Desktop Metal

CASE STUDY

Unique and Highly Customized Luxury Watches

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Tamau Italia and EXOTIME use binder jetting technology to challenge conventional watchmaking

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The Pioniere luxury watch from EXOTIME is a pioneering model that seamlessly blends Italian craftsmanship with cutting-edge metal 3D printing technology. Produced in a limited edition of 100 pieces, each watch is priced at 2,497 € (approx. $ 2,597).

3D Printing Service Bureau
Tamau Italia

Location
Megliadino San Fidenzio, Italy

Scope of Service
Manufacturing of mechanical metal components

Machine
Shop System™

Website
www.tamau.it

Customer
EXOTIME

Location
Milan, Italy

Applications
Luxury watch components such as cases, bezels, crowns, and buckles

Material
316L stainless steel

Website
exotime.it

Luxury watch brands must continue to innovate

The luxury watch industry is a highly competitive market, with Swiss brands holding a dominant position. However, Italian, German, Japanese, and emerging market brands also play a significant role. To maintain market share, **brands must continuously innovate** to attract luxury watch collectors and enthusiasts.

EXOTIME, an emerging Italian microbrand, is successfully implementing continuous innovation by combining Italian artisanal tradition with cutting-edge metal 3D printing technology. The result is premium timepieces that meld unique, iconic, and innovative designs with excellent quality and extensive customization options. EXOTIME is famous for its 3D-printed monobloc cases and customizable stone inserts.

Watch micro-brands are small independent companies that produce luxury watches in limited quantities, typically only a few hundred pieces per year or even less. This approach allows manufacturers to focus on quality and precision at every stage of production, resulting in well-built watches with impeccable finishes and reliable movements.

Source: EXOTIME website

The limitations of conventional watchmaking processes

EXOTIME recognizes the unique and exacting needs of luxury watch enthusiasts, collectors, and new comers to the luxury watch market. Its clientele expects nothing less than the highest standard of quality and a timepiece that sets them apart. EXOTIME's luxury watches must have unique designs, impeccable finishes, and extreme precision. As stated on the brand's website, "We were born to create watches with sophisticated and unmistakable style (...) complex shapes and geometries define the unmistakable character of our timepieces."

However, these objectives are not without their challenges, as the conventional technological processes involved in the luxury watchmaking industry—such as CNC machining and investment casting—present obstacles. Producing intricate designs is one of the major challenges, which hindered EXOTIME from continuously creating innovative products. As Riccardo Pinos, founder of EXOTIME, noted: "Traditional manufacturing methods in the watch industry do not allow for the creation of complex geometries and lines for various watch components, including the case, crown, buckle, and bezel."

For EXOTIME, the ability to fabricate unique timepieces on demand and to re-engineer any component of the watch is also essential for the company. However, traditional watchmaking processes have lengthy production times, which can take weeks to manufacture a single component, as well as high costs for small-batch production and customization. The need for molds and machining tools makes it uneconomical to produce limited editions or custom products. In addition, lightweight watch cases are becoming increasingly popular due to advances in materials and a shift towards comfort and wearability. EXOTIME previously used CNC machining to produce the watch case, but this was very costly and did not reduce the weight of the part.

To address these challenges posed by traditional production methods for its luxury watch components, EXOTIME collaborated with Tamau Italia, a manufacturing company specializing in the production of high-performance metal parts using advanced technologies such as binder jet 3D printing from Desktop Metal. The partnership's main objective was to enhance the geometries of its watch components, including cases, bezels, crowns, and buckles. This initiative aimed to ensure that the finished watches would have a more sophisticated and unique appearance, as well as being lighter in weight through design for additive manufacturing (DfAM). Additionally, EXOTIME sought to expedite the production process and reduce the cost of prototyping.

"Additive manufacturing experts, particularly in metal binder jetting and 3D design, made an analysis of binder jetting watch components compared to traditional watchmaking processes. Based on this, we decided to 3D print our watch components using binder jetting," said Pinos.

Additive manufacturing of watch components with binder jet technology

At Tamau Italia, the additive manufacturing process for watch components began with optimizing the topology of each part using finite element method (FEM) simulations. The objective of this process was to reduce weight without compromising strength. Subsequently, a computer-aided design (CAD) was reproduced to optimize the geometric characteristics for the binder jetting process and to allow for easy customization.

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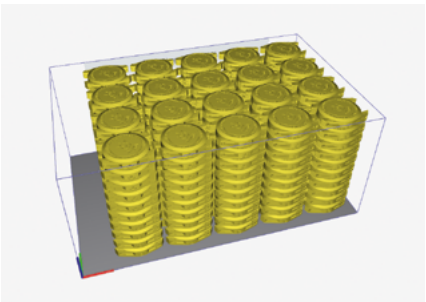
Tamau Italia uses the Desktop Metal Shop System to 3D print luxury watch components for EXOTIME, including these monobloc cases, each identified by a unique code.

Following the CAD design, Tamau Italia utilized the Shop System, a metal binder jet platform from Desktop Metal, to 3D print the watch components layer-by-layer until the desired geometries were achieved. The binder jetting process is notable for its ability to print without the need for support structures, enabling EXOTIME to design intricate patterns with exceptional precision and extremely fine detail. It also allows 200 watch cases to be nested in the build box and printed in a single build cycle. The components were 3D printed in 316L stainless steel, known for its strength and durability.



