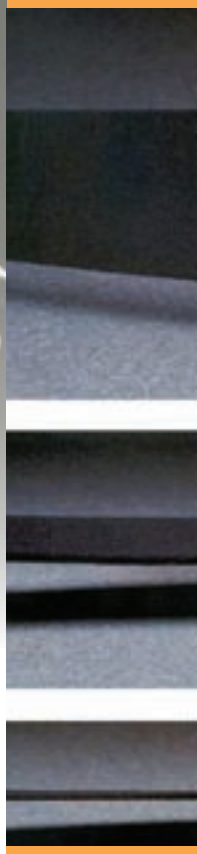
Thin & Risky



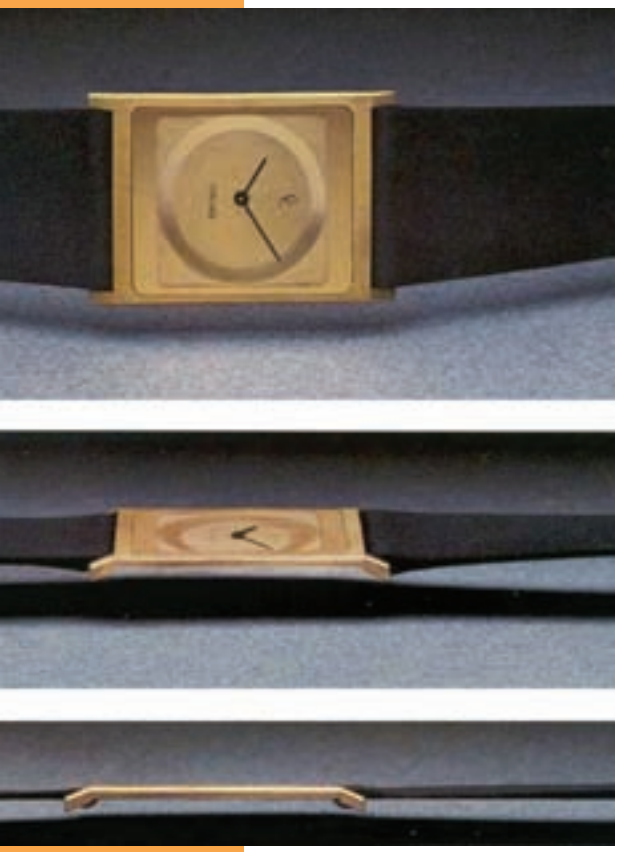
Above and right: In 1979 Concord unveiled its first Delirium watch, the thinnest analog watch ever produced. The original Delirium, created according to the brand's cutting-edge methodology, initiated a new trend among other Swiss and Japanese watchmaking companies that ever since have been striving for ever-thinner watch models.

The photo story in the last issue of *QP* emphasised the trend for ultra-thin watches. Their popularity is certainly deserved – the pieces are elegant, with a deceptive air of simplicity – but with such tiny cases and high demand for complications, what are the limitations of the super slim timepieces and how close is horology to reaching this boundary?

Ken Kessler & Peter Roberts FBHI

Masochism is not something one might normally apply to the watch industry, but recent obsessions indicate just such a streak. It's as if they deliberately set near-impossible challenges for themselves to prove their mettle. No self-respecting *manufacture* would dream of a catalogue without a tourbillon and yet tourbillons only serve a genuine function in pocket watches. Moonphase? Strictly the province of werewolves and zookeepers. So one should not be surprised that the industry is moving *en masse* toward the mandatory presence of another tough-to-produce feature in brands' catalogues, despite their worth being solely – albeit successfully – aesthetic: ultra-thin mechanical watches.

No watchmaker can identify any gains other than visual to justify ultra-thin movements. There simply are no operational gains that ultra-thins can offer over conventional timepieces. But manufacturers do find a way to rationalise the ultra-thin watch for reasons other than the purely visual. Piaget's UK Brand Manager, Nicolas Mohs, for example, posited that: "The beauty of having an ultra-thin movement is that it provides a lot more opportunity to work on the design and ergonomics of the watch, as the movement is not taking up too much of the watch space. This is why Piaget was one of the first to be able to work with hard stone dials, which are much thinner than normal dials."



A moot point, perhaps, as the thickness in question is measured in fractions of a millimetre, and a number of watches feature hard stone dials. But this has not stopped Piaget and its primary rival in the art of the thin, Vacheron Constantin, along with another master of the genre, Jaeger-LeCoultre, from reviving this fashion from the 1950s and 1960s with enormous vigour.

