

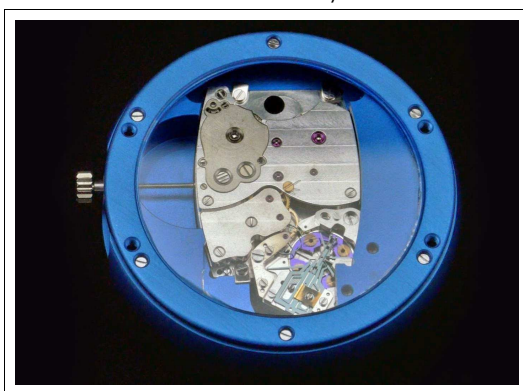
# Master Horologer

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Monday, September 15, 2014

## Vaucher Manufacture Fleurier and CSEM launch a mechanical movement with an exceptional Power-reserve of one month

The watchmaking skills of **Vaucher Manufacture Fleurier (VMF)** combined with the creativity of CSEM and its mastery of silicon technologies to produce an invention which drastically increases the power-reserve of the mechanical watch. Culmination of a project initiated seven years ago. Vaucher Manufacture Fleurier has drawn on all its watchmaking know-how to industrialize a revolutionary mechanism developed by CSEM to replace the traditional Swiss lever escapement. The movement is based on a very advanced technology and merits being proven on an industrial scale: the manufacture therefore plans to release the first movements within a three-year timescale.



Prototype of the movement

Structures on flexible guides are particularly suitable for providing precise, frictionless movements, without the use of lubricants and without wear. Convinced that these advantages could be usefully exploited in micro-engineering and precision watchmaking, Pierre Genequand, a physicist at CSEM, devised a new type of mechanical regulator which uses flexible structures both in the escapement and the oscillator.

The major benefit of the regulator proposed by Pierre Genequand is that it drastically reduces the energy consumption of a watch movement. The challenge of adapting such an innovation to the scale of a wristwatch was overcome by combining the excellent mechanical properties of silicon with entirely frictionless pivots mounted on flexible articulations, both in the escapement and the oscillator. In the final analysis, the owners of a watch movement powered by this regulator will need to wind their watch just once a month.

*"This is a wonderful meeting of minds with a watch industry partner that has the necessary expertise to turn our invention into an innovation, i.e. a prestigious product which meets its customers' expectations,"* said a delighted Mario El-Khoury, CEO of CSEM. *"The Genequand movement adds a new invention to applied research meets luxury Product the history of mechanical watchmaking."*

Familiar with the production of mechanical movements that use a traditional escapement through the work of its sister company Atokalpa, Vaucher Manufacture Fleurier

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BRAND OF THE WEEK: DETROIT WATCH COMPANY

encourages the use of silicon where traditional technologies are less efficient.



**P. Genequand, M. El Khoury & JD Dubois at Vaucher Decoration Workshop**

In the present case, Jeandaniel Dubois concludes: *"The Genequand escapement is an innovation which gives the traditional mechanical watch an exceptional power-reserve. VMF, in its capacity as a high end movement manufacturer, proves its determination to improve still further the performance of the mechanical watch. The Genequand regulator incorporated in a special movement will be marketed by our sister brand Parmigiani Fleurier for an exclusive period. The system will then become available to other clients, powering calibres specifically developed to receive it."*

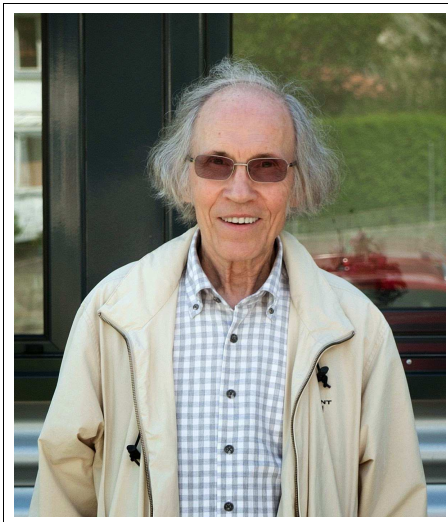


**Assembling Workshop, Vaucher Manufacture Fleurier**

The policy of innovation followed by the Fleurier motorist guarantees numerous benefits to its clients, not least the ability to stand out in a world where authenticity and tradition are of paramount importance.

In 2002, Pierre Genequand was newly retired and looking forward to realising an old dream: to apply to watchmaking a technology invented for other applications in which he had extensive experience. He now had time to pursue ideas which had come to him earlier, encouraged by progress made with silicon: the possibility of making micro-engravings on components derived from this material and of applying to watchmaking a technology hitherto developed for aerospace engineering projects.

During his years in Neuchâtel, firstly as a researcher at the Swiss Foundation for Micro-Engineering Research, and from 1985 to 2002 with CSEM as a researcher and senior expert in Advanced Mechanisms, he had never been able to fulfil his ambition of developing a watch. However in the 1980s, the watch industry crisis drove the industry to technological diversification, a trend that was maintained after the establishment of CSEM in 1984. It is fortunate that in the Neuchâtel region, one of the birthplaces of watchmaking, people never really lose touch with their roots.



