SMART CARD PRODUCTION TECHNOLOGY

PRODUCT OVERVIEW

CONTENTS

MÜHLBAUER GROUP AT A GLANCE

MÜHLBAUER'S BUSINESS UNITS AND SITES

Founded in 1981 in the heart of Bavaria, the Mühlbauer Group has ever since grown to a leading global player in the fields of Parts & Systems, Semiconductor Related Products, Document Solution Related Products and TECURITY® Solutions. With around 3,500 employees, technology centers in Germany, Malaysia, Slovakia, the U.S.A. and Serbia and 35 sales and service locations worldwide, Mühlbauer created a strong competence network around the globe.

We continuously invest in the latest technologies and innovative processes to enhance our competences and provide you with optimized solutions. Our in-house precision part production MPS – Mühlbauer Parts & Systems – guarantees unlimited flexibility and highest customer satisfaction.

Our business unit AUTOMATION does not only develop and assemble individually customized production systems, but also provides matching software solutions for the production process of Document and Solution Related Products. Vision inspection technologies as well as semiconductor and RFID applications complete our comprehensive portfolio.

Our business unit TECURITY® is established as a competent partner for the implementation of security systems for identifying and verifying both documents and individuals. Our clients benefit from more than three decades experiential value which we have gained during the realization of over 300 ID projects worldwide.

HQ Germany

Service Hub Russia
Production Center Germany
Production Center Slovakia
Production Center Bosnia & Herzegovina
Production Center Serbia
Service Hub Spain
Service Hub Turkey
Service Hub Georgia
Service Hub Iraq
Service Hub South Korea
Service Hub Japan
Production Center China
Service Hub Taiwan
Production Center USA
Service Hub United Arab Emirates
Service Hub India
Production Center Malaysia
Service Hub Mexico
Service Hub El Salvador
Service Hub Uganda
Service Hub South Africa
Service Hub Brazil
Service Hub Australia

Mühlbauer
Bosnia & Herzegovina

Mühlbauer
China

Mühlbauer
Germany
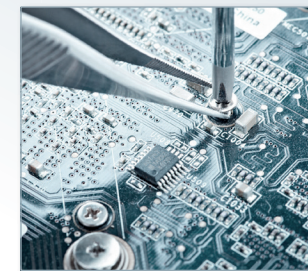
Mühlbauer
Malaysia

Mühlbauer
Serbia

Mühlbauer
Slovakia

Mühlbauer
USA

MPS
Precision Parts & Surface Engineering

AUTOMATION
Production Equipment & Systems

WORLD OF TECURITY®
Government & Technology Solutions

MANUFACTURING EXECUTION SYSTEMS

MB MCES
PERSONALIZATION MANAGEMENT

MB MCES is a personalization management software, which integrates incoming data with product definitions and controls the associated physical and electrical personalization processes. MB MCES handles personalization data from a variety of different input methods and formats.

MB INCAPE
INTEGRATED PRODUCTION MANAGEMENT SOFTWARE

MB INCAPE is Mühlbauer's Production Management Software for the production and personalization of electronic cards and documents (e.g. ID cards, ePassports, Driver's Licenses, EMV or GSM cards). Combining data management, production control and material management, the system allows for highly automated processes. It processes customer- and application-specific production, personalization, quality control and document delivery scenarios with highest solution flexibility.

MB PalaMax®
TOTAL PROCESS TRANSPARENCY

MB PalaMax®, Mühlbauer's Smart Factory solution, is developed for card, tag or booklet productions, personalization factories and semiconductor backend shop floors to set and collect process data to monitor and improve the efficiency of production and personalization for later processing, visualization and statistical analysis.

MB tool.Leader
CONNECTOR BETWEEN SYSTEMS

MB tool.Leader is a software package which consists of several applications and serves as a reliable link between the individual systems involved in the production process. By means of MB tool.Leader, the entire process chain – from the incoming order to the final precision part – can easily be monitored and controlled. This real-time machine monitoring guarantees an automated production process. Production errors can be detected and solved at an early stage. Thus, MB tool.Leader reduces the machine downtimes, which in turn leads to an increase of the machine's productivity by up to 20 percent.

FEATURES & ADVANTAGES

- Configurable workflow steps regarding personalization, quality assurance & issuance
- Fully-automated processing & production management
- Scalability regarding different documents, machines & personalization locations
- Flawless integration of Mühlbauer's material management system (MB WAREHOUSE)
- Connection to card / document management systems via web service, database, file-based interface
- Standard interface to personalization machines with integration of third-party machines possible
- Integration of MB User Management
- Full coverage of production control requirements (security industry & EMV standards)

- Seamless connection to MB PalaMax® & MB Data Preparation
- Simplified administration due to web-based operator clients
- Monitoring of real-time performance of the production
- Seamless tracking of documents from point of production to issuance
- Statistical tool analyze collected data & deliver customized statistics on OEE
- Tool which enables the remote operation of machines on the shop floor from a control centre
- Tool which increases effectiveness & efficiency so that production becomes more profitable
- Enables production engineering to prepare & test a repeatable factory set-up. Factories can switch between products within minutes.

CMT 200

CHIP MODULE TESTING SYSTEM

Designed as an open platform, the test handling system CMT 200 is suitable for the counting and testing of IC Modules. Built on a compact basis with integrated spoolers, the (reel-to-reel principle) CMT 200 can be used for input quality measurement for card manufacturers. The modules can be tested mechanically as well as electronically with 4-fold contact. Optionally, contactless modules can be tested using a 6-fold contact-based head. Identified reject modules are marked by means of reject punching.
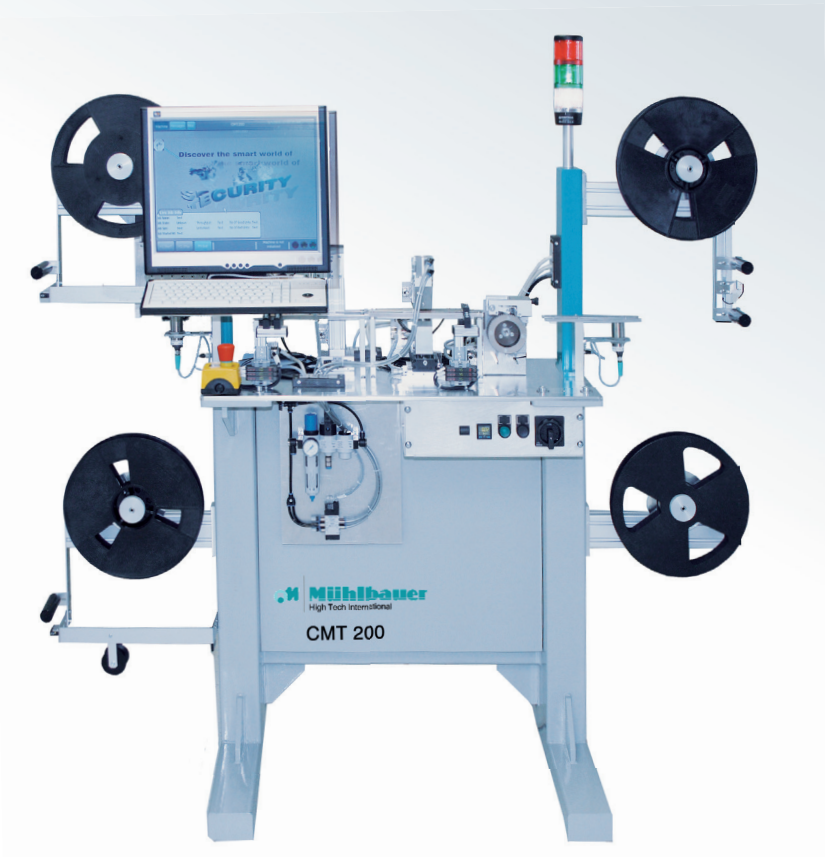
FEATURES & ADVANTAGES