Christian Selmoni, Artistic Director at Vacheron Constantin says: "Ultra-thin watches have their origins in super-elegant, dress pocket watches – typically, from the 1930s. In 1955, to celebrate 200 years of the Maison, we launched the slimmest mechanical movement, the calibre 1003, only 1.64mm thick. We also designed self-winding ultra-thin wristwatches, starting in the 1960s. Considered as very elegant and discreet, such models have always been cherished by watch lovers and collectors, and ultra-thin wristwatches have always been in our collections, since 1955."

And they are not alone, they are merely the most militant. In the fray with both revived classics and all-new models are Hamilton, Frédérique Constant, IWC, A Lange & Söhne, Blancpain, Breguet, Zenith and many others.

Less is more

If discretion has replaced the conspicuous consumption of yesteryear, then the watch companies have just the ammunition. The revived ultra-thins are so subtle that they garner respect without demanding it, the way an oversized watch does so gracelessly. Perhaps the challenge is enough to justify the return of the ultra-thin. As Piaget's Mohs sees it: "Being able to manufacture a mechanical automatic movement made of 191 components with a 40-hour power reserve, which is only 2.35 mm thick is a massive achievement.

Above: Vacheron Constantin's Historique Ultra-fine 1955 is currently the world's thinnest mechanical hand-wound watch, measuring just 4.1mm thick. It is equipped with the mechanical hand-wound 1003 movement – the thinnest in the world at just 1.64mm thick.

"Some of the pieces had to be drastically reduced in size – the wheels in the new Altiplano are only 0.12mm thick (a hair is 0.08mm thick), whereas the standard size is about 0.2mm." As for another 'why', Mohs neatly sums it up. "This is who we are and what have been doing for more than 60 years. It is really part of the brand's DNA."

If a watch manufacturer is courting ultimate thinness, a manual-wind watch with a non-waterproof case is the simplest route; a waterproof case inherently makes the watch thicker overall. As Peter Roberts defines it: "If we're talking about manual-wind watches, we're into the 1mm-2mm area. If we're talking about automatics, 2mm-3mm – anything in those areas I would define as ultra-thin. Cases really do add a lot to the overall thickness. For example, a 1.5mm, exceptionally thin movement, will result in a 4mm-4.5mm thick watch."

To design an ultra-thin manual movement, a company must possess impeccable engineering standards. Roberts believes that, "you have to be absolutely at the top of your skills as a watchmaker. There's no room for error. It's very easy to engineer movements for today's models – they're large, oversized and the cases are thick." One of the unforeseen benefits of the public's acceptance of much bigger watches that came about 20 years ago is the extra 'real estate' for the movement. Roberts notes that "accommodating extra mechanisms is not so difficult".

In making watches as thin as possible, the manufacturers must deal with the absolute opposite situation. "An ultra-thin watch is not terribly practical," according to Roberts. "Modern wearers want watches that will run for a decent amount of time between servicing and ultra thinness has an effect on this. Back in the 1960s, when we were looking at very, very thin watches, people were quite happy to take them in every 18 months to have them serviced. Nowadays, people expect servicing intervals of four or five years." Customers, with much justification, expect a thin watch to possess the same servicing intervals that they have with conventional watches.

Spring time

What determines a watch movement's thickness is almost always the mainspring and its height. The diameter is important but it's not a major problem with a thin watch because the designer is not obliged to sacrifice width – a watch can have a 42mm case, and still be thin. That said, the thin

Above and right: Chopard's L.U.C XPS features a self-winding movement with twin barrels and a 65-hour power reserve inside a 7.13mm case.

2011's Saxonia Thin case has a diameter of 40mm and a height of just 5.9mm – the flattest timepiece crafted so far by A. Lange & Söhne. To fit the thin case, the company developed an equally slim manually wound movement – the calibre L093.1 with a diameter of 28mm and a height of 2.9mm, featuring an indexless oscillation system that beats with a frequency of 21,600 semi-oscillations per hour and a power reserve of 72 hours.

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watches of the past did tend to have small movements with 20mm being the average. Roberts, who has designed his share of movements, explains. "Everything else we can make very short – the balance staff, all the wheels, etc. The main component that determines the thickness of the movement is the mainspring. In simple terms, if you lower the height of a spring, you get less power. The diameter and the length determine the running duration of a watch; the height of a spring and the thickness of a spring determine how much power you get from that spring.

