



## **Dual Time Resonance: Masterpiece 1 by Armin Strom**

The Dual Time Resonance by Armin Strom is a horological Masterpiece: a chef-d'œuvre combining the practicality of two completely independent time indications with the increased precision of two independent movements in resonance. The Dual Time Resonance launches the Swiss manufacture's new flagship Masterpiece collection, which highlights the Armin Strom's extraordinary technical and artistic abilities.

Masterpiece 1 Dual Time Resonance shines a spotlight on Resonance: two independent movements sit side-by-side in a distinctive oval case, their regulators wedded by Armin Strom's patented Resonance Clutch Spring performing a continually horological two-step between the dual eye-catching counter-oscillating balances.

The Resonance Clutch Spring is the key to Armin Strom's mastery of resonance, and the was result of three-years of intensive research and development. Two independent movements display two independent time zones — not simply one movement with two displays.

Armin Strom Co-Founder and technical director Claude Greisler explains, “Developing a perpetual calendar or tourbillon would have been far easier than the years we spent calculating and validating the Resonance Clutch Springs, it was uncharted territory.”

Independent movements enable the Dual Time Resonance to indicate GMT, or a second time zone, as well as a function used as a timer or countdown. Power reserve indicators on each of the hand-guilloche dials and a 24-hour indication at 6 o'clock complete the indications.

While it has been long known that resonance in watch and clock movements with synchronized coupled oscillators improves accuracy by averaging slight differences in the precision of each movement and in wristwatches minimises adverse effects of shocks on precision. Less known is that resonance also conserves energy: vibrational energy that is normally be lost through the supports of the regulator is conserved in the system.

Armin Strom's laboratory testing has revealed gains in precision of 15-20% for two COSC chronometer-level regulated movements placed in resonance.

“Form follows function” could have been written for the Dual Time Resonance: two movements side by side (rather than stacked vertically) naturally led to the oval-shaped case, while the increased space afforded by the movements in this configuration allowed for two barrels per movement and a longer power reserve. Gazing through the display back at all four barrels winding simultaneously is as mesmerising as the ballet of the dual regulators on the dial.

The Armin Strom Masterpiece 1 Dual Time Resonance launches in a limited edition of 8 pieces in Grade 5 titanium.

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## Dual Time Resonance: GMT inspiration and development

Masterpiece 1 Dual Time Resonance was developed as a showcase for Armin Strom's technical and artistic excellence, bringing the phenomena of resonance front and centre.

The resonance clutch spring allows the mysterious force of resonance to be visualized in real time. It's a visually entertaining complication as well as a technical *tour de force*; a performance-enhancing mechanism so obvious that you can see it.

Armin Strom did not set out to make a dual time watch; the principal aim was to showcase the resonance movement to the maximum. The movement architecture was a perfect meld of form and function: spreading the two movements apart horizontally in the Dual Time Resonance – compared to the two vertically stacked movements of the Armin Strom Mirrored Force Resonance – meant that a dial on each movement was a logical choice.

And with two time displays, dual time follows naturally. The independent second time display can also function as a countdown indicator or for tracking elapsed time. Two independent (aside from resonance) movements, two independent time displays, one 24-hour indicator, four mainspring barrels, and two conical power reserve indicators.

In the pursuit of horological accuracy, precision, and rate stability, resonance has usually involved using two independent movements connected to allow fine tuning of the distance between them. Until Armin Strom, precise adjustment of the distance between the two regulators has been necessary to incite resonance. However, Armin Strom Resonant Clutch Spring eliminates the necessity for fine tuning the distance and ensures a much more reliable and efficient resonant system.

When starting out of resonance, the Armin Strom Resonant Clutch Spring can take up to 10 minutes to synchronise the two systems.

The idea of resonance has endured for three centuries for a reason, but that doesn't mean you can't improve upon it.

Armin Strom's patented Resonance Clutch Spring is an innovative way of upgrading an old concept, one that is horology's very reason for being: precision and accuracy.

Note that the CSEM (Centre Suisse d'Electronique et de Microtechnique) has officially certified Armin Strom's resonance system based on the clutch spring as being a true system in resonance.

