EDISON

Riber

Strategy update

Key technology for compound semiconductors

Tech hardware & equipment

Riber has the dominant share in global molecular beam epitaxy (MBE) equipment. This equipment is used by researchers to develop next-generation compound semiconductor materials used in fibre-optic networks, electronic device displays and sensors for autonomous vehicles as well as for commercial material production. We believe that demand should be supported by exposure to key structural trends such as demand for faster data, next generation displays and the proliferation and evolution of sensors to support greater automation and intelligence (Industry 4.0). The shares trade at a substantial discount to Riber's larger peers that share similar growth drivers.

Year end	Revenue (€m)	PBT* (€m)	EPS* (€)	DPS (€)	P/E (x)	Yield (%)
12/18	31.3	2.0	0.07	0.05	22.1	3.2
12/19	33.5	1.8	0.06	0.03	25.8	1.9
12/20e	35.3	2.2	0.08	0.05	19.4	3.2
12/21e	36.4	2.8	0.10	0.05	15.5	3.2

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

Enabling electronic devices of the future

MBE is used to deposit the very thin layers of material forming compound semiconductor materials. Riber has the dominant share for both R&D and production systems. Because Riber's MBE systems are used in research on new materials and for the production of electronic and optoelectronic devices used in communications networks, demand remains robust. While this may change in the longer term if investment in research and electronic device production is affected by a global recession, we note that MBE machines are used to develop and manufacture key semiconductor materials used in wireless and optical communication systems. Demand therefore should be relatively resilient.

MBE system demand remains strong

Our FY20 estimates model deliveries of four production systems and eight R&D systems. While coronavirus related travel restrictions are delaying sales negotiations, management is confident of securing orders for the two R&D systems needed to compensate for orders that were cancelled because of export licence issues and thus meet this target. Riber's manufacturing facility has remained operational through the coronavirus pandemic so capacity has not been affected.

Valuation: Trading at a discount to peers

Riber is currently trading at a discount to both peers on all prospective multiples. While some discount for relative capitalisation and low free float is justified, the size of the discount (eg 0.8x EV/sales for Riber vs 2.4x for our year 1 sample mean) is, in our opinion, unwarranted. This gives ample scope for share price appreciation as investors gain confidence that demand for MBE systems will not be affected in the medium term by the coronavirus outbreak and that Riber can address the delivery issues that marred FY18 and FY19 reported profits.

18 June 2020

Price	**€1.55**
Market cap	**€32m**
Net cash (€m) at 31 December 2019	5.4
Shares in issue Excluding treasury shares	20.8m
Free float	51.3%
Code	RIB
Primary exchange	Euronext Paris
Secondary exchange	N/A

Share price performance

%	1m	3m	12m
Abs	18.3	35.3	5.4
Rel (local)	2.2	7.2	14.0
52-week high/low	€2.69		€1.09

Business description

Riber designs and produces molecular beam epitaxy systems and evaporator sources and cells for the semiconductor industry. This equipment is essential for the manufacturing of compound semiconductor materials that are used in numerous high-growth applications.

Next events

AGM	23 June 2020

Analyst

Anne Margaret Crow +44 (0)20 3077 5700

tech@edisongroup.com

Edison profile page

Riber is a research client of Edison Investment Research Limited

Investment summary

Company description: Leading MBE equipment provider

Riber has the dominant share of the global MBE market. MBE is a versatile and precise technique for depositing precise amounts of material onto substrates that is used to create innovative semiconductor structures deployed in many novel devices, including high frequency 4G and 5G communications chips, transmit/receive devices for fibre-optic networks and 3D sensing chips for autonomous vehicles. Riber also supplies high-quality material evaporators that are used to make inexpensive thin-film solar cells and displays for organic light-emitting diode (OLED) TVs.

Financials: Continued demand for MBE systems

Total revenues increased by 7% year-on-year during FY19 to €33.5m, with 140% growth in MBE system sales (69% of total) offsetting a sharp fall in evaporator sales (3% of total) reflecting a lull in investment in the OLED screen industry. As a result of the decline in evaporator sales, which are a high-margin product line, an abnormally low gross margin on a prototype MBE system and inefficiencies relating to new employees, adjusted EBIT fell by €0.4m to €1.8m. Reported performance in both FY18 and FY19 was depressed by exceptional payments relating to manufacturing issues, which management states has been addressed. The balance sheet is strong with €5.4m net cash at end FY19. Total revenues decreased by 19% year-on-year during Q120 to €5.3m. Revenues from MBE systems were down 44% compared with Q119 as coronavirus travel restrictions caused delivery of one production machine to slip from Q120 to Q220. Sales of services and accessories rose 79%. We provide a short sensitivity analysis to show the impact of potential delivery delays on our FY20 estimates later in the note.

Valuation: Trading at a discount to peers

We base our valuation on a peer multiples approach. We have restricted our sample to the two listed companies that are involved in the development of equipment for manufacturing compound semiconductors since they benefit from similar growth trends to Riber, rather than the wider semiconductor industry. Riber is currently trading at a discount to both peers on all prospective multiples. Given the volatility in EPS, reflecting the lumpiness typical of Riber's product revenues, we prefer to focus on EV/sales, as year-to-year fluctuations in revenues are less pronounced. The size of the discount (eg 0.8x EV/sales for Riber vs 2.4x for our year 1 sample mean) is, in our opinion, unwarranted. This gives ample scope for share price appreciation as investors gain confidence that demand for MBE systems will not be affected in the medium term by the coronavirus outbreak and that future profits will not be marred by the exceptional costs relating to late deliveries and warranty issues that affected FY18 and FY19 reported performance. We note a prospective dividend yield of 3.2% at the current share price.

Sensitivities: Lumpiness of earnings

The key sensitivities as we see them are lumpiness of earnings, market cycles, dependence on key suppliers and customers and foreign exchange exposure. The first two are the most significant. Since a single production MBE system can cost €2.2–3.5m, depending on configuration (an R&D system is typically <€1m), and 90% of revenue is recognised on delivery, turnover can fluctuate substantially from quarter to quarter and the final outcome each year is very dependent on Riber meeting its delivery schedule for individual units. Demand for evaporators is linked to the OLED and solar equipment cycles. Demand for MBE equipment is less dependent on individual cycles because it is deployed in more markets, each following different phasing.

