

Automotive

TAG Heuer's Monaco undergoes an outrageous upgrade

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⌚ The V4 was the watch on everybody's lips at Basel. One of the best-kept secrets before the fair, it took everyone by surprise – seen-it-all cynics included. Given TAG's connection to motorsport, the eponymous winding barrel arrangement inspired by a car engine, could, at first glance, be dismissed as gimmicky. But that is before you notice the linear oscillating winding weight. And its 13 drive belts.

It was getting near to closing time on the first day of BASELWORLD and I was on my way to the front exit laden with the day's kilo-upon-kilo of catalogues and press kits. On my left, another multimedia presentation was taking place at the TAG Heuer stand, watched by the usual mass of aficionados and journalists. My instinctive reaction was "ho-hum, here we go again." But that was until I caught sight of a large pipe on the enormous projection screen: an old-style curlicue-shaped briar straight out of a Magritte painting that was unmistakably Philippe Dufour's. As my eye followed the curling mouthpiece upwards, it indeed ended in the mouth of the man himself. What on Earth was Dufour – that paragon of hand-made watch-making tradition – doing sharing the podium with the TAG Heuer team?

The answer was obvious. He was helping out with the presentation of a new watch called the V4. But what was not immediately obvious to many present (and what had been one of



Two views of the Monaco V4 from the back and front (left and right respectively). The sapphire glass caseback allows an unobstructed view of the central linear oscillating winding weight and the four winding barrels, which are mounted on a V-shaped main plate angled at 15° like cylinders in a racing engine.



the best-kept secrets in Switzerland) was that he was an essential consultant on the project. The horological world immediately fell into two disparate groups right there at the press conference: those who hailed the V4 concept as a miracle of futuristic watchmaking and those who said that it would never work and would disappear like ice in the hot sun.

The post-presentation atmosphere was charged; some people wildly enthusiastic and others almost belligerent that such tomfoolery was being foisted on the public. Jack Heuer, with watery eyes, said that the V4 team was the first to put TAG Heuer firmly back on the path of true innovation since the company's heyday. So what was all the fuss about?

High concept

What TAG Heuer did was to take a blank sheet of paper and design a watch from scratch. No idea was deemed too crazy, no road too far. Thomas Houlon, Innovation Brand Manager of TAG, approached Jean-François Ruchonnet, the owner of DMC in Geneva. If DMC sounds familiar then you have probably seen one of the amazing Lange & Söhne DVD presentations in which all the pieces of the Datograph or the new Lange Split come together in a cosmic whirlwind and the viewer can 'step inside' the watch: these are done by his company.

One afternoon whilst cleaning his Maserati, Ruchonnet took a long look at the car's engine and realized that V-belts, toothed or plain, were a tried and tested system for high-grade engines, and that a Maserati motor block, with its red manifolds, was undeniably racy. And since a watch is also an engine, lateral thinking led to one of those famous 'sketch on a napkin' moments; not only were the belts picked up in the process, but so was the entire idea of a motor-block form. Alongside TAG's connection to motor sport, this idea was perfect. Ross Lovegrove, TAG Heuer's design guru, went lovingly over every detail of the case – a process that took months to perfect.

Belts, belts, belts...

Very soon, the pros and cons of the idea became apparent. In a normal mechanical wristwatch, transmitting power is a question of arranging wheels and pinions of appropriate dimensions – a precise and complicated process in which such minute details as teeth profiles have to be considered. However, the basic V4 concept is extraordinarily simple on a mechanical level; not a bad thing when discussing issues of reliability. But belts have problems of their own – most notably the combination of stretch and play under the varying levels of tension that occur depending upon the temperature. In addition, a standard V-belt without teeth might slip, which is

something that you do not want if you are striving for accurate timekeeping. The only answer for the V4 was to use toothed belts.

The exact engineering solution was to be found in two basic steps: the testing of dozens of materials under extreme conditions (between +200°C and -200°C) and the development of a process to cut the teeth. This led to the V4 having the smallest toothed belts ever produced. But then such a project was perfect for TAG Heuer's research and development department, which excels at material research, design and testing (in actual fact, TAG Heuer has one of the most

rigorous testing programs for watches of any brand in Switzerland). The teeth of several test belts that I examined under a loupe, some of which were even made from titanium, were amazing: unlike the teeth in the slightly simplified drawings here, each tooth has a tripartite section that looks almost like a *fleur de lis*.

