![Mühlbauer High Tech International]

SMART CARD PRODUCTION TECHNOLOGY

PRODUCT OVERVIEW
