SILICON
A solution for the manufacture of your micro-components

made in switzerland
Sigatec is specialised in the manufacture of silicon micro-mechanical components. Established in 2006, the company supplies these components mainly in the fields of watchmaking, aerospace and bio-medical needs.

The majority of our work is achieved in clean room, completely equipped for the design of silicon components. Our methods are optimal, whether for the manufacture of unique components or for series production up to 100,000 parts.

The use of silicon as a micro-mechanical component began in the 70s with the development of MEMS (Micro-Electro-Mechanical Systems).

MANUFACTURING TECHNOLOGY
The most common manufacturing technology is deep reactive-ion etching (DRIE). This technology is made up of the following steps:

1. Wafer covered in photo-sensitive resin which is illuminated through a mask.
2. Resin is developed.
3. Deep etching of silicon (Bosch method).
4. Parts are removed.

Silicon is a material that:
- Is light: mass density of 2.33 kg/dm³
- Is elastic: 130-170 GPa
- Can be etched with precision at both micro-metric and submicro-metric levels.
PARTS FOR WATCHMAKING APPLICATIONS

1. SURFACE OXIDISATION
Silicon component oxidisation improves mechanical resistance and tribology properties. Different thicknesses are offered, which can have an influence on the final colour. Standard thicknesses are from 0.5 µm (violet) or 1.55 µm (grey).

2. DIAMOND DEPOSIT DCS, Diamond Coated Silicon
The technology which comprises of coating the components with a diamond nano-cristalline allows for the mechanical strengthening of the parts.

3. LATERAL SURFACE STRUCTURING
With the mastery of etching technology, Sigatec can structure flanks and optimize their usage. Moreover, decorative angles and surface friction optimization are possibilities (for example, wheel-anchor).

4. DECORATIVE AND HOLOGRAPHIC ETCHING
Through micro-etching one can cover silicon surfaces with motifs. These motifs are unique, customized and highly identifiable.

MANUFACTURING PROCESS
ONE-LEVEL ETCHING
Part types
Anchors, escapement wheels

MANUFACTURING PROCESS
TWO-LEVEL ETCHING: CROSSED LEVELS
Part types
Disks, anchors

MANUFACTURING PROCESS
TWO-LEVEL ETCHING: SUPER-IMPOSED LEVELS
Part types
Escapement wheels, anchors

MANUFACTURING PROCESS
DRIE ANGLING
ASSEMBLY OTHER APPLICATIONS

1. BIOMEDICAL
The extreme precision of machining technology with silicon, combined with its metallic replication possibilities, opens the door to numerous technological breakthroughs in the following fields:

> Microfluid microchannels
> Cell traps and a selection of cells via wells and dead end channels

2. FILTERS AND MICRO-CAVITY DIFFUSERS
Cavities of various shapes and micro-metric sizes are achievable in silicon or via metallic replication. Utilization in the fields of diffusion and product filtration.

3. CONNECTING PLATES
Silicon structuring precision is also used in the field of connectivity.

COMPONENT ASSEMBLY
Sigatec offers the possibility of final silicon component assembly to its clientele, thereby allowing our customers to receive the parts ready for use.
We have developed our know-how in the following fields:

> Gluing procedures
> Geometric testing of assembled parts
> Torque and strength tests

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