SMART TECHNOLOGY SERVICES

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<table>
<tr><td>Semi-automatic presser SI20
for chips, contact plates and biometric sensors

General description</td></tr>
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I. SI20 product objective and positioning

The SI20 is a semi-automatic presser heads system allowing pressing 1 or several times a chip module, an ISO plate or a fingerprint sensor on a card. The 2 presser heads allow reproducing a standard embedding process, typically with the first head heating the component, and the second head cooling it.
Each embedding parameters can be controlled including the pressing temperature, the pressing time, and pressure force.

This simple and affordable system allows performing various embedding tests on cards in a view tuning a process before implementing it into a bigger system like the SI700. For some particular projects where:

- specific or new components need to be embedded on cards, like a particular fingerprint sensor,
- particular card material needs to be used, like metal cards or others,
- a particular/new adhesive and/or conductive glue need to be used,
- a particular embedding process,
- a pilot, experiment or tests need to be conducted using a small quantity of cards,

then the SI20 is the perfect system to exercise these new elements and related embedding parameters on a small quantity of cards, before launching a production.


The SI20 is mainly used for engineering purposes. It avoids using a production system to exercise a new technology or new card products. It has been designed to bring a maximum of flexibility:
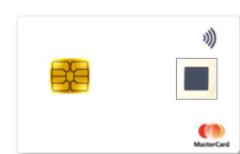
- All embedding process parameters are adjustable: temperature, pressure force, pressure time.
- It can embed chip modules, contact plates and fingerprint sensors in any position on the card, except 1mm from the right/left edge of the card, and 2mm from the top/bottom of the card.
- Presser heads can be easily changed to accommodate the component design, depending on the chip module / contact plate / fingerprint sensor used.
- It supports various card materials: PC, PVC, ABS, PET, composite, metal.
- It can be used to manually produce small volumes of cards, including:
    o Contact cards, with a single chip or with multiple chips
    o Dual interface cards
    o Biometric cards
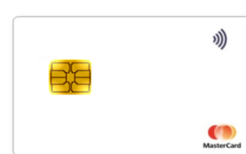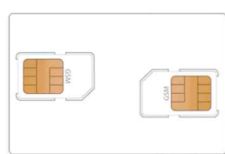
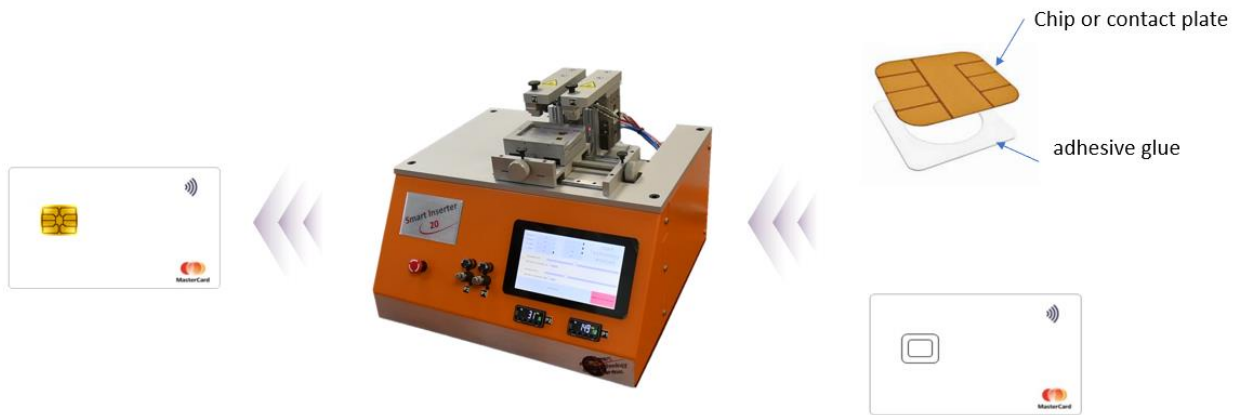contact   dual interface   biometric

II. SI20 Product description

The SI20 is a semi-automatic presser heads system requiring using cards already milled and chips/contact plates/sensors already laminated with an adhesive glue, as illustrated below.

**General process for chip modules and contact plates**

General process for fingerprint sensors

When the chip/contact plate/sensor/object also needs during embedding to be connected to the card inlay through electrical contacts, the SI20 supports 2 types of technologies:

- **Linxens Edgelink**®, where the film supplied by Linxens supports chips, contact plates or sensors integrating solder bumps. For sensors for instance, each sensor typically has 8 solder bumps as shown here →

  These solder bumps are made in a material allowing connecting the chip/contact plate/sensor to contact pads from the card inlay when pressing and heating during a certain time.