KEY FEATURES

- Automatic test handler for contact & contactless IC Modules on (super) 35 mm tapes
- Easily accessible control electronics & pneumatics
- Automatic spooling systems for module tape & spacer tape
- SPS-driven operation system
- Fully automatic processing of test procedures
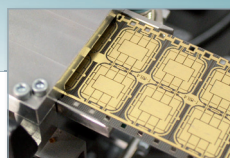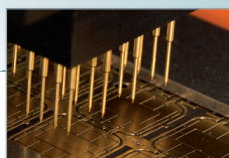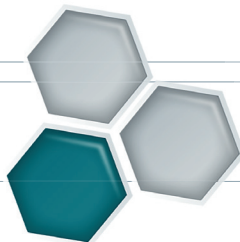- Contact & contactless test systems available
- MCES / INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Integrated spooling systems for module tape & spacer tape
- Highly flexible testing solution for various IC Module applications
- 4-fold test heads for 9.5 & 14.25 mm pitch contact IC Modules
- 6-fold test heads for 9.5 mm pitch contactless IC Modules
- Availability: up to 95%
- Yield: up to 99.7%
- Environmental conditions:
  » Room temperature: 23°C; +/-3°
  » Humidity: 50%; +/-10%

TECHNICAL DATA

- Module tape: 35 mm / super 35 mm; reel diameter: max. 500 mm
- Module pitch: 9.5; 14.25 mm
- Spacer tape: 35 mm; reel diameter: max. 500 mm
- Typical test time / ATR (ATS) test: ca. 1.0 sec
- Throughput: Contact-IC up to 11,000 UPH & Contactless-IC up to 16,000 UPH based on 1.0 sec ATR (ATS) test

KEY MODULES

Spooling unit (IC Module)

Electrical test station

Reject punching unit

UPH

Contact-IC ▼   Contactless-IC ▼

2000   4000   6000   8000   10000   12000   14000   16000
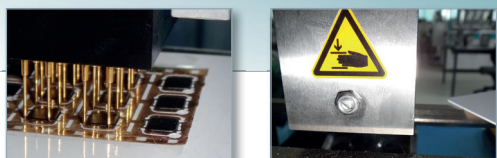
CMT 2280

CHIP MODULE PRE-PERSONALIZATION SYSTEM

The new generation of Mühlbauer's high-speed IC Module pre-personalization and initialization system CMT 2280 is designed for test / pre-personalization of Smart Card IC Modules, especially for GSM and banking applications. Integrated high-end reader technologies such as Mühlbauer's MCES (also used in card personalization equipments, smartware or micropross) guarantee the fastest personalization performance. A mechanical thickness measurement and optical quality control can optional-ly be chosen to ensure 100% good quality of the personalized modules. Faulty modules are automatically marked by the reject punch, which can move in x- and y-direction, is freely program-mable and can mark IC Modules on any position of the module tape without decreasing the throughput. The final counting of the IC Modules takes place after the whole process is finished. This enables the pre-personalization of a determined quantity of IC Modules and the generation of a total report.

FEATURES & ADVANTAGES

KEY FEATURES
- Compact & cost-efficient
- Easily accessible control electronics & pneumatics
- Automatic spooling systems for module tape & spacer tape
- Fully automatic processing of test & pre-personalization procedures
- Contact- (dual interface) & contactless interface test systems available
- User-friendly operator interface ETS
- MCES / INCAPE ready

PRODUCTIVITY / PROCESS UNITS
- Integrated spooling systems for module tape & spacer tape
- Highly flexible testing solution for various IC Module applications
- Vision module counting system
- Up to 16- or 32-fold test / encoding heads
- Programmable positioning of reject punch location in x/y
- Printer for reporting & statistics (reel report)
- Spooling systems TS 1150/I,O for IC Module tape & spacer tape
- UPS (uninterruptable power supply)
- Full performance personalization through Mühlbauer's coding system MCES
- Smartware or even micropross compatible capability
- Availability: up to 95%
- Yield: up to 99.7%
- Environmental conditions:
  » Room temperature: 23°C; +/-3°C
  » Humidity: 50%; +/-10%

TECHNICAL DATA
- Module tape: 35 mm / super 35 mm; reel diameter: max. 700 mm
- Module pitch: 9.5; 14.25 mm (others on request)
- Spacer tape: 35 mm; reel diameter: max. 500 mm
- Typical test time / ATR test: Ca. 2 sec
- Throughput: up to 34,000 UPH based on 2 sec. ATR test

CHIP MODULE TESTING

PRE-PERSONALIZATION

GLUE TAPE LAMINATION

MILLING

DUAL INTERFACE

IMPLANTING

MILLING & IMPLANTING

CHIP MODULE PUNCHING

KEY MODULES

Spooling unit (IC Module)

Pre-personalization & initialization

Reject punching unit

UPH

5000 10000 15000 20000 25000 30000 35000

CMT 6560

CHIP MODULE PRE-PERSONALIZATION SYSTEM

Mühlbauer's chip module encoding and testing system CMT 6560 is designed for counting, testing and initializing IC Modules on standard 35 mm tapes.

High-speed test handling or module counting with up to 65,000 modules per hour can be realized through the synchronization of test and pre-personalization. The testing of contact, contactless, dual interface and single or multirow modules is achieved with the best performance and yield in the market by using Mühlbauer's MCES, the same high-end reader systems such as Mühlbauer's card personalization systems. Alternatively smartware and even micropross readers are available upon request.

KEY MODULES

Spooling unit
(IC Module)

Pre-personalization
& initialization

Reject punching unit

FEATURES & ADVANTAGES

KEY FEATURES

- Most flexible & suitable for high volumes, especially for long coding procedures
- Easily accessible control electronics & pneumatics
- Automatic spooling systems for module spacer tape
- Fully automatic processing of test & pre-personalization procedures
- Contact, contactless & dual interface test systems available
- User friendly operator interface ETS
- MCES / INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Integrated spooling systems for module & spacer tape
- Highly flexible testing solution for various IC Module applications
- Vision module counting system
- 16- or 32-fold test & encoding heads
- Up to 2 test stations for 64-fold parallel tests
- With extension module EM/600 up to 128 fold parallel test
- Programmable positioning of reject punch location in x/y
- Printer for reporting & statistics (reel report)
- Spooling systems TS 1150/I,O for IC Module & spacer tape
- UPS (Uninterruptable Power Supply)
- Full performance personalization through Mühlbauer's coding system MCES
- Smartware or even micropross compatible
- Availability: up to 95%
- Yield: up to 99.7%
- Environmental conditions:
  - » Room temperature: 23°C; +/-3°C
  - » Humidity: 50%; +/-10%