Company description: Global number one in MBE

Riber develops and manufactures MBE machines and evaporators, both of which are used in the manufacture of semiconductors. It is the global market leader for MBE equipment, with the largest installed base of MBE machines in operation (c 750) and more than 50% market share. The MBE portfolio ranges from competitively priced research reactors to substantially larger production machines. Over 80% of the installed MBE base is deployed in universities, research institutes and the research labs of major global corporations. The remainder is deployed in the production facilities of electronic component manufacturers and providers of epitaxial wafers. MBE equipment is used to create compound semiconductor material for a wide range of applications including high-frequency 4G and 5G communications chips, terrestrial and submarine fibre-optic networks, light detection and ranging (LiDAR) and night vision sensors. Riber's dominant share in the global MBE market is attributable to it having the broadest range of MBE systems, which enables the deposition of the widest range of types of alloys. The evaporators are incorporated in equipment for processing thin-film solar cells, OLED displays for smartphones and tablets and OLED lighting. They are sold either to the equipment integrator or direct to the end-user. Riber also derives revenues from providing services to its large installed base of clients.

Exhibit 1: Company timeline

Date	Milestone
1964	Formation of company making ultra-high vacuum equipment.
1976	Development of first commercial MBE deposition systems.
1978	Launch of world's first turnkey MBE system.
1990s	Launch of world's first high-throughput MBE production reactor.
2000	Listed on NYSE-Euronext Paris.
2004	Acquisition of Addon to extend product portfolio and gain access to OLED market.
2008	Acquisition of VG Semicon from Oxford Instruments to expand service activity.
2009	Launch of first thin-film evaporator systems.
2015	Acquisition of assets of MBE Control Systems to strengthen service activity in the US.
February 2019	Acquisition of assets of SemiPro to strengthen service activity in the US.

Source: Edison Investment Research

Riber's headquarters are in Bezons in the suburbs of Paris, where it owns a 3,500m^2 facility, including a 1,000m^2 clean room with the capacity to output 25 MBE machines annually. The company designs and assembles equipment in Bezons, outsourcing the manufacture of individual non-key components. It has subsidiaries in China (opened H218), Korea and the US, and a network of around 30 agents and distributors. More than 90% of revenues are generated from exports to customers elsewhere in Europe and in the US, Canada, Mexico, Japan, China and South Korea. It currently employs around 120 people.

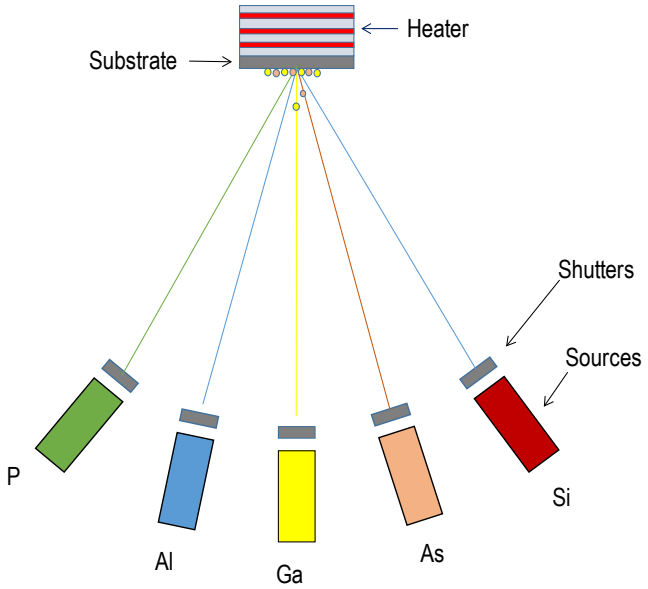
Technology

MBE key tool for creating multi-layer structures

Semiconductor devices consist of very thin films of compound semiconductor materials with differing electronic and optical properties stacked up like a many-layered cake. The behaviour of a device is determined by how electrons move through each layer. For example, a transistor acts as a switch by only allowing electrons to pass through a stack when a voltage is applied across the top and bottom layers of the stack. Different structures where electrons are converted to light energy as they pass through specific layers form light-emitting diodes (LEDs) and lasers. Varying the composition of the layer where electricity to light conversion takes place causes a different colour of light, including ultra-violet (UV) or infra-red (IR) wavelengths, to be produced. These complex structures cannot be realised using standard silicon chip fabrication technology. Specialist

equipment such as MBE or metal organic chemical vapor deposition (MOCVD – for a comparison with MBE see below) reactors are required.

Exhibit 2: MBE process



Source: Edison Investment Research

Device performance depends on achieving very precise control over the thickness and composition of each layer. MBE achieves this by generating individual streams of molecules by heating solid or gaseous materials, directing these beams onto a substrate material and turning the stream on and off with a computer-controlled shutter or valve with a very quick response time (typically 0.6 seconds). For example, a layer of gallium arsenide is created by directing beams of gallium (Ga) and arsenic (As) onto the substrate. When the atoms arrive on the substrate, they combine to form gallium arsenide (GaAs). Small amounts of other elements may be added to the mixture. For example, adding aluminium (Al) results in the formation of a layer of gallium aluminium arsenide (GaAlAs), which is commonly used in GaAs-based red and IR laser diodes. The entire process takes place in an ultra-high vacuum to ensure very high levels of purity of the individual layers.

MBE market: Size and growth

Since Riber's MBE equipment may be used to manufacture a wide range of compound semiconductor materials, it is deployed in many markets that have different profiles. This reduces the company's exposure to any single market but makes it more difficult to predict overall demand beyond the period covered by the order book. Typical applications are 5G/4G/Wi-Fi communications, satellite transceivers, FTTH (fibre-to-the-home), LAN (local area network) and submarine fibre-optic networks, laser cutting, infrared and UV detectors used in night vision systems, thermography, medical diagnosis, vegetation mapping, LiDAR systems and magnetic sensors. One of the markets where Riber is well placed to benefit from customers expanding R&D and production capacity is optical fibre networks. According to a report from Future Market Insights published in February 2020, the global FFTH market is expected grow at a CAGR of 15% between 2019 and 2029 from a base of over US$12bn in 2018. Factors driving growth include rising demand for higher bandwidth and the increased use of fibre for cloud computing services. Riber's MBE equipment is used to deposit the vital layers that convert electricity to light in optical components.