- **ACF glue**, which is a combination of a thermo-setting adhesive and conductive particles. The conductive particles are distributed homogeneously maintaining consistent particle density and thickness. They allow connecting the chip/contact plate/sensor to contact pads from the card inlay when pressing and heating during a certain time.
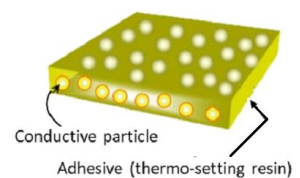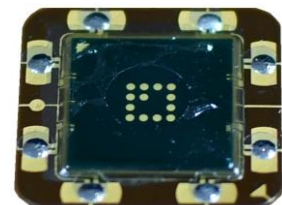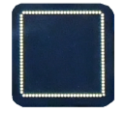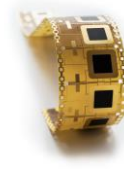
In terms of components, the SI20 supports various chips, contact plates and sensors

As of April 2021, fingerprints sensors currently used with the SI20 are the fpc1321 from Fingerprints, and IDEX. However the SI20 can easily support other sensor types.

fpc sensors on 35 mm film   IDEX sensor

STS also offers a solution allowing to manually mill cards to produce a cavity, and to manually punch a chip/contact plate/sensor from a film. More information on the manual punching system is provided in chapter 3 below.

The SI20 requires using compressed air, which can be provided with a standard air compressor. See chapter 4 below for more information.

The SI20 is a stand-alone equipment, which does not require any connection to a PC or a network.

Equipment overview
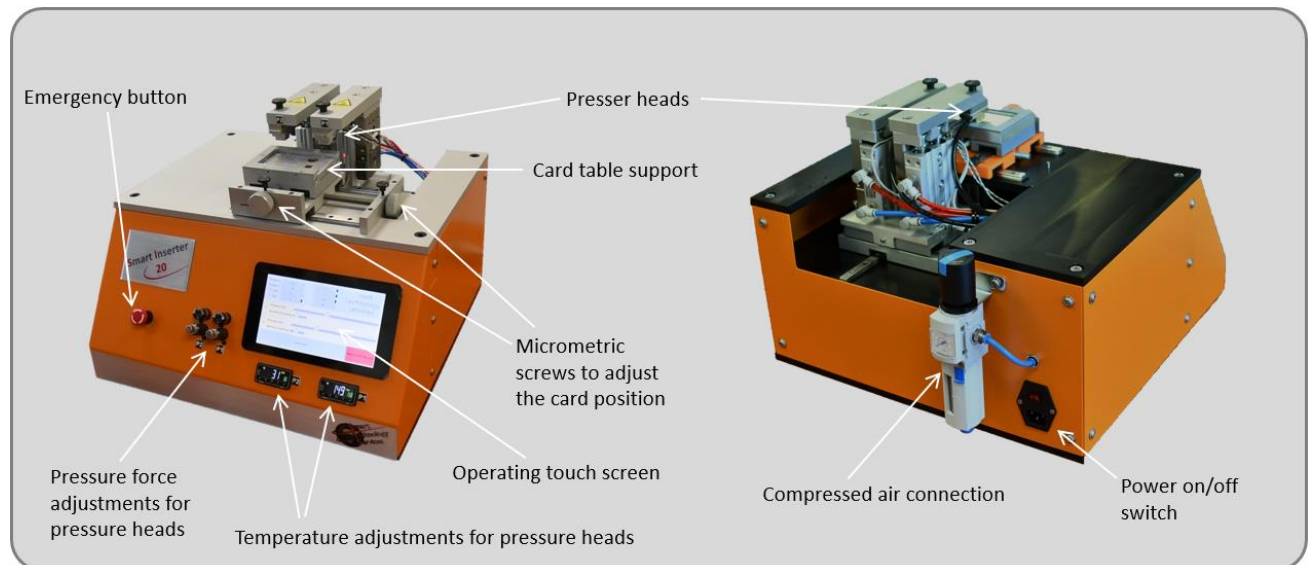
The SI20 is supplied with 2 presser heads corresponding to the component design to embed on the card: either a chip module, a contact plate, or a fingerprint sensor. The illustration here shows for instance a presser head designed for the FPC1321 fingerprint sensor.
The 2 presser heads can be easily changed depending on the chip, contact plate or fingerprint sensor design.

These 2 presser heads allow performing a typical embedding process, which usually requires pressing 2 times:
- first time allows pressing and heating at "high temperature", like 180°C for instance
- second time allows pressing at a lower temperature, which can just be the ambiant temperature (20°C for instance).