TECHNICAL DATA

- Module tape: 35 mm / super 35 mm; reel diameter: max. 700 mm
- Module pitch: 9.5; 14.25 mm; others on request
- Spacer tape: 35 mm; reel diameter: max. 500 mm
- Typical test time / ATR test: ca. 2 sec
- Throughput: up to 65,000 UPH based on 2 sec., ATR test; customized throughput (optional)

CHIP MODULE TESTING

PRE-PERSONALIZATION

GLUE TAPE LAMINATION

MILLING

DUAL INTERFACE

IMPLANTING

MILLING & IMPLANTING

CHIP MODULE PUNCHING

UPH

10000   20000   30000   40000   50000   60000   70000
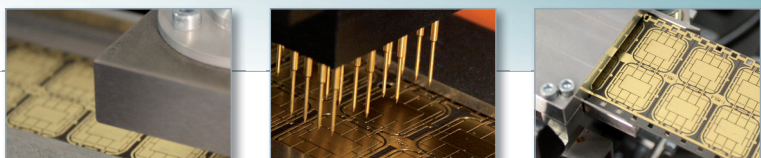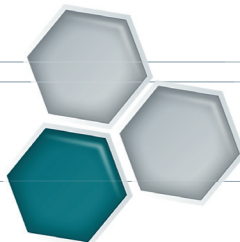
CML 201

GLUE TAPE LAMINATION SYSTEM

The CML 201 is Mühlbauer's highly reliable and efficient glue tape lamination system. A standardized set-up, produced in large lots results in a very competitive price. This machine is suitable for a wide range of IC Module tapes – standard as well as dual interface. A short product changeover and highest autonomy times lead to a great cost of ownership value. Automatic spooling units as well as easy-to-handle operation allow for a through-put of up to 9,000 modules per hour.

FEATURES & ADVANTAGES

KEY FEATURES

- Easily accessible control electronics & pneumatics
- Automatic spooling systems for module & spacer tape
- SPS-driven operation system
- Locked production cabinet
- Best process ability with heating from top & bottom for 100% bubble-free glue lamination
- Sensor & mechanically controlled tape transport guarantees accurate glue film placement
- Tool change within seconds (without removal of module tape)
- Highest automatic production time
- Best cost-of-ownership ratio

PRODUCTIVITY / PROCESS UNITS

- Integrated spooling systems for module tape, spacer tape & glue tape
- Highly flexible solution for various IC Module applications
- 4-, 6-fold lamination & glue tape punching tools
- Dual interface module tools
- Customized tool designs (optional)
- Glue tape position control vision system (optionally available)
- Availability: up to 95%
- Yield: up to 99.7%
- Environmental conditions:
  » Room temperature: 23°C; +/-3°C
  » Humidity: 50%; +/-10%

TECHNICAL DATA

- Module tape: 35 mm / super 35 mm; reel diameter: max. 500 mm
- Module pitch: 9.5; 14.25 mm
- Spacer tape: 35 mm; reel diameter: max. 500 mm
- Throughput:
  » up to 6,000 UPH (8-contact module tape)
  » up to 9,000 UPH (6-contact module tape), in case of pressing process time of 1,500 ms

KEY MODULES

- Card input
- Card output tray
- Magstripe encoding (ISO HiCo, LoCo)
- Chip encoding (contact and / or contactless)
- Retransfer print
- Card cleaning
- Card turning
- Overlay lamination
- Lamination unit (reel-to-reel for patches)

UPH

| | | 8-contact-tape ▼ | | 6-contact-tape ▼ | |
| 1500 | 3000 | 4500 | 6000 | 7500 | 9000 |

SCM 501

SMART CARD MILLING SYSTEM

Mühlbauer's Smart Card milling system SCM 501 is used for automatic milling of cavities for IC Modules in plastic cards. This system provides a very economical card milling process for small and medium sized production tasks. Flexibility and modularity are the main benefits of this system which provides a variety of options including dual interface production. Producing standard cavities, the SCM 501 can reach a throughput of up to 3,500 cards per hour.

KEY MODULES

Magazine card input	Card cleaning	Reject bin
CNC milling station	Cavity depth measurement	Magazine card output

FEATURES & ADVANTAGES

KEY FEATURES

- Fully automatic milling of cavities for IC Modules into plastic cards
- Operator-friendly, flexible & modular system design
- Scratch-free handling of card bodies due to vacuum card separation
- Graphic based milling design programming
- Highly accurate milling system with cooled spindle drive
- Excellent cavity cleaning by efficient suction system
- Fast milling tool changing & fully automatic calibration
- INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Card feeding & stacking based on Mühlbauer magazine system
- Automatic magazine changer
- Magazine handlers with magazine buffer (optional)
- Card orientation & thickness measurement system (optional)
- 1 CNC-controlled weight optimized milling system
- Patented MB Antenna Touch System (ATS) for dual interface card production (optional)
- In-line antenna quality measurement station (optional)
- Cavity cleaning station
- Cavity measurement station with in-line feedback loop
- Electrical & optical antenna pad control systems (optional)
- Reject & sampling station (up to 3 fold max., optional)
- Availability: up to 95%
- Yield: up to 99.5%

TECHNICAL DATA

- Card types: ID-1 cards; PC, PVC, ABS, PET; other materials on request
- CNC milling heads: 1
- Programmable milling axis: 3 (x-, y-, z-axis)
- Dynamic drive accuracy: x- / y-axis: +/- 15 μm, z-axis: +/- 10 μm
- Measurement system accuracy: +/- 2.5 μm
- Throughput: up to 3,500 UPH; depending on cavity design & material

UPH

500   1000   1500   2000   2500   3000   3500
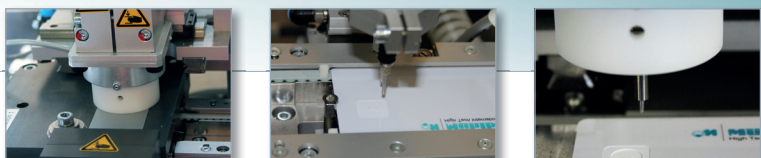
SCM 5001

SMART CARD MILLING SYSTEM

The Smart Card milling system SCM 5001 is used for automatic milling of cavities for IC Modules in plastic cards. The system is perfectly suitable for all contact cards, dual interface cards and multi-SIM cards. It features a highly economical card milling process for medium to large production tasks. Flexibility and modularity are main benefits of this system which provides a variety of options, including dual interface production. With a standard milling configuration, the SCM 5001 reaches a throughput of up to 5,000 cards per hour.