"If you have to reduce the height – by, say, 25 per cent – the net result is that you need to increase the thickness, but there's a limit to how far you can go with that. Springs always have to be a ribbon shape, so you would not have a spring that is as high as it is thick – a square cross section. The problem isn't just in making the spring very low, it is also that you've got to put it into a barrel – the case that holds the spring."

In modern watches, the barrel is called a 'going barrel', which rotates and drives the centre wheel and the rest of the train. For many hundreds of years, one method of making a thinner watch was to have what is called a 'hanging barrel', which allowed the maker to remove the bottom of the barrel and the bottom bearing, and to suspend the entire barrel mechanism from the top bearing.

Roberts has doubts about the 'hanging barrel' method. "Engineering-wise, it's not a terribly nice solution. How it was done on old, mainly continental watches, was rather crude, but it could be done. If you get rid of the bottom cover of the barrel, you can have a higher mainspring, sitting there in the open. The downside is that you have a bearing only on one end, rather than both ends, so it is necessary to use a sophisticated bearing. There are ways, however, around it, with modern types of bearings."

A lot on the plate

On the manufacturing side, ultra-thin watches demand even greater precision in a field where precision is already the paramount concern. On a normal watch, the basis is a main plate where the parts are screwed into place with bridges and cocks. In a thin movement, the main plates and parts are so thin that they become flexible. As Roberts explains: "In a normal watch, the main plate has its own inherent thickness. It doesn't move. It's the most stable thing in the watch.

At 10.4mm thick, the Piaget Emperador Coussin Tourbillon Automatic Is the world's thinnest self-winding tourbillon watch. Already a master of the genre, Piaget has taken ultra-slims to a new level with its 5.55 mm 1270P movement.

Proving that ultra-thin is an all-encompassing trend, even the king of overstatement Richard Mille has introduced its take on the subject with the automatic extra flat RM 033, which features the placement of the RMXP1 calibre's automatic micro rotor to the side rather than the center of the movement, thus saving precious millimeters in total height, allowing the movement a thickness of just 2.6mm. The case stands at just 6.3mm high.

All the moving parts are securely attached to it. You make the main plate and the bridges as stiff as possible because they maintain the accuracy of the watch."

In a super-slim watch, everything that is done to make the main plate and bridges strong is compromised, because they have to be so thin. So how do manufacturers compensate for this? "By working very carefully and sometimes by using special materials. It's much finer work."

Often the case can be used to reinforce the main plate, but the design of a slim watch prevents the use of too much extra metal in the case. Roberts feels that, "once you get to around the 2mm size, that's about as far as you really should go. After that, it's no longer really practical. Not that it is impossible. In fact, the record for the thinnest mechanical watches – held by Jean Lassale – is for a 1970s manual movement, which is just 1.2mm thick and an equally impressive 2.8mm-thick automatic movement."

Adding automatic winding always makes a movement thicker. Most of the ultra-thin automatics, such as Piaget's, use a micro-rotor, and they work well. And it's not just that an automatic adds thickness, it also adds volume and that volume has to go somewhere. So the designer either opts for a wider movement, or accepts something that's slightly thicker. Modern ultra-thin automatics measure in the 2-3mm region.

Power reserve shouldn't really be affected by ultra-thin movements and manual-wind ultra-thins can attain 35-40 hours, automatics the same. But ultra-thins will not hold as much lubrication as a thicker watch, hence the potential for more frequent servicing. Both the designers and the clients must also consider the water-resistance of the case, as that prolongs the life of the lubricant as well as keeping moisture out. It's not insurmountable to make a very thin waterproof case, and it's much easier now thanks to modern materials for better seals, but ultra-thins still lack the mass and the bulk of a thicker case.

Service charge

For the repairer, ultra-thin watches are a matter of delicacy. Roberts has serviced his share over the years, including Her Majesty the Queen's Jaeger-LeCoultre's Calibre 101, the smallest movement ever produced. "They are a challenge," he says. "The great ultra-thins of the 1950s – Piagets, Vacherons, Audemars – whenever you get one of these you have to stop and think and concentrate when you work on them. They're much, much finer. It's very easy to break or bend something. Even just putting the movement into a movement holder, you could damage or squash it. These watches need special holders and jigs and they should never be given to the average watchmaker. You need to go to somebody who has been trained on them. The new ultra-thins will need factory-trained watchmakers."

