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**Card pre-personalization / initialization solutions
with SE1000 and MPR5800**

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SE1000



MPR5800

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I. General principles for pre-personalization / card initialization

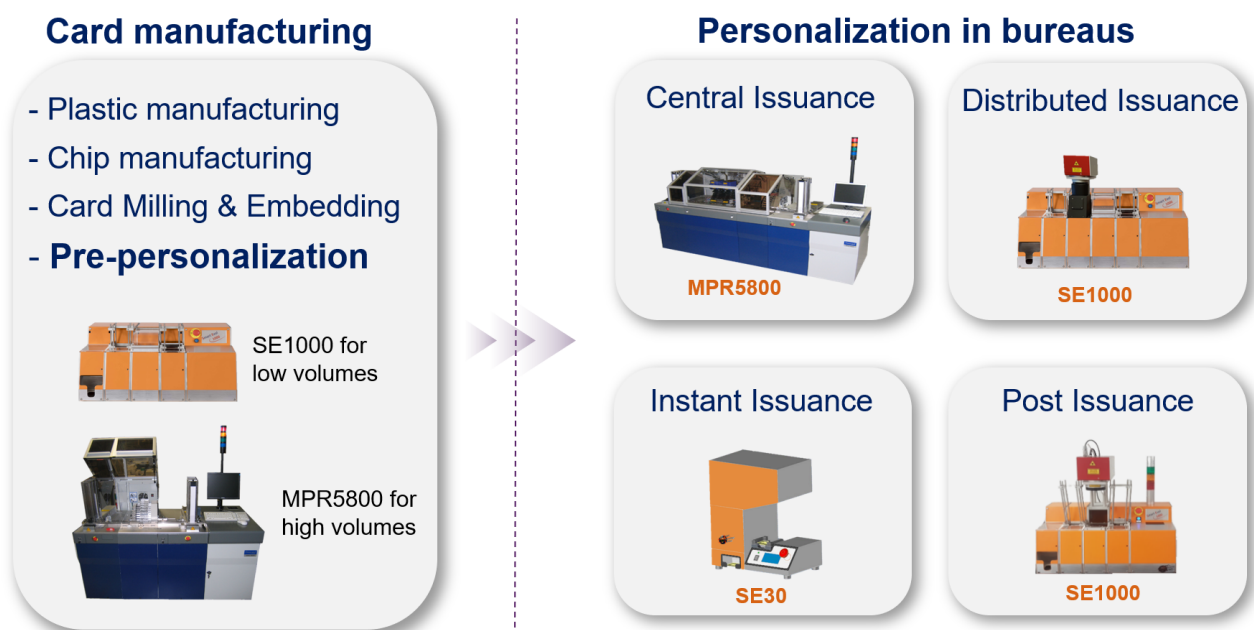
1. What is pre-personalization / card initialization ?

Pre-personalization consists in loading/creating a basic environment into the chip card prior to personalization. Pre-personalization is also called card initialization.

This step is usually required for ID and Financial cards, where the main objective is to enhance the card security and prepare it for final personalization.

Pre-personalization can also be used to load an application or several applications on the chip, depending on the project and on the card architecture.

Pre-personalization is usually part of the card manufacturing process.



Pre-personalization is mandatory for Financial cards. The « EMV Card Personalization Specification » released by EMVCo describes the pre-personalization work needed for any EMV cards.

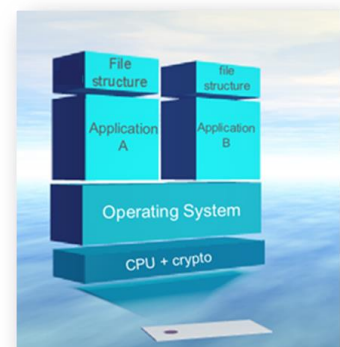
Depending on the project, pre-personalization is also used for ID cards, mainly to also increase the card security.

2. What is done during pre-personalization?

Depending on projects and type of cards, pre-personalization could consist in:

- loading applications(s) (applets)
- loading keys, loading certificates
- updating production data (« CPLC »)

In any case, data loaded and work done during pre-personalization are independant of final cardholders. Sometimes, pre-personalization also requires printing the card serial number on the card, usually using laser.