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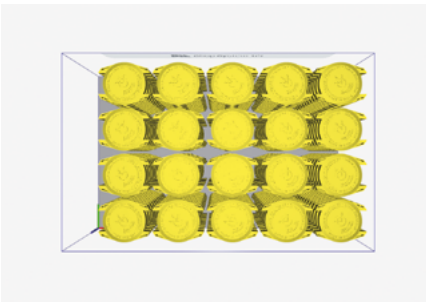
200 watch cases can be printed in a single build cycle on the Desktop Metal Shop System. No support structures are required.



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Estimated printing time: 19 h – 22 h 51 m
Total used volume: 2442.8 cc
Powder required: 112.2 kg (330 lbs)

Following the printing process, the components were sintered in a high-temperature furnace to consolidate the material, resulting in a dense and strong metal structure.

With binder jetting, Tamau Italia achieves the best surface finish possible in metal 3D printing. However, as in other manufacturing processes (e.g. MIM or CNC), post-processing is still necessary to meet specific customer requirements. Selective finishing processes were therefore carried out to ensure perfect aesthetics and superior quality:

- Electrochemical polishing to achieve bright, uniform surfaces
- Fine sandblasting to obtain a high-end satin effect
- Physical vapor deposition (PVD) coatings to improve scratch resistance and durability

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Polished watch case

The advantages of 3D printing watch components

“Finally we can create watches with unique designs without geometric constraints,” said Pinos. Thanks to the Desktop Metal Shop System, Tamau Italia produced innovative designs and lightweight watch components for EXOTIME impossible to achieve with traditional watch production systems. Pinos commented on the exclusivity of the design:

“Tamau’s knowledge and design in additive manufacturing has allowed us to develop a completely innovative and distinctive design. This distinction is evident in our first model, the EXOTIME Pioniere, as seen in the lateral excavations on the case, the grooves that cross the four lugs, the lightweighted design of the buckle, and the four sharp-edged recesses on the bezel, where a craftsman meticulously shapes and inserts natural stones.”

> "Thanks to additive manufacturing we are able to create fully customized watches by changing the design of different components according to the customer's needs. Binder jetting has enabled us to minimize prototyping expenses and evaluate multiple variants prior to production."
>
> Riccardo Pinos, Founder, EXOTIME

Unlike traditional manufacturing, which often requires specific molds or tooling for each design, metal binder jetting can produce different designs without any tooling, eliminating the many steps and costs of toolmaking. As a result, metal binder jetting facilitates a streamlined, expeditious, and cost-effective approach to creating customized components.

The advantages of binder jetting watch components compared to traditional manufacturing*

	Traditional Production	Binder Jetting (with optimized geometry)
Feasible geometry	Limited	Enables more complex and unique geometries
Production time	4-6 weeks	5-7 days
Costs for small batches	High	Competitive
Customization	Difficult and expensive	Easy and cost-effective
Surface finish	Manual processing required	Customizable with advanced treatments

*This evaluation was made by Tamau Italia and EXOTIME

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Metal binder jetting enables simple, fast, and cost-effective production of customized luxury watch components.

Next innovation on the way

Tamau Italia and EXOTIME were pleased with the outcome of their collaboration, as it demonstrated the unmatched capabilities of 3D printing binder jet technology from Desktop Metal to produce distinctive luxury watch components with ultra-fine details. "It is fascinating to be able to create timepieces with unique geometries that cannot be replicated with other manufacturing methods," praised Pinos. In addition, EXOTIME also believes that this technology will bring other benefits for its business. "We expect it to

be able to take the concept of design optimization to the extreme, including topology for different components of future models," added Pinos.

In light of this outcome, Tamau Italia and EXOTIME have prepared to expand their production with binder jetting to more components or product ranges. They also plan to conduct tests with the technology with premium materials such as special alloys and gold, and to introduce watches with these materials. Additionally, they will participate in relevant industry events and trade shows to showcase the 3D printed timepieces.

TAMAU ITALIA
MECHANICAL COMPONENTS

About Tamau Italia

TAMAU Italia, a market leader in MIM and precision investment casting, is the go-to service bureau for binder jetting, offering high-quality metal additive manufacturing solutions for prototyping, serial production, and advanced component validation. With over 25 years of experience, TAMAU HUB is at the forefront of industrial additive manufacturing, specializing in:

- Binder Jetting (BJ) – its core technology for high-precision metal AM
- Metal Injection Molding (MIM)
- Precision Investment Casting

As a leading binder jetting service provider, Tamau Italia delivers cost-effective, scalable, and production-ready metal parts, ensuring customized solutions for industries such as aerospace, automotive, biomedical, and industrial manufacturing. Tamau Italia‘s mission is to transform metal manufacturing through binder jetting, reducing costs and lead times while enhancing mechanical performance and maintaining rigorous quality control at every stage of production.

Learn more: www.tamau.it

EXOTIME

About EXOTIME

EXOTIME is an emerging Italian micro-brand that produces iconic and unique watches by combining metal 3D printing technology with artisanal craftsmanship.

Learn more: exotime.it

Desktop Metal

About Desktop Metal Inc.

Desktop Metal is driving Additive Manufacturing 2.0, a new era of on-demand, digital mass production of industrial, medical, and consumer products. Our innovative 3D printers, materials, and software deliver the speed, cost, and part quality required for this transformation. We’re the original inventors and world leaders of the 3D printing methods we believe will empower this shift, binder jetting and digital light processing. Today, our systems print metal, polymer, sand and other ceramics, as well as foam and recycled wood. Manufacturers use our technology worldwide to save time and money, reduce waste, increase flexibility, and produce designs that solve the world’s toughest problems and enable once-impossible innovations.

Learn more about Desktop Metal and our #TeamDM brands at www.desktopmetal.com