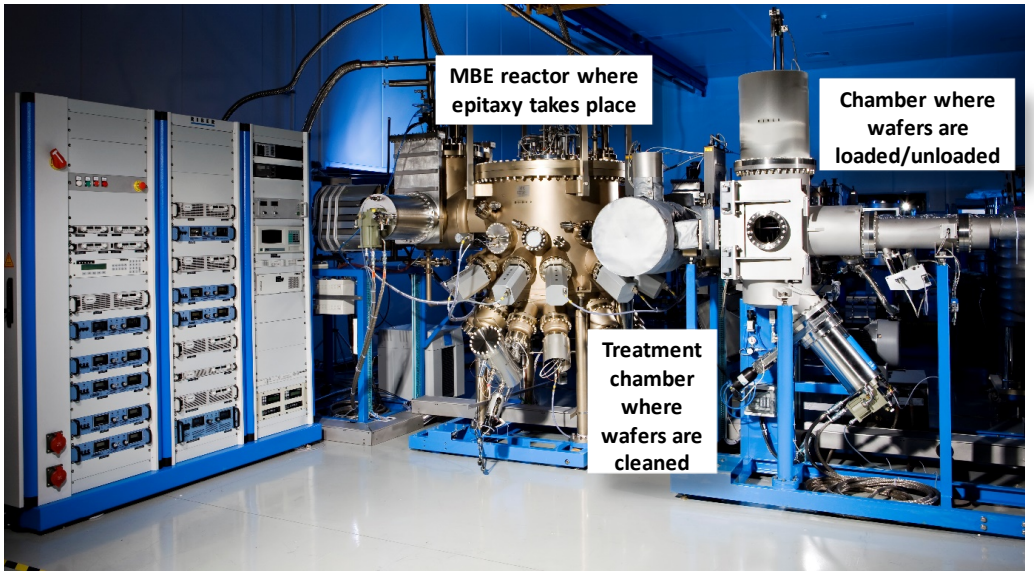
Emerging markets for MBE equipment include the use of GaN material for UV applications and micro-LEDs. The application areas for UV LED systems have increased steadily over the past five years. The dominant application is UV curing, which includes printing, adhesives and coatings. Other applications are disinfection and purification, which are driven by the rising need to stop

water- and air-borne diseases. Market growth has benefited from the worldwide ban on mercury vapour lamps after 2020, combined with reduced prices of UV LEDs and their increased adaptability, efficiency and longevity, which have been made possible by the adoption of next-generation substrates. A report from BIS Research published in February 2018 predicted that the global UV LED market will reach $1,163.5m by 2023. A report by Technavio published in November 2018 predicted that the global UV LED technology market will show a CAGR of 37% between 2017 and 2022. This report cited new applications such as treating seeds, improving the shelf life of agricultural produce and spectroscopy. Clearly any global recession resulting from the pandemic may cause growth to be slower in the initial period covered by any projections, but we believe that the overall direction of travel will be the same.

With regard to the micro-LED market, which is in its infancy, a report from Research and Markets published in February 2020 predicts that this will grow by US$18.7bn between 2019 and 2025, a CAGR of 78.8%. The key market driver here is the development of display technology that can deliver brighter pictures with less power consumption. In the nearer term, near-to-eye cameras and virtual reality and mixed reality (a fusion of actual and virtual worlds) headsets for professional applications are likely to be the dominant applications, but in the longer term, incorporation of micro-LEDs in consumer devices such as laptops, smartphones and home theatres will become commonplace if, as assumed in the report, the price point reduces to a level where this is economically viable.

Recent independent data on the projected growth rate of the MBE market is scarce. Management notes that demand for R&D equipment is generally stable with total global sales of 10–15 units each year. Purchases are driven by new projects instigated in response to technological challenges: for example, a requirement to shift to larger diameter substrates or renewal of equipment originally purchased in the 1980s or 1990s. There is also demand from economies such as China and India, which are seeking to develop their own compound semiconductor capability. Demand for production equipment is similar to the semiconductor cycle, though linked to various types of compound semiconductor devices discussed below, so is more variable. Management notes that the global requirement is typically three to six systems each year.

Exhibit 3: Riber MBE equipment



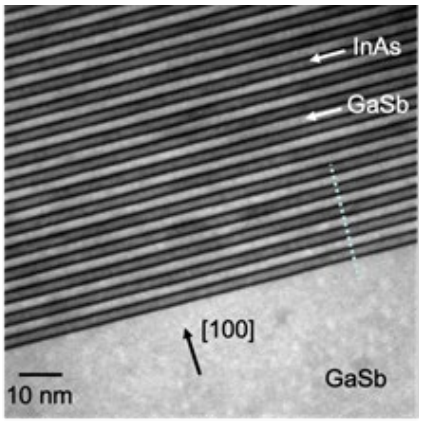
Source: Riber

MBE market: Competitive position

There are relatively few other companies globally manufacturing MBE equipment. According to a Yole Développement study published in 2012, US-listed Veeco is the only other company offering

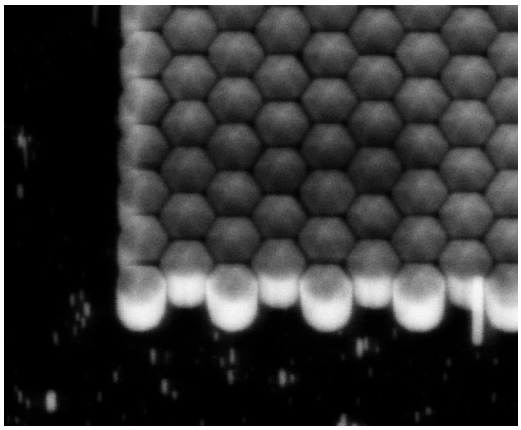
high-capacity/high-throughput MBE production tools for manufacturing. Management estimates that in FY19 Riber had 86% share of this segment. Management believes that this dominant position is attributable to the production output, yield and cost of ownership afforded by the equipment as well as the services and maintenance provided.

Exhibit 4: InAsGaSb epitaxial structure created using MBE



Source: Riber

Exhibit 5: Nanowires created using MBE



Source: Riber

There are around 10 other manufacturers offering R&D or pilot-production systems. These include DCA Instruments (Finland), Dr. Eberl MBE-Komponenten (Germany), Eiko (Japan), Scienta Omicron (Germany), SVT Associates (US) and Veeco. Riber has the dominant share of this segment (79% in FY19 according to management estimates) as well. Management believes that the company commands the dominant position in this segment because it supports production of the widest range of alloys including III-V and II-VI compound semiconductors, gallium nitrides, mercury/cadmium/telluride (MCT), SiGe and oxide alloys. As in the production segment, the technical barriers to entry are extremely high, deterring new market entrants. Moreover, given the relatively small size of the market globally, we believe it is unlikely that an equipment manufacturer would regard the return as economically worthwhile.

