

Pioneer in terms of quality and efficiency in dental 3D printing

The Swiss m4m Center was founded in 2019 as an additive manufacturing center for medical applications. Since early 2021, it has been certified according to the internationally recognized standard ISO 13485:2016 – Medical Devices. The certificate is only issued to companies that have a high level of expertise, have established safe manufacturing processes and offer high-quality products. The company ventured into the production of semi-finished dental products in 2022. In addition to the corresponding manufacturing services from a validated environment, the Swiss m4m Center also offers its customers from this sector - dental laboratories and specialist laboratories for orthodontics - a transfer of technology and know-how: If you want to get into additive manufacturing yourself, you can get active support from the team at Swiss m4m Center headed by CEO Nicolas Bouduban. Training courses, investment advice and help in setting up smoothly functioning production chains are provided, depending on requirements. Laboratories that use this service not only benefit from the expertise of the Swiss m4m Center, but also from the expertise of numerous partners, including the machine manufacturer TRUMPF.

Swiss m4m Center

www.swissm4m.ch



The Swiss m4m Center in Bettlach, Switzerland, is an additive manufacturing center for medical, dental and orthodontic applications. At the same time, the company acts as a technology transfer center that makes it easier for customers from the medical technology and dental industries to get started with additive manufacturing. At the end of 2020, the State Secretariat for Education, Research, and Innovation (SERI) classified the Swiss m4m Center as a "research institution of national importance".

INDUSTRY	NUMBER OF EMPLOYEES	SITE
Medical and dental technology	8	Bettlach (Switzerland)

TRUMPF PRODUCTS

- TruPrint 2000
- TruPrint 1000
- TruMark

APPLICATIONS

- Additive manufacturing
- Laser marking
- Industrial part and powder management

Challenges

Swiss dental laboratories are currently characterized by a rather small-scale structure. To date, the proportion of purely analog production work has been surprisingly high (according to industry statistics

for 2021, it is almost 60 percent). However, the pressure to increasingly rely on digital manufacturing processes in the future is constantly increasing: There is talk of the risk of laboratory managers or owners becoming too old, while the shortage of skilled workers in the country is increasing. At the same time, patients are increasingly paying attention to the costs incurred, while their demands for quality and timely delivery remain high. Accordingly, one of the greatest challenges facing dental laboratories is to produce high-quality dentures and orthodontic parts as efficiently and cost-effectively as possible.

This is exactly what additive manufacturing is basically made for: With modern systems, for example for laser metal fusion technology (component production by laser melting of metal powder), many elements can be manufactured within a very short time. With regard to the geometry of the components, there are hardly any limits for the user and the surface and part quality is high - provided that the implemented process chain runs reliably and smoothly. This also addresses one of the biggest hurdles that beginners have to overcome: the time-consuming and labor-intensive installation of all components and the establishment of reliable production processes that deliver consistent quality. In addition to the initial investment costs, the associated high effort deters many laboratory owners - especially the older ones - from additively manufacturing semi-finished dental products from metal.



"Those who decide against investing in equipment do not have to do without additively manufactured semi-finished products. It is important that they find a reliable partner who can promptly deliver high-quality components."

NICOLAS BOUDUBAN
CEO OF SWISS M4M CENTER



Solutions

This is where the Swiss m4m Center comes in with its services. Dental technical and orthodontic laboratories commission the company to manufacture such products as promodel cast prosthetics, frameworks for complex (implant) prosthetic restorations and orthodontic parts such as transpalatal arches, GNE and Herbst appliances either from a chrome-cobalt alloy or from titanium. Usually only the digital model pair is provided for this – it is designed and manufactured in the Swiss m4m Center. In this way, even laboratories that decide against investing in additive manufacturing systems can also benefit from the technology and the associated manufacturing quality.

Anyone planning to get started with the additive manufacturing of dental components made of metal – from the start or at a later point in time – will receive appropriate support. "For such an investment to be worthwhile from an economic point of view, a fairly high production volume is required, which only a few dental laboratories in Switzerland actually achieve. However, for those who want to remain innovative first and foremost and advertise their technical equipment, an investment in additive manufacturing can be worthwhile, even for smaller piece counts," reports Nicolas Bouduban. He sees this technology transfer as a matter of course.

Implementation

In order to set up a reliable process chain - both in an in-house production center and in a laboratory - a machine must first be selected. In terms of process reliability, this machine should always be used for the material, i.e. one system is required for each material. Then the other required components are assembled. As soon as a quality structure has been established and the team has mastered the technology within it, the speed can be optimized in order to meet the stated market requirements.

In the Swiss m4m Center, a process chain established in 2020 around the MYSINT100 (Sisma) system is used to produce dental components made of titanium. In autumn 2022, the company invested in a TruPrint 1000 from TRUMPF for processing chrome-cobalt alloy, which was presented as a world first in November 2022. "For me, the greatest strengths of the new system are the component quality that can be achieved, the versatility and the options for adapting the equipment to your own requirements," reports Nicolas Bouduban. The TruPrint 1000 has a substrate plate with a diameter of 98.5 mm, and the equipment can be adapted to user needs thanks to numerous equipment options. The range of applications can be expanded with the preform option for the production of up to 64 individual implant abutments on one platform, as well as the hybrid production option. The latter makes it possible to rework the fitting surfaces of printed components by milling. If, on the other hand, the total order volume increases, the multilaser options can be retrofitted to simultaneous exposure of the powder with two TRUMPF fiber lasers and Multiplate. Multiplate takes up to four build plates, changes them fully automatically and collects finished plates in the overflow bin, allowing large order volumes to be realized overnight and on weekends without personnel.

"We initially invested in a basic version of the TruPrint 1000, but plan to gradually expand the options - starting with the preform equipment package this year," says Nicolas Bouduban. He adds: "The start-up and establishment of the process chain went absolutely smoothly for us. This is certainly also due to the fact that we have already gained a lot of experience in laser metal fusion with a TRUMPF machine: The TruPrint 2000, which is used for instrument production. Basically, TRUMPF as a manufacturer, but also the special system itself, make it easy for beginners to produce high-quality components too."



Looking ahead

While the existing process chains are running smoothly, the Swiss m4m Center team is already thinking about ways to further increase speed and manufacturing quality. In addition, they are aiming for an even higher degree of automation for the entire production - a goal in which TRUMPF will support the team as a strong partner with well-founded expertise in matters of dental production. Nicolas Bouduban could also imagine working together to develop completely new concepts, such as plastic-metal combination

printing. "Up to now, the limiting factor has been material development: It's a long hard road to develop materials that meet the regulatory requirements," says the expert. We can't wait to see what the Swiss m4m Center does next!

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TruPrint 1000

With the next generation of the TruPrint 1000, you enjoy even higher productivity and premium quality in 3D printing - all on the smallest possible footprint.



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TruPrint 2000

Do you want cost-effective 3D printing in premium quality? With its small 55- μ m laser beam diameter, the TruPrint 2000 provides a high-quality printing result with superior surface quality and level of detail.



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