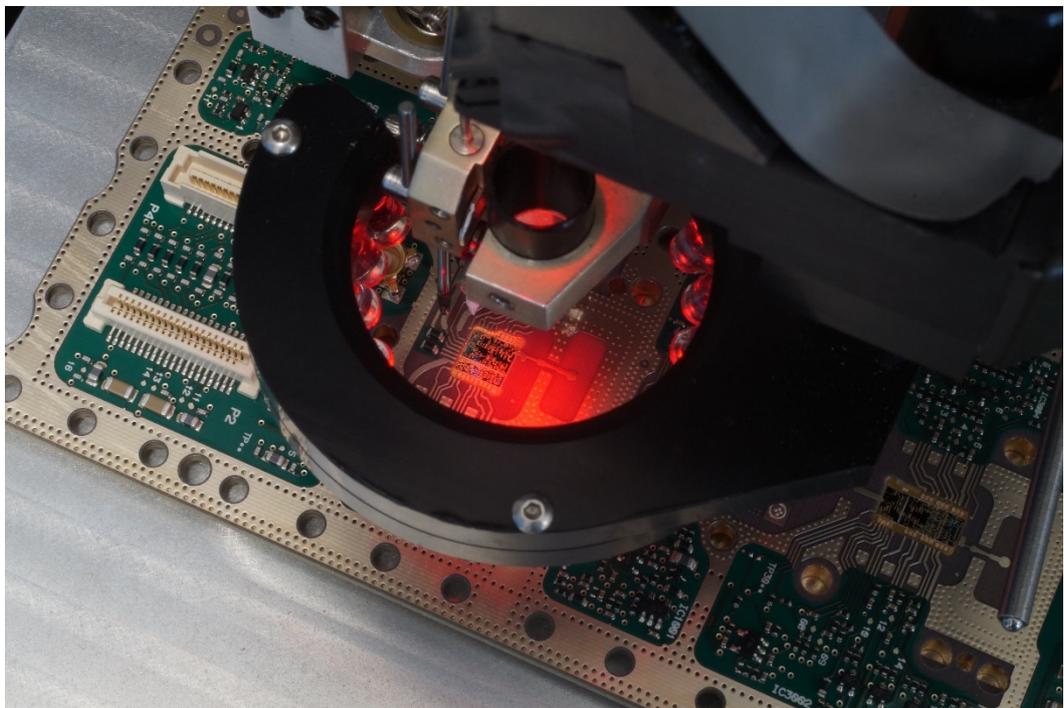
The defence and aerospace market also requires high-reliability communications and radar products. As defence equipment spending targets higher frequency and more technically advanced radar and communications products, Filtronic's manufacturing knowhow and technical capabilities are of increasing interest to this market.

Filtronic's principal products for this market are transceiver modules for active electronically scanned array radars. It also offers filter banks for radar applications and microwave sub-systems based on MMICs, which it has designed in-house and are used in missile electronics. These products are designed in Leeds and manufactured in County Durham.

In July 2020 Filtronic announced it had won a £4.9m contract from its lead defence and aerospace customer, who is a Tier 1 European defence equipment supplier, for the supply of high-performance radar transceiver modules for airborne applications. This order is a follow-on contract to the supply contract signed in 2017, which concluded in June 2020 but is for a new end-client of Filtronic's customer. The contract covers the supply of modules over a two-year period with delivery commencing in August 2020. (The name of the customer has not been disclosed, but we infer that it is BAE Systems, given that this major UK defence prime contractor and Leonardo were jointly awarded a £317m contract in September 2020 to deliver active electronically scanned array radar to the RAF's fleet of Typhoon aircraft.)

In January 2021 the company announced it had won a contract worth over £1m from a new major UK defence customer for the supply of battlefield radio communications hardware, which is a new application area. The contract is for the design and supply of field units over a 12-month period. During this time, Filtronic will develop and validate a prototype solution that will then transition into low volume manufacturing with final product delivery expected to commence in the second half of CY21. Management notes significant potential for further opportunities for repeat orders and for other products from this new customer. The company has also won several small development contracts for defence applications in recent months. While these are modest, they have the potential to lead to more substantial projects and give access to a wider customer base.

