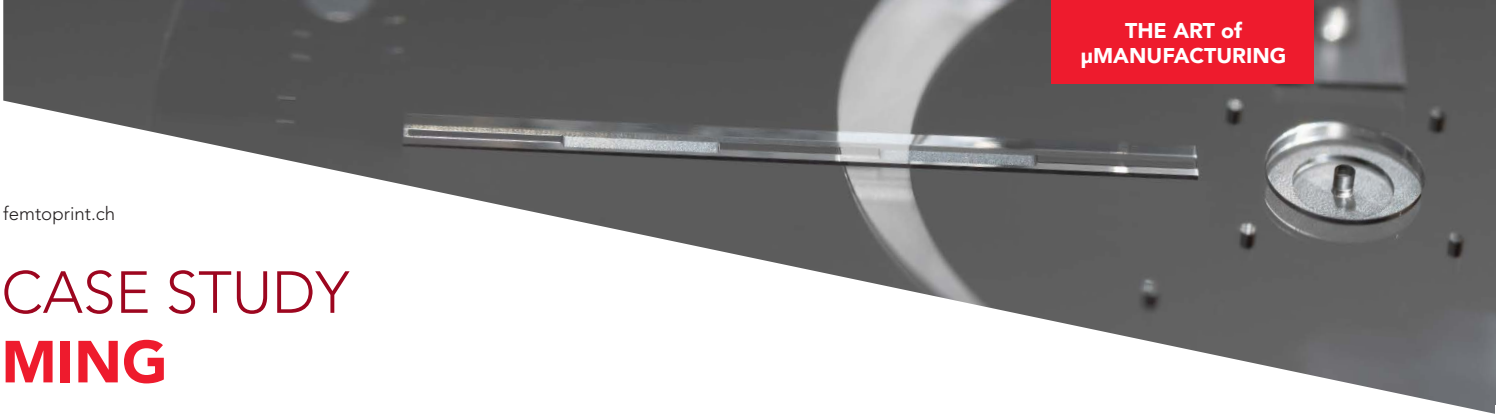
THE ART of µMANUFACTURING

CASE STUDY
MING

The dazzling and revolutionary dial of the MING 20.01 Series 3 watch

MING

FEMTOPRINT®
3D PRINTING FOR GLASS MICRODEVICES



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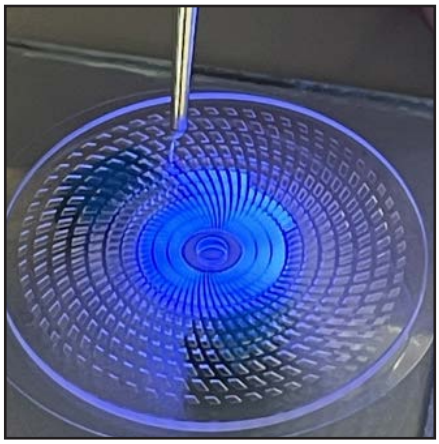
INTRODUCTION

The MING 20.01 Series 3, unveiled in August 2024, marks a significant milestone in luxury watchmaking by showcasing an innovative collaboration with FEMTOPRINT, a Ticino-based company specializing in precision microfabrication on glass. Leveraging its expertise in cutting-edge laser technology, FEMTOPRINT created a unique "topographic" glass dial for MING, featuring 600 meticulously crafted voids arranged in a harmonious radial pattern. This partnership represents a major technical advancement, blending aesthetics and innovation, and redefines the role of materials and techniques within the watchmaking industry.



The 600 cavities are manually filled with Super-LumiNova X1, applied with a brush. For this operation, the operator uses a 2.5x microscope.

TECHNICAL CHALLENGES AND SOLUTIONS

To bring this ambitious design to life, FEMTOPRINT employed its high-precision 3D laser microfabrication technology. Each cavity was sculpted in the glass following strict parameters to ensure uniformity and precision across the entire radial pattern. The combined use of femtosecond lasers and chemical etching solutions allowed for the creation of these 600 three-dimensional pockets, varying in size and depth with remarkable finesse.

