CIMA

# Strategic Case Study Examination

May – August 2026

Pre-seen material

## Context Statement

We are aware that there has been, and remains, a significant amount of change globally. To assist with clarity and fairness, we do not expect students to factor these changes in when responding to, or preparing for, case studies. This pre-seen, and its associated exams (while aiming to reflect real life), are set in a context where current and ongoing global issues have not had an impact.

Remember, marks in the exam will be awarded for valid arguments that are relevant to the question asked. Answers that make relevant references to current affairs will, of course, be marked on their merits.

# Contents

## Introduction

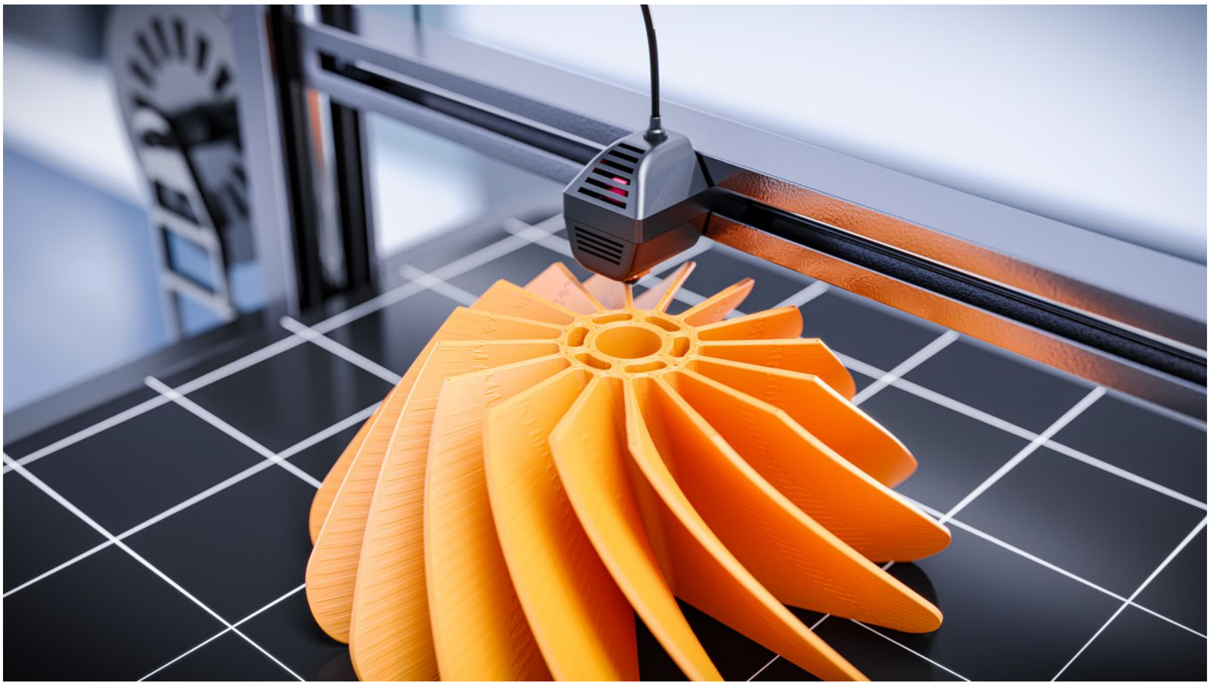
Kwirtmak is a quoted company that builds commercial 3D printers to customers' specification. These printers can be tailored to a variety of tasks.

You are a senior manager in Kwirtmak's finance function. You report directly to the Board and advise on special projects and strategic matters.

Kwirtmak's head office is located in Ennland, a developed country that has an active and well-regulated stock exchange. Ennland's currency is the E$. Ennland requires companies to prepare their financial statements in accordance with International Financial Reporting Standards (IFRS).

## 3D printing

3D printing, or additive manufacturing, is a process whereby items are constructed by building up layers of material. These items are designed in computer-aided design (CAD) software. Different types of printer can manufacture items in plastic, metal or organic matter. 3D printers vary in size, sophistication and cost, starting with small units that are suitable for hobbyists to large units that can create parts for commercial applications. The commercial applications of this technology include prototyping new products and the manufacture of bespoke items.



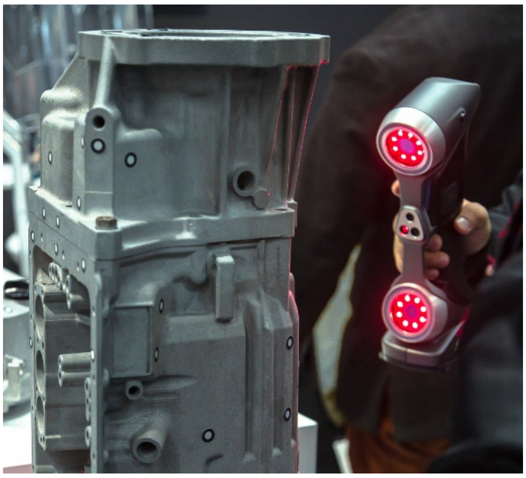
3D printing starts with a three-dimensional digital model of an object. The printer creates a physical object by building up a succession of thin layers of material. This technology offers significant benefits in terms of the speed and accuracy of construction. For example, an engineer can edit a digital model of an object using CAD software before sending the result to a 3D printer for fabrication. 3D printers can create accurate physical versions of these CAD designs.

3D printing can be used to design and create prototypes of components that can be used to assist in design work. It is also possible to manufacture complex parts that would be difficult to fabricate using traditional manufacturing methods.