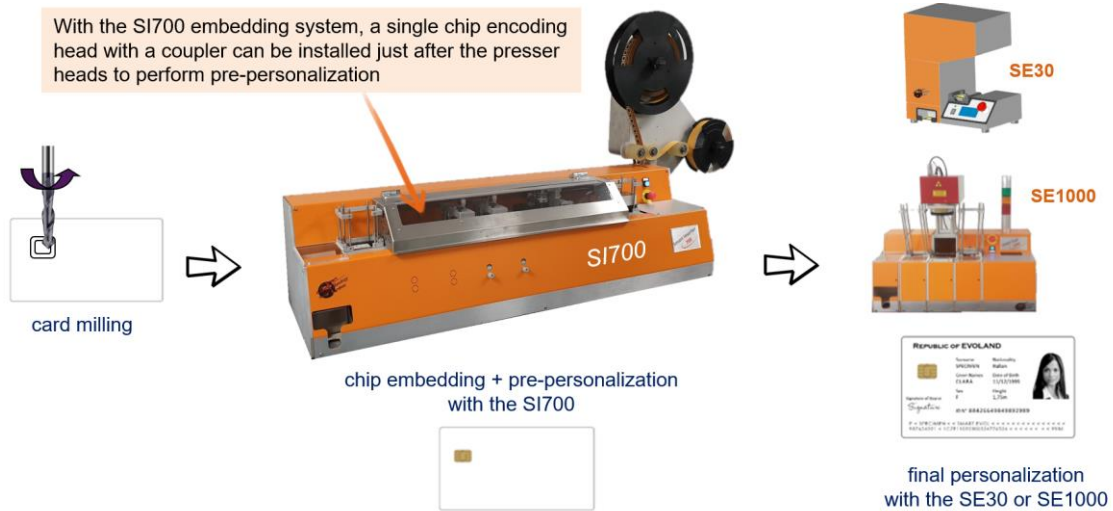
3. Where is done pre-personalization?

Pre-personalization can be done either:

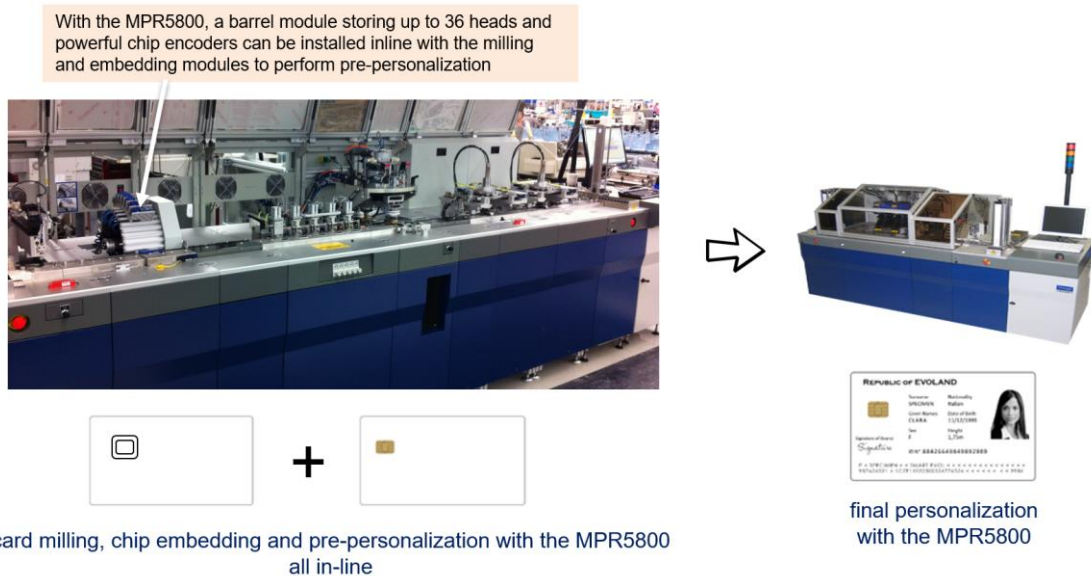
- in-line with a card embedding equipment during card manufacturing (“case 1” below), or
- with a separate equipment after card manufacturing, and before final personalization (“case 2”)

Case 1: pre-personalization is performed in-line with card embedding

For small volumes, STS offers the SI700; a desktop system able to embed chips, contact plates or fingerprint sensors on cards, and able to perform pre-personalization work just after the embedding and presser heads stations of the equipment, as below. The SI700 can run up to 700 cards/hour.