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## **What is resonance?**

Any body in motion causes vibrations in its surroundings. When another body with a similar natural resonant frequency to the first receives these vibrations, it absorbs energy from it and starts vibrating at the same frequency in a sympathetic manner. For example, a trained singer can hold a note causing a tuning fork tuned to the same frequency to vibrate.

For the oscillators to be able to synchronize with each other, they have to be closely tuned. A small child trying to synchronize steps with an adult is unlikely to synchronise for more than a few steps as the systems are too dissimilar to resonate.

Imagine yourself pushing a child on a swing: the child and the swing make a natural pendulum, which will have an inherent natural frequency (speed of swing back and forth). If you push at the wrong frequency (too fast or too slow) then you are likely to block the motion and slow the swing down; however, if you push at or near the natural frequency of the swing then you will increase the amplitude (distance the swing moves) of the child/swing system.

In horology, the phenomenon of synchronized motion has fascinated watchmakers since the time of Christiaan Huygens (1629-1695). Huygens, inventor of the pendulum clock, was the first to discover the resonance of two separate pendulum clocks, which he logically surmised should keep slightly different time. When hung from a common beam, however, the pendulums of the adjacent clocks synchronized; subsequent researchers confirmed that the common wooden beam coupled the vibrations and created resonance. The two pendulums functioned as one in a synchronous manner. In the eighteenth century, Abraham-Louis Breguet demonstrated his mastery of the physics with his double pendulum resonance clock.

An outside shock slowing down one of them increases the speed of the other one by the same amount; but both will strive to get back in resonance, averaging and minimizing the effects of the outside influence as they find their rhythm. What was true for Huygens and Breguet's clocks is just as true for Armin Strom's wristwatch.

The advantages of resonance are threefold: 1) stabilizing effect on timekeeping (better accuracy); 2) conservation of energy (think of a professional cyclist riding in the shadow of another cyclist in a racing situation); and 3) reduction of negative effects on timekeeping accuracy due to outside perturbation such as shock to the balance staff, which in turn keeps the rate more stable (better accuracy).

While the advantages of resonance have been known for centuries, only a handful of clockmakers and watchmakers have created timepieces deliberately and successfully

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exploiting the phenomenon of resonance, including Antide Janvier (1751-1855) and Abraham-Louis Breguet (1747-1823). And, now, Armin Strom.

## **Technical specifications: Dual Time Resonance TI18-RGMT.90**

Indications: Movement 1 - hours, minutes, 24-hour indicator, power reserve indicator;  
Movement 2 - hours, minutes, power reserve indicator

Movement: Armin Strom manufacture calibre ARF17

Manual-winding, patented resonance clutch spring, dual off-centre time indications, 4 mainspring barrels

Regulating system: two independent regulation systems connected by a resonance clutch spring

Power reserves: conical x 2, 110 hours for each movement

Dimensions: 52.55 mm x 39.95 mm x 11.67 mm

Frequency: 3.5 Hz (25,200 vph)

Finishing: base plate and bridges are decorated to the highest quality level

Jewels: 70

Number of components: 419

Case: Grade 5 titanium

Sapphire crystal and case back with antireflective treatment

Diameter: 59 mm x 43.4 mm (including lugs)

Height: 15.9 mm

Water resistance: 50m

Dial: hand guilloché

Hands: polished stainless steel

Straps: delivered with a black alligator strap and stainless steel double-folding clasp.

Retail price: CHF 180,000.-

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## **Armin Strom today: Serge Michel and Claude Greisler partnership**

Children born in the same year growing up in a town like Burgdorf (population: 15,000) are likely to know each other, either through school, family or mutual friends. Such is the case with Serge Michel and Claude Greisler, who grew up in the town where Armin Strom, famous for his watch skeletonisation skills, had his watch shop and workshop. When the plastic Swatch watch was launched, having been developed and produced in the nearby city of Bienne, Serge was hooked and started collecting Swatches, following in the footsteps of his father, who is also a watch collector. It was a passion that would continue throughout his life. But while Serge went on to study marketing, Claude decided to become a watchmaker, first attending the watchmaking school in Solothurn before specializing in the restoration of vintage and complicated movements at the CIFOM technical school in Le Locle, concluding his studies there with a specialization in movement development.

