

Meeting aesthetic and technical requirements

Parametric optimization for traditional watchmaking with ANSYS



Task

The intersection between art and engineering makes it very special to develop luxury watches. Each step of the development of a new component is conducted under the careful supervision of mechanical engineers and designers working hand in hand. It is a real challenge to fulfill the technical requirements in an excellent way on the one hand but also to meet the high aesthetic criteria on the other.

From a mechanical point of view, a spiral spring has to meet precise specifications pertaining to its torque at specific loading angles and over many cycles as well as geometric requirements for its manufacturing. From a visual perspective it is important that the windings of the spiral stay concentric at all times (Fig. 1). The challenge is to find a geometry meeting all the requirements by only changing geometric parameters such as the number of windings, the dimensions and the shape of the spiral.

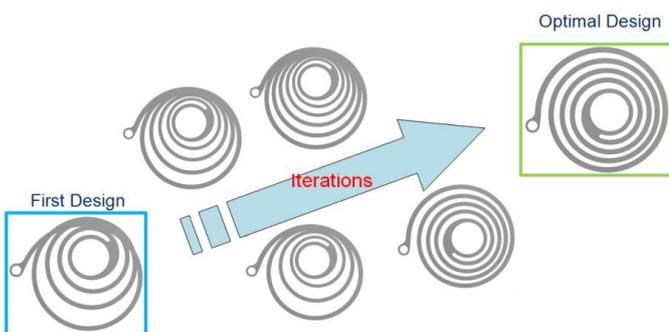


Fig. 1: Iterations on the design lead to a spiral spring satisfying both functional, robustness and aesthetical requirements.

Contact:

Joël Grognez
 P +41 (0) 21 - 614 80 - 44
 joel.grognez@cadfem.ch

Meeting aesthetic and technical requirements

Parametric optimization for traditional watchmaking with ANSYS

Solution

A parametric structural simulation model was created in ANSYS Workbench to vary the size of the pocket containing the spring and the characteristic dimensions of the spiral spring. In addition different anchoring options for the end of the spring have been assessed. The simulation setup considered a full loading and unloading cycle in order to analyze time history of the torque developed by the spring.

The ease with which geometrical parameters can be changed allowed new designs to be tested rapidly. The following technical requirements were considered in addition to the aesthetic criteria; pre-load, maximum torque, allowable stresses and strain relaxation due to creep.

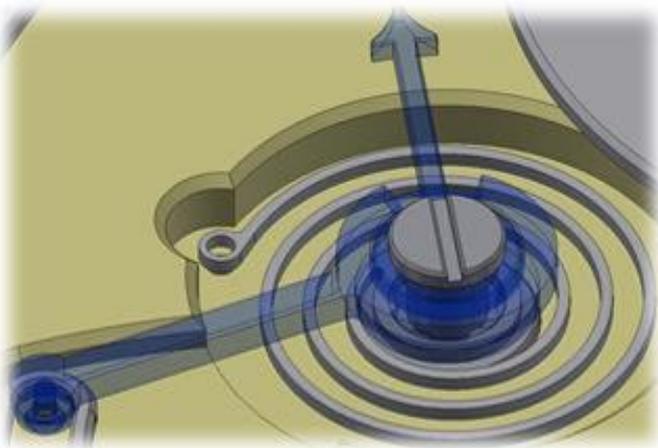


Fig. 2: Final design of the optimized spiral integrated in the watch.

ANSYS is a registered trademark of ANSYS, Inc. All other named products are the property of their respective owners. Figures Courtesy of Chopard Technologies SA.

About CADFEM

Since 1985, CADFEM delivers CAE competence and works closely with ANSYS Inc. Today we are an ANSYS Elite Channel Partner and we provide our customers with everything required

Customer Benefit

In very little time the development team could achieve a working design meeting both technical and aesthetic criteria.

With this new parametric simulation approach the number of prototypes was reduced from several units in former developments to just one. This has significantly reduced development time while reducing costs for prototypes, test equipment and of course also human resources.

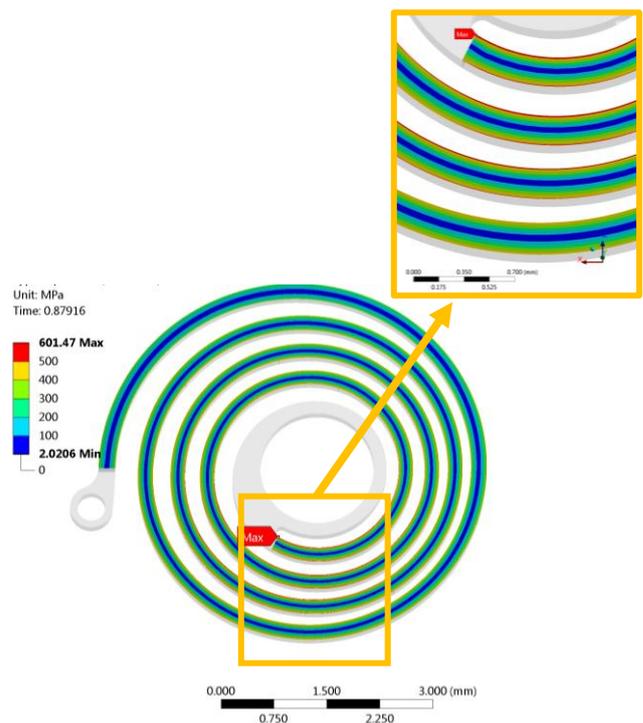


Fig. 3: Detailed stress condition in the loaded state.

to bring success in simulation: Software and IT-solutions. Consulting, Support, Engineering. Know-how-Transfer.