Traditional manufacturing methods such as machining and moulding are generally more expensive than 3D printing when it comes to making individual units for prototypes. They are often less accurate in terms of creating a physical object from a plan. 3D printing of parts can, however, be much more expensive than mass producing those same parts using traditional methods.

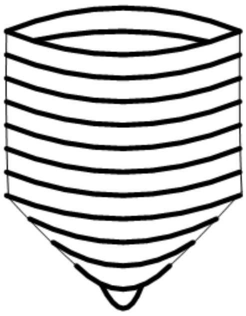
## 3D printing technology

In commercial settings, 3D printing applications usually start with the construction or edit of a model created in 3D CAD software. The design stage can often be speeded up by scanning an object that requires modification using a high-definition three-dimensional scanner. The scanner creates a file that can be opened and edited in 3D CAD software. That makes it possible to create 3D CAD files more quickly than by drawing the component in its entirety, starting with an empty file.



Once the digital model has been drafted, the software splits the resulting object into a large number of very thin layers. Each layer is intended to be added to the object with a single pass of the printer. Each layer is too thin to be seen with the naked eye.

The final stage is to transfer the processed file to the 3D printer, which creates a solid object that corresponds exactly with the digital model. There are several types of 3D printer. Each printer uses a specific material. 3D printing can create objects from:

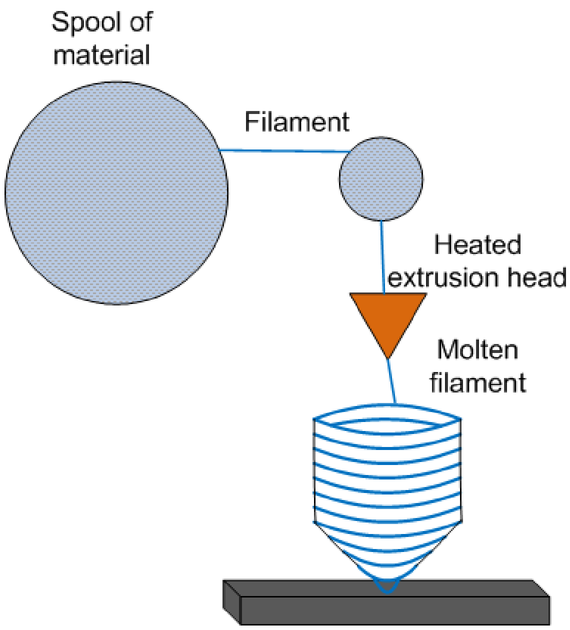


- plastic
- nylon
- ceramic
- metal
- resin

3D printers can create complex shapes that require no further assembly. Conventional production techniques might require the same items to be made in multiple parts that have to be fitted together to arrive at the final shape.

3D printing offers convenience and can save a significant amount of time in the design and development of new products. It is, however, necessary to apply some engineering skill in the creation of objects using 3D printing. For example, a complex shape might require a temporary support to be incorporated into the design. Once the object has been printed, it will have sufficient strength on all sides to allow for the support to be removed.

## Types of printer

| | |
|---|---|
| **Extrusion**<br><br> | Extrusion is one of the most recognisable 3D printing technologies. The physical object is constructed from plastic filament, which is loaded into the printer in spools.<br><br>The filament is fed into an extrusion head which melts the plastic and deposits it precisely, building up the object in layers. Each layer hardens and bonds to the preceding layer underneath.<br><br>Extrusion might require support structures to be added temporarily to ensure that any overhanging sections of the object are supported while they cool and harden.<br><br>Some extrusion printers have multiple extrusion heads, which makes it possible to incorporate different materials into an object. One application for this is the use of water-soluble material to construct any temporary support structures. These can then be removed by washing the object and dissolving the supports, which are no longer required.<br><br>These printers can be relatively small and can produce reasonable quality objects. |

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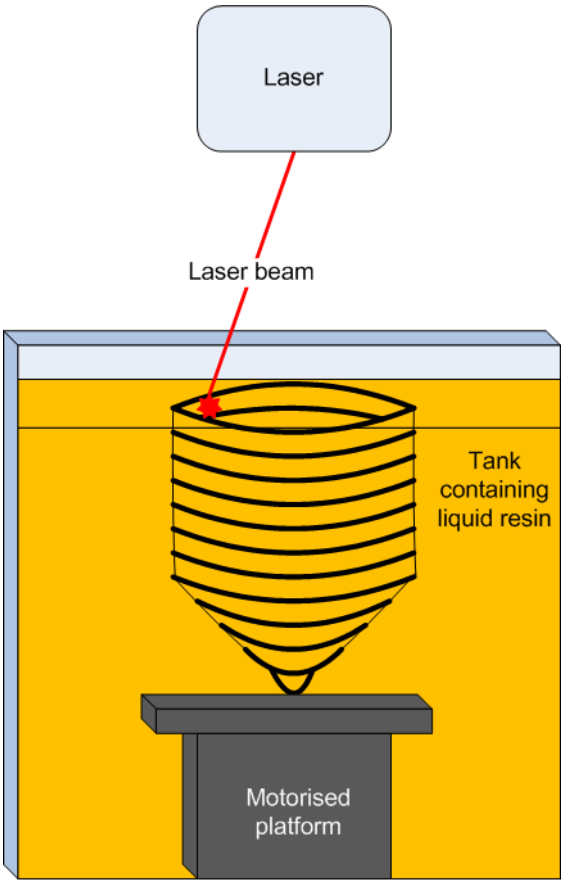
**Stereolithography (SL)**

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Stereolithography (SL) uses photopolymer resins. These cure very quickly when exposed to laser light.

The printer consists of a laser that is mounted above a tank of liquid resin. The tank contains a motorised platform that can be raised to the surface of the resin and then lowered in very small and precise increments.