Competitive epitaxial technologies

The main alternative to MBE for creating epitaxial layers is MOCVD. In this technique gases are injected into a chamber containing the substrate, which is heated. When the mixture of gases meets the surface of the hot substrate it reacts, depositing a thin layer of the desired alloy on the substrate. For example, a mixture of trimethylindium ($In(CH_3)_3$) and phosphine (PH_3) reacts to form indium phosphide (InP) and methane (CH_4). The indium phosphide is deposited on the substrate and the methane gas is removed from the reactor. We note the following key differences between the two techniques:

- **Throughput:** MOCVD can deposit material more quickly than MBE, so for structures such as LEDs, which are composed of relatively thick layers of materials, it is the preferred technology.
- **Uniformity:** the MBE technique results in the deposition of a much more uniform layer across the surface of a single wafer or multiple wafers being processed simultaneously. This in turn gives superior yield.
- **Precision:** as the MBE technique enables a reactor to switch between source materials more cleanly than MOCVD it is more suitable for devices with thin and alternating layers eg PHEMTs. Additionally, since MBE takes place at a lower temperature than MOCVD, there is less mixing between layers at an interface, giving more precise control of the final structure. This is attractive for higher performance device structures such as 850nm vertical cavity surface

emitting lasers (VCSELs) for data communications and 940nm VCSELs for high power applications.

- **Material range:** MBE enables a wider range of elements to be deposited since the stream of molecules is created by simply heating a sample of the material (eg indium or phosphorus) that is to be deposited. In the MOCVD technique the active elements (indium and phosphorus) need to be converted into a gas containing other elements (hydrogen and carbon). This is not always possible. For example, it is very difficult to get stable antimonide gases. Antimonide-based infra-red detectors are key materials for aerospace sensors and systems, remote sensing, thermal imaging, infrared spectroscopy and LiDAR.
- **Cost:** MBE reactors are larger and more expensive than MOCVD reactors because the former operate in an ultra-low vacuum. However, this is partly offset by the more rigorous safety measures required for MOCVD because of the toxic and flammable nature of the gases used.

We note that a high proportion of Riber's MBE reactors are sold for R&D purposes, reflecting the wider range of materials that may be deposited using this technique and the higher levels of control over the deposition process. Within the production environment, the higher throughput of MOCVD reactors has obvious attractions, but MOCVD is not suitable for all types of epitaxy. We note that reactors being installed for the first phase of IQE's Newport facility are for volume VCSEL production and use MOCVD technology for VCSEL (opto-electronic) epitaxy, while MBE reactors are deployed at some of IQE's other locations where they are used for a variety of applications including IQE's new and emerging technologies. One of these emerging applications, cREO, uses a combination of MBE and MOCVD capabilities.

Diversification into evaporators

Riber has adapted the effusion cells used to generate streams of material inside MBE systems so that they can be used to deposit highly uniform, ultra-thin films of material on much larger substrates. Arrays of point source evaporators are used to deposit the aluminium forming electrical contracts in OLED displays and lights. Riber sells evaporators to systems integrator Canon Tokki, which serves OLED manufacturers in South Korea and China. It also sells linear evaporators for copper indium gallium selenide (CIGS) thin-film solar cell processes to systems integrator Singulus Technologies, primarily for deployment in China.

Evaporator market

Management estimates that the market size is several thousand point source evaporators per year depending on investment cycles in the OLED and solar industries and the emergence of new applications. The market is dominated by two larger Asian-based competitors. Since Riber's principal customer stopped ordering evaporators in H218 because of weakness in its own order book, Riber's current market share is minimal. Riber expects sales to pick up towards the end of 2020. Management believes that Riber's point source evaporators deposit films that are more uniform with respect to thickness and exhibit a lower number of defects than films deposited by competitive equipment and that Riber is the only manufacturer to have developed a high precision linear evaporator for depositing the selenium used in CIGS type solar cells.

Strategy

MBE: R&D

Management's objective in this segment is to maintain Riber's global market share above c 60%. This is partly to secure further R&D sales and partly to ensure it stays close to the projects that progress to production so it is well placed to sell production equipment with the appropriate

enhancements. The company's strategy for taking market share is to invest in innovation, typically making relatively small adjustments to components and accessories to support novel processes. For example, it is adapting R&D equipment so it has the same level of automated process control as production models. As part of this programme it is working with LAAS-CNRS in Toulouse on enhancements to its proprietary control software that will monitor layer growth in real-time and feedback the data to control production temperatures and thus layer growth. Once finalised, this capability would be added to production equipment as well, providing a significant competitive advantage.

MBE: Production

Riber is focusing its sales resource on mainland Europe, where there is a lot of activity in the opto-electronics market, and in China, where the government is developing its own semiconductor industry so it is not dependent on products from companies such as Qorvo or Skyworks. The potential impact of a no-deal Brexit is therefore very limited. Riber is less active in the US where there is a lot of spare MBE capacity, for example at one of IQE's sites, although it has acquired service operations in the territory to support existing customers. (See Exhibit 6 for an analysis of the customer base.)

Exhibit 6: Customer base

	Clients	Operational units	Sample customers
MBE for R&D	324	630	Chinese Academy of Sciences, Fraunhofer Institute, Ioffe Physico-Technical Institute, Russian Academy of Sciences, The University of Tokyo, US Naval Research Laboratory
MBE for production	44	120	III-V lab, Acken Optoelectronics, Asahi Kasei, Aselsan, Coherent, IntelliEPI, IQE, Northrop Grumman, Phillips Photonics, QDLaser, Raytheon, Teledyne Technologies, Trumpf
Evaporators	9	c 2,000	Canon Tokki, First Solar, Heliatek, Singulus Technologies

Source: Company data

Riber is attempting to catalyse market growth higher than the historical average by working with partners to develop new MBE applications. We note that it typically takes seven to 10 years for an initial idea to pass into volume production. Three of the areas closest to commercialisation are LiDAR, VCSELs and UV LEDs. Exhibit 7 shows the expected timescale for meeting major milestones on each of these programmes.

