CASE STUDY

RED CERAMICS FOR THE WATCH INDUSTRY

Problem – Challenge
With increasing cost pressure from globalization and the strong Swiss franc, innovation is becoming a key competitive factor for Swiss companies. This is one more reason to step up the collaboration between industry and research institutions in order to bring innovative ideas onto the market sooner.

Empa set about developing a red ceramic material that meets the high demands of the watch industry. The new material had to be non-toxic, which ruled out any compounds containing lead or cadmium for color schemes. A glaze on the ceramics was also unsuitable as it could chip off. The bezel therefore needed to be produced from colored ceramics that would also survive the subsequent engraving of the letters and numerals unscathed.

Solution
And so the Empa team opted for aluminium oxide as their material of choice – a common, white ceramic material used in artificial hips or as a seal in taps, for instance. Months of experimenting followed, where the researchers specifically mixed tiny amounts of chromium as well as inorganic additives into the ceramics. The multi-stage process to produce red ceramics was co-developed by the Swatch Group and Empa in a CTI project. The extremely complex production path has been protected by a patent application in March 2016.

CASE STUDY

CONTRABASS CLARINET EXTENDED

Problem – Challenge
Contrabass clarinets commercially available today leave many musicians’ wishes open. Traditional mechanics demand compromises in positioning the tone holes, which lead to a flawed sound and insecure intonation. The challenge was therefore to develop an innovative “play-by-wire” musical instrument that is nevertheless still blown like a traditional instrument.

In the precursor project, Contrabass Clarinet Unlimited, a functioning laboratory model was presented in October 2013 after two years of research. The task was to realise a newly conceived instrument with its own character, and to make it ready for the market.

Solution
The team chose a radically new approach. The traditional mechanics have here been replaced by sensory dynamic keys that activate small electric motors. This means that no more compromises are necessary in positioning the tone holes. The sound and intonation have been markedly improved, and new audio-visual interfaces have been created for composers and performers. The innovations developed in this project could in future be applied to the bass clarinet and other low wind instruments, which all suffer from similar technical and tonal difficulties.

For further information see: http://www.hkb-interpretation.ch/projekte/contrabassclarinet-extended/