An object is created by placing the platform just below the surface of the resin, leaving a very thin layer of liquid. The laser beam is directed over specific parts of the platform, curing the layer of liquid in selected areas and so creating the first layer.

The platform is then lowered by one increment, leaving the first layer just below the surface. The laser creates the second layer by curing the resin in the appropriate places.

As with extrusion, SL may require temporary structures or supports for overhanging sections of the object.

Objects created with SL may require further curing by exposing them to bright light in order to fully harden the resin.

SL is one of the most accurate 3D printing processes.

There is a similar 3D printing process called digital light processing (DLP) which uses a more conventional light source that is directed using a lens and a mirror instead of a laser.

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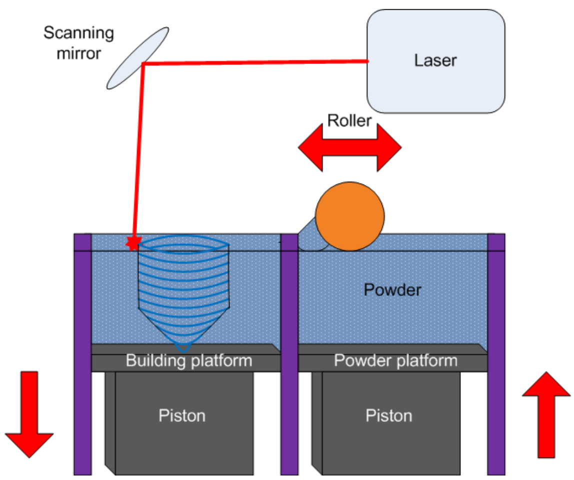
**Laser melting**

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Laser melting uses powdered materials in a machine that has two chambers: a build chamber and a powder chamber. Both chambers have platforms that can be raised or lowered by means of pistons.

The build chamber starts at the top of its tank. The piston in the powder chamber rises slightly and a roller pushes a thin layer of powder over the building platform. The powder is spread evenly and compacted by the weight of the roller.

The laser is directed over the appropriate parts of the building platform, causing the powder to melt and fuse to create a hard layer.

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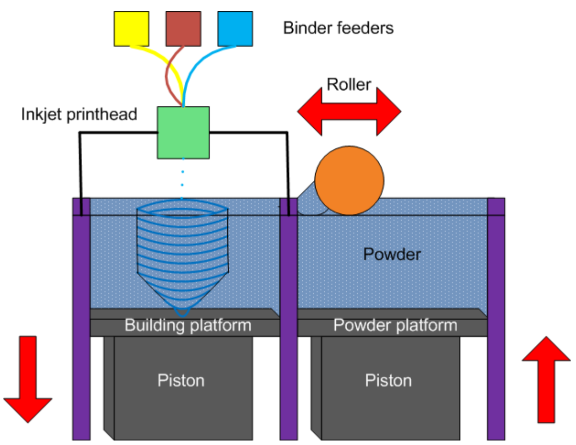
| | |
|---|---|
| | Subsequent layers are created by the piston under the powder platform, raising the platform slightly so that a further layer of powder can be spread across the building platform. The laser hardens subsequent layers, which bond with previous layers to create a solid object. This is repeated until all layers have been added.<br><br>Once the object has been completed, the material in the building tank is allowed to cool and then the object is removed from the unused powder. Any remaining powder can then be brushed away.<br><br>Laser melting does not require overhanging sections to be supported because the unused powder packs any empty spaces and so provides all necessary support.<br><br>Laser melting can create objects from plastic and metal materials.<br><br>Objects made using laser melting tend to be stronger than those from SL or DLP, although they are not always as accurate and their surface finish may be rougher. |
| **Multijet**<br> | There are two forms of multijet 3D printing: binder jetting and material jetting.<br><br>Binder jetting has some superficial similarities to laser melting. Both rely on powder being spread evenly and compressed on a building platform. Binder jetting fuses the relevant areas of powder by spraying them with precise quantities of a liquid binder. The binder reacts with the powder, creating a layer of the object.<br><br>The printhead that distributes the binder is very similar to the printhead on a conventional inkjet printer. It can be moved very precisely in two dimensions to reach any part of the platform.<br><br>Binders come in different colours and can be mixed, enabling the construction of multicoloured objects.<br><br>As with laser melting printers, the powder provides all necessary support during construction and so there is no need to add temporary supports to designs.<br><br>Binder jetting printers can use a wide range of materials, including ceramics.<br><br>Objects produced from this technology are not as strong as those from laser melting. |

| | |
|---|---|
| | Inkjet technology is also used in material jetting printers. A printhead is used to deposit a layer of liquid or molten material, usually a photopolymer, onto a construction platform. Each layer is cured using ultraviolet light before the next pass from the printhead.<br><br>Material jetting allows for the simultaneous use of different materials. The resulting objects tend to be very accurate with smooth finishes. |

## Materials

| | |
|---|---|
| **Plastics** | Plastics are often used in powdered form in laser melting printers or in filament form for extrusion. Nylon can be used in both forms, creating strong and flexible objects. Nylon is usually supplied in white, but it can be coloured, either before or after printing.<br><br>Powdered nylon can also be combined with powdered aluminium to create alumide, which makes it possible to create objects that are both stiff and heat resistant.<br><br>ABS is a very strong plastic that can be used in filament form in extrusion printers. It is available in a wide range of colours.<br><br>PLA is a biodegradable plastic that can be supplied in resin form for use in SL and DLP printers and in filament form for extrusion. |
| **Metals** | Several metals can be used in powder form for 3D printing:<br>• aluminium<br>• cobalt<br>• stainless steel<br>• gold<br>• silver<br>• titanium<br><br>The metals differ in terms of their characteristics and applications. |
| **Ceramics** | Ceramic materials can be obtained in different formats, making it possible to use them in extrusion, binder jetting, laser melting, material jetting and DLP.<br><br>Ceramic objects must be fired, in the same manner as any other ceramic item, after printing. |

## Potential benefits of 3D printing

3D printing is often associated with the rapid development of prototypes, thereby speeding up research and development projects. For example, a 3D printer can create a solid object directly from a 3D CAD file. The alternative might require a time consuming and expensive process, such as sculpting the part from a solid block of material or making a mould and using that to cast the prototype.