For high volumes, STS offers a second hand MPR5800 (depending on availabilities); a central issuance system able to mill cards, embed chips or contact plates, and able to perform pre-personalization work just after the embedding and presser heads stations of the equipment, as illustrated below. The MPR5800 with milling, embedding and pre-personalization – all in-line - can run up to 5,000 cards/hour. Final personalization can also be done using a MPR5800, configured for personalization only, which can run up to 9,000 cards/hour.



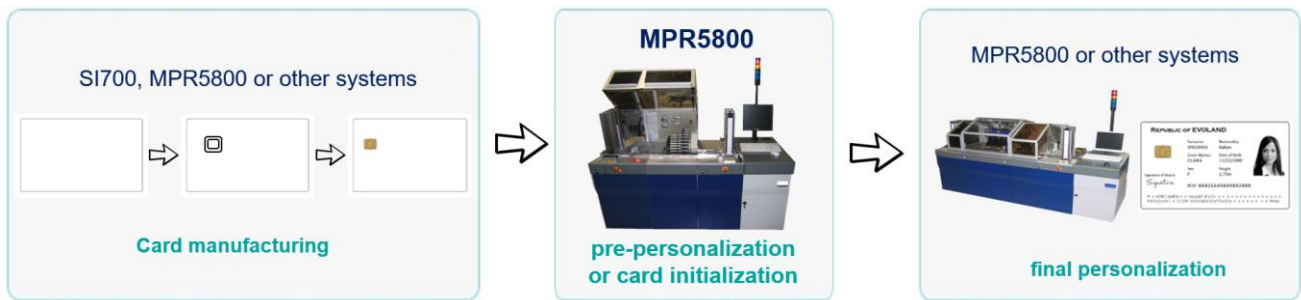
Case 2: pre-personalization is performed after card embedding on a separate equipment

In this case, pre-personalization is done on a stand alone system, which is usually configured to only support chip encoding, but can eventually also support laser printing – depending on the project requirement. For pre-personalization, laser printing is usually used to only print simple information like the card serial number or other manufacturing information.

For small volumes, STS offers the SE1000 (Smart Evol 1000), a fully modular desktop system able to personalize ID cards, Financial cards, Telecom cards and others – either contact, contactless or dual interface. The SE1000 can run up to 1000 cards/hour. It can be also configured to only support pre-personalization. Further information are provided in chapter 2 below.



For high volumes, STS offers second hand MPR5800s (depending on availabilities), a fully modular central issuance system able to personalize ID cards, Financial cards, Telecom cards and others – either contact, contactless or dual interface. The MPR5800 can run up to 9000 cards/hour. It can be also configured to only support pre-personalization. Further information are provided in chapter 3 below.



II. Proposed SE1000 for pre-personalization

The Smart Evol 1000 (SE1000) is described in the document “Smart Evol 1000 general description - May 2020.pdf”.

The proposed configuration for pre-personalization consists in the following modules:

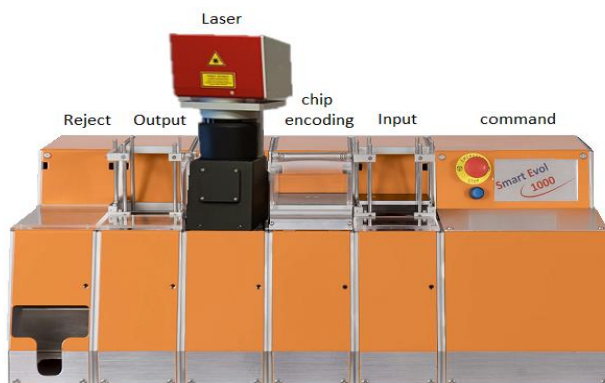
- A Command module, running under Windows 10 and including SmartGear, EvolMotion and EvolTools software
- A Card Input module able to store 250 cards
- A chip encoding module with:
 - o A single contact head, or contactless head, or dual interface head
 - o A powerful Smartware Ultrasmart V5 coupler
- An output module able to store 250 cards
- A card reject module