The primary technical challenge for this dial was achieving flawless polishing on the upper and lower surfaces without severe imperfections, while maintaining the geometric precision of the 600 voids. This meticulous attention to detail was essential to ensure the aesthetic balance of the dial and to enable optimal interaction with light and the luminescent material used.

The pockets, arranged along a slightly curved spiral, feature depths ranging from 1.13 mm at the center to 0.15 mm toward the edge. Their width gradually increases from 0.2 mm to 0.7 mm, while their length decreases from 1 mm to approximately 0.7 mm toward the edge. The walls are almost vertical, with a deviation of +/- 0.1 degree.

The MING dial was then manually filled with Super-LumiNova® X1 luminescent pigment by an operator from Monyco, a FEMTOPRINT partner, using a brush in a painstaking 12-hour process that required precision craftsmanship. This intricate work endows the dial with a captivating visual effect, featuring intense brightness and unique depth, allowing every detail of the pattern to stand out, even in low-light conditions.

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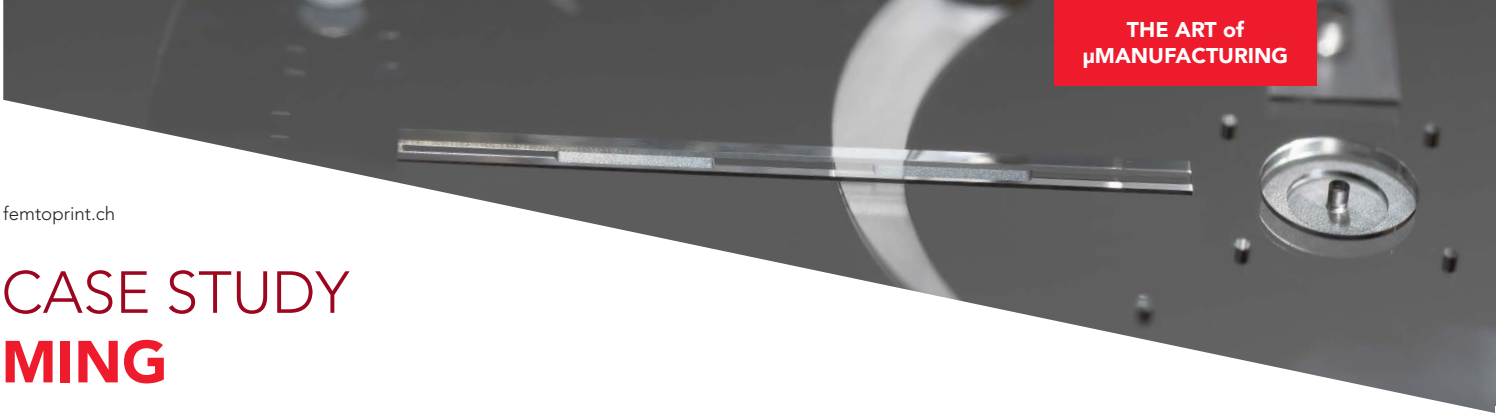

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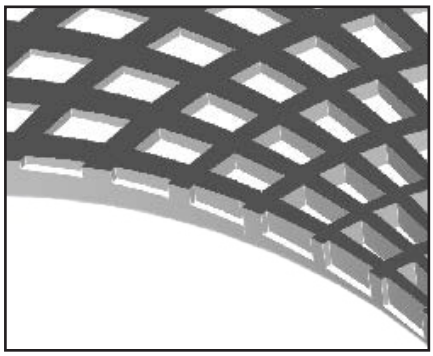


The cavities, vary in depth from 1.13 mm at the center to 0.15 mm at the outer edge.

