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## PUTTING ETERNITY ON YOUR WRIST

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During his time as head watchmaker at IWC, Kurt Klaus translated the Gregorian calendar, with all its many irregularities, into a mechanical program for a wristwatch that will continue running perfectly until 2499 with virtually no corrections. His legendary design was first featured in the Da Vinci Chronograph Perpetual Calendar in 1985 and is still regarded, even today, as a milestone in the art of watchmaking. Ingeniously simple, and with a total of just 81 parts, the calendar took the luxury watch manufacturer from Schaffhausen to the peak of haute horlogerie.

With its many vagaries, the Gregorian calendar, based on the Julian calendar introduced under Julius Caesar, is a hurdle for any young child. One well-known method of remembering the lengths of the months involves counting on your knuckles. But knowing that months last 28, 30 or 31 days is not enough: We need to add an extra “leap” day – the 29<sup>th</sup> of February – every four years to correct the deviation from the real solar year. Generations of watchmakers and inventors have racked their brains to develop a mechanical calendar consisting of cogs, levers, switch cams, springs and clicks that would replicate it.

The first such mechanisms were found inside huge astronomical clocks. From the 1920s onwards, they were a regular feature of pocket watches and, finally, of wristwatches. However, they were still extremely complicated and not very user-friendly. A perpetual calendar for a pocket watch, for example, consisted of over 200 parts, and each of its displays had to be set separately using push-buttons.

The beginning of a chapter that was to mark a decisive change in IWC’s history came in the late 1970s, a time when the Swiss watch industry was in the throes of its most testing crisis ever. Electronic timepieces, whose tempo was determined by a quartz crystal and not an evenly oscillating balance, were being mass-produced in Japan and flooding the world’s markets. The expertise amassed by watchmakers and timers over the course of many generations was suddenly superfluous. All the know-how relating to complex precision mechanisms that had been continuously perfected over the centuries was at threat of extinction from one day to the next.

But while many of his peers joined together to wail in unison about the situation, Kurt Klaus got down to work: In the mid-1970s, he created the first calendar for a magnificent open-face pocket watch, almost 100 of which were sold. It became clear to him that the only way IWC would be able to set itself apart was with unusual timepieces like those. Success was the spur, and he continued to work away at his mechanisms, often during his spare time. He created displays for the moon phase or the signs of the zodiac and even came up with an unusual thermometer watch. Finally, he succeeded in persuading executive management, under Günter Blümlein and Hannes Pantli, to give the go-ahead for the development of a perpetual calendar for wristwatches.

Back then, calendars tended to be built into a particular movement, but Klaus wanted to design a separate module he could integrate into different basic movements. With his calendar, he was also aiming to set new standards regarding simplicity and operation. And in keeping with the spirit of IWC’s founder F.A. Jones, Klaus the perfectionist was already thinking in terms of possible industrial production. He decided, therefore, to work with relatively simple shapes and as few parts as possible.

The basic idea was to use the date mechanism integrated into the basic movement as a source of power. A single switching impulse triggered during the night would activate an entire gear chain and advance the date, day of the week and moon phase displays. After a month, the month indicator would likewise advance, followed by the decade indicator after ten years and the century display after a hundred. All evenly paced and perfectly synchronised.

So much for theory, as in practice the undertaking turned out to be more complicated. Whilst out enjoying long walks, Klaus sketched out the basic functions in his mind's eye. On the drawing board, the shape and arrangement of the parts underwent continuous revision. Klaus constructed the entire mechanism on triangles, assigned coordinates to every position and carried out countless calculations. The design phase was intensive and at times frustrating. Despite all the setbacks, he managed to complete three working prototypes just in time for the Da Vinci Chronograph Perpetual Calendar's début at the 1985 Watch Show in Basel.

The way the mechanism — with just 81 parts — functions is unbelievably efficient. Every night, the basic movement causes the date advance lever to move. In response, a click advances the date wheel, with its 31 teeth, by one day. At the same time, another lever causes the star-shaped day-of-the-week wheel and moon phase display to move forward. A single tooth on the date wheel is longer than all the others: At the end of each month, it automatically advances the month cam, as it is known, by a single position.