Global machine footprint is as follows. Total length: 600 mm



Thanks to the modularity of the SE1000, additional modules can easily be added on site such as:

- A laser module including
 - o A MPIX 3 watts, 10 watts or 20 watts laser
 - o A flipper station inside the laser chamber, allowing printing on both card side
Note: printing on both card sides impact the machine throughput.
 - o A fume extraction system if needed
- A magnetic stripe encoding module
 - o equipped with a HiCo / LoCo ISO 1, 2, and 3 magnetic stripe head
- And other modules such as vision inspection, chip testing.



The Smart Evol 1000 modules with chip and laser. Total length : 700 mm



Optional fume extraction

SE1000 card throughput

The throughput of a SE1000 configured with a chip encoding module can be calculated as follows, depending on chip encoding time:

Throughput in cards/hour = $3600 / \text{chip personalization time in seconds}$.
 With a maximum of 1,000 cards/hour.

For instance; with a chip encoding time of 10 seconds, throughput will be 360 cards/hour.

Chip encoding time also depends on the coupler used to encode the chip. The SE1000 integrates a very powerful coupler – the Smartware Ultrasmart coupler – allowing encoding chips usually faster than other couplers.

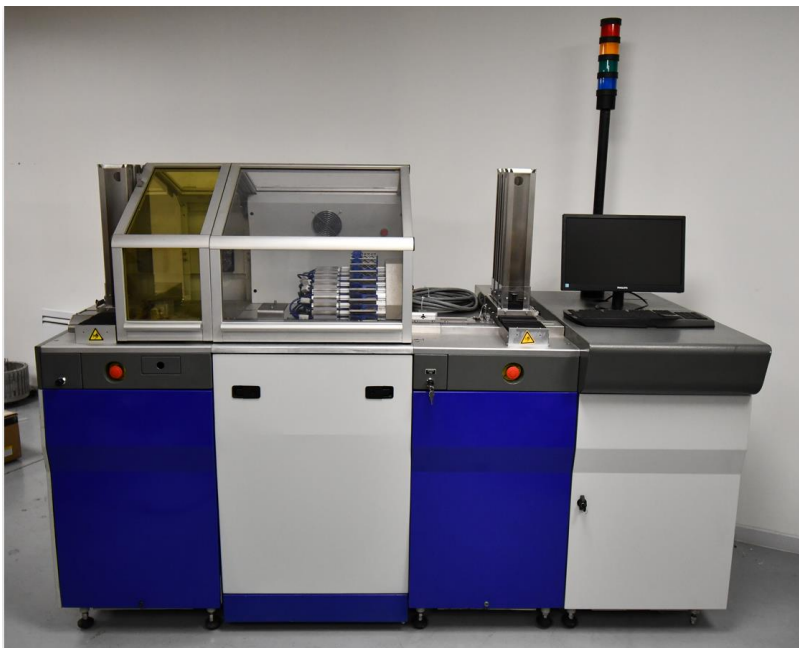
If a laser module is part of the configuration, then the SE1000 throughput also depends on the laser printing time.

III. Pre-personalization solution based on the MPR5800

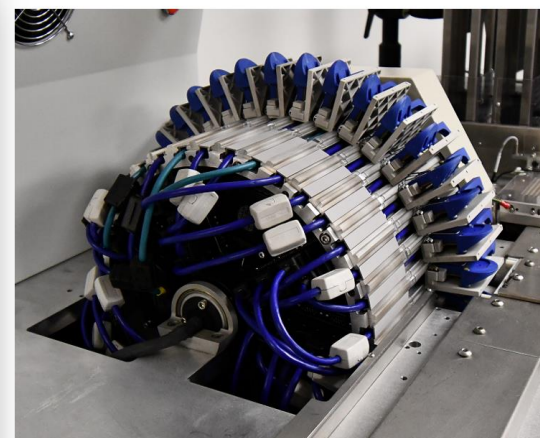
The Entrust Datacard MPR5800 is a modular system that can support card milling, card embedding and glue tape lamination, magstripe encoding, chip encoding, laser printing, vision inspection. These modules can be all in-line if needed.