LiDAR

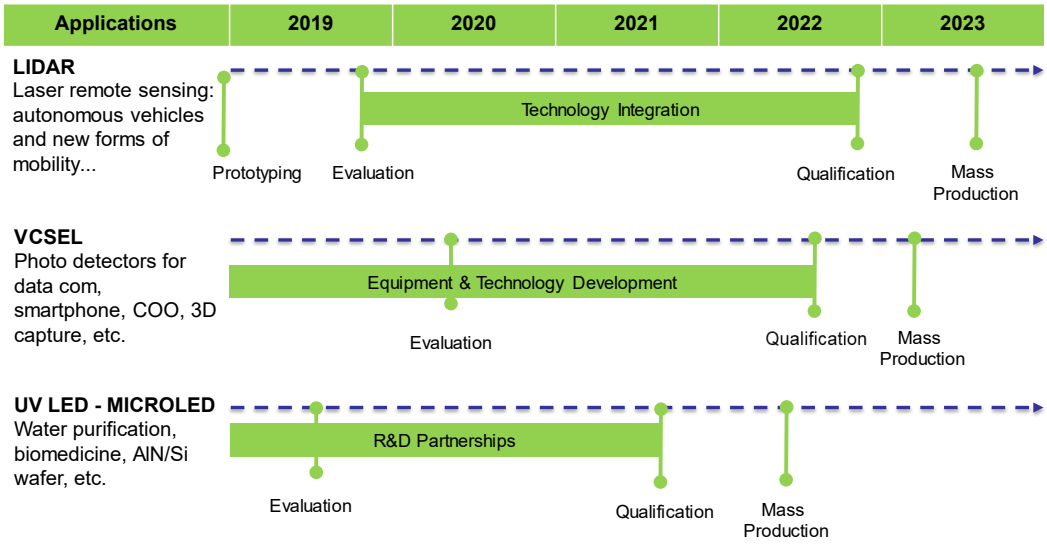
During H119, Riber commenced on-site testing of an MBE49 variant for the Belgian research institute IMEC for work on antimonide alloys that will potentially be deployed in LiDAR for autonomous vehicles. The project involves work on the stack of layers forming the laser to improve the response time and optimising the process so 4" substrates can be used instead of 2" ones, thus improving throughput. This potentially brings down the cost of production to a price point suitable for widespread adoption. A report from Grand View Research published in March 2020 notes that the global LiDAR market was valued at US$1.1bn in 2019 and is expected to register a CAGR of 13.2% between 2020 and 2027. The main driver for this growth is navigation and positioning systems in autonomous vehicles.

Opto-electronics: VCSELs

In our January Outlook note on IQE we observed the widespread adoption of VCSELs had been triggered by a switch to 6" substrates, which increased MOCVD throughput, thus supporting a price-point appropriate for mass adoption. However, as noted earlier, uniformity issues with MOCVD have a deleterious impact on yield. Riber is working with IntelliEPI on a new MBE system able to process eight 6" VCSEL wafers simultaneously. This will substantially improve throughput, potentially making MBE a more cost-effective process for manufacturing VCSELs. In December 2019 MarketsandMarkets predicted the global VCSEL market would rise at a CAGR of 16.9% from

$1.8bn in 2018 to $3.9bn by 2023. Growth was attributed mainly to the rising adoption of arrays of VCSELs in proximity sensing and medical applications, data communications, infrared illumination in automobiles for pedestrian detection, collision avoidance, parking assistance, traffic sign recognition and lane departure warning.

Exhibit 7: Timescale for commercialising new industrial markets



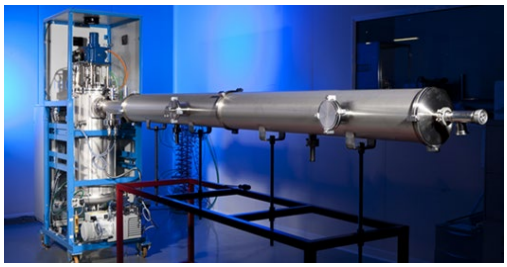
Source: Riber

UV LEDs and micro-LEDs

As noted earlier, most LEDs are manufactured using MOCVD technology. However, it is easier to achieve high levels of doping with MBE technology than MOCVD. Riber is working with the Centre de Recherches sur l'HétéroEpitaxie et ses Applications (CRHEA), part of the Université Côte d'Azur on the fabrication of red and green coloured micro-LEDs with the highly doped active layers processed using MBE, the others using MOCVD. CRHEA has installed MBE equipment from Riber that is capable of handling the 8" wafers commonly used in MOCVD processes to give high throughput. The project with CRHEA also involves the development of UV LEDs as these require high levels of doping to create structures that emit the correct wavelength (colour) light. CRHEA is creating a demonstration UV LED wafer for evaluation by a potential commercial customer interested in using UV light to purify water.

Evaporators

Exhibit 8: Linear evaporator



Source: Riber

Exhibit 9: Flexible substrate with evaporated layers for CIGS PV (photo-voltaic)

Source: Riber

The strategic focus for this product line is the development of a next-generation linear evaporator that extends the potential market. Riber is working on a medium-temperature linear evaporator to extend the range of applications of this technology to other industrial sectors. Target markets include battery manufacturing and silicon wafer production where the technology has the potential to deliver more homogenous substrate doping.

Services and accessories

Management has identified this activity as giving potential for delivering high-margin revenue that is less dependent on the overall level of investment in compound semi-conductor, OLED display or sola cell-manufacturing equipment. Its stated objective is to grow annualised revenues by 35% over the next three years, thus providing a substantial proportion of annual fixed costs. The company has created a dedicated sales and marketing team to actively promote the offer across the company's extensive installed base. This includes training, consultancy, retro-fit sales of hardware and software, on-site upgrades, in-factory component repairs and refurbishments and preventative or remedial operations at client sites. The acquisition of US-based SemiPro in February 2019 is supportive of this goal, as well as furthering the drive to sell MBE equipment in the region.

Management

CEO Philippe Ley: A graduate of Ecole Nationale Supérieure d'Arts et Métiers, one of the Grandes Écoles, Philippe Ley started his career at the international engineering company ASSYSTEM in 1994. He moved to Renault Automation in 1997, where he occupied different managerial positions and became head of engineering at COMAU France, an industrial automation company, in 2001. He joined Riber in 2007 where he was first production director, then operation director and member of the executive board. He left Riber in 2015 to become managing director at ERCA, which produces equipment for manufacturing containers for dairy food. He returned to Riber in 2018 as chief executive officer and member of the executive board, taking over as president in June 2019.

Chairman Michel Picault: A graduate of Institut National des Sciences Appliquées Lyon, one of the Grandes Écoles, Michel Picault's first employment was a research post with a government organisation, followed by an R&D role with a French telecom company. Between 1983 and 1997 he worked for Riber in a range of capacities including technical, after-sales service, sales and marketing and production in both the US and France. In 1997 he led a buy-out of Riber and was appointed president of the company. He stepped down from this position in 2008, while remaining member of the executive board until 2014. He left Riber in 2014, working as an adviser for small companies and on funding for start-ups. In 2016 he was invited to re-join the executive board, to help turn the company round, and was reappointed president of the executive board in 2018. While stepping down from this position in June 2019, he remains a member of the executive board. He is scheduled to retire at the end of December 2020. A replacement has not been appointed yet.