KEY MODULES
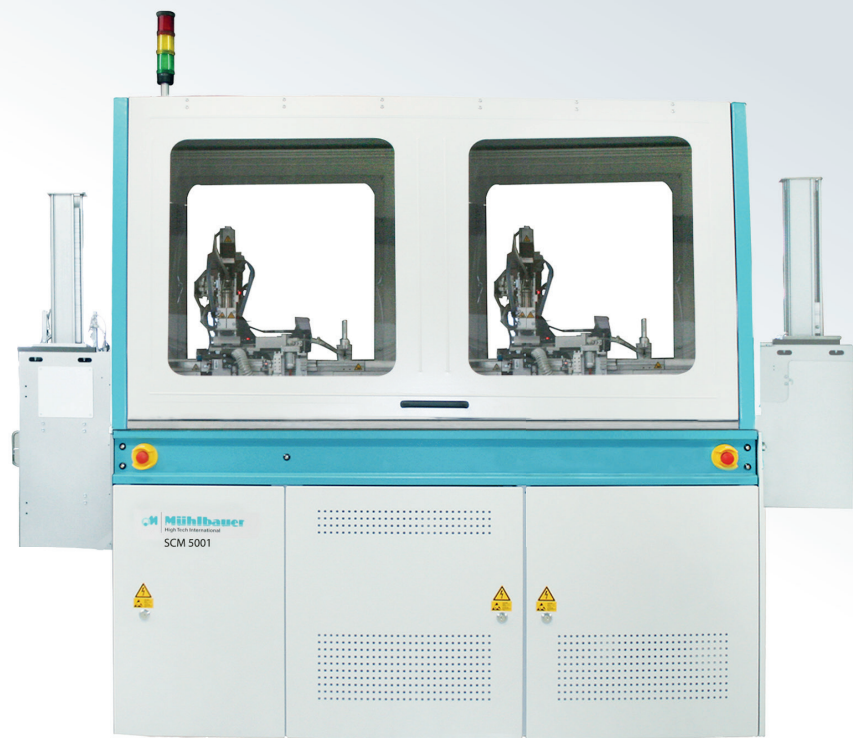
Magazine card input

CNC milling station

2x cleaning modules

2x cavity depth measurement

Reject bin

Magazine card output

FEATURES & ADVANTAGES

KEY FEATURES

- Fully automatic milling of cavities for IC Modules into plastic cards
- Best accuracy, process ability & flexibility due to 2 independent milling stations (6 axis)
- Operator-friendly, flexible & modular system design
- Scratch-free handling of card bodies due to vacuum card separation
- Graphical based milling design programming
- High accurate milling system with cooling spindle drive
- Excellent cavity cleaning by efficient suction system
- Fast milling tool changing & fully automatic calibration
- INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Card feeding & stacking based on the Mühlbauer magazine system
- Automatic magazine changer
- Magazine handlers with magazine buffer (optional) – close to 1 hour system autonomy
- Card orientation & thickness measurement system (optional)
- 2 CNC-controlled independent milling systems
- Patented MB Antenna Touch System (ATS) for dual interface card production (optional)
- In-line antenna quality measurement station (optional)
- 2 cavity cleaning stations
- 2 cavity measurement stations with in-line feedback loop
- Electrical & optical antenna pad control systems (optional)
- Reject & sampling station (up to 3 fold max., optional)
- Availability: up to 95%
- Yield: up to 99.5%

TECHNICAL DATA

- Card types: ID-1 cards; PC, PVC, ABS, PET; other materials on request
- CNC milling heads: 2
- Programmable milling axis: 3 (x-, y-, z-axis)
- Dynamic drive accuracy: x- / y-axis: +/- 15 μm, z-axis: +/- 10 μm
- Measurement system accuracy: +/- 2.5 μm
- Throughput: up to 5,000 UPH; depending on cavity design & material

UPH

1000   2000   3000   4000   5000   6000

MFB 2500

SYSTEM FOR DUAL INTERFACE CARD PRODUCTION

Mühlbauer's Flexible Bump technology offers a well-proven system that guarantees an absolutely secure connection between chip and antenna for dual interface cards. The unique and patented Flexible Bump process ensures electrical connection even when the card is intensively used.

The latest generation of Mühlbauer's MFB 2500 offers even more state-of-the-art ingenuity and the flexibility to be integrated into existing production lines without any additional upgrades. The MFB 2500 combines the unique antenna touch milling technology and the Flexible Bump process in one system. It offers the lowest costs per card, especially for high production volumes with a throughput of up to 2,500 cards per hour. Thanks to a vision system as well as the possibility of re-working, this system guarantees 100% good cards and a maximized yield.

FEATURES & ADVANTAGES

KEY FEATURES

- Fully automatic preparation of dual interface card bodies with the patented MB Flexible Bump technology
  » Highly reliable with a long life connection of DI-IC Module with antenna in the card body
  » Test certificates for Flexible Bump process by independent test laboratories
  » International references in banking & ID for almost 15 years
- Automatic milling of antenna connection pads with the patented MB Antenna Touch System (ATS)
- Graphical based dosing design programming
- Automatic in-line quality control ensuring highest yield & quality
- The Mühlbauer dual interface process – Flexible Bump:
- INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Card feeding & stacking based on the Mühlbauer magazine system
- Magazine handlers with magazine buffer for high system autonomy (optional)
- Input cavity detection (optional)
- Antenna resistance measurement station (optional)
- NC-controlled milling system with patented ATS for dual interface card production
- Vision system for antenna pad control (optional)
- Up to 2 highly accurate Flexible Bump dosing systems
- In-line quality control of Flexible Bump
- Reject & sampling station (up to 3 fold max., optional)
- Availability: up to 95%
- Yield: up to 99.5%

TECHNICAL DATA

- Card types: ID-1 cards; PC, PVC, ABS, PET; other materials on request
- NC milling head optional: 1
- CNC dosing heads: up to 2
- Programmable milling / dosing axis: 3 (x-, y-, z-axis), x- / y-axis: +/- 15 μm, z-axis: +/- 10 μm
- Measurement system accuracy: +/- 2.5 μm
- Throughput: up to 2,500 UPH; depending on cavity design / materials & 2 dosing heads

KEY MODULES

- Magazine card input
- Cavity check
- CNC milling station with automatic antenna detection system
- Electrical test station (antenna resistance)
- Flexible Bump dispensing station
- Vision inspection (bump size & position inspection)
- Pre-curing station
- Magazine card output
- Sample box
- Vision inspection (bump height)

UPH
500   1000   1500   2000   2500   3000

CMFB 2500

ADVANCED SYSTEM FOR DUAL INTERFACE CARD PRODUCTION

Mühlbauer's CMFB 2500 combines the superior and economic Mühlbauer cavity milling system with the patented ATS milling and Flexible Bump application technology in one manufacturing step. Highest accuracy and proven Mühlbauer technology ensure an efficient and high-quality production of dual interface cards. An output of 100% flawless cards is guaranteed by integrated measurement systems of the cavity depth and antenna resistance, as well as optional features such as thickness measurements and orientation checks of cards. With a number of optional upgrades, the CMFB 2500 adjusts flexibly to any requirements, thus achieving a throughput of up to 2,500 cards per hour.

