



# MICRO-SCREW LOCKING SOLUTIONS

Watchmaking – Leather goods – Eyewear

## ASSEMBLY EXPERTISE

Soprima is the French leader in pre-coating threaded and smooth parts in numerous industrial sectors, processing over 200 million parts each year.

For 30 years, we have developed our expertise in assembly solutions in close collaboration with our customers in very varied areas of applications.

Soprima has a fleet of special machines developed in-house that allows us to process a wide variety of parts.

ALL OUR PROCESSES ARE  
ISO 9001 CERTIFIED.



## LOCKING SOLUTIONS

Locking by bonding  
Reusable locking

Watches, glasses, handbags, cell phones and medical devices, among others, are subject to vibrations and shocks that naturally cause loosening of the screws assembling them.

These screwed assemblies must be locked in order to increase their quality and reliability. In the 1980s, we developed the locking-by-bonding technique on micro-screws for a large luxury brand, which today remains loyal to us.

**Our customers are major luxury brands**, specialised particularly in watchmaking, eyewear, leather goods, jewellery, electronics and aeronautics defence.

# WATCH-MAKING SCREW SOLUTIONS

## H-LOCK SOLUTIONS

We propose two solutions for locking by bonding of the S0.7 to M2 micro-screws :

### ■ Locking by bonding with micro-capsules :

- The technique consists of pre-coating the threads with a micro-encapsulated adhesive, which is activated during assembly.
- During assembly, the microcapsules burst, releasing the adhesive that polymerizes and bonds the threaded components together.
- This is the most effective locking solution.

### ■ Reusable locking by polyamide :

- When tightening the screw, the polyamide patch on the thread is compressed. The radial tension created by the product's elastic deformation increases the friction and results in locking.
- As the polyamide deformation is partially reversible, locking is also reversible; therefore, the part can be assembled and disassembled several times.
- Polyamide has two other functions versus unpatched screw :
  1. Dampen vibrations to avoid screw loosening
  2. If the screw loosens, it is not lost.
- Locking is activated immediately after mounting.



## TECHNIQUE & APPLICATIONS

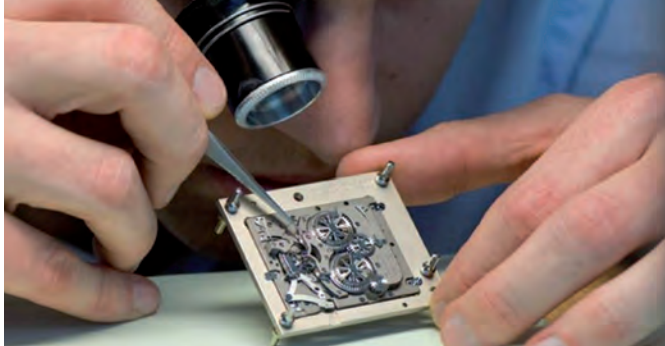
- Pre-coating effectively replaces the traditional techniques of mechanical locking and adhesion by liquid threadlockers.
- Our process allows to pre-coat a large number of micro-screws and pins in both boxes and bracelets : boxes screws, decorative screws, bracelet screw, folding clasp screws, links extension screw, without head screws, motion screws, cage door screws, crown screws, ...
- We use different processes to treat all types of screws, but also set or fine-headed axles.
- Our machines suited to parts from S0.7 to M2.
- The length and thickness of the coating are determined for each application according to the assembly parameters : number of threads engaged, part in the assembly, thread quality, parts material, etc.
- For the technical validation of our solution, we provide sample batches for tests by the customer. We can also achieve torque measurements on customer parts, in that case we provide a trial report.

## SPECIAL SERVICES & PACKAGING

- All incoming parts are inspected : we count the batches and verify them visually.
- The parts are processed and dried so that the patch is dry to the touch. They are then packed in airless bags.
- For fragile parts such as polish parts, we process them individually : the parts received in cells are processed one by one using pliers and unitary controlled by operator.
- Small batch production bags can be offered.