3D printing offers other benefits. For example, objects can be customised to fit customers' particular requirements.

3D printing can be flexible. For example, laser melting and binder jetting can make multiple objects simultaneously in the same development tank. These items can either be identical or tailored to a particular requirement.

3D printing can produce complex shapes that would be impossible to produce using conventional production techniques. That capability can also eliminate time-consuming assembly from manufacturing processes. The alternative to 3D printing a single object might be the manufacture of two or more pieces that would have to be built together to create the final item.

3D printing can result in sustainable production methods. Products and components can be printed locally, reducing the need for transportation. Also, conventional manufacturing techniques often result in materials waste that can be avoided using 3D printing.

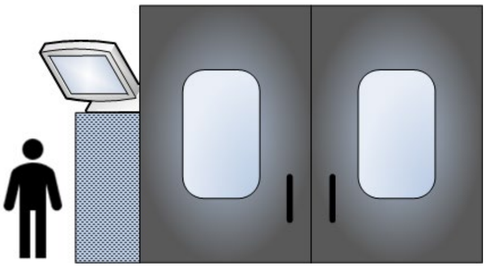
## About Kwirtmak

Kwirtmak

Kwirtmak was founded in 1992. Initially, it manufactured small 3D extrusion printers that were popular with small commercial design workshops.

Kwirtmak was quoted on the Ennland stock exchange in 2004.

The company's product range expanded over time. It continues to build 3D extrusion printers, but also makes stereolithography (SL), digital light processing (DLP), laser melting and material jetting printers. Kwirtmak specialises in printers for commercial customers, including machines that can create relatively large objects from plastic, metal or ceramics. The company's largest extrusion printer can create objects with a build volume of up to 1 metre cubed.



Kwirtmak supplies materials for use in its printers. Customers are not required to purchase those materials, but many choose to do so because they are known to be compatible and so will produce the best possible output from Kwirtmak's machines.

Kwirtmak's customers are from a wide range of industrial backgrounds, including:

- **Aerospace** – the creation of spare parts at major airports around the world in order to speed up repairs to aircraft that would otherwise have to wait for parts to be flown in if not held locally in inventory.
- **Automotive** – the manufacture of switches and dashboards for low-volume luxury cars.
- **Consumer electronics** – the rapid creation of prototypes for the development of new or improved products.

- **Jewellery** – the manufacture of individual pieces in complicated shapes that would be difficult, if not impossible, to create using traditional jewellery techniques. These might be bespoke items that can be designed using 3D CAD in accordance with the consumer's specific wishes and sized to be a perfect fit, where necessary.

Kwirtmak supplies a wide range of customers, covering many different industries. The company has a strong reputation for the provision of technical advice, ensuring that customers' requirements are met in terms of several key criteria:

- **Cost** – 3D printers are generally quite expensive to purchase and to operate. They come at a range of different price points, depending on the technology of the printer and the features that are required.
- **Speed** – the time taken to create a particular item will depend on the printer's technology and the power of components such as lasers or heaters.
- **Properties of output** – customers should probably focus on the properties of the objects that they wish to create before considering factors such as cost and speed:
    - **Accuracy** – printers vary in terms of the precision that they can deliver. The need for precision depends on the application. An engine part might have to be accurate to within a tiny fraction of a millimetre, while an ornament could be perfectly acceptable even if it is created to a much wider tolerance.
    - **Finish** – different combinations of printer and material will produce different finishes on the item being created. Some parts might have to be created in a precise colour scheme and/or have a smooth surface. Appearance might not be an issue for parts that will not be visible to a consumer.
    - **Strength** – different combinations of printer and material will yield different strengths of object. Some objects will not require a great deal of strength while others will have to be quite robust. Objects will also vary in terms of their ability to retain their strength when exposed to moisture or to high or low temperatures.
    - **Size** – printers vary in terms of the size of their production platforms, which has implications for the size of the objects that they can create. It may be necessary to build some objects in multiple parts if the entire object could not be built as a single part on the platform.

Kwirtmak's range of products enables it to meet most customer requirements in terms of the speed and property of output criteria. The prices of Kwirtmak's printers and materials tend to reflect the high quality of its products. More advanced and capable printers tend to have higher selling prices in recognition of the superior components and better build quality that they provide.

Kwirtmak largest factory is in Ennland, alongside its head office in the outskirts of Capital City. The company has three other factories, each in a different country. The company sells to a global market.

# Extracts from Kwirtmak's annual report

## Kwirtmak's mission, vision and values

Our mission

Kwirtmak's mission is to transform its customers through innovation in design and production.

Our vision

Kwirtmak's vision is to be the leading provider of additive manufacturing solutions across industries, to be achieved in a sustainable manner.

Our values

- Kwirtmak creates wealth and success.
- Kwirtmak's innovations are driven by customer need.
- Kwirtmak overdelivers on promises to its customers.
- Kwirtmak trusts its staff.
- Kwirtmak staff are team players.

## Kwirtmak's Board of Directors

*Madda Fedele, Non-Executive Chair*

Madda had a successful career as an administrator in Ennland's Government. She was involved in drafting several key pieces of business-related legislation during her time in office. She reached a very senior position before she retired from government service.