Exhibit 3: Transmit/receive module under construction



Source: Filtronic

Defence expenditure shifting away from 'boots and bombs'

In November 2020 the UK government announced a £16.5bn increase above its manifesto commitment over the next four years. Together with a pledge to increase defence spending by 0.5% above inflation for every year of the current parliament, this represented an overall cash increase of £24.1bn over four years compared to the prior year budget. Of this additional funding, £6.6bn was

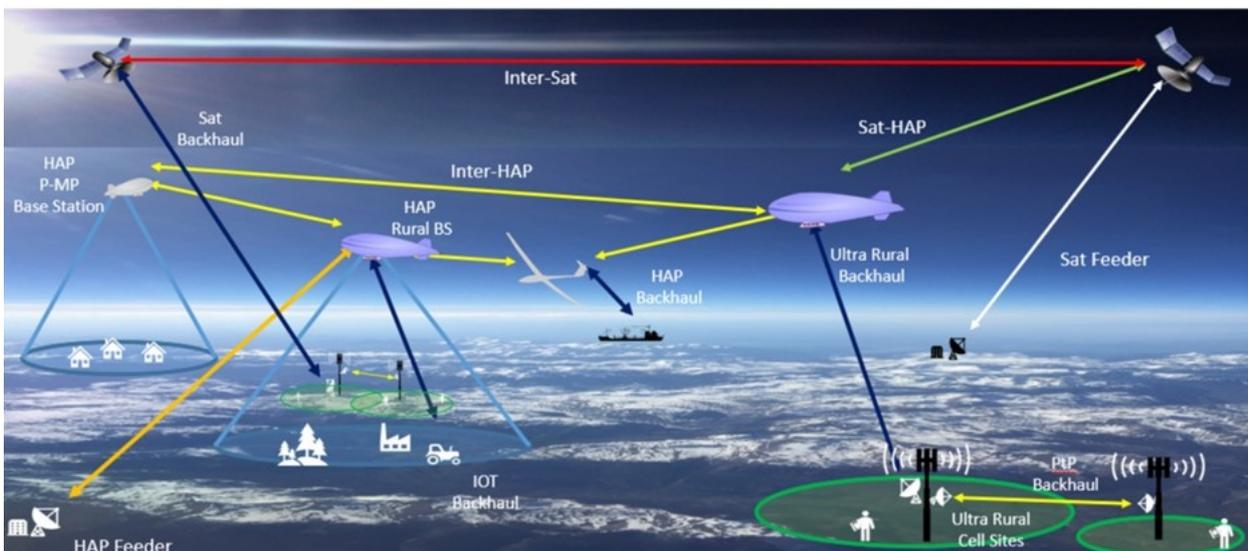
allocated to R&D. The Integrated Review of Security, Defence, Development and Foreign Policy published in March 2021 revealed that, among other items, the additional funding will be used for delivering upgraded Typhoon radars, which has clear potential for Filtronic.

Emerging application areas

Since Morpheus modules have a footprint of 90 x 80mm and weigh only 110g, they are a good basis from which to develop systems for other applications. These include:

- Low-latency private networks:** in December 2020 Filtronic secured a £0.4m development contract for a low latency private network. This type of network is of interest to financial institutions because reducing the time it takes to transmit a signal from one site to another can create a competitive advantage when trading shares. This type of low-latency network also has potential for safety applications on industrial sites where it is not practical to connect critical infrastructure with fibre optic cable.
- 5G test equipment:** Filtronic is developing systems for laboratory testing of 5G equipment. This requires very accurate transceivers and equipment that can cover a wide frequency range. Management expects these products to commence low-volume production over the next 12 months.
- Wireless point-to-multipoint systems:** Filtronic is working on a couple of projects for customers with bespoke RF communications systems operating in unlicensed frequency bands.
- Internet-in-the-sky/Spy-in-the-sky:** as discussed in our [report on the small satellite sector](#), constellations of low Earth orbit (LEO) satellites and aerial platforms referred to as high-altitude pseudo-satellites (HAPS) are being developed to provide high-speed broadband interconnectivity to remote regions of the globe, including rural areas of North America. Satellites are also being deployed for earth observation. While mmWave links do not deliver as high a data rate as free-space laser communications links, the technology is proven and transmission in certain frequencies, including E-band, is not seriously affected by rain or water vapour. This makes mmWave transmission a good option for links between a satellite, unmanned aerial vehicle or aircraft and the ground (see Exhibit 4). For example, Telesat's proposed Lightspeed LEO constellation will have four optical links on each satellite as well as Ka-band (26.5–40GHz) microwave links to the earth.

Exhibit 4: Taking technology from terrestrial networks into space



Source: Filtronic

Filtronic has already proved its transceivers through work with a major HAPS developer which has recently withdrawn from the market. It is currently in discussions with other potential partners regarding LEO programmes. However, while the communications technology is proven, the economic case for using HAPS and large constellations of LEOs to provide internet access is less certain, so management expects it will be several years before this segment begins to generate meaningful revenues for Filtronic.

We note that the Integrated Review of Security, Defence, Development and Foreign Policy published in March 2021 referred to the establishment of a new Space Command by summer 2021. This body will support the armed forces, integrate in-space and ground sensing to track space debris, investigate incidents in space, and detect, anticipate and attribute hostile activity, as well as provide financial support for the UK space sector. This initiative could create opportunities for Filtronic’s transceivers in satellite communications networks.

- **Ultra-high capacity trackside to train links:** during FY20, Filtronic’s E-band transceiver links were successfully trialled outside the UK for providing high-speed broadband connectivity on board trains. There are trials ongoing in the UK as well. While the UK trials are scheduled to complete by end CY21, it is likely to be several years before the system is deployed in this country because of the challenges involved in getting track infrastructure operators, train operators and telecommunications operators to agree on roll-out.

Given the additional capacity following the investment in the County Durham site, Filtronic is also actively marketing its manufacturing and test capability as a service to defence and medical customers and intends to market it to companies making down-hole drilling equipment when the oil and gas market stabilises.

Competitive advantages

RF engineering team: Filtronic has a team of around 20 designers and developers. It is highly unusual in being an independent company that has MMIC design engineers, RF hardware designers, RF manufacturing engineers and RF system engineers as well as manufacturing and test capability. This combination of skills is rare outside large telecoms groups such as Ericsson, Huawei or Nokia and even these often outsource RF front-end design because of a shortage of suitably experienced staff. Other independent companies typically only specialise in one of the aspects of designing RF systems such as MMIC design and do not have any volume manufacturing capability. This range of skills means that defence and telecoms OEMs, which are increasingly operating as system integrators to give more flexibility over their cost bases, can outsource both design and manufacture of sub-systems to a single supplier. It also means that for Filtronic the competition is effectively from in-house operations rather than other independent RF specialists.

Exhibit 5: mmWave design capability



Source: Filtronic

Exhibit 6: mmWave assembly capability



Source: Filtronic

Manufacturing facilities tailored to market: the ability to make electronic products containing unpackaged integrated circuits is critical for high-frequency applications because dispensing with the packaging enables the die to be much closer to each other, reducing signal losses. It also results in lighter, more compact sub-systems. However, using unpackaged die means that specialist equipment is required for placing the tiny unpackaged die in the correct place on the circuit boards and for connecting the die to the circuit boards. Filtronic is one of a handful of companies in Europe that has the equipment required to carry out these processes in volume. It also has the secure premises, proven, documented processes and full traceability and work-in-progress tracking required for defence contracts, and a range of fulfilment options preferred by defence OEMs including turnkey design and manufacturing, inventory management and supply of kits of components ready for assembly.