The SI20 can press more than 2 times if needed. For instance the first presser head can press 3 times, and the second head 2 times. This can be defined when setting up the process parameters using the touch screen.

Operating mode overview

Operating the SI20 is simple and can be summarized as follows:

- Using the operating touch screen, the operator sets the embedding parameters such as the temperature for each head, the pressure time for each head, the number of times to press. He also adjusts the pressure force using the 2 buttoms on the left of the touch screen.
  The operator needs to wait until the defined temperatures for the heads are reached. The equipment tells the operator when it is ready.
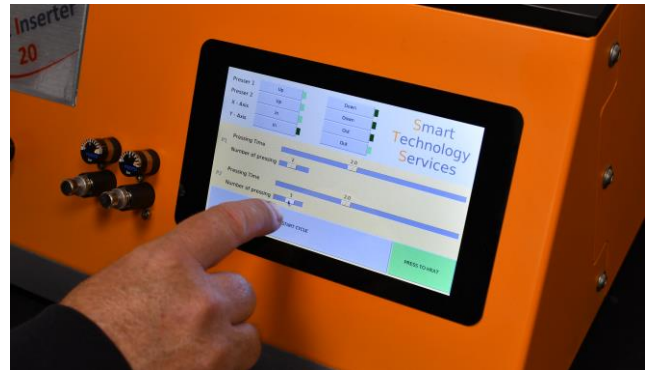

- The operator stores the card in its support. As above indicated the card should have a component (chip, contact plate, fingerprint sensor …) already laminated with glue. The operator should care about the exact component positioning to make sure the right contacts are made with the card inlay if such contacts are needed.

- The operator should visually check that the first presser head is correctly aligned with the component on the card. He can use the 2 micrometric screws to adjust the table position in X/Y. This should be done only for the first head as the second head will automatically move to the component position as soon as the first head has finished pressing.

Micrometric screws

- Once the card is correctly positionned and the machine tells it is ready, the operator can hit the "start" icon on the screen to perform the embedding. The machine will press the component using the first head as per the parameters set for this head, and then it will automatically move the heads support so that the second head will press the component as per the parameters set for this second head.
  Once the second head completed the pressing step, the machine will move the heads support to position the first head at its initial position, ready to press another card.

Each head has its own cylinder to allow pressing individually

Once the first head finishes pressing, the heads support automatically position the second head under the component to press, and then press it.

- The operator can then remove the card from its support, and test it.
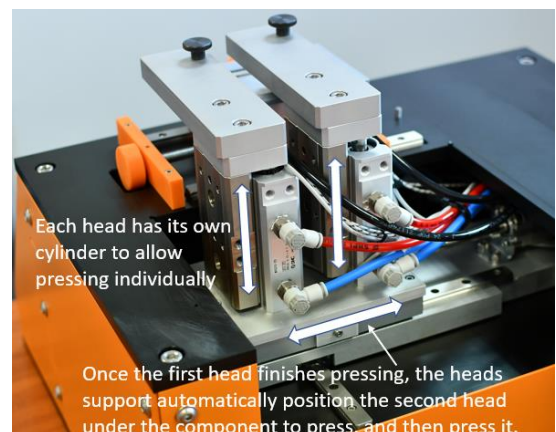
Detailed information on the equipment operation are provided in the document "SI20 User's Manual" and in the "SI20 training video".

Equipment dimensions

336 mm maximum

214 mm

450 mm

396 mm

The SI20 is made in France by Smart Technology Services

III. SI 20 general specification

SI20 Specification	
System Functionality	Press a chip module, a contact plate, a biometric sensor or eventually a smart object in any position on the card surface except 1mm from the right and left edge of the card, and 2mm from the top and bottom of the card
Preliminary conditions	- A cavity should be milled on the card - The chip/contact plate/sensor film should be laminated with an adhesive glue
Embedding Placement	Placement is done manually
Connecting technologies to the card inlay	2 supported technologies allow connecting the chip, contact plate or sensor to the contact pads of the card inlay: - ACF glue (Anisotropic adhesive conductive glue) - Edgelink® from Linxens
Presser heads temperature, pressure force, pressure time	- From ambient to 300°C - Pressure force up to 6 bars - Pressure time up to 20 sec
Card Types Supported	ISO/IEC 7810 ID-1 Size; 30 mil (±10%)
Card Materials Supported	Polycarbonate, composite, PVC, ABS, metal
System dimensions	H 336 mm x W 396 mm x L 450 mm
Power supply / Compressed air	120V / 240V, 50 or 60 Hz / Compressed air: 6 bars, 8 liters/minute