A sentiment echoed by Selmoni: "We consider that an ultra-thin watch must incorporate an ultra-thin movement – as the thickness of the movement is driving the watch design. Our most important challenge is to maintain the thinness of the whole watch at its minimum.

"Mastering the conception and the development of ultra-thin movements is really the key and the main challenge to conceiving and developing ultra-thin watches. Yet they are not considered to be complications as they do not offer additional functions. However, ultra-thin movements are considered by experts with the same respect as complications, as they require as much human ingenious, technique and know-how to be mastered by engineers, decoration specialists and, of course, watchmakers."

So does this suggest that very thin watches demand special care from the customer? "They must understand that they've paid a premium to get this very thin watch," says Roberts. "These watches are more fragile, they require more servicing care and you should take them off when you're doing anything rough. You're buying into something that requires thought. This applies, as well, to the salesman who sells them. He should look at the customer's lifestyle and how they will treat the watch. I've actually seen people sold these watches and they haven't lasted a month. They return with a ruined watch. Nowadays, people expect a lot more from their timepieces."

In the quest for what the Swiss insist on calling 'novelties' and the need for complications, ultra-thin movements are yet another in a never-ending flow of 'added attractions'. Certainly for many enthusiasts, a watch that simply tells the time and perhaps the date, with utter dependability and accuracy, may not be enough. And if 'sleek chic' appeals, then ultra-thins are the ultimate.

It may not be the thinnest of ultra-thins, but Hamilton's re-visited Thin-O-Matic launched at Basel this year certainly has one of the most direct names. With its roots in the 1960s, when the original model of this name first made waves, the 11.5mm thick piece is powered by an automatic 2824 movement and comes in either a 38mm or 42mm case.

Launched at Baselworld this year, the 4.7mm-thick, Rado True Thinline is the world's thinnest high-tech ceramic watch and proves that ultra-thin has come full circle – from quartz to mechanical and back to quartz playing catch-up.

The Jean Lassale Calibre 1200

While Piaget and the rest are to be lauded for their weight-watching, a movement forgotten by all but those who were working in the watch business in the late 1970s deserves mention in any look at the current craze. Jean Lassale's manual Calibre 1200, and its automatic counterpart, the Calibre 2000, were first presented in Basel in April 1976.

The 11-jewel 1200 had a diameter of 20.4 mm and a thickness of 1.2mm. The automatic version was 2.08mm thick. Its secret was a ball-race containing 14 ball bearings, only 0.2mm in diameter. Its frequency was 21,600 Alt/H, and its power reserve 35 hours. The two calibres were built from 1976 to 1979 in Geneva, requiring highly-refined production techniques, as well as specialised repairers to service them.

According to Peter Roberts the movement was, "so thin that it didn't require a shock absorber: the balance was made to run so close to the plates and it was so light that it wouldn't break. It could withstand the same shock as a normal shock absorber.

"Lassale designed a movement where none of the wheels had two bearings. It was lateral thinking (literally), with all bearings on one side. They were able to do this by using tiny little ball races that had to be developed in Switzerland. So all the wheels, from the barrel down to the escapement, are what are called 'flying' or 'hanging' wheels, with a bearing at one end. You can do that if you have very accurate ball races that can take the side thrust, where a normal bearing couldn't."

Although excellent movements, they appeared as quartz came along and the firm went bankrupt. Aside from what quartz did to mechanical watches in general, it obviated any need for a mechanical watch if thinness was the only goal, as electronic watches could be made with movements beneath the 1mm threshold. The name was bought by Seiko in 1979, while the Lassale technology was acquired by Omega (then SSIH), eventually ending up with Nouvelle-Lemania. Lemania produced those movements and supplied them to Vacheron Constantin.

Top: In 1970, Master Watchmaker Pierre Mathys designed and built the prototype of a revolutionary watch calibre, with the goal of making the thinnest watch in the world. The resulting Jean Lassale watch was not only ultra thin, but also transformed into a table clock. **Middle:** The Lassale calibre 1200 was first presented in Basel in April 1976. The mechanical, hand wound movement has a diameter of 20.4mm, and a thickness of 1.2mm. **Bottom:** The automatic version of the Lassale movement – calibre 2000 – is 2.08mm thick and was also built between 1976 and 1979 in the Bouchet-Lassale SA factory in Geneva.