UK/US manufacturing: during FY20, Filtronic moved the assembly of its public safety products, which are primarily sold to a customer in the United States, from its Chinese sub-contractor to an in-house facility at its operation in Maryland, US. This has the dual benefit of reducing lead times and achieving compliance with the McCain Bill, which bars a large number of named Chinese companies from the US market. It is possible that the commitment in the Integrated Review of Security, Defence, Development and Foreign Policy cited earlier to growing the UK's science and technology capability may benefit Filtronic's UK-based activities.

Management focusing on strategic growth and development

Over the last year the board has been considerably strengthened to drive business growth and development. In September 2020, Richard Gibbs became CEO, enabling chairman Reg Gott to step back from an executive to a non-executive role. Richard is an experienced director who has led a number of business operations supplying semiconductor, RF and electronics sub-systems to the telecoms, aerospace, defence, medical and oil & gas markets. He joined Filtronic from Micros Components, a private equity-owned company, where he had been managing director since 2016. Prior to that, he spent nine years at E2V Technologies, where he was group sales and marketing director and president of the RF Product and Hi-Reliability Semiconductors divisions, and 20 years with Honeywell, of which 10 years were spent managing overseas operations. John Behrendt was appointed as a non-executive director in January 2021. He was head of Principal Investments with Eight Roads, part of the Fidelity network of companies, from 2015 until January 2020, and has held a number of leadership and operational roles including CEO of Optegra, an international health care company; CEO/CFO of Frontier Silicon, which at the time was a VC-backed supplier of components/software for mobile devices and digital audio markets; CFO for Teraview, an instrumentation devices company operating in the pharmaceutical and defence markets; and CFO for Alphamosaic, a VC-backed fabless chip company.

Sensitivities

Customer concentration: the telecommunications equipment market is dominated by a few giant companies, so there are only a small number of potential customers. Filtronic is extremely dependent on its relationship with three key customers. During FY20, these three customers collectively accounted for 87% of revenue, with the largest accounting for 44% of the total and the second largest 27%. We note that Filtronic has very long-term relations with each of these customers, effectively functioning as an extension to their RF design and manufacturing operation and providing RF modules for use in multiple end-products. For example, it is working on programmes to develop next-generation public safety network products for launch in two or three

years' time. It would be time-consuming and risky for each of these customers to bring the work in-house and difficult for them to find alternative suppliers with the same range of capabilities. Working with large customers with strong positions in their respective markets means that Filtronic is working with partners which are defining the direction of the market and require products at sufficiently high volumes to give Filtronic the benefit of economies of scale. (For example, Filtronic's public safety customer has a dominant share of the US market, from which we infer that it is Motorola Solutions. This is because Motorola's land mobile radio sales, most of which are for P25 networks and are therefore sold to end-customers in the United States, totalled US\$4.0bn in 2020 and, according to research house Global Industry Analysts, the US land mobile radio system market was valued at US\$3.7bn in 2020.)

Speed of 5G roll-out outside China: we infer from an analysis of the geographic split of Filtronic's revenue that its major mobile telecommunications customer is based in Europe, which means that the customer is unlikely to be supplying material volumes of telecommunications infrastructure to 5G projects in China, which is where the majority of 5G deployments have happened so far. Uptake of Filtronic's E-band transceivers for mobile communications applications is therefore very dependent on the roll-out of 5G networks in other regions. It is also very dependent on whether these regions already have fibre connectivity for backhaul, as is common in the United States, or are reliant on mmWave links for backhaul, as is typical in India.

Component availability: in common with other electronics companies, Filtronic is currently having to contend with shortages of certain electronic components. Filtronic has addressed this by building up an inventory of key parts. There may be an impact in FY22 because even if Filtronic has the components it needs, if other sub-system providers are not able to manufacture product because of component shortages, Filtronic's customers will not have all of the sub-systems they need to build complete networks.