KEY MODULES

Magazine card input

Card orientation check

CNC milling station for cavity milling

Cleaning station

Cavity depth measurement

Milling station for ATS milling

Antenna resistance measurement

Flexible Bump dispensing station

Vision inspection (bump height)

Vision inspection (bump size & position inspection)

Pre-curing station

Magazine card output

Reject box

FEATURES & ADVANTAGES

KEY FEATURES

- Fully automatic preparation of dual interface card bodies with the patented MB Flexible Bump technology
  - » Highly reliable with a long life connection of DI-IC Module with antenna in the card body
  - » Test certificates for Flexible Bump process by independent test laboratories
  - » International references in banking & ID for almost 15 years
- Automatic milling of module cavity & antenna connection pads with the patented MB Antenna Touch System (ATS)
- Graphical based milling & dosing design programming
- Automatic in-line quality control ensuring highest yield & quality
- INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Card feeding & stacking based on the Mühlbauer magazine system
- Magazine handlers with magazine buffer for high system autonomy (optional)
- Antenna resistance measurement station (optional)
- 1 CNC-controlled milling system
- 1 NC-controlled milling system with patented MB Antenna Touch System (ATS)
- Vision system for antenna pad control (optional)
- Up to 2 highly accurate Flexible Bump dosing systems
- In-line quality control of Flexible Bump
- Availability: up to 95%
- Yield: up to 99.5%

TECHNICAL DATA

- Card types: ID-1 cards; PC, PVC, ABS, PET; other materials on request
- NC milling head: 1
- CNC milling head: 1
- CNC dosing heads: up to 2
- Programmable milling / dosing axis: 3 (x-, y-, z-axis)
- Dynamic drive accuracy: x- / y-axis: $+/- 15\,\mu m$, z-axis: $+/- 10\,\mu m$
- Measurement system accuracy: $+/- 2.5\,\mu m$
- Throughput: up to 2,500 UPH; depending on cavity design / materials & 2 dosing heads

CHIP MODULE TESTING

PRE-PERSONALIZATION

GLUE TAPE LAMINATION

MILLING

DUAL INTERFACE

IMPLANTING

MILLING & IMPLANTING

CHIP MODULE PUNCHING

UPH   1 dispensing Station ▼   2 dispensing Station ▼

500   1000   1500   2000   2500   3000

DICL 5000

DUAL INTERFACE CARD LINE

DICL 5000 is an effective in-line production system for long-life dual interface cards, as well as standard ID-1 Smart Cards. The system is designed for large production tasks and provides an economic and flexible design that guarantees extremely high accuracy. It excels in providing the highest yield with a through-put of up to 5,000 cards per hour. The DICL 5000 provides the continuously proven Mühlbauer technology and quality, which is known in the Smart Card business for decades.

FEATURES & ADVANTAGES

KEY FEATURES

- Compact system for in-line production of dual interface cards
- MB TeConnect® technology, developed for longest life time & easy handling
- Equipment also suitable for milling & implanting of standard contact cards
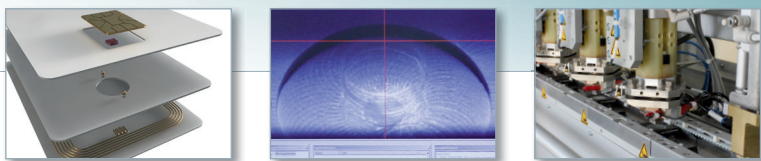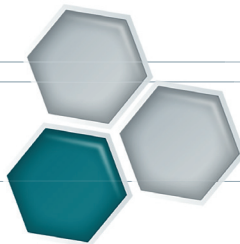- Operator-friendly, flexible & modular system design

PRODUCTIVITY / PROCESS UNITS

- Card feeding & stacking based on Mühlbauer magazine system
- 2 independent CNC-controlled milling systems (6 axis)
- Patented MB Antenna Touch System (ATS) for dual interface card production
- Additional cleaning station for highest process stability
- Cavity depth measurement with closed loop feedback to milling head
- Quality check of antenna pad by electrical resistance measurement and / or optical inspection
- Unique loop-back functionality keeps the volume of the glue stable
- Double dosing unit for MB TeConnect® solder paste or customized glue (optional)
- Optical inspection of bump height, position & size
- IC module tape feeding high precision punching system with reject handling
- Pick & place system with position & force controlled z-axis to avoid damaged chips
- Up to 4 hot press stations possible
- IC Module inspection by vision system (optional)
- Electrical test of contact (ATR) and / or contactless (ATS) cards
- 100% resonance frequency measurement for dual interface or hybrid cards (optional)
- In-line multi encoding system for pre-personalization & initialization with up to 6 coding heads

TECHNICAL DATA

- IC Modules: 35 mm / super 35 mm tapes; 9.5 / 14.25 mm pitch
- Card types: ID-1 cards from PC, PVC, ABS, PET; other materials on request
- CNC milling heads: 2
- Programmable milling axis: 3 (x-, y-, z-axis)
- Dynamic drive accuracy: x- / y-axis: $\pm$ 15 μm, z-axis: $\pm$ 10 μm
- Measurement system accuracy: $\pm$ 2.5 μm
- Implanting accuracy: X, Y = $\pm$ 30 μm
- Implanting pressure / temperature: up to 200 N / up to 300 °C
- Throughput: up to 5,000 UPH (standard Smart Cards), up to 2,200 UPH (dual interface cards with TeConnect®)
- Availability: up to 95%
- Yield: up to 98%

KEY MODULES

- Magazine card input
- 2x CNC milling station
- Patented Antenna Touch System (ATS)
- 2x cleaning module
- 2x cavity depth measurement
- Antenna resistance measurement

- Dosing station for solder bump
- Optical inspection of solder bump
- Implanting station
- 3x hot press
- Cold press & module height measurement
- Optical module inspection

- Electrical test station contact
- Electrical test station contactless
- Resonance frequency measurement
- Magazine card output
- Reject box

CHIP MODULE TESTING

PRE-PERSONALIZATION

GLUE TAPE LAMINATION

MILLING

DUAL INTERFACE

IMPLANTING

MILLING & IMPLANTING

CHIP MODULE PUNCHING

UPH   dual interface ▼   standard ▼

1000   2000   3000   4000   5000   6000

SCI 202

SMART CARD IMPLANTING SYSTEM

Mühlbauer's SCI 202 is a cost-efficient IC Module implanting system for ID-1 Smart Cards. The system is designed for start-up and medium-size production tasks. It offers minimum footprint, an economic but flexible design, as well as extremely high accuracy. It excels with an outstanding uptime providing the highest yield at a throughput of up to 3,500 cards per hour.

FEATURES & ADVANTAGES

KEY FEATURES

- Fully automatic implanting of IC Modules into plastic cards
- Suitable for contact & dual interface card production
- Operator-friendly, flexible & modular system design
- Scratch-free handling of card bodies due to vacuum card separation
- Operator-friendly & fast tool changing
- In-house tool manufacturing & customizing
- INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Card feeding & stacking based on Mühlbauer magazine system
- Cavity detection
- Automatic card & IC Module tape transport & indexing system
- Up to 2 hot press units
- 1 cold press unit with integrated module height difference measurement
- IC Module inspection by vision system (optional)
- Electrical contact station for IC Module check after implanting (ATR)
- Contactless test for dual interface or hybrid cards (optional)
- Resonance frequency measurement for dual interface or hybrid cards (optional)
- Optional multi encoding system up to 6 stations for pre-personalization & initialization
- Customized system extension (optional)
- Reject & sampling station (up to 2 fold max., optional)
- Availability: up to 95%
- Yield: up to 99.7%