**Pierre Genequand**

Pierre Genequand therefore rose to the challenge of reducing the energy dissipation of a



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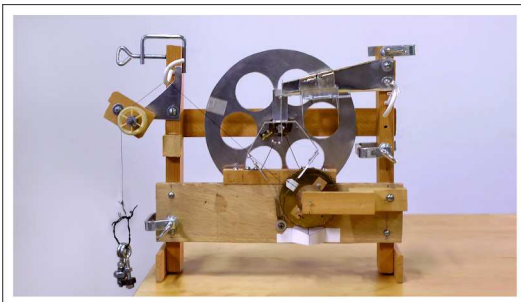
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PHILIPPE DUFOUR – Living Legend of Traditional Watchmaking

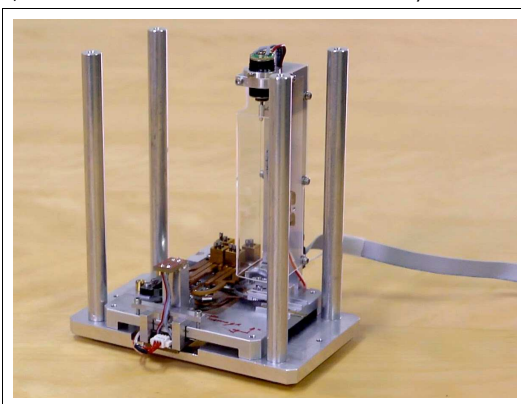
PHILIPPE DUFOUR is a world renowned master watch maker who is specialised in the manufacturing

watch – thereby increasing its power-reserve – with the help of Flextech technologies (applying the clearance-free and frictionless properties of flexible articulations to precision mechanisms developed in the fields of fibre-optic guidance and aerospace engineering). In this problem the components most affected by friction are the escapement and the balance pivot, hence most likely to benefit from Flextech. Initial studies of the escapement led to the concept of flexible pallets in permanent contact with the toothed wheel. He then combined this escapement with a geometry in which the pivot, the return spring and the link with the pallets of the balance are all manufactured as Flextech components.



20 : 1 Scale model of Genequand System

Miniaturisation to increase the power-reserve of the mechanical watch: This phase was completed in 2004 with the construction of a 20:1 scale model which he presented to a CSEM delegation, to whom he transferred the invention shortly afterwards.



5 : 1 Scale model of Genequand System

This first mock-up was reduced to a 5:1 scale model by CSEM in 2005, together with a preliminary study for a 1:1 scale model made of silicon.



Project Team in front of Manufacture Vaucher

In 2007, the partnership between CSEM and Vaucher Manufacture Fleurier was signed. At that point, in order to achieve the 1:1 scale miniaturisation which would allow integration in a watch movement, components such as the isochronism compensator and the Wittrick had to be developed in addition to the pallets, resulting in a three-component system. In 2014, movement prototypes demonstrated how the system named in honour of Pierre Genequand worked: a new mechanical regulator offering an exceptional power reserve was born.

### The Genequand System

- 1 winding per month
- 10 years from idea to system
- Invented by Pierre Genequand
- 2 partners, CSEM and Vaucher Manufacture Fleurier
- 1 team of 20 people
- From the scale model to the system, miniaturisation by a factor of 20
- 3 components isochronism compensator, Wittrick oscillator, pallets (on the left)



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- 86,400 vibrations per hour of the oscillator
- 10 x 15 mm, dimensions of the system
- 0.02 mm, strip thicknesses

#### Project Leaders

- Mario El-Khoury, CEO of CSEM
- [Jean-Daniel Dubois](#), CEO of Vaucher Manufacture
- Pierre Genequand, now retired from CSEM and inventor of the Genequand regulator
- François Barrot, CSEM Project Manager
- Takahiro Hamaguchi, Head of Movements Development, Vaucher Manufacture Fleurier

#### About Vaucher Manufacture Fleurier

A manufacturer of high-end mechanical watch movements, VMF is happy to describe itself as a prestige motorist. It manufactures the heart of the watch, an assembly which itself consists of several hundred components. The vertically-integrated firm is responsible for the complete production and quality control of watch movements thanks to a production capacity which combines innovation and tradition. VMF is majority owned by the Sandoz Family Foundation and Hermès International. The manufacturing arm of Parmigiani Fleurier, a partner of Hermès and a supplier of movements to prestigious watch brands, it has a 200-strong workforce and trains 15 apprentices. Through its Vaucher Private Label entity, it is a strategic tool for brands wishing to gain access to high-end watchmaking. ([Click here for more details](#))

#### About CSEM

CSEM is a private research and development institute specialising in micro-technologies, nanotechnologies, microelectronics, systems engineering, photovoltaic technology and information and communication technologies. CSEM has more than 400 highly qualified employees working at CSEM sites in Neuchâtel, Alpnach, Muttenz, Landquart and Zurich.

Under contract to the Swiss Confederation, CSEM develops innovative technology platforms through four strategic programs – Microsystems, systems, ultra-low-power integrated systems and surface engineering – corresponding to domains in which it has acquired over the years a national and international reputation. By expanding its knowledge and adapting it to the needs of industry, new products are brought to market and new ventures are created.

Posted by [Geethu Lawrence](#) at 9:45 AM 

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