Recruitment: Filtronic is very dependent on the availability of engineers with second degrees in RF engineering. There are very few universities offering this training. However, Filtronic does not appear to have a major problem with recruiting and retaining suitably skilled personnel.

Brexit: management does not believe that this will significantly change its trading relationships with customers and suppliers in the EU or add significant costs. It secured the necessary export licences and additional inventory ahead of the deadline to reduce any potential disruptions to operations.

Financials

H121 performance

Filtronic has remained fully operational throughout the coronavirus lockdowns, enabling it to keep core engineering developments on track against their respective milestone delivery plans and maintain product delivery schedules. The end-markets remained reasonably robust, although there was a slowdown in sales to the public safety market which management believes was the result of public funds being diverted to COVID support measures and the lead customer experiencing difficulties in accessing sites to install equipment. In addition, travel restrictions adversely affected new business acquisition. The slowdown in the public safety market and a slower switch to the next-generation Morpheus platform than management had expected were partly offset by stronger sales in the defence and aerospace market. Total sales revenues declined by 5% year-on-year during H121 to £7.1m, in line with management expectations.

Adjusted EBITDA was flat at £0.6m and the group moved from £0.2m adjusted profit before tax in H120 to £0.1m adjusted loss before tax in H121.

Net debt reduced by £0.1m during H121 to £0.6m at end November 2020 (including £2.2m lease liabilities). Cash generated from operations was £0.5m. Investment in capital equipment was minimal (£0.0m in H121 versus £1.2m in H120) because the investment in the Sedgefield site completed in FY20. Capitalised development costs were substantially lower y-o-y (£0.1m versus £0.4m) because much of the recent development work is being paid for by customers. At the end of H121, the company had a £3.0m invoice discounting facility against the UK debtor book and a US\$4.0m factoring facility against the US debtor book. Both of these facilities are undrawn but give flexibility with regard to working capital. There was also a £0.5m overdraft facility that was put in place during H121 to provide additional headroom as a precaution against potential adverse impacts of the coronavirus pandemic. This facility was also undrawn.

Exhibit 7: H121 vs H120 performance

£m	H121	H120	Commentary
Revenue	7.1	7.5	
Material costs	(2.7)	(3.1)	
Material costs/revenue	38.0%	40.9%	Lower material costs/revenues on defence projects benefited H121
Other costs	(3.8)	(3.8)	Further increases in sales and marketing offset by lower travel costs, £0.2m payment from the US Paycheck Protection Program and the furlough of 23 UK production staff between June and September, which coincided with production delays
EBITDA	0.6	0.6	
EBITDA/revenue	8.6%	8.1%	
Depreciation and amortisation	(0.5)	(0.3)	Higher levels of depreciation in H121 following the completion of the investment at the Sedgefield site in FY20 plus a small impairment of development costs
Pre-exceptional EBIT	0.1	0.3	
Exceptional items	-	(0.8)	
Reported EBIT	0.1	(0.5)	
Finance costs	(0.2)	(0.1)	Higher in H121, reflecting the new asset finance leases used to purchase equipment for the County Durham site in FY20
Reported loss before tax	(0.1)	(0.7)	
Tax	0.1	(0.1)	
Reported loss after tax – continuing operations	(0.1)	(0.8)	
Loss from discontinued operations	-	(1.1)	
Loss for the period	(0.1)	(1.8)	

Source: Company data, unaudited.

