ISRAEL

XJet Expands Activities in Europe

Jet Ltd. is a provider of professional solutions for Additive Manufacturing (AM) of metal and ceramic components. These are used, for example, in the aerospace sector, in the automotive industry, in chemicals and electronics, but also in medical technology including dental technology, in toolmaking and luxury goods. The company is known for NanoParticle Jetting technology. This enables the manufacture of objects with the help of liquid droplets that contain metal or ceramic particles.
The company with its 100 employees, which was started up in 2005 by Hanan Gothait, is headquartered in the Science Park of the Israeli town of Revohot. Hanan Gothait was previously co-founder of Objet Geometries Ltd., which later merged with Stratasys (3D print-ing of polymers). In April 2022, he handed over his position as CEO to Yair Alcobi and has since served as President. International expansion of the company in the USA and in Asia is in full swing. We had the opportunity to talk to Andy Middleton (AM), who, as Vice President Business Europe, is responsible for setting up the XJet Europe Division, which corresponds to his previous role at Stratasys.

Fig. 1
Andy Middleton, XJet Vice President Business Europe

CA: *Since when has XJet engaged with the Additive Manufacturing of ceramic components?*
AM: The sale of the first systems in Asia, the USA, Great Britain, Switzerland and last year at CeramTec in Germany was preceded by a development period lasting around six years. Our team in Israel is made up of around 70 % engineers and scientists who have been working intensively on this and will press ahead with its further development for the ceramics industry, too.
CA: *Industrial 3D printing in ceramics is getting established. How far are XJet systems already integrated in industrial-scale manufacturing lines?*
AM: Our approach is the industrial application of 3D printing of unit numbers of several thousand components. Smaller batch sizes are, of course, necessary in the introduction and development of products. But we see the use of our systems clearly in industrial production and not in prototyping. The first systems have been operating for over three years in ceramics manufacturing in regions like Asia, North America and Europe.

NanoParticle Jetting Technology

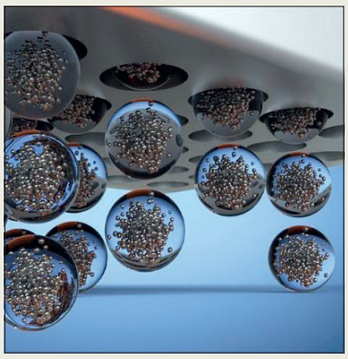

Fig. 2 a
Droplets are jetted

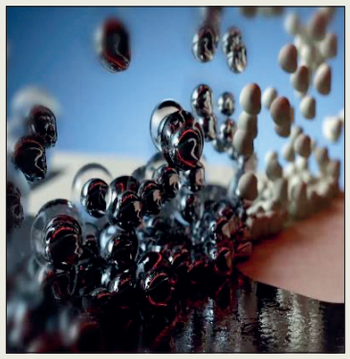

Fig. 2 b
Droplets touch the hot tray

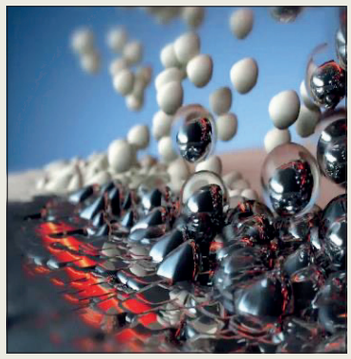

Fig. 2 c
Liquid evaporates

The key to the NanoParticle Jetting (NPJ) starts with its unique liquid dispersion methodology. A liquid suspension containing solid nanoparticles of a selected build material, i.e. zirconia or alumina, is jetted onto the build tray to additively manufacture detailed parts. This liquid suspension serves as the base materials for the AM process, unlike most existing ceramic and metal AM technologies that utilise hazardous and hard-to-handle powders. The use of liquid dispersion makes it possible to simultaneously jet a special soluble support material. Printheads with thousands of inkjet nozzles simultaneously jet millions of ultrafine drops of both build and support material onto the system build tray in ultrathin layers. The liquid carrier evaporates due to heat inside the printing chamber, and the build material's nanoparticles are left layer after layer to create a green part. After the part is additively manufactured, the support structure, made from special soluble material, easily dissolves from the finished part. The green part then goes to washing off the soluble support and afterwards to sintering in common industrial furnaces.
The liquid suspensions are delivered and installed in hassle-free sealed cartridges. The process takes place powderless, there is no work with powders and waste material. NPJ is the only technology with soluble support, removable by liquid. The soluble support allows to automate the entire process and makes it easy and safe. Applying the SMART system, manual post-processing is eliminated while ensuring a repeatable and efficient process.

Since the extensive increase in our sales activities in Europe, we are experiencing ever higher demand for the integration of our system in existing production operations.
The XJet system, which companies find highly flexible, is integrated seamlessly in existing production and, with less than 10 000 components/system, it closes the gap to complex and expensive traditional manufacturing.
CA: *Where do you see the strengths of the XJet process?*
AM: For high-precision parts – that applies to their geometry but equally to their surface quality. Additional functionalities, cavities or channels are often integrated in the components and, of course, extremely complex geometries are realised. Lightweight engineering is another huge aspect. With regard to component sizes, we are at the lower end of the range on account of the build rates.
A crucial benefit is the debinding process, which, owing to the evaporation of the liquid substances in the ink, is almost completed already during printing. Consequently, in most cases, separate, downstream debinding can be completely avoided, and extremely high density of the green parts is realised. Another benefit of our process for industry is that the support material is water soluble and therefore no complex or hazardous, manual removal of these structures is necessary.
The support structures are removed with the SMART (Support Material Automated Removal Technology) system in a time-saving and automated process, which is a precondition for economic and time efficiency in series manufacture. SMART offers user-friendly processes with different washing programmes adapted to the component, which are individually optimised in line with the printed parts. As a result, no specially trained operatives are needed.
We have a high reliability of the follow-on process and achieve very high sintered densities of 99,96 %. With alternative processes, this is often not possible or only with downstream HIP processes. We supply the material for printing in cartridges, to ensure absolutely safe and easy handling.
CA: *The inks used for printing are made by XJet. Do you do individual product developments for customers?*

AM: Yes, precisely those are approaches to further developing the technology. Our printers are tuned individually to the material processed. We engage very intensively with enquiries, not only in respect of the applications of our (potential) customers, but also with regard to the use of the printed components.

CA: *How concrete are XJet's plans for Europe?*

AM: In summer 2023 at the latest, the company will register a GmbH corporate form and the location for a Centre of Excellence in Germany will be decided. There, printers for testing will be installed and training sessions arranged.

This not only applies to the printing system itself, but also to the AM- and material-compatible design of the components: We are already negotiating with external partners in Germany, who will support us with applied research, e.g. for customised material developments.

We shall provide direct support for customers in the German-speaking countries, in some European countries we shall work through representatives.

In addition, our strength is certainly that we support customers in business development. As a concrete example, I can mention some work that I am currently doing with customers in Europe to optimise products from the luxury goods sector. There, we are talking, for instance, with designers and product developers to optimally design the components for their applications but also for 3D printing. To do this professionally, we are working across different market levels.

In this segment, quality standards are very high as the demand is for extremely sophisticated components in precisely defined colours. Very filigree, high-strength and complex parts are, of course, needed for electronics, too. These, too, are applications that fit well with our technology.

CA: *Thank you for talking to us.* KS