Sensitivities

The key sensitivities as we see them are:

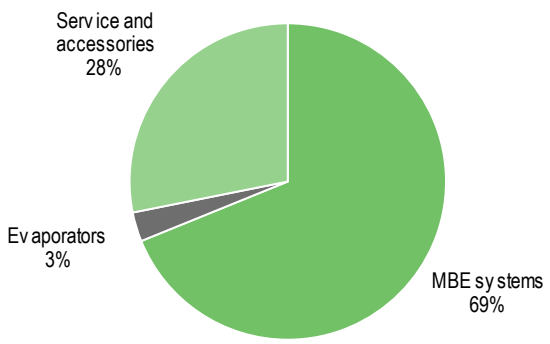
- **Lumpiness of earnings**: since a single production MBE system can cost €2.2–3.5m depending on configuration and 90% of revenue is recognised on delivery, turnover can fluctuate substantially from quarter to quarter and the final outcome each year is very dependent on Riber meeting its delivery schedule for individual units. The high cost of a single MBE production system also means the proportion of revenues attributable to individual customers in any one year is material, but the customers involved will change from one year to the next.

- **Market cycles**: as noted above, demand for evaporators is linked to the OLED and solar equipment cycles. Demand for MBE equipment is less affected by individual market cycles because it is deployed in more markets, each with different phasing.
- **Dependence on individual customers**: evaporator sales also depend on the ability of individual systems integrators to secure market share.
- **Dependence on key suppliers**: Riber carries out machining and welding of R&D systems in-house but does not have the ability to execute these steps for larger production systems. These are outsourced to a specialist that is able to clean the surface of completed chambers so they are suitable for ultra-high vacuum deployment. We note that the slippage of two MBE deliveries from FY18 to Q119, with consequent impact on FY18 performance, was caused by late deliveries of components from suppliers. Issues with obtaining parts from specialist sub-contractors based in France whose production schedules have been affected by the coronavirus pandemic may cause some deliveries to slip from H120 into H220.
- **Foreign exchange exposure**: Riber prices sales contracts in euros, except for customers in the US, who are billed in US dollars. This is partly balanced by some materials purchases that are denominated in US dollars.

Financials

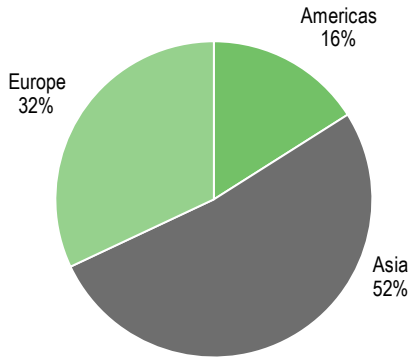
FY19: MBE system sales up, but evaporator dip affects profits

Exhibit 10: FY19 revenues by segment



Source: Riber

Exhibit 11: FY19 revenues by geography



Source: Riber

Total revenues increased by 7% year-on-year during FY19 to €33.5m. MBE system sales grew by 140% to €23.0m as the company delivered seven production machines and five R&D machines compared with only three production and three R&D systems in FY18. This growth is attributable to strong demand for electronic and optoelectronic devices used in 5G networks as well as delivery of two production systems slipping from Q418 to Q119. Revenues from evaporators fell from €11.6m to €1.0m, reflecting a lull in investment in the OLED screen industry. Although sales of services and accessories had been 23% ahead year-on-year for the nine months ended September 2019, billing issues meant that revenues for the full year ended December 2019 were 7% lower than FY18 at €9.4m. Adjusted gross margin fell by 6.7pp to 30.8% of sales because of the lower proportion of evaporators, which are a high-margin product line, an unusually low gross margin for one of the MBE machines, which was a prototype, and inefficiencies relating to new employees. Administrative costs (adjusted for exceptional items, depreciation and amortisation) reduced by 8% year-on-year, relating to lower costs associated with temporary workers and costs in the US. As a result of the decline in evaporator sales and abnormal gross margin on the prototype MBE system, adjusted EBIT fell by €0.4m to €1.8m.

Reported EBIT increased from €0.0m to €0.9m, primarily because the FY18 result was adversely affected by a €1.1m cost associated with the allocation of shares for a staff bonus scheme. Reported performance in both years was depressed by exceptional payments relating to manufacturing issues, which management notes have been addressed: €0.6m warranty payments in FY18 and €0.9m payments relating to deliveries that slipped from Q418 to Q119 in FY19. The dividend was cut from €0.05/share in FY18 to €0.03/share in FY19 to conserve cash given the uncertainty created by the coronavirus pandemic. We lay out the adjustments to reported revenues and profit in Exhibit 12 below:

Exhibit 12: Adjustments to FY19 operating profit

	Reported	Adjustment	Adjustment	Adjusted
Revenue (€m)	33.5			33.5
Gross profit (€m)	9.9	0.4	Contractual payments relating to late delivery	10.3
Operating costs (€m)	(9.0)	0.5	Financial compensation for late delivery	(8.5)
		(0.1)	Adjustment to provision for employee share allocation scheme	
		0.1	Provision for R&D tax credit	
Operating profit (€m)	0.9	0.9		1.8

Source: Riber

Strong balance sheet

Net cash increased by €2.8m during FY19 to €5.4m at the year-end. This included a €0.3m credit line taken out in H218 to pay suppliers. Working capital decreased by €4.2m, reflecting advances from customers for systems. €0.2m was invested in the acquisition of SemiPro, a company providing MBE-related services in the US, €0.7m in capitalised R&D and €0.9m on tangible assets. Capital expenditure was primarily an R&D system provided to Harvard University for a joint project to develop a variant of existing MBE technology for depositing oxide layers in micro-electromechanical systems devices with a higher level of precision than current techniques.

Outlook: MBE order book strong but evaporator market weak

Q120 sales affected by delays in export process

Total revenues decreased by 19% year-on-year during Q120 to €5.3m. Revenues from MBE systems were €2.3m, down 44% compared with Q119. Q120 revenues included invoicing on the delivery of only one production system, compared with two in Q219. These had slipped from Q418 because of manufacturing issues, which have since been resolved. However, the COVID-19 situation prevented Riber from exporting an R&D system to the Middle East during Q120 as scheduled because of the lack of flights. This has now been shipped. There was no revenue from evaporator sales in Q120 compared with €0.8m in Q119, reflecting the absence of investments in the OLED screen industry. Sales of services and accessories rose 79% to €3.0m, part of which was attributable to catching up on deliveries of accessories that should have completed in Q419.