Outlook

Management has not provided any formal guidance for FY21 other than noting in February that it expects year-on-year growth in EBITDA. As FY22 revenues are very sensitive to the rate of 5G roll-out outside China, we only present one year of estimates. Our FY21 estimates make the following assumptions:

- **Revenues:** we model these as higher in H221 than H121 because order flow from the lead customer in the public safety market began to recover in December and also because Filtronic received an order worth £1m+ in January from a new defence customer.
- **Cost of materials/sales:** we model this at H121 levels, although the higher proportion of work for the defence and public safety sectors may push cost of materials/sales lower.
- **Other costs:** we model an increase in staffing costs in comparison with H121 to reflect investment in sales and in engineering to support new customers, as well as an increase in marketing expenditure.
- **Working capital:** inventory levels increased by £0.4m during H121 as the company built up stocks of long-lead semiconductor materials and to support relocation of production from China to the United States. We model this as unwinding during H221 in line with management expectations. We also reduce creditor levels at end FY21 compared with end H121 because Filtronic paid the last instalment of warranty costs for telecoms antennae to a specific customer in December 2020, thus reducing provisions and has paid suppliers for the stocks it had built up during H121.

- **Investment activity:** we model minimal amounts of investment in capital equipment because the programme of expenditure at the Country Durham site completed in FY20. We model capitalised development costs at H121 levels.

Valuation: Lower EBITDA margin than peer average

There are very few other listed companies specialising in high-power mmWave communications products, not just in the UK, but also across mainland Europe, Israel and North America. While this emphasises the uniqueness of Filtronic's skillset, it makes it more difficult to create a sample of peers to use as the basis of a peer multiples comparison. We have created two sample sets. The more valid one consists of relatively small companies which, like Filtronic, offer niche product used for transmitting data at mmWave frequencies. For reference, we also include a sample of European and North American companies offering complete telecommunications solutions based on high-power, high-frequency microwave links, although these are not directly comparable with Filtronic.

Exhibit 8: Peer multiples

Name		Market cap (£m)	EV/Sales 1FY (x)	EV/EBITDA 1FY (x)	P/E 1FY (x)	EBITDA margin 1FY (%)
Aviat Networks (AWNW.OQ)	Microwave networking products including E-band radios	284	1.3	11.4	15.5	11.7
Baylin Technologies (BYL.TO)	Microwave communications products up to Ka-band (26.5–40GHz)	32	0.9	46.7	(4.6)	1.8
CommScope Holding Company (COMM.O)	Microwave communications products including point-to-point antennae up to 11.7GHz and tower-mounted amplifiers	2,799	1.6	10.7	10.0	15.3
Comtech Telecommunications (CMTL.O)	Microwave communications products including Ku-band (12–18 GHz) power amplifiers and block-up-converters.	433	1.3	10.7	(8.4)	12.0
RF specialists			1.3	10.9	12.8	13.0
Motorola Solutions (MSI.N)		24,272	4.7	16.0	23.0	29.5
Nokia (NOKIA.HE)		20,151	0.9	7.6	17.7	12.5
Telefonaktiebolaget LM Ericsson (ERICB.ST)		31,354	1.5	9.7	17.9	15.3
Global telecommunications equipment companies – mean			2.4	11.1	19.5	
Filtronic		19	1.2	12.1	76.9	10.3

Source: Refinitiv, Edison Investment Research. Note: Prices as at 27 May 2021. Grey shading indicates exclusion from mean.

Comparing Filtronic's multiples with those of its RF specialist peers, we note that it is trading broadly in line with the mean of the sample with regards to both prospective EV/Sales and EV/EBITDA and at a significant premium to the mean with regards to P/E. In our opinion, it is reasonable for Filtronic to be trading in line with the mean EV/Sales and EV/EBITDA for our sample of RF specialists at present because our estimates predict that the group's FY21 EBITDA margin will be 10.3%, which is at a small discount to the mean for our sample.

Leveraged business model could drive share price uplift

Exhibit 9: FY22 EBITDA margin (%) as a function of revenue and cost development

		Year-on-year revenue growth			
		5.0%	10.0%	15.0%	20.0%
Incremental indirect costs as a % of additional sales	3.0%	9.9	12.3	14.4	16.4
	5.0%	8.0	10.5	12.7	14.8
	7.0%	6.1	8.6	11.0	13.1

Source: Edison Investment Research. Note: Modelling materials costs at 37.9% of sales, ie FY21 levels.