There are 13 belts of several different types in the V4, consisting of various polymers, metals and other materials with different properties to coincide with particular tensional requirements; the larger belts can carry a load of almost 21 kg, whereas the belt that drives the seconds hand

In this view of the V4, one can clearly see the three-tiered differential gearing, supported beneath the V-shaped bridge at 12 o'clock. The small seconds hand is at 4:30. The overall design is based upon the iconic Monaco – the world's first automatic chronograph with microrotor, created in 1969 and worn by Steve McQueen. Its then-unusual, squared-off case remains highly distinctive.



carries only 1.6 kg. Microscopic ball bearings made of hi-tech ceramic are used to ensure minimal friction.

Winding system

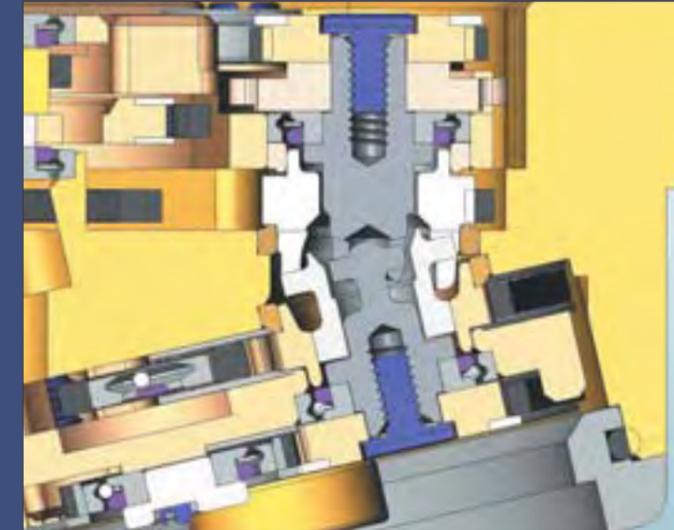
In a standard mechanical movement, there is much ado about transferring the energy from the barrel through the gearing, which can appreciably limit the mechanical layout. Since the use of V-belts in the V4 simplified the gearing and therefore allowed the movement more freedom of spacing, there was no reason why more than one winding barrel could not be put into the watch. Although at first the idea in itself seems a major complication, it ended up being a plus point since the barrels themselves also function as wheels for the belts. In light of this, the symmetrical placement of a winding barrel in each of the four corners of the watch case is highly efficient for the construction.

View of the watch back, with its four separate winding barrels, platinum weight and winding transmission gearing. Note the very fine teeth along the lower outer edge of the weight for engagement of the winding gears.

Many watchmakers, aware that a non-rotating winding system has built-in energy problems, were sure that the rocking system used in the V4 would never provide enough energy. However, the design is such that all four barrels are wound with each shuttle of the dense platinum weight. Indeed, on the functioning movement that I had in my hands, the weight sped back and forth at the slightest gesture, with L-shaped banking springs at each end helping it to change direction easily.

Differential and escapement

In approaching the two issues of the differential and escapement, Philippe Dufour's experience was of great importance. Although he works in a strictly traditional manner he is not afraid of new ideas and many years ago personally designed and manufactured a watch he called 'Duality' – an attempt at higher timing precision utilising two balance wheels



(Left) In this dial-side view, the differential is located at the top of the illustration under the V-shaped bridge. It controls the distribution of the winding barrel's energy and transmits it to the cannon pinion. For visual purposes, only a part of the movement baseplate is visible on the left, and the belt tensioner on the right – which would have been seated in the extreme bend of the belt – has been removed from view. The cannon pinion is located dead centre. The power is transferred from the four barrels on the back of the movement to the front via the two slanted bearings and, with one V-belt per bank, to the differential. (Right) Cross-sectional view between 9 and 3 o'clock. The back of the movement is at the bottom of the picture. An angled bearing carries the energy up to the face of the watch.

and escapements in order to cancel out or equalize timing variations.

This was achieved through the application of a microscopic differential, which he made entirely by hand and to extreme tolerances. Dufour's hands-on experience working with the construction problems of such differentials was to prove invaluable to the V4 project team. The V4's differential can just be seen in the main dial illustration under the blue, V-shaped bridge and up close in the cutaway illustration. It is of central importance to the V4's functioning as it has the role of equalising and transferring energy.