Both Serge and Claude had known about watchmaker Armin Strom from a very young age. Serge not only remembers peering through the window of his store to look at the watches, but also the fact that Armin Strom was a local celebrity known for travelling far and wide to deliver his watches to customers. Claude had also known about Armin Strom from an early age, since his parents owned an optician's shop right next to Armin Strom's store in the historic centre of Burgdorf. In Serge's case, Armin Strom became a family friend and at convivial dinners the talk would often turn to watches and watchmaking. It was hardly surprising, therefore, that the family friendship evolved into a business relationship in 2006 as Armin Strom was considering how to ensure the future of his name and reputation.

“I was convinced that this is a fantastic opportunity to maintain this tradition of skeletonizing watches and develop it for the future, and my family agreed,” says Serge. “That was back in 2006, but at the time we didn't really have the knowledge about watchmaking. We had the passion, but we needed someone who was an expert on the watchmaking side of things, which is where Claude comes in. He joined me in 2007, and we started to set up the brand Armin Strom and change the direction from purely handmade skeletonised watches to a fully equipped manufacture, which we are today.”

For Claude Greisler, it was like a dream come true. “When Serge first called me and talked about taking the brand to the next level with a factory and taking the brand over from someone from the same town as us, it was the perfect mix. Armin Strom had always been interested in the mechanics of the movement, so to be able to take this philosophy forward was a fantastic opportunity.”

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The core element in the vision of the duo was always to consider the movement as the very heart of the watch, which meant that the company would need to be a manufacture to produce its own movements. “This was not just a question of designing our own movements,” explains Claude, “but being able to take exactly the kind of brass that we wanted and the type of steel that we wanted to make the best possible plates, bridges, screws and pinions that we could and to do the electroplating and finishing, as well as the assembly, all in-house.”

## **Armin Strom: A fully integrated manufacture**

While Armin Strom is a vertically integrated complete horological *manufacture*, no new watch movement would ever see the light of day, however, were it not for Claude Greisler, who puts ideas such as the one for the revolutionary Mirrored Force Resonance movement down on paper before they are transferred to computer-aided design programmes to start modelling the movement. Like so many things at Armin Strom, all of this is done in-house, with the dimensions calculated down to a precision of one micron to provide the inputs for the machines that will eventually produce the smallest of components.

At Armin Strom, the majority of components in the movement, with the exception of the escapement and balance spring, are produced in-house. Small round components like screws, pinions and gear wheels are produced by profile-turning machines, which gradually whittle away long steel or brass rods from the side to cut teeth or axles. Larger components such as base plates and bridges are produced from brass on CNC machines, which are capable of machining along multiple axes consecutively using different tools for different operations, moving the component using robotic arms.

Particularly small and delicate components, such as smaller bridges, levers and springs, are produced using wire erosion. This involves threading a wire that is not much smaller than a human hair through a tiny hole in the metal. An electrical current running through the wire reacts with a solution in which the entire working plate is dipped, thus “eroding” minuscule amounts of the metal. This allows particularly delicate operations to be carried out while maintaining the structural integrity of the metal. In fact, Armin Strom does not produce any of its components by stamping because of the stresses that this places on the metal.

Once the raw components are manufactured, they are engraved, bevelled, polished and decorated with circular graining or Geneva stripes by hand before moving to the in-house electro-plating department. Here, all steel and brass components are first given a gold plating before a layer of nickel is added to prevent corrosion and harden the surface. After cleaning, the parts are then dipped in other electroplating baths to give them their final colour such as rhodium, ruthenium or rose gold. It is only thanks to its mastery of electroplating techniques inside its own workshops that Armin Strom can allow customers to choose preferred colours for the coating on different components.

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Only then can the individual components of the movement be passed on to the watchmaker for assembly. After setting the jewels into the base plate and bridges, the watchmaker adds the gear train and mainspring. After the escapement and balance wheel are positioned, the movement finally comes to life...only to be completely disassembled, cleaned and dried before being re-assembled and lubricated. After several days of testing the precision, the watch is finally ready.

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