TECHNICAL DATA

- IC Modules: u35 mm / super 35 mm tapes; 9.5 / 14.25 mm pitch
- Card types: ID-1 cards; PC, PVC, ABS, PET; other materials on request
- Implanting accuracy: x, y = +/- 30 μm
- Implanting pressure / temperature: up to 200 N / up to 300°C
- Throughput: up to 3,500 UPH; depending on material

KEY MODULES

- Magazine card input
- Implanting station
- Hot press
- Cold press
- Electrical test station
- Reject bin
- Magazine card output

CHIP MODULE TESTING

PRE-PERSONALIZATION

GLUE TAPE LAMINATION

MILLING

DUAL INTERFACE

IMPLANTING

MILLING & IMPLANTING

CHIP MODULE PUNCHING

UPH

500   1000   1500   2000   2500   3000   3500
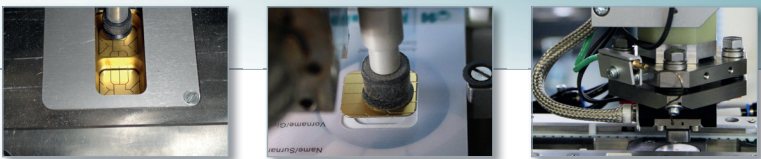
SCI 5001

SMART CARD IMPLANTING SYSTEM

Mühlbauer's SCI 5001 is a high-speed IC Module implanting system for ID-1 Smart Cards. The system is designed for medium to large-sized production tasks.

With its economical implanting process, flexible design and extremely high accuracy the SCI 5001 guarantees an outstanding uptime providing the highest yield with a throughput of up to 5,000 cards per hour.

KEY MODULES

- Magazine card input
- Implanting station
- 3x hot press
- Cold press
- Electrical test station
- Reject bin
- Magazine card output

FEATURES & ADVANTAGES

KEY FEATURES

- Fully automatic implanting of IC Modules into plastic cards
- Suitable for contact & dual interface card production
- Operator-friendly, flexible & modular system design
- Up to 4 hot press stations for maximum speed
- Scratch-free handling of card bodies due to vacuum card separation
- Operator-friendly & fast tool changing
- In-house tool manufacturing & customizing
- INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Card feeding & stacking based on the Mühlbauer magazine system
- Magazine buffer for high system autonomy (optional)
- Fully automatic card & IC Module tape transport & indexing system
- Up to 4 hot press units
- 1 cold press unit with integrated module height difference measurement
- IC Module inspection by vision system (optional)
- Electrical contact station for IC Module check after implanting (ATR)
- Contactless test for dual interface or hybrid cards (optional)
- Resonance frequency measurement for dual interface or hybrid cards (optional)
- Multi-encoding system: up to 6 stations for pre-personalization & initialization
- Customized system extension (optional)
- Reject & sampling station (up to 3 fold max., optional)
- Availability: up to 95%
- Yield: up to 99.7%

TECHNICAL DATA

- IC Modules: 35 mm / super 35 mm tapes; 9.5 / 14.25 mm pitch
- Card types: ID-1 cards; PC, PVC, ABS, PET; other materials (optional)
- Implanting accuracy: x, y = +/- 30 μm
- Implanting pressure / temperature: up to 200 N / up to 300°C
- Throughput: up to 5,000 UPH; depending on material

UPH

| 1000 | 2000 | 3000 | 4000 | 5000 | 6000 |
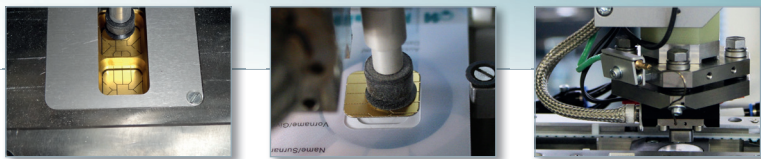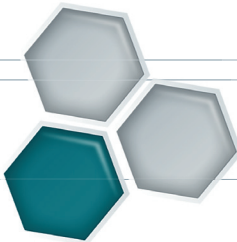
CMI 202

COMBINED MILLING & IMPLANTING SYSTEM FOR MEDIUM VOLUMES

Mühlbauer's CMI 202 is a combined milling and implanting system for standard ID-1 Smart Card applications. The system is designed for small to medium-sized production tasks, offering a minimum footprint and economic, yet flexible design with extremely high accuracy.

Customers benefit from an excellent uptime, providing a very high yield with a throughput of up to 3,500 cards per hour. The CMI 202 provides all the proven Mühlbauer technology and quality, which is known in the Smart Card business for decades.

KEY MODULES

- Magazine card input
- CNC milling station
- Cleaning
- Depth measurement
- Implanting station
- Hot press
- Cold press
- Electrical test station
- Reject bin
- Magazine card output

FEATURES & ADVANTAGES

KEY FEATURES

- Fully automatic cavity milling & implanting of IC Modules into plastic cards
- Graphical based milling design programming
- Highly accurate milling system with cooling spindle drive
- Fast tool changing
- In-house tool manufacturing & customizing
- Operator-friendly, flexible & modular system design
- MCES / INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Card feeding & stacking based on Mühlbauer magazine system
- Card orientation & thickness measurement system (optional)
- Fully automatic card & IC Module tape transport & indexing system
- CNC-controlled milling system
- Cavity cleaning measurement station with in-line feedback loop
- Up to 2 hot press stations
- IC Module inspection by vision system (optional)
- Electrical contact station for IC Module check after implanting (ATR)
- Contactless test for dual interface or hybrid cards (optional)
- Resonance frequency measurement for dual interface or hybrid cards (optional)
- Optional Multi encoding system up to 6 stations for pre-personalization & initialization
- Availability: up to 95%
- Yield: up to 99.7%

TECHNICAL DATA

- IC Modules: 35 mm / super 35 mm tapes; 9.5 / 14.25 mm pitch
- Card types: ID-1 cards; PC, PVC, ABS, PET; other materials (optional)
- CNC milling heads: 1
- Programmable milling axis: 3 (x-, y-, z-axis)
- Dynamic drive accuracy: x- / y-axis: +/- 15 μm, z-axis: +/- 10 μm
- Measurement system accuracy: +/- 2.5 μm
- Implanting accuracy: x, y = +/- 30 μm
- Implanting pressure / temperature: up to 200 N / up to 300°C
- Throughput: up to 3,500 UPH; depending on material