Coronavirus delaying commercial negotiations although manufacturing facility remained operational

Exhibit 13: Revenue analysis

	2018	2019	2020e	2021e
Number of industrial MBE systems	3	7	4	6
Number of R&D MBE systems	3	5	8	7
Revenue MBE systems (€m)	9.6	23.0	21.1	21.9
Revenue – Evaporators (€m)	11.6	1.0	1.6	1.6
Revenue - Accessories, components and services (€m)	10.1	9.4	12.6	13.0
Total revenues (€m)	31.3	33.5	35.3	36.4

Source: Edison Investment Research

Riber's manufacturing facility remained operational throughout the coronavirus pandemic, which seems to be over in France, and moved to split-shift working so capacity has not been affected. However, issues with obtaining parts from specialist sub-contractors based in France may cause some deliveries to slip into H220.

The following assumptions underpin our FY20 estimates:

- Our estimates assume delivery of four production and eight R&D systems during FY20. There was one production system delivered in Q120. The adjusted contracted order book at the end of March ie with contracts for three R&D systems destined for Asia for which Riber was not able to secure export licences removed, was for a further three production systems and five R&D systems. The company won another R&D order, for which it does have an export licence, in May. This means that Riber needs to win contracts for another two R&D systems for delivery in FY20 to meet our estimates. Management is currently in negotiations regarding additional contracts. While travel restrictions have caused delays in getting contracts signed, which may impact the end June order book, the restrictions appear to be easing and management is confident in securing orders for another two systems in time for delivery by the year end. Demand remains robust since e Riber's MBE systems are used in research on new materials and for the production of electronic and optoelectronic devices used in communications networks. In this context we note that IQE, which is at the next stage of the supply chain, expects a 27% year-on-year increase in revenues for the six months ended June 2020.
- Our 34% year-on-year estimated growth in service revenues reflect the strong year-on-year segmental growth in Q120, not all of which was attributable to catching up on Q419 deliveries. We note that Riber's customers such as IQE and those in China remain operational so will continue to require replacement parts.
- Although there were no evaporator orders at end Q120, management notes that orders may resume by FY21.
- Gross margin on MBE system sales of 25% allows for the inefficiencies associated with the split shift working introduced in response to the COVID-19 situation. Based on our discussions with management, we assume the manufacturing issues in FY18 were fully resolved during FY19 and there will not be any exceptional payments relating to warranties or later deliveries going forward.
- Although management reduced the dividend payable for FY19 to conserve cash during the coronavirus pandemic, there is ample cash on the balance sheet to resume paying the dividend at FY18 levels (€0.05/share) if, as assumed in our estimates, medium-term demand for MBE systems is not affected by the COVID-19 outbreak. Clearly if demand is affected, management has the option to reduce this.

Our FY21 estimates assume demand for MBE systems and evaporators remains at current levels. We note that while demand for both categories of product may change in the longer term if investment is affected by a global recession, MBE machines are used to develop and manufacture key semiconductor materials used in wireless and optical communication systems. Demand therefore should be relatively resilient and may even be boosted by the pandemic as consumers ensure they can maintain contact with their work, family and friends despite social distancing and lockdown measures. In addition, since a high proportion of Riber's MBE sales are to China, where government investment in developing its domestic semiconductor industry is likely to be maintained, Riber is relatively protected from a downturn in investment elsewhere. An upturn in investment in OLED manufacturing capability could potentially result in upside to our FY21 evaporator estimate. Evaporator revenues were €11.6m in FY18.

Sensitivity analysis

Given the potential for delivery timings to slip because of delays in the manufacturing process, we model the impact of two R&D system deliveries being postponed from FY20 into FY21. This would result in a €2.7m reduction in FY20 group revenues to €32.6m and a €0.7m (32%) drop in adjusted EBIT to €1.5m. Considering upside to FY21 performance, shipping an additional two R&D machines during the year would raise our forecast revenues by €1.8m to €32.2m and adjusted EBIT by €0.5m (18%) to €3.3m.

Valuation

We base our valuation on a peer multiples approach. We restrict our sample to the two listed companies that are involved in developing equipment for manufacturing compound semiconductors because they benefit from similar growth trends to Riber, rather than the wider semiconductor industry.

Exhibit 14: Compound semiconductor peers

Name	Ytd performance (%)	Market cap (€m)	EV/sales 1FY (x)	EV/sales 2FY (x)	EV/EBITDA 1FY (x)	EV/EBITDA 2FY (x)	P/E 1FY (x)	P/E 2FY (x)
Aixtron SE	13.9	1,084	3.0	2.7	18.5	13.2	38.5	26.3
Veeco	(7.2)	591	1.7	1.5	15.8	N/A	20.4	14.3
Mean			2.4	2.1	17.2	13.2	29.5	20.3
Riber SA	(41.9)	32	0.8	0.7	7.8	6.7	19.4	15.5

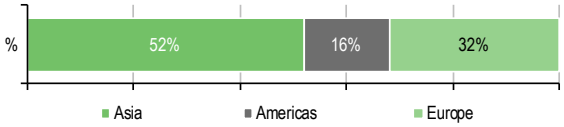
Source: Refinitiv, Edison Investment Research. Note: Priced at 17 June 2020.

Although Riber's share price has picked up from a low of €1.10 on 16 March, the recovery since then has not been as strong as that for its larger peers. Riber is currently trading at a discount to both peers on all prospective multiples. Given the volatility in EPS, reflecting the lumpiness typical of Riber's product revenues, we prefer to focus on EV/sales, as year-to-year fluctuations in revenues are less pronounced. While some discount for relative capitalisation and low free float is justified, the size of the discount (0.8x for Riber vs 2.4x for our year 1 sample mean) is, in our opinion, unwarranted. This gives ample scope for share price appreciation as investors gain confidence that demand for MBE systems will not be affected in the medium term by the COVID-19 outbreak and that future profits will not be marred by the exceptional costs relating to late deliveries and warranty issues that affected FY18 and FY19 reported performance. We note a prospective dividend yield of 3.2% at the current share price.

