



PERPETUAL ROTOR

FREEDOM, ETERNITY, MOVEMENT

Fundamental mechanism of every watch in the Oyster Perpetual collection, the Perpetual rotor, developed by Rolex and patented in 1931, has marked the history of modern watchmaking. By capturing the energy generated by even the slightest move of the wrist, this self-winding system breathes life into the movement.



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When a watchmaker opens the case of an Oyster Perpetual watch, the first thing he sees is the Perpetual rotor. This mechanism comprises a half-moon-shaped weight which pivots in both directions with the slightest movement of the wrist, allowing fleeting glimpses, as it rotates, of the famous reversing wheels with their characteristic red colour.

A WATCHMAKING REVOLUTION

To look carefully at this rotor with its clean lines is to appreciate nine decades of a major chapter in watchmaking history written by Rolex. In 1931, the brand patented this legendary system with a free rotor that would revolutionize the entire watchmaking industry.

CAPTURING THE WEARER'S ENERGY

Particularly ingenious, the principle of the Perpetual rotor has remained unchanged in the course of various evolutions and successive improvements: as the wrist moves, with the slightest gesture, the half-moon-shaped component – the oscillating weight – rotates in both directions, driven by the Earth's gravity. The kinetic energy generated by the oscillations of this weight is transmitted via the wheels of the winding mechanism to the mainspring, which is constantly being wound. As long as the watch is being worn, the spring stores and 'perpetually' releases the energy necessary for the functioning of the mechanical movement. For increased efficiency, towards the end of the 1950s, the winding could take place regardless of the direction of rotation of the weight, thanks to the remarkable red reversing wheels, a distinguishing characteristic of Rolex movements.

Once the maximum tension of the spring is reached, a clutch system stops the winding, preventing damage to the mainspring by overwinding. When the watch is not being worn, the fully wound spring ensures a power reserve of approximately two to three days.

COMFORT AND PRECISION

The Perpetual rotor offers three major advantages: the wearer no longer has to worry about manually winding their watch, thereby gaining additional comfort and freedom; the mainspring is self-winding – the role of this component is to constantly store and release the energy it receives, ensuring greater regularity and better precision of the watch's regulating organ; and finally, the waterproofness of the case is reinforced because the winding crown remains screwed down most of the time – it is now only required to adjust the watch's functions, or to wind the movement by hand, but only if the watch has stopped.



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PERFECTING THE OYSTER

It is difficult to imagine what a considerable step forward the invention of the Perpetual rotor represented in its day. Within some 20 years – with the first chronometry certificate granted to a Rolex wristwatch in 1910, the invention in 1926 of the Oyster, the first waterproof wristwatch, and the development of the self-winding system via Perpetual rotor, precursor to today's automatic winding systems, in 1931 – Rolex and Hans Wilsdorf, the brand's founder, revolutionized watchmaking three different times, proving that a wristwatch could be precise, robust and waterproof, and also 'perpetual'. The Perpetual rotor, in a way, constitutes the perfecting of the concept of the Oyster, because it further improved the watch's precision and waterproofness while bringing additional comfort and freedom to the wearer.

ETERNAL HEARTBEAT

With the Perpetual rotor, Rolex found the best solution to a problem that had long concerned watchmakers – that of how to ensure constant tension in the barrel without having to manually wind the watch. The invention around 1770 of a self-winding pocket watch, whose winding was carried out via a system with an oscillating weight that captured the energy generated by the movements of the wearer, is credited to Abraham-Louis Perrelet or Hubert Sarton (experts differ on this subject). But the movements of the wearer had little influence on a pocket watch. Systems using alternating movements – in which the path of the weight was limited by stops which it struck and from which it rebounded to amplify the back-and-forth motion – were developed thereafter.

It was such a system that an English watchmaker named John Harwood transposed for the first time to a wristwatch in 1923. The winding based on stops proved too fragile, however, and therefore inappropriate for a wristwatch. Hans Wilsdorf asked his technical team to adapt to the wristwatch the self-winding system with an oscillating weight pivoting freely 360° without jolting, which he saw as being much more suitable for a watch worn on the wrist. In 1931, Rolex presented the Perpetual rotor.

SYMBOL OF EXCELLENCE

The result fulfilled all hopes: as soon as it was introduced, the Perpetual rotor became the symbol of watchmaking excellence. Patented, this mechanism contributed, along with the Oyster case, to establishing the brand's reputation.

Once the patents expired and fell into the public domain, this self-winding system with a free rotor was adopted by the entire industry, and numerous watchmaking firms were quick to apply the



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principle. A noble destiny for the invention that makes the heart of a Rolex watch beat with each and every movement of its wearer. For almost a century already, and for a very long time to come.

TECHNIQUE AND MANUFACTURE

Several parameters are critical for the winding system via Perpetual rotor to function efficiently. First, the oscillating weight must be as heavy as possible. To accomplish this, Rolex generally uses a particularly dense tungsten alloy, thus ensuring a rotor with excellent dynamic properties in spite of its small dimensions. Next, the centre of gravity of the oscillating weight must be as peripheral as possible, and its motion must never be impeded by the rest of the movement or the case. Finally, the watch must be wound as quickly as possible, otherwise on an active wearer – a sportsman, for example – the clutch system preventing overwinding of the spring would be too often brought into play. If you consider that there is a factor of 300 between the movements made by a wearer who is jogging and those of a wearer sitting at a desk all day, it is easy to imagine the delicate balance that must be achieved so that the winding mechanism remains reliable in all circumstances.

BIENNE: MANUFACTURING, ASSEMBLY

At the Manufacture des Montres Rolex S.A., located in Bienne, the various components of the self-winding system with Perpetual rotor are manufactured and assembled. Each one is first shaped, then machined. At the end of the manufacturing process, each is checked, controlled and inspected, because every little detail is important. For example, the two anodized aluminium reversing wheels are carefully paired to present the same shade of red. Next comes the assembly of the various components of the winding mechanism. Once again, there is a careful control, notably of the endshake – the axial play between the ends of the moving parts and the surfaces of the bearings, or jewels – which is a few dozen microns. This step is entrusted to a machine under the supervision of an operator whose eye is trained to detect the slightest deviation. Experience and expertise also play their roles in the lubrication of the winding mechanism, an extremely delicate process performed using tiny needles and requiring an almost constant human presence at the machine. In another workshop, technicians assemble the oscillating weight.

GENEVA: FINALIZATION AND CONTROL

The winding modules and the oscillating weights – which together form the Perpetual rotor – as well as the movements, leave Bienne for the Acacias site in Geneva, where final assembly of all Rolex watches takes place.



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When destined for a movement in the 22XX, 31XX or 41XX families, the winding module and oscillating weight are assembled in Bienne before being delivered to Geneva; there, the Perpetual rotor is fitted onto the movement once it has been cased. For calibres in the 32XX family, the Perpetual rotor is both assembled and installed on the movement in Bienne. Calibre 9001 leaves Bienne fitted with just the winding module; the oscillating weight is added in Geneva.

Before screwing down the case back, the watchmaker checks the freedom of rotation of the Perpetual rotor and then performs one last test designed to verify its winding power, in other words its capacity to capture and store energy from wrist movements.