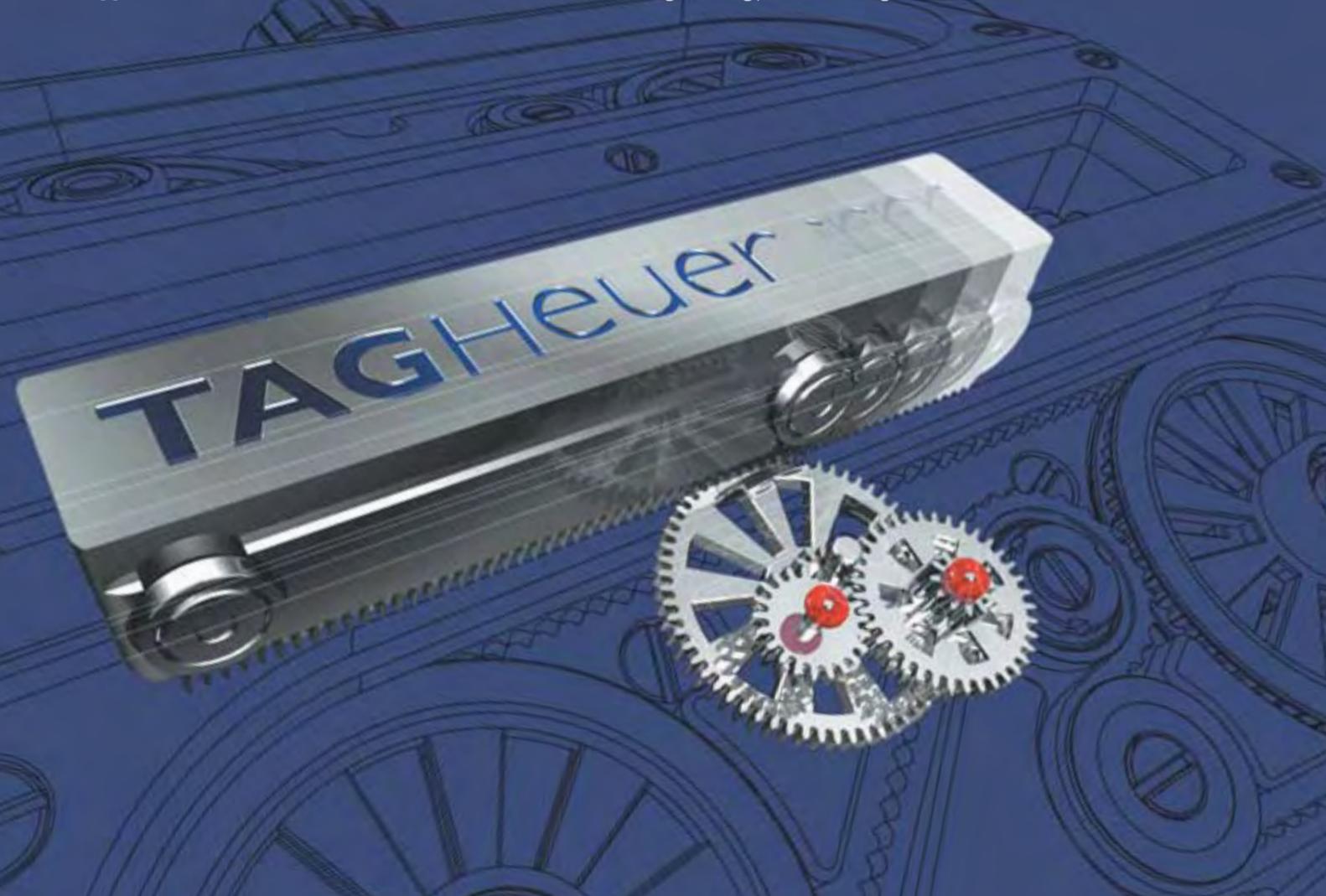
As for the escapement, a traditional system was chosen for its reliability and proven quality, again inspired by high-performance cars and their tried-and-tested combustion engines that still use principles from bygone centuries. The famed Dufour 'Simplicity' wristwatch uses a Philips-Breguet overcoil and Dufour's highly finished escapement.

This is what is being used for the time being in the test versions of the V4, though the definitive escapement setup is yet to be settled on.

Under construction

The V4 movement will be the first to be produced in-house at TAG Heuer – the new machines to make them have been installed at La Chaux-de-Fonds and are functional. At this moment the details for the first production run of a limited series are being finalised. Construction of non-limited editions will depend on the successful sale of the limited series, but, given the tremendous interest generated by the V4, it would be hard to imagine that every piece has not already been bought.

But that is not all. Cryptically, even bigger things are to be unveiled by TAG Heuer later this year. Rest assured that QP will bring you the details as soon as they become available. ○



Further information: TAG Heuer, Tel: 0800 037 9658, www.tagheuer.com