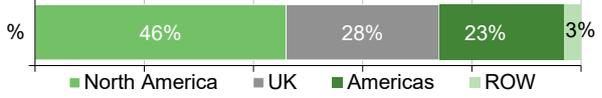
However, looking forward to FY22, while we do not have any estimates for this period, we note that Filtronic's surplus manufacturing capacity means that indirect costs would not increase as quickly as revenues if there were to be significant sales growth during FY22. The use of a network of sales agents in the US should help keep the increase of indirect costs relatively low as sales increase.

Provided that indirect costs are kept under control, revenue growth of 10% or more would result in an improvement in EBITDA margin (see Exhibit 9). Depending on the scale of EBITDA margin improvement, Filtronic could justify trading on EV/Sales and EV/EBITDA multiples that were at a premium to the mean for our sample, potentially driving an uplift in the share price.

Exhibit 10: Financial summary

	£m	2018	2019	2020	2021e
31 May		IFRS	IFRS	IFRS	IFRS
INCOME STATEMENT		Restated			
Revenue		21.6	15.9	17.2	16.0
EBITDA		3.6	0.7	1.2	1.6
Normalised operating profit		3.2	0.2	0.4	0.7
Amortisation of acquired intangibles		0.0	0.0	0.0	0.0
Exceptionals		0.0	0.0	(0.6)	0.0
Reported operating profit		3.2	0.2	(0.2)	0.7
Net Interest		(0.1)	(0.1)	(0.2)	(0.4)
Exceptionals		(0.5)	0.0	0.0	0.0
Profit Before Tax (norm)		3.1	0.1	0.1	0.3
Profit Before Tax (reported)		2.7	0.1	(0.4)	0.3
Reported tax		0.1	2.1	(0.1)	0.0
Profit After Tax (norm)		3.1	0.1	0.1	0.3
Profit After Tax (reported)		2.7	2.2	(0.5)	0.3
Discontinued operations		(1.5)	(3.5)	(1.4)	0.0
Net income (normalised)		3.1	0.1	0.1	0.3
Net income (reported)		1.2	(1.3)	(2.0)	0.3
Basic average number of shares outstanding (m)		207	208	211	214
EPS - basic normalised (p)		1.52	0.05	0.05	0.12
EPS - diluted normalised (p)		1.49	0.05	0.05	0.12
EPS - basic reported (p)		1.31	1.08	(0.25)	0.12
Dividend (p)		0.00	0.00	0.00	0.00
Revenue growth (%)		N/A	-26.3	7.8	-6.9
EBITDA Margin (%)		16.8	4.2	6.8	10.3
Normalised Operating Margin		14.8	1.5	2.2	4.3
BALANCE SHEET					
Fixed Assets		6.3	4.3	7.5	6.8
Intangible Assets		3.9	1.2	1.8	1.9
Tangible Assets		1.4	1.0	3.8	3.0
Investments & other		1.0	2.0	1.9	1.9
Current Assets		12.3	14.0	9.8	9.0
Stocks		2.1	2.1	2.9	2.9
Debtors		6.4	4.2	4.8	4.5
Cash & cash equivalents		3.8	2.6	2.0	1.6
Other		0.0	5.0	0.0	0.0
Current Liabilities		(6.1)	(7.1)	(6.0)	(4.8)
Creditors		(5.1)	(2.3)	(3.5)	(2.3)
Short term borrowings		(0.1)	(0.1)	(0.7)*	(0.7)*
Other		(1.0)	(4.7)	(1.8)	(1.8)
Long Term Liabilities		(0.3)	(0.1)	(2.0)	(1.4)
Long term borrowings		(0.1)	(0.0)	(2.0)*	(1.4)*
Other long term liabilities		(0.2)	(0.1)	0.0	0.0
Net Assets		12.2	11.0	9.4	9.6
Minority interests		0.0	0.0	0.0	0.0
Shareholders' equity		12.2	11.0	9.4	9.6
CASH FLOW					
Op Cash Flow before WC and tax		3.6	0.7	1.2	1.6
Working capital		(0.7)	2.2	(2.4)	(0.8)
Exceptional & other		(1.2)	(2.7)	(2.7)	0.0
Tax		0.1	(0.1)	1.2	0.0
Net operating cash flow		1.8	(0.0)	(2.6)	0.8
Capex		(1.0)	(1.0)	(1.2)	(0.3)
Acquisitions/disposals		0.0	0.0	3.7	0.0
Net interest		(0.1)	(0.1)	(0.3)	(0.4)
Equity financing		0.0	0.1	0.3	0.0
Dividends		0.0	0.0	0.0	0.0
Other		0.0	0.0	0.0	0.0
Net Cash Flow		0.7	(1.0)	(0.2)	0.2
Opening net debt/(cash)		(2.6)	(3.6)	(2.5)	0.7
FX		0.0	0.0	0.0	0.0
Other non-cash movements		0.3	0.0	(3.0)	0.0
Closing net debt/(cash) including lease liabilities		(3.6)	(2.5)	0.7	0.5
Lease liabilities				2.5	1.9
Closing net debt/(cash) excluding lease liabilities		(3.6)	(2.5)	(1.8)	(1.4)