Madda serves on the senate of Capital City University. Her responsibilities include membership of the University Audit Committee.

Madda joined Kwirtmak's Board as Non-Executive Chair in 2024.

*Dr David Wallace, Chief Executive Officer (CEO)*

David is a mechanical engineer. He has BEng and MEng degrees from the University of Central City. He completed a PhD at Capital City University, writing a thesis on the precision control of mechanical devices.

David joined Kwirtmak as a member of the Research and Development Department after graduating with his PhD. He has held several positions with the company, including Chief Technical Officer.

David was promoted to CEO in 2023.

*Kristina Eder, Operations Director*

Kristina has a degree in chemical engineering from the University of Newtown. She joined a company in the oil industry after graduation, where she held a number of positions in production.

Kristina joined Kwirtmak in 2016 as Head of Quality. She was promoted to the Board as Operations Director in 2022.

*Dr Said Abouchdak, Chief Technical Officer (CTO)*

Said has BEng and PhD degrees from the University of Central City. Said's PhD thesis was on the behaviour of molten plastics under extrusion.

Said joined Kwirtmak after completing his PhD. He has worked in both Production and Research and Development.

Said was promoted to Kwirtmak's Board as CTO in 2024.

*Agata Paluch, Chief Financial Officer (CFO)*

Agata is a professionally qualified accountant. She worked for an electronics manufacturer while studying for her professional exams. After qualifying, she moved to a larger electronics manufacturer and then to Kwirtmak, joining as Chief Accountant.

Agata was promoted to Kwirtmak's Board as CFO in 2025.

*Ouyang Qi, Marketing Director*

Ouyang joined the marketing department of a major manufacturing company straight after school. He has since had a long and successful career in business-to-business sales.

Ouyang joined Kwirtmak's Marketing Department as a senior manager in 2019. He was promoted to Marketing Director in 2022.

*Dr Ada Rothenberg, Senior Independent Director*

Ada's PhD was in economics. Most of her career was spent in banking, ultimately serving as the Chief Economist of the Ennland Mutual Bank.

Since retiring from banking, Ada has served on three government advisory committees.

She joined Kwirtmak as Senior Independent Director in 2024.

*Professor Ahmet Usta, Independent Non-Executive Director*

Ahmet had an academic career. He taught and conducted research at the University of Newtown, before moving to the University of Central City's School of Business as head of their Master of Business Administration (MBA) degree.

Ahmet continues to serve as a part-time visiting professor at the University.

He joined Kwirtmak's Board as an Independent Non-Executive Director in 2025.

*Nina Abersek, Independent Non-Executive Director*

Nina founded a successful company that specialised in the commercial application of innovative new technologies. Her company was quoted on the Ennland stock exchange.

Nina has held several non-executive directorships since selling her shares and stepping back from the company that she founded. She now serves as a non-executive director on Kwirtmak's Board. She is also the Chair of Ennland Opera.

### Board responsibilities

| David Wallace<br>Chief Executive Officer | | | |
|---|---|---|---|
| Kristina Eder<br>Operations Director | Said Abouchdak<br>Chief Technical Officer | Agata Paluch<br>Chief Financial Officer | Ouyang Qi<br>Marketing Director |
| • Factory operations<br>• CAD software<br>• Human resource management<br>• Health and safety<br>• Sustainability | • Research<br>• Product development | • Financial reporting<br>• Management accounting<br>• Treasury | • Marketing<br>• Customer service<br>• Public relations |

| | Board committees | | | |
|---|---|---|---|---|
| | Audit | Risk and CSR | Remuneration | Nomination |
| Madda Fedele<br>Non-Executive Chair | ♦ | ♦ | | ♦ |
| Ada Rothenberg<br>Senior Independent Director | ♦ | | ♦ | ♦ |
| Ahmet Usta<br>Independent Non-Executive Director | ♦ | ♦ | ♦ | |
| Nina Abersek<br>Independent Non-Executive Director | | ♦ | ♦ | ♦ |

Kwirtmak's Chief Internal Auditor reports to the convener of the Audit Committee.

## Kwirtmak's principal risks

| Risk impact | Risk mitigation |
| --- | --- |
| Kwirtmak trades globally, which can leave the Group exposed to the effects of economic trends. For example, foreign governments might increase interest rates in response to unacceptable rates of inflation. Such changes can have adverse effects on Kwirtmak's suppliers and customers. | Kwirtmak's Treasury Department closely monitors all such trends and recommends strategies for the mitigation of associated risks. The Group also pays close attention to minimising operating costs. |
| Sales demand can be volatile, creating variability in reported earnings. This volatility can also make it difficult to predict demand, which can lead to overinvestment in inventory if forecast sales do not materialise. | Kwirtmak's Marketing Department maintains a good relationship with major customers. Kwirtmak's sales staff ensure that customers are kept informed of potentially useful new products or updates to existing products. |
| Kwirtmak's printers are complicated in terms of the hardware and software used in their construction. Any flaws or faults can create significant quality issues. Errors in 3D printed components can often result in mission-critical failures. Customers can also be badly inconvenienced when 3D printers have to be taken offline because of breakdowns or software problems. | Kwirtmak's Factory Operations Department pays the closest possible attention to the quality of hardware manufactured in the Group's factories.<br><br>The Product Software Department pays close attention to updating and upgrading the software that operates products and provides their interface to leading 3D CAD packages. |
| Kwirtmak relies heavily on third-party suppliers to provide parts and materials for manufacturing its printers and 3D printing materials. These suppliers also provide many of the spare parts used to replace worn or damaged items. Any lack of availability can disrupt Kwirtmak's operations and those of its customers. Defective parts and materials can also affect Kwirtmak's product quality. | Kwirtmak works closely with third-party suppliers to ensure that they are aware of all of the quality standards that are required in the supply of parts and materials.<br><br>Quality management systems should minimise the risk of defective output being despatched to customers. |
| The nature of Kwirtmak's products can create significant exposure to the risk of penalties for non-compliance with health and safety and environmental legislation. | Kwirtmak's Legal Department pays close attention to all applicable laws and regulations that could impose a duty in relation to products and their operation. |