## PRODUCT SPECIFICATIONS

### Characteristics

|                         | H Lock 2510                | H Lock 2353                | H Lock Polyamide  |
|-------------------------|----------------------------|----------------------------|-------------------|
| Colour                  | Orange                     | Blue                       | Green             |
| Type                    | Microencapsulated adhesive | Microencapsulated adhesive | Polyamide resin   |
| Function                | Strong locking and sealing | Standard locking           | Reusable locking  |
| Standard coating length | 5 to 6 threads             | 5 to 6 threads             | 4 to 6 threads    |
| Curing time at 20°C     | 5 days                     | 3 days                     | Immediate locking |

### Characteristics in use

|                                      | H Lock 2510            | H Lock 2353            | H Lock Polyamide |
|--------------------------------------|------------------------|------------------------|------------------|
| Number of uses                       | 1 (to 2 in some cases) | 1 (to 2 in some cases) | 5                |
| Locking torque on tightening (Cfv)   | Low                    | Low                    | Average          |
| Loosening torque (Cdes)              | High                   | High                   | Average          |
| Resistance to vibrations             | Excellent              | Excellent              | Good             |
| Resistance to shocks                 | Excellent              | Excellent              | Good             |
| Chemical resistance                  | Good                   | Good                   | Good             |
| Guaranteed sealing (oil, UV, grease) | Yes                    | Yes                    | Yes              |

## Comparisons of different solutions for watch-making screw assemblies

### Advantages of Soprima solutions

|   | H Lock 2510 & 2353 | H Lock Polyamide | Thin elastomers | Liquid threadlockers |   |
|---|--------------------|------------------|-----------------|----------------------|---|
| Ease assembly                           | ✓✓✓                | ✓✓               | ✓               | ✓                    | The braking torque on micro-encapsulated patched screw is very low and does not disrupt the screw tension. However, polyamides and elastomers cause an important braking torque because of the product's hardness. Liquid threadlockers cause reliability issues because the quantity applied is not well-mastered, moreover pollution issues are well known. |
| Resistance against vibration and shocks | ✓✓✓✓               | ✓✓               | ✓               | ✓✓✓✓                 | The adhesive solution gives the best results: 12 hours of vibration and 15,000 Chappuis shocks without loosening.   |
| Reusability                             | ✓                  | ✓✓               | ✓✓              | ✓                    | Polyamide and elastomer solutions can be reused several times.  |
| Process reliability                     | ✓✓✓                | ✓✓✓              | ✓               | ✓✓✓                  | Thin layers of elastomers are incompatible with the tolerances of both parts of the assembly that cause some extent of loosening. Soprima products are less prone to loosening because thick layers are applied at a thread filling rate over 50%.  |
| Cleanliness                             | ✓                  | ✓                | ✓✓              | ✓                    | The detachable particles can pollute the assembly; this pollution increases with deposit hardness.  |
| Capability                              | ✓✓✓                | ✓✓✓              | ✓               | ✓✓✓                  | Soprima processes screws of all dimensions, but also headless screws and axles.   |
| Capacity                                | ✓✓✓                | ✓✓✓              | ✓               | ✓                    | The Soprima machines equipped with vibrating bowl and automatic conveyors, can be used to process large series of several million parts per year in very short periods of time.   |
| Quality                                 | ✓✓✓                | ✓✓✓              | ✓✓              | ✓✓✓                  | The Soprima processes are certified ISO 9001.   |
| Preservation of part's appearance       | ✓✓✓                | ✓✓✓              | ✓               | ✓✓                   | The Soprima processes drying temperatures do not exceed 100°C, which preserves the structure of the part and its appearance.  |
| Price                                   | ✓✓✓✓               | ✓✓✓✓             | ✓               | ✓✓                   | Soprima industrial processes make substantial savings possible. The economic result of liquid threadlockers is unfavourable because the cost of application, storage, supply and non conformity are very high.  |



## LOCKING

- **Locking by bonding**

Both components of the assembly adhere together after curing of the micro-encapsulated adhesive applied on the threads.

- **Polyamide or mechanical locking**

Locking is achieved by elastic deformation of a product applied on the threads. The product used is most often polyamide (nylon) applied locally or over the entire circumference of the threads.

## TORQUES

- **Braking torque (Cfv)**

Maximum torque measured when the assembly is stressed.

- **Tightening torque (Cser)**

Torque required to tighten a screw to a level of stress.

- **Loosening torque (Cdes)**

Torque measured after the breakaway point when unscrewing adhesive-coated screws. We can talk about a break loose torque when the assembly is bonded.

- **Locking torque on unscrewing (Cfd)**

Maximum residual locking torque after release on a single turn of the screw.

For reusable locking, Cfd1 is used for the first turn of the screw and Cfd 5 for the fifth turn of the screw after five successive assemblies.

## THREAD M AND S

- The thread M is defined by the ISO standard whilst the thread S is defined by the NIHS standard of the Swiss watch-making industry.

ISO 9001:2015

BUREAU VERITAS  
Certification