Exhibit 15: Financial summary

€m	2018	2019	2020e	2021e
Year end 31 December	IFRS	IFRS	IFRS	IFRS
INCOME STATEMENT				
Revenue	31.3	33.5	35.3	36.4
Cost of Sales	(19.6)	(23.2)	(23.4)	(24.0)
Gross Profit	11.7	10.3	11.9	12.4
EBITDA	3.3	2.5	3.4	4.0
Operating Profit (before amort. and except.)	2.2	1.8	2.2	2.8
Amortisation of acquired intangibles	0.0	0.0	0.0	0.0
Exceptionals	(2.2)	(0.9)	0.0	0.0
Share-based payments	0.0	0.0	0.0	0.0
Reported operating profit	0.0	0.9	2.2	2.8
Net Interest	(0.2)	0.0	(0.0)	(0.0)
Profit Before Tax (norm)	2.0	1.8	2.2	2.8
Profit Before Tax (reported)	(0.2)	1.0	2.2	2.8
Reported tax	0.5	0.1	(0.3)	(0.4)
Profit After Tax (norm)	1.4	1.3	1.6	2.0
Profit After Tax (reported)	0.3	1.1	1.9	2.4
Average Number of Shares Outstanding (m)	20.8	20.8	20.8	20.8
EPS - basic normalised (€)	0.07	0.06	0.08	0.10
EPS - diluted normalised (€)	0.07	0.06	0.08	0.10
EPS - basic reported (€)	0.02	0.05	0.09	0.11
Dividend (€)	0.05	0.03	0.05	0.05
Revenue growth (%)	2.5	7.0	0.0	0.0
Gross Margin (%)	37.5	30.8	33.8	34.0
EBITDA Margin (%)	10.4	7.6	9.7	11.0
Normalised Operating Margin	7.1	5.4	6.3	7.7
BALANCE SHEET				
Fixed Assets	9.5	11.4	11.4	11.4
Intangible Assets	1.9	2.6	2.6	2.6
Tangible Assets	4.8	5.1	5.1	5.1
Investments & other	2.8	3.7	3.7	3.7
Current Assets	28.2	26.8	29.1	30.9
Stocks	15.3	11.5	12.1	12.4
Debtors	8.8	8.0	8.7	9.0
Cash & cash equivalents	3.0	5.9	7.1	8.3
Other	1.2	1.3	1.3	1.3
Current Liabilities	(17.3)	(17.3)	(18.3)	(18.7)
Creditors	(11.4)	(13.0)	(14.0)	(14.5)
Tax and social security	0.0	(0.0)	(0.0)	(0.0)
Short term borrowings	(0.4)	(0.2)	(0.2)	(0.2)
Other	(5.4)	(4.1)	(4.1)	(4.1)
Long Term Liabilities	(1.3)	(1.7)	(1.7)	(1.7)
Long term borrowings	0.0	(0.4)	(0.4)	(0.4)
Other long term liabilities	(1.3)	(1.3)	(1.3)	(1.3)
Net Assets	19.2	19.2	20.5	21.9
CASH FLOW				
Op Cash Flow before WC and tax	4.2	2.5	3.4	4.0
Working capital	(5.3)	4.2	(0.2)	(0.1)
Exceptional & other	(1.7)	(0.3)	0.0	0.0
Tax	0.0	0.0	(0.3)	(0.4)
Net operating cash flow	(2.8)	6.4	2.9	3.5
Capex	(0.8)	(1.6)	(1.2)	(1.2)
Acquisitions/disposals	0.0	(0.2)	0.0	0.0
Net interest	(0.0)	(0.0)	0.0	0.0
Equity financing	(0.5)	0.1	0.0	0.0
Dividends	(1.0)	(1.0)	(0.6)	(1.1)
Other	0.0	(0.4)	0.0	0.0
Net Cash Flow	(5.2)	3.3	1.1	1.2
Opening net debt/(cash)	(7.4)	(2.5)	(5.4)	(6.5)
FX	0.0	0.0	0.0	0.0
Other non-cash movements	0.2	(0.4)	0.0	0.0
Closing net debt/(cash)	(2.5)	(5.4)	(6.5)	(7.7)

Source: Riber accounts, Edison Investment Research

Contact details	Revenue by geography (FY19)
31 Rue Casimir Périer, 95870 Bezons, France +33 (0) 1 39 96 65 00 www.riber.com	

Management team

Chairman: Michel Picault

A graduate of Institut National des Sciences Appliquées Lyon, Mr Picault's first employment was a research post with a government organisation, followed by an R&D role with a French telecom company. Between 1983 and 1997 he worked for RIBER in a range of capacities including technical, after-sales service, sales and marketing and production in both the US and France. In 1997 he led a buy-out of RIBER and was appointed president of the company. He stepped down from this position in 2008, while remaining member of the executive board until 2014. He left Riber in 2014, working as an adviser for small companies and on funding for start-ups. In 2016 he was invited to re-join the executive board, to help turn the company round, and was reappointed president of the executive board in 2018. He is scheduled to retire at the end of December 2020. A replacement has not been appointed yet.

CEO: Philippe Ley

A graduate of Ecole Nationale Supérieure d'Arts et Métiers, Mr Ley started his career at the international engineering company ASSYSTEM in 1994. He moved to Renault Automation in 1997 where he occupied different managerial positions and became head of engineering at COMAU France, an industrial automation company, in 2001. He joined Riber in 2007 where he was first production director, then operation director and member of the executive board. He left Riber in 2015 to become managing director at ERCA, which produces equipment for manufacturing containers for dairy food. He returned to Riber in 2018, as chief executive officer and member of the executive board.

Principal shareholders	(%)
Ormylia SAS, Jacques Kielwasser (Mr Kielwasser was formerly a member of Riber's supervisory board)	22.7
ISA Finances, Socodol, Mr and Mrs Raboutet (Mr Raboutet is a member of Riber's supervisory board)	20.8
Emmanuel Ichbiah	5.3

Companies named in this report

Aixtron (AIXA:GR), Asahi Kasei (3407:JP), Aselsan Elektronik (ASELS:TI), Coherent (COHR:US), First Solar (FSLR:US), IntelliEpi (4971:TT), IQE (IQE:LN), Northrop Grumman (NOC:US), Raytheon (RTN:US), Singulus Technologies (SNG:GR), Teledyne Technologies (TDY:US), Veeco (VECO:US)

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Frankfurt +49 (0)69 78 8076 960
Schumannstrasse 34b
60325 Frankfurt
Germany

London +44 (0)20 3077 5700
280 High Holborn
London, WC1V 7EE
United Kingdom

New York +1 646 653 7026
1,185 Avenue of the Americas
3rd Floor, New York, NY 10036
United States of America

Sydney +61 (0)2 8249 8342
Level 4, Office 1205
95 Pitt Street, Sydney
NSW 2000, Australia