## Extract from Kwirtmak's financial statements

**Kwirtmak Group**
**Consolidated statement of profit or loss**
**For the year ended 31 March**

| | 2026<br>E$ million | 2025<br>E$ million |
|---|---|---|
| Revenue | 2,320.0 | 2,856.6 |
| Cost of goods sold | (828.0) | (913.4) |
| Gross profit | 1,492.0 | 1,943.2 |
| Selling and administration | (47.4) | (47.1) |
| Research | (270.0) | (285.0) |
| Operating profit | 1,174.6 | 1,611.1 |
| Finance costs | (108.0) | (108.0) |
| | 1,066.6 | 1,503.1 |
| Tax expense | (256.0) | (360.7) |
| Profit for the year | 810.6 | 1,142.4 |

**Kwirtmak Group**
**Consolidated statement of changes in equity**
**For the year ended 31 March 2026**

| | Share capital<br>E$ million | Currency reserve<br>E$ million | Retained earnings<br>E$ million | Total<br>E$ million |
|---|---|---|---|---|
| Opening balance | 300.0 | 267.4 | 1,204.8 | 1,772.2 |
| Currency loss | | (44.3) | | (44.3) |
| Profit for year | | | 810.6 | 810.6 |
| Dividend | | | (432.2) | (432.2) |
| Closing balance | 300.0 | 223.1 | 1,583.2 | 2,106.3 |

**Kwirtmak Group**
**Consolidated statement of financial position**
**As at 31 March**

| | 2026<br>E$ million | 2025<br>E$ million |
|---|---:|---:|
| **Assets** | | |
| **Non-current assets** | | |
| Property, plant and equipment | 2,551.3 | 2,321.7 |
| Goodwill | 118.6 | 118.6 |
| Other intangible assets | 497.2 | 422.6 |
| | 3,167.1 | 2,862.9 |
| **Current assets** | | |
| Inventory | 287.5 | 312.4 |
| Trade receivables | 198.3 | 244.2 |
| Bank | 136.2 | 148.1 |
| | 622.0 | 704.7 |
| | | |
| **Total assets** | 3,789.1 | 3,567.6 |
| | | |
| **Equity** | | |
| Share capital | 300.0 | 300.0 |
| Currency reserve | 223.1 | 267.4 |
| Retained earnings | 1,583.2 | 1,204.8 |
| | 2,106.3 | 1,772.2 |
| | | |
| **Liabilities** | | |
| **Non-current liabilities** | | |
| Borrowings | 1,350.0 | 1,350.0 |
| | | |
| **Current liabilities** | | |
| Trade payables | 76.7 | 84.6 |
| Tax liability | 256.1 | 360.8 |
| | 332.8 | 445.4 |
| | | |
| **Total equity and liabilities** | 3,789.1 | 3,567.6 |

## Extract from competitor's financial statements

Kwirtmak is one of eight major manufacturers of industrial 3D printers. Most of these compete directly with Kwirtmak, producing similar ranges of products.

Breskko is Kwirtmak's closest competitor. It sells a very similar range of 3D printers and materials.

Breskko is based in Ennland. It is quoted on the Ennlandian stock exchange. The other major manufacturers are based abroad, but all compete in the same markets as Kwirtmak and Breskko.

**Breskko Group**
**Consolidated statement of profit or loss**
**For the year ended 31 March**

| | 2026<br>E$ million | 2025<br>E$ million |
|---|---:|---:|
| Revenue | 3,016.0 | 2,744.6 |
| Cost of goods sold | (1,026.7) | (903.5) |
| Gross profit | 1,989.3 | 1,841.1 |
| Selling and administration | (59.7) | (55.5) |
| Research | (329.4) | (312.9) |
| Operating profit | 1,600.2 | 1,472.7 |
| Finance costs | (112.0) | (112.0) |
| | 1,488.2 | 1,360.7 |
| Tax expense | (342.3) | (313.0) |
| Profit for the year | 1,145.9 | 1,047.7 |