CHIP MODULE TESTING

PRE-PERSONALIZATION

GLUE TAPE LAMINATION

MILLING

DUAL INTERFACE
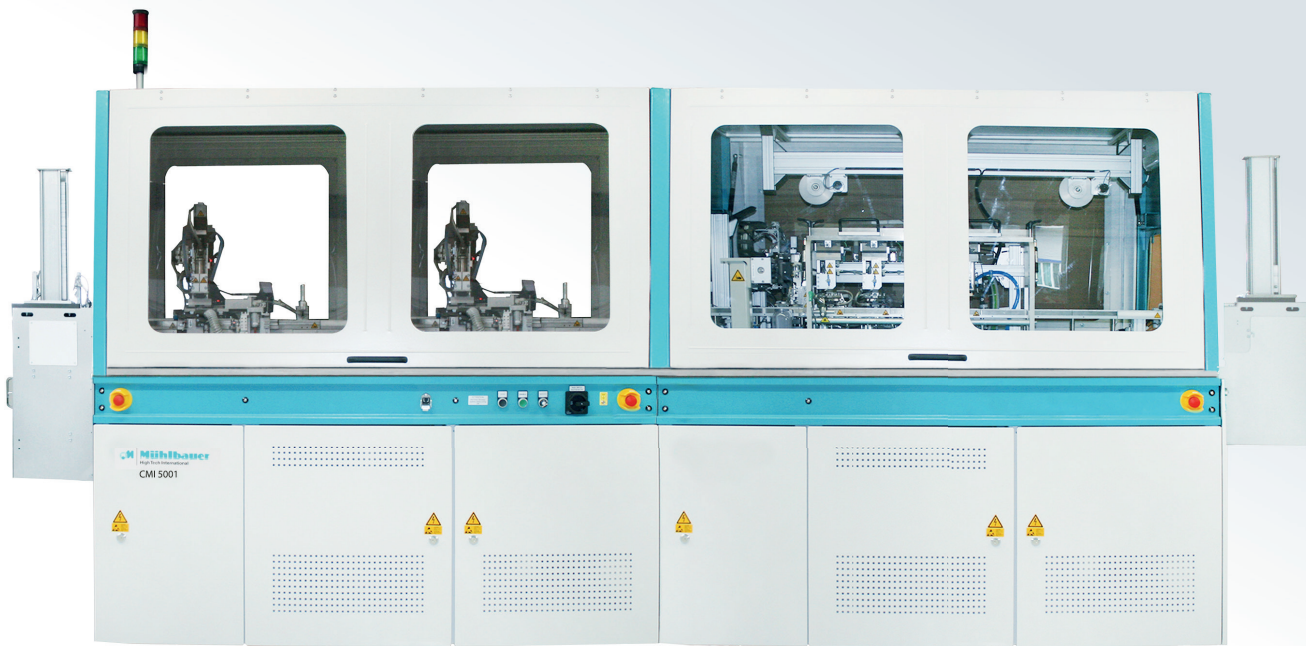
IMPLANTING

MILLING & IMPLANTING

CHIP MODULE PUNCHING

UPH

500   1000   1500   2000   2500   3000   3500

CMI 5001

COMBINED MILLING & IMPLANTING SYSTEM FOR HIGH VOLUMES

Mühlbauer's CMI 5001 is an efficiently combined milling and implanting system for standard ID-1 Smart Card applications. The system is designed for large-sized production tasks offering an economic, yet flexible design with extremely high accuracy.

It excels at providing the highest yield with a throughput of up to 5,000 cards per hour. The CMI 5001 provides the continuously proven Mühlbauer technology and quality, which is known in the Smart Card business for decades.

KEY MODULES

- Magazine card input
- 2x CNC milling station
- 2x cleaning module
- 2x cavity depth measurement
- Implanting station
- 3x hot press
- Cold press
- Electrical test station
- Reject bin
- Magazine card output

FEATURES & ADVANTAGES

KEY FEATURES

- Fully automatic cavity milling & implanting of IC Modules into plastic cards
- Suitable for contact & dual interface card production
- Operator-friendly, flexible & modular system design
- MCES / INCAPE ready

PRODUCTIVITY / PROCESS UNITS

- Card feeding & stacking based on Mühlbauer magazine system
- Magazine handlers with magazine buffer (optional)
- Card orientation & card thickness measurement system (optional)
- Fully automatic card & IC Module tape transport & indexing system
- 2 independent CNC-controlled milling systems (6 axis)
- Patented MB Antenna Touch System (ATS) for dual interface card production (optional)
- Up to 4 hot press stations (optional)
- IC Module inspection by vision system (optional)
- Electrical contact station for IC Module check after implanting (ATR)
- Contactless test for dual interface or hybrid cards (optional)
- Resonance frequency measurement for dual interface or hybrid cards (optional)
- Multi encoding system up to 6 stations for pre-personalization & initialization (optional)
- Customized system extension (optional)
- Reject & sampling station (up to 3 fold max., optional)
- Availability: up to 95%
- Yield: up to 99.7%

TECHNICAL DATA

- IC Modules: 35 mm / super 35 mm tapes; 9.5 / 14.25 mm pitch
- Card types: ID-1 cards; PC, PVC, ABS, PET; other materials on request
- CNC milling heads:2
- Programmable milling axis: 3 (x-, y-, z-axis)
- Dynamic drive accuracy: x- / y-axis: $+/- 15\,\mu m$, z-axis: $+/- 10\,\mu m$
- Measurement system accuracy: $+/- 2.5\,\mu m$
- Implanting accuracy: x, y $= +/- 30\,\mu m$
- Implanting pressure / temperature: up to 200 N / up to 300°C
- Throughput: up to 5,000 UPH; depending on material

CHIP MODULE TESTING

PRE-PERSONALIZATION

GLUE TAPE LAMINATION

MILLING

DUAL INTERFACE

IMPLANTING

MILLING & IMPLANTING

CHIP MODULE PUNCHING

UPH

| 1000 | 2000 | 3000 | 4000 | 5000 | 6000 |

CMP 2000/M

SEMI-AUTOMATIC CHIP MODULE PUNCHING SYSTEM

Mühlbauer's manual table top chip module punching system CMP 2000/M is designed for punching and cutting of SIM cards in compliance with ISO standards. ID-1 cards are manually placed under the punching respectively cutting unit. Then the hydro-pneumatic punching process is activated by a foot switch. The combined tool simultaneously punches and cuts the SIM format (ID-000) which is then ready to be pushed out of the ID-1 card. The throughput per hour depends on the operator.

FEATURES & ADVANTAGES

KEY FEATURES

- Semi-automatic system for punching & pre-cutting of:
  - » GSM plugs in formats 2FF, 3FF, 4FF
  - » Mini Visa
  - » DUAL-SIM
  - » Customized shapes
- 1 punching / cutting unit
- Manual card handling
- Operator-friendly
- In-house tool manufacturing and customizing
- Quick tool change
- Customized punching die

PRODUCTIVITY / PROCESS UNITS

- Punch cycle is started with foot switch
- Hydro-pneumatic punch drive

TECHNICAL DATA

- Card types: ID-1 cards; PVC, ABS, PET; other materials on request
- Punching / cutting system : Hydro-pneumatic
- Punching speed: Manually adjustable
- Punching / cutting force: Max. 31 KN
- Punching accuracy: +/- 0.1 mm
- Punching / cutting geometry: 2FF, 3FF, 4FF; special shapes on request
- Throughput: up to 2,000 UPH

KEY MODULES

GSM punching tool

GSM cutting tool

Waste box

UPH

500   1000   1500   2000   2500   3000

CMP 2020

FULLY AUTOMATIC CHIP MODULE PUNCHING SYSTEM

Mühlbauer's CMP 2020 is designed for the pre-cutting and punching of GSM Cards (SIM Cards) or other shapes out of an ID-1 plastic card according to ISO standards or individual customer requirements. The new replug technology offers highest flexibility for different configurations of the tools. The CMP 2020 can be set up with up to 3 punching tools which make the system the ideal equipment to punch half-cut SIM, Mini SIM, Mini Visa and paper GSM cards in one run. The cards are handled from magazine to magazine. A pick-and-place system automatically feeds the incoming cards to the punching and pre-cutting stations. An optional vision system checks the punch position and the complete removal of waste.