At the same time, this cam is the centrepiece of the mechanical calendar programme. Running round its edge is a series of raised and indented sections, which provide information on the differing lengths of the months. It functions in a similar way to punch cards, from the days when computer technology was in its infancy. To ensure that leap years are also part of the equation, the cam represents a full four-year cycle consisting of 48 months. A single recess — the one for the 29<sup>th</sup> of February — is therefore deeper than all the others.

In the shorter months, another mechanism comes into play. An additional click on the date advance lever rests on an eccentric that is connected directly to the date wheel. At the end of months with fewer than 31 days, it drops down from the eccentric to rest on a projection. During the switching sequence, which takes place in the middle of the night, it advances all the days before the non-existent 31<sup>st</sup> of the month before the normal pawl comes into play and advances the date wheel by a single tooth.

This additional mechanism is controlled indirectly by the month cam. In months with fewer than 31 days, a feeler arm connected to the date advance lever falls into a recess. The deeper the recess, the greater the radius

through which the date advance lever moves. A long radius causes the additional pawl to be retracted slightly further and drops from the eccentric at the end of the month. The protrusions and recesses on the month cam determine the different radii and whether and when the additional pawl comes into action.

Several calendar mechanisms had already been invented, but Klaus went further. Starting with the month wheel, which takes over the display of the calendar month on the dial, he integrated a transmission chain that led, successively, to a year wheel, a decade wheel and a century slide. The latter is moved through just 1.2 millimetres every 100 years. To put this in perspective: During the same period, a point on the balance rim theoretically covers a distance equal to 40 orbits of the Earth.

Kurt Klaus had thus hit upon a solution that was revolutionary in several respects. The most important new feature was the perfect synchronisation of all the displays, from the date and day of the week through to the month and phase of the moon. If the watch isn't worn for a few days and stops, all the displays can simply be advanced and reset, one day at a time. The ingenious mechanism also had a four-digit year display, which is not often found in wristwatches. Another novelty was also the extremely precise moon phase display.

The Da Vinci Chronograph Perpetual Calendar proved to be a resounding success and marked a reversal in the history of IWC. The basic functional principles of the perpetual calendar have remained virtually unchanged since 1985. The mechanism comprises fewer than 100 parts and sets itself apart thanks to its uncompromising user-friendliness. It will need to be advanced manually by only one day in 2100, when, due to another quirk of Pope Gregory's calendar, the leap year will be omitted.

IWC has continued to develop and slightly modify the calendar since its introduction. The design engineers at Schaffhausen, for example, created a version with a digital display for the date and month. Another new departure was a model with a moon phase display, which depicts the shape of the moon as seen from the southern hemisphere. In the current version of the calendar, the moon phase display is so precise it only needs to be corrected by one day after 577.5 years.

## IWC SCHAFFHAUSEN

In 1868, the American watchmaker and entrepreneur Florentine Ariosto Jones travelled from Boston to Switzerland and founded the 'International Watch Company' in Schaffhausen. His visionary dream was to combine advanced American manufacturing methods with the craftsmanship of Swiss watchmakers to make the best pocket watches of his time. In doing so, he not only laid the foundation for IWC's unique engineering approach but also established the centralised production of mechanical watches in Switzerland.

Over its 150 year history, IWC Schaffhausen has developed a reputation for creating functional complications, especially chronographs and calendars, which are ingenious, robust, and easy for customers to use. A pioneer in the use of titanium and ceramics, IWC today specialises in highly engineered technical watch cases manufactured from advanced materials, such as titanium-aluminide and Ceratanium®. Preferring the principle of "form follows function" over decoration, the Swiss watch manufacturer's timeless creations embody their owners' dreams and ambitions as they journey through life.

IWC sources materials responsibly and takes action to minimise its impact on the environment, creating intrinsically sustainable timepieces that are built to last for generations. The company prides itself in training its own future watchmakers and engineers, as well as offering an excellent working environment for all employees. IWC also partners with organisations that work globally to support children and young people.

## DOWNLOADS

Images can be downloaded at [press.iwc.com](http://press.iwc.com)

## FURTHER INFORMATION

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