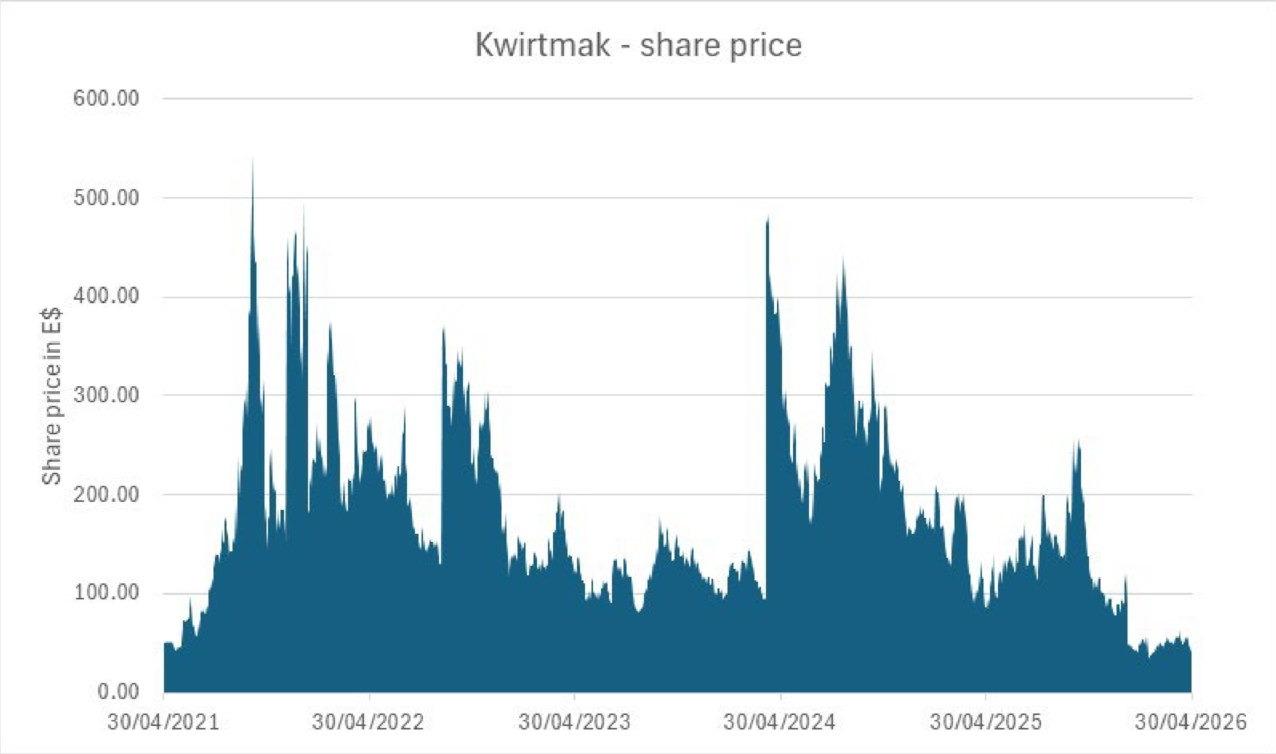
**Breskko Group**
**Consolidated statement of changes in equity**
**For the year ended 31 March 2026**

| | Share capital<br>E$ million | Currency reserve<br>E$ million | Retained earnings<br>E$ million | Total<br>E$ million |
|---|---:|---:|---:|---:|
| Opening balance | 250.0 | 228.7 | 2,463.9 | 2,942.6 |
| Currency loss | | (11.3) | | (11.3) |
| Profit for year | | | 1,145.9 | 1,145.9 |
| Dividend | | | (799.4) | (799.4) |
| Closing balance | 250.0 | 217.4 | 2,810.4 | 3,277.8 |

**Breskko Group**
**Consolidated statement of financial position**
**As at 31 March**

| | **2026**<br>**E$ million** | **2025**<br>**E$ million** |
|---|---:|---:|
| **Assets** | | |
| **Non-current assets** | | |
| Property, plant and equipment | 3,571.8 | 3250.3 |
| Goodwill | 212.4 | 212.4 |
| Other intangible assets | 600.3 | 575.4 |
| | 4,384.5 | 4,038.1 |
| **Current assets** | | |
| Inventory | 345.0 | 343.6 |
| Trade receivables | 257.8 | 234.6 |
| Bank | 124.6 | 118.7 |
| | 727.4 | 696.9 |
| | | |
| **Total assets** | 5,111.9 | 4,735.0 |
| | | |
| **Equity** | | |
| Share capital | 250.0 | 250.0 |
| Currency reserve | 217.4 | 228.7 |
| Retained earnings | 2,810.4 | 2,463.9 |
| | 3,277.8 | 2,942.6 |
| | | |
| **Liabilities** | | |
| **Non-current liabilities** | | |
| Borrowings | 1,400.0 | 1,400.0 |
| | | |
| **Current liabilities** | | |
| Trade payables | 91.7 | 79.3 |
| Tax liability | 342.4 | 313.1 |
| | 434.1 | 392.4 |
| | | |
| **Total equity and liabilities** | 5,111.9 | 4,735.0 |