A MPR5800 configured for pre-personalization with chip encoding only can run up to 9,000 cards/hour, and can store up to 36 contact heads on a barrel system. Like the SE1000, it can also support contactless heads or dual interface heads, and double contact heads for double SIM cards.

Like the SE1000, STS can offer a second hand MPR5800 configured for pre-personalization, and eventually with complementary modules like lasers, and magnetic stripe encoding.



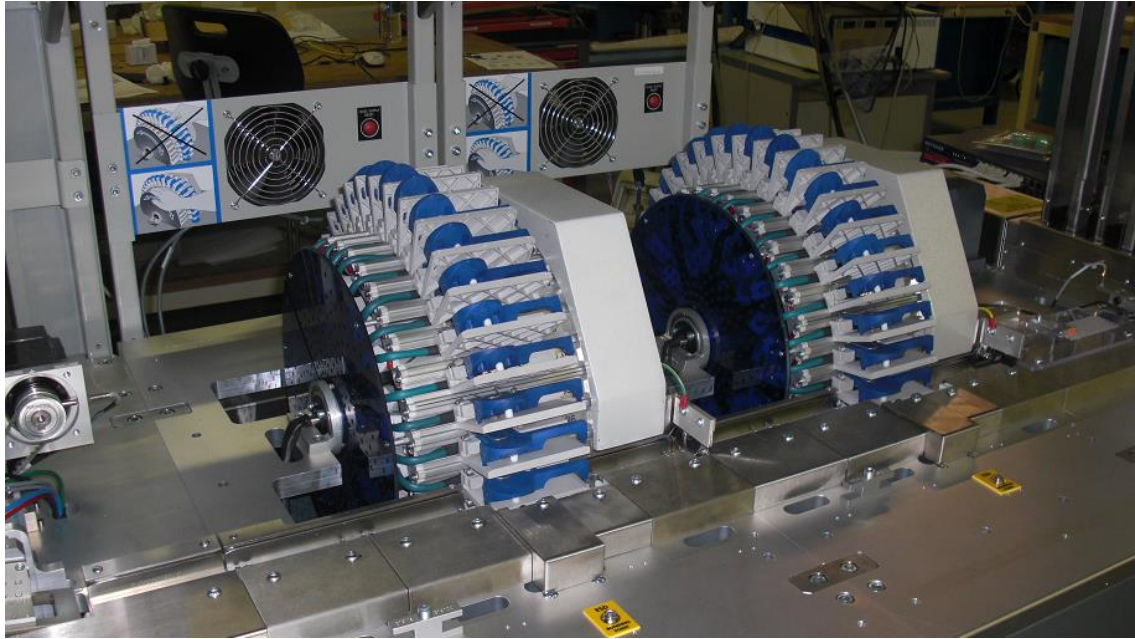
Second hand MPR5800 for pre-personalization delivered by STS



Barrel with 36 heads contact and 9 couplers. The barrel can also support up to 18 contactless heads or 18 dual interface heads

When chip encoding is very long, the MPR5800 can support 2 barrels with up to 72 heads contact, or up to 36 heads contactless, or up to 36 heads dual interface.

Each barrel can also be configured to support a mix of contact and contactless/dual interface heads.



Configuration with 2 barrels, each storing 36 heads contact

MPR5800 card throughput

The following formula can be used:

$$\textit{Throughput in cards/hour} = 3600 * \frac{\textit{(number of heads - number of barrels)}}{\textit{chip personalization time in seconds}}$$

With a maximum of 9,000 cards/hour, a maximum of 36 heads per barrel, and a maximum of 2 barrels.

For instance, with a chip personalization time of 30 seconds, a MPR5800 with 1 barrel and 36 heads will provide the following throughput: $3600 * (36-1)/30 = 4,200$ cards/hour.

With 2 barrels equipped with 36 heads each (so 72 in total), throughput would be $3600 * (72-2)/30 = 8,400$ cards/hour.

If a laser module is part of the configuration, then the SE1000 throughput also depends on the laser printing time.

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