FEATURES & ADVANTAGES

KEY FEATURES
- Fully automatic system for punching & pre-cutting of:
  - » GSM plugs in format 2FF, 3FF, 4FF
  - » Mini Visa
  - » DUAL-SIM incl. half-cut
  - » Customized shapes
- New MB replug tool generation for punching of multiple DUAL-SIM or all SIM sizes of one card in one step
- Up to 3 independent punching / cutting units
- Single- & DUAL-SIM handling
- Operator-friendly, flexible & modular system design
- In-house tool manufacturing & customizing
- INCAPE ready

PRODUCTIVITY / PROCESS UNITS
- Card feeding & stacking based on Mühlbauer magazine system
- Magazine handler with magazine buffer for high system autonomy (optional)
- Up to 3 punching / pre-cutting stations
- Card orientation & card thickness measurement system (optional)
- Inspection system for punching quality control (optional)
- Reject & sampling station (up to 3 fold max., optional)
- Availability: up to 95%
- Yield: up to 99.7%

TECHNICAL DATA
- Card types: ID-1 cards; PVC, ABS, PET, paper; other materials on request
- Punching system: Hydraulic driven
- Pre-cutting system: Hydraulic driven
- Punching speed: Adjustable
- Punching / cutting force: 23,5 kN
- Punching accuracy: +/- 0.1 mm
- Punching / cutting geometry: 2FF, 3FF, 4FF; special shapes on request
- Throughput:
  - » SINGLE-SIM: up to 5,000 UPH;
  - » DUAL-SIM: up to 7,000 UPH; depending on material
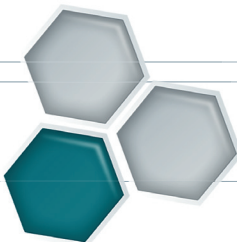
CHIP MODULE TESTING
PRE-PERSONALIZATION
GLUE TAPE LAMINATION
MILLING
DUAL INTERFACE
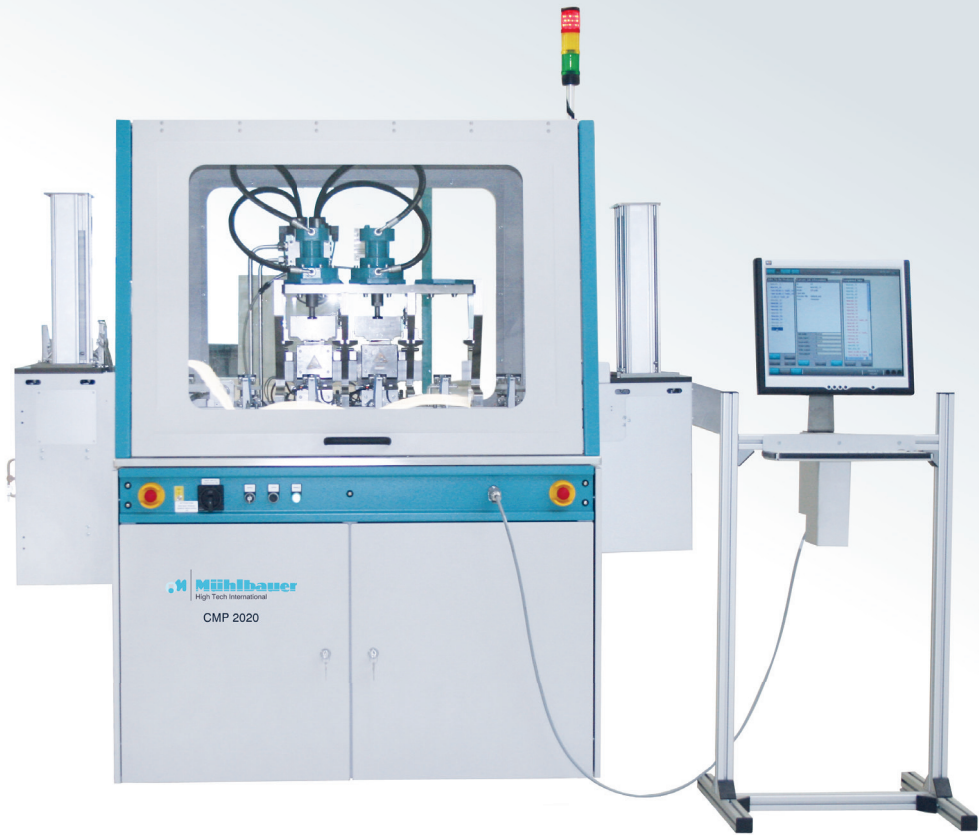IMPLANTING
MILLING & IMPLANTING
CHIP MODULE PUNCHING

KEY MODULES

- Magazine card input
- GSM punching tool
- GSM cutting tool
- 3rd punching / stamping tool (optional)
- Vision system (optional)
- Reject box
- Card output

UPH

| | SINGLE SIM ▼ | | DUAL SIM ▼ |

1000 2000 3000 4000 5000 6000 7000

QUALITY ASSURANCE

TESTING EQUIPMENT

CARD BODY TESTING EQUIPMENT

CSG 100 / 200
Card size gauge

CTG 100 / 200
Card thickness / cavity depth gauge

DLT 500
Peel force tester

SMART CARD TESTING EQUIPMENT

SCF 2300
Flexion test system

TWT 2500
Three wheel testing system

SCT 2400
Torsion test system

MAT 1230
Module adhesion testing system

CARD PERSONALIZATION TESTING EQUIPMENT

MEASURING MICROSCOPE
Measuring of embossing distances

COLOR DENSITOMETER
Measuring of color density

UV-LIGHT CABINET
Inspection of various printing processes

PRODUCT PORTFOLIO

YOUR ONE-STOP-SHOP TECHNOLOGY PARTNER

AUTOMATION

CARDS & ePASSPORTS
- IC Module Production
- Card Body & Smart Card Production
- Holderpage & Booklet Production
- Card & ePassport Personalization
- Packaging & Mailing

RFID / SMART LABEL
- Antenna Production & Inlay Assembly
- Converting
- Personalization

SEMICONDUCTOR BACKEND
- IC Module Production
- Carrier Tape Production
- Die Sorting

INDUSTRIAL INSPECTION SYSTEMS
- Packaging
- Metal Working
- Special Solutions

FUTURE TECHNOLOGIES
- Concentrator Solar Technology
- Flexible Solar Cell Technology
- Solar Panel Technology
- eSIM PERSO
- LED Technology

TECURITY®
- ID Card Solution
- ePassport Solution
- MB IDVERSO® Border Management Solution
- Driver's License & Vehicle Registration Solution
- Production Facilities

PARTS & SYSTEMS
- Precision Parts
- Surface Engineering

CONSULTING
- Identification of Customer Requirements
- Planning & Design
- Implementation
- Ongoing Operations

SERVICE
- Worldwide Locations for Service & Support
- Worldwide Spare Parts Supply
- Reaction Time & Full Service Contracts
- Service & Maintenance Management
- Updates & Upgrades
- Teleservice, Remote Access & Hotline (24 hours)
- Training & Support on Different Levels
- Production & Administration Support

![Mühlbauer – High Tech International]

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