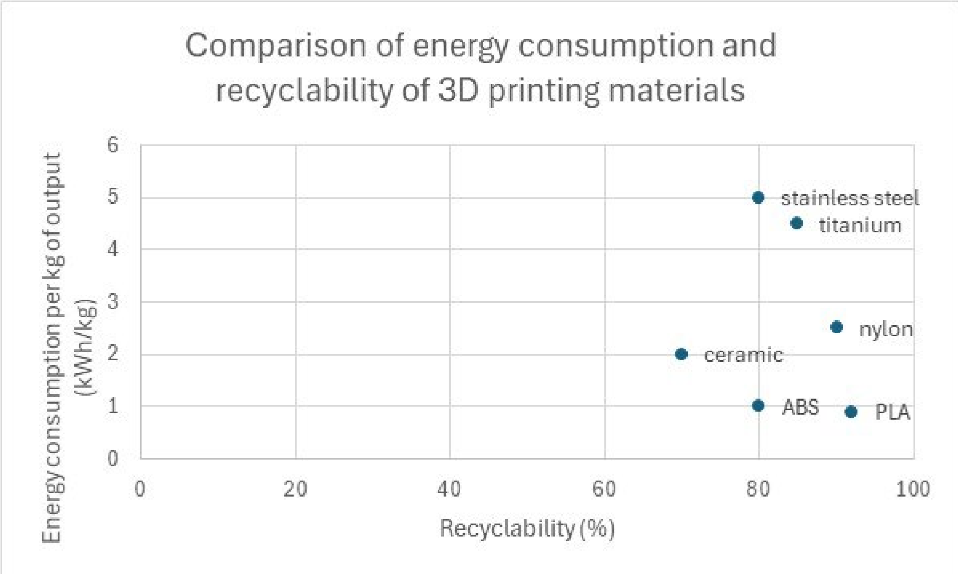
## Kwirtmak’s share price history




Kwirtmak’s beta is 2.3

## Kwirtmak's sustainability

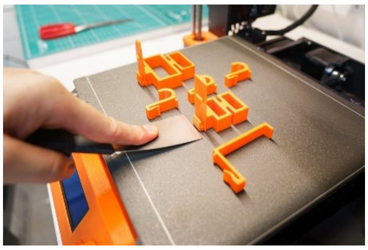
| | |
|---|---|
| **Governance** | Kwirtmak's Operations Director has a specific responsibility for the oversight of sustainability issues. The Operations Director is expected to report on sustainability issues at all routine Board meetings.<br><br>Kwirtmak also has a Risk and CSR Committee, which monitors sustainability issues on behalf of the Board as a whole. |
| **Strategy** | 3D printing offers several benefits for the promotion of sustainability in comparison to traditional manufacturing methods:<br><br>• **Efficient use of materials –** The additive nature of 3D printing generally uses less material than traditional manufacturing, which often starts with a larger block of material and removes material to create an item.<br><br>• **Recycling –** Many of the plastics used in 3D printing can be recycled as new filament.<br><br>• **Carbon footprint –** 3D printers can be located close to the point of use, allowing components to be manufactured nearby, eliminating the need for transportation. |
| **Risk management** | Kwirtmak takes care to ensure compliance with all environmental legislation. All staff are trained in environmental issues relating to their roles and are encouraged to report any concerns.<br><br>Kwirtmak engages with government and other regulators with a view to assisting in the development of realistic and effective sustainability targets.<br><br>All staff are empowered to halt operations in the event of any serious environmental concerns, such as excessive emissions. |

| | |
|---|---|
| **Metrics** | Kwirtmak pays close attention to the impact of the machines that it sells on the environment. It aims to enhance the sustainability of its printers in use by customers.<br><br>For example, the energy consumption associated with printing with PLA was reduced by 32% through adjustments to the nozzle temperature and the thickness of layers in building up items.<br><br> |

## News stories

# Happy Comic

## Readers' questions



**Question:** My dad has a 3D printer that he uses to make model soldiers. He has a huge collection and they are really realistic.

I have asked him to make me a new wheel for my bicycle, but he says that he cannot. Why is that?

Alice, age 11

**Answer:** 3D printers come in lots of different shapes and sizes and your dad's printer is probably just too small to build a bicycle wheel. Also, his printer is probably designed to produce plastic objects. A plastic wheel made by a large printer would probably be too weak to carry a cyclist's weight.

Some businesses use 3D printers just like your dad's to create small objects such as buttons and switches that need not be particularly strong. It is also possible to buy 3D printers for commercial use that can make larger objects, possibly using robust materials such as metal.

**Question:** My uncle restores old motorcycles. He often finds it difficult to find parts. On his current project, the bracket holding the speedometer in place was cracked and he couldn't find a replacement. He had a new one made by a specialist company that uses 3D printers. He says that the bracket they supplied is a perfect match for his bike. How did they do that?

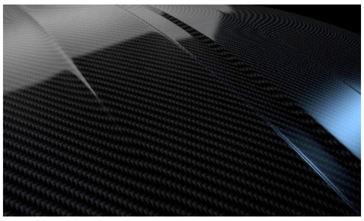
Pranesh, age 12

**Answer:** The 3D printing company probably used a three-dimensional scanner to create an image of the old bracket. They might have had to edit the image a little to take out any cracks or bends in the metal. There are lots of different 3D printing technologies, some of which can create metal objects that can be quite strong.

# Ennland Telegraph

**Technology** | **Business** | **Politics** | **Science** | **World** | **Weather**

## Growing demand for carbon fibre



Manufacturers of carbon fibre are reporting strong demand for their product, which is used extensively in industrial applications that require materials that combine light weight with strength.

Carbon fibre consists of very thin fibres made from organic polymers (plastics) that can be woven into fabrics or combined with resin and built up in layers to create composite materials. In either form, carbon fibre is both light and strong and so can be used in a number of ways.

In the automotive and aerospace industries, carbon fibre can be used to make car body parts or aeroplane wings that reduce the weight of vehicles or aircraft without compromising on build quality. Further uses are emerging, including the manufacture of sporting goods such as tennis rackets or bicycle frames that combine light weight and rigidity.

# Ennland Daily

**Technology** | **Business** | **Politics** | **Science** | **World** | **Weather**

## Medical profession making greater use of 3D printing

Doctors and dentists have been using artificial body parts to treat patients for many years. Perhaps the most common is the use of dental implants to replace lost teeth and enable patients to keep their smiles.

Medical implants are used widely in treating a range of conditions. For example, patients with serious heart problems can be treated by replacing their worn or damaged heart valves with articificial valves. Lost or injured limbs can be replaced with articificial limbs.

These replacements require considerable skill in their creation. They must be a perfect fit for the part that they are replacing and be free from manufacturing defects. Skilled technicians use measurements provided by dentists or doctors to fabricate those parts. Waiting for parts to come from the laboratory can delay urgent treatment.

Doctors and dentists are becoming increasingly reliant on 3D printing to speed up delivery of these products. The technicians enter the details provided by the medical experts into 3D CAD software and that interacts with a 3D printer to create the required parts. This is both faster than traditional manufacturing processes and more accurate.

The materials that are being used in these medical applicatons have all been submitted to the Ennlandian Health Service (EHS) for approval. They are not permitted for use until the EHS experts have made sure that they are safe for use with patients.

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