Source: Company data, Edison Investment Research. Note: *Including lease liabilities.

<p>Contact details</p> <p>Filtronic House 3 Airport West, Lancaster Way, Yeadon, Leeds, LS19 7ZA UK +44 113 220 0000 www.filtronic.com</p>	<p>Revenue by geography</p>  <table border="1"> <thead> <tr> <th>Geography</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>North America</td> <td>46%</td> </tr> <tr> <td>UK</td> <td>28%</td> </tr> <tr> <td>Americas</td> <td>23%</td> </tr> <tr> <td>ROW</td> <td>3%</td> </tr> </tbody> </table>	Geography	Percentage	North America	46%	UK	28%	Americas	23%	ROW	3%
Geography	Percentage										
North America	46%										
UK	28%										
Americas	23%										
ROW	3%										
<p>Management team</p>											
<p>Non-executive chairman: Reg Gott</p> <p>Reg has an extensive background in the machinery, automation and controls segments of the capital goods markets across Europe and North America. He was chief executive of Resource Group between June 2012 and February 2016. From 2002 to 2008 he was an executive director of international diversified engineering group FKI and from 2009 to 2012 he was chief executive of ventilation solutions provider Nuair Group. He became a non-executive director of Filtronic in July 2006, becoming non-executive chairman in October 2016. Between October 2019 and October 2020 this was an executive role while the group looked for a new CEO.</p>	<p>CEO: Richard Gibbs</p> <p>Richard is an experienced director who has led a number of business operations supplying semiconductor, RF and electronics sub-systems to the telecoms, aerospace, defence, medical and oil & gas markets. Richard joined Filtronic from Micros Components, a private equity-owned company, where he had been managing director since 2016. Prior to that Richard spent nine years at E2V Technologies, where he was group sales & marketing director and president of the RF Product and Hi-Reliability Semiconductors divisions, and 20 years with Honeywell, of which 10 years were spent managing overseas operations. He took up his appointment as CEO in September 2020.</p>										
<p>CFO: Michael Tyerman</p> <p>Michael joined Filtronic in 2007 as financial controller of the broadband business, and was promoted to group financial controller in 2009 and then to CFO in April 2016. Prior to joining Filtronic, Michael held various positions at Procter and Gamble, Huntsman Polyurethanes and Komatsu, which included time working in the Benelux and Nordic regions.</p>											
<p>Principal shareholders</p>											
<p>Diana Marguerite Dixon Canaccord Genuity Wealth Management David John Newlands River and Mercantile Asset Management LLP John Stephen Rockliff</p>	<p>(%)</p> <p>22.2 11.7 8.5 7.2 3.4</p>										

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