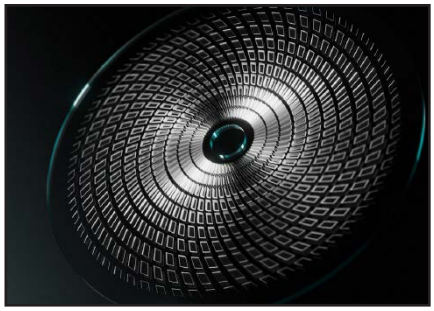
A REVOLUTIONARY DIAL: BOTH TECHNICAL AND ARTISTIC

The final result is much more than a simple watch dial. By transforming a glass plate into a luminous landscape, FEMTOPRINT successfully combined technical complexity with MING's visual appeal. This 30 mm diameter, 1.3 mm thick glass dial enhances readability and emits an intense glow that accentuates the depth and relief of the pattern.

Through this feat, the MING 20.01 Series 3 embodies a contemporary vision of watchmaking, where design and technology unite to deliver a groundbreaking visual experience.

MING'S INSIGHTS: A PARTNERSHIP PUSHING BOUNDARIES

"FEMTOPRINT proved to be the ideal technological partner for the production of the MING 20.01 Series 3" stated Mr. Ming Thein, founder of the brand. "They rose to a challenge that many others deemed unsolvable, delivering results with remarkable effectiveness, efficiency, and a speed rarely seen in the watchmaking industry.
Our collaboration with FEMTOPRINT has always been highly constructive, marked by relevant and insightful discussions, questions, and feedback. Most importantly, they demonstrated a clear understanding of our needs and successfully adapted the process and innovation to the design, rather than the other way around."



PERSPECTIVE ON INNOVATION

Produced in a limited edition of 20 pieces and equipped with the AgenGraphe movement by Agenhor, the MING 20.01 Series 3 transcends the boundaries of traditional watchmaking. It embodies a spirit of innovation and creativity that pushes these traditional limits of horology. The collaboration between MING and FEMTOPRINT highlights the potential of new technologies in Haute Horlogerie, combining traditional watchmaking craftsmanship with advanced technical solutions. The result redefines expectations in dial design, bringing a new dimension to exceptional timepieces.

MING

"FEMTOPRINT proved to be the ideal technological partner for the production of the MING 20.01 Series 3"

Mr. Ming Thein, Founder & Chief Creative Horologer Ming SA , Switzerland

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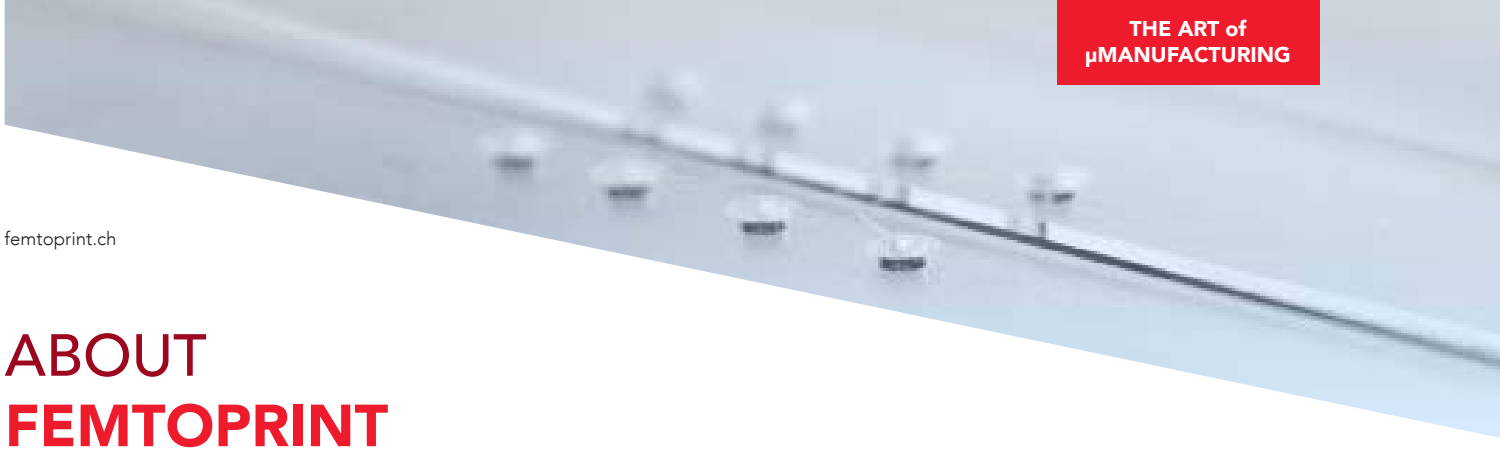
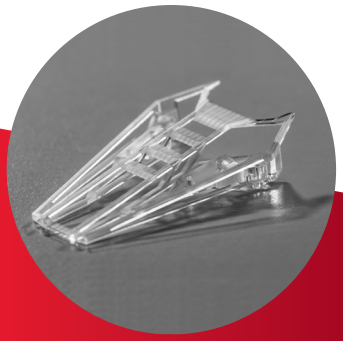


ABOUT FEMTOPRINT



COMPETENCIES

- Design for manufacturing
- Product engineering and development
- Excellent skills in material sciences, physics, optics, photonics and microfabrication
- Rapid prototyping
- Pilot & volume manufacturing
- Structural & functional characterization
- Quality control

PERFORMANCES

- Free-form geometries
- Process resolution ~ 1 µm
- Standard roughness Sa ≤ 100 nm
- After post-process treatment Sa < 10 nm
- Aspect ratio: > 1:500
- Substrate thickness: up to 30 mm
- Working area: up to 300 mm Ø

WHY FEMTOPRINT

- Trusted partner from product development to wafer-scale volumes manufacturing
- Excellence in delivering superior quality, Swiss Made
- One-stop glass manufacturing foundry, vertically integrated
- Free-form design at the µm scale
- Fast turnaround time in prototyping

FEMTOPRINT is a Swiss high-tech Contract Development and Manufacturing Organization (CDMO) specializing in high-precision 3D microfabrication in glass. With the ground-breaking FEMTOPRINT ™ microfabrication platform, we support leading industrial Customers with services spanning feasibility studies, rapid prototyping, pilot production, and industrial-scale series manufacturing at the wafer level.

FEMTOPRINT's manufacturing plant is located in Agno, Switzerland. In 2022, the company opened a subsidiary in Neuchâtel, a hub for excellence in the fields of microtechnology, watchmaking, optics and photonics. The company is ISO certified 9001 and 13485:2016.

INDUSTRIES

Medical | Watchmaking | Life Sciences & Diagnostics | Optics & Photonics | Aerospace
Quantum | Semiconductors | Industrial Machinery | AI | Automotive | Energy

APPLICATIONS

Microfluidics | Micro-optics | Photonics | Microelectronics | Micromechanics | MEMS | Packaging | Mastering | Or the combination of some of them!

The core FEMTOPRINT ™ micro-manufacturing platform leverages cutting-edge ultrafast laser-based technology combined with etching techniques to produce innovative, three-dimensional glass microdevices with micrometer-scale resolution. This advanced platform is further enhanced by additional capabilities, including laser welding, three-dimensional waveguide inscription, dicing, and surface treatments. It accommodates a wide range of transparent substrates as raw materials for the creation of intricate 3D structures, such as fused silica, borosilicate, ULE, boroaluminosilicate, and alkali-free glass. The platform supports a maximum working area of 300 mm in diameter and 30 mm in thickness, enabling the fabrication of complex and precise microstructures.

ADVANTAGES

- Free-form microfabrication technlogy with micro-metric accuracy.
- High surface quality and outstanding process repeatability, suitable for wafer-scale production.
- Glass offers numerous functional advantages over for example plastics, ceramics and metals.
- Integration of optical, fluidic, and mechanical functionalities.
- Wafer-scale production for series volumes.
- Engineering expertise to support product development.
- Full control over proprietary processes and systems.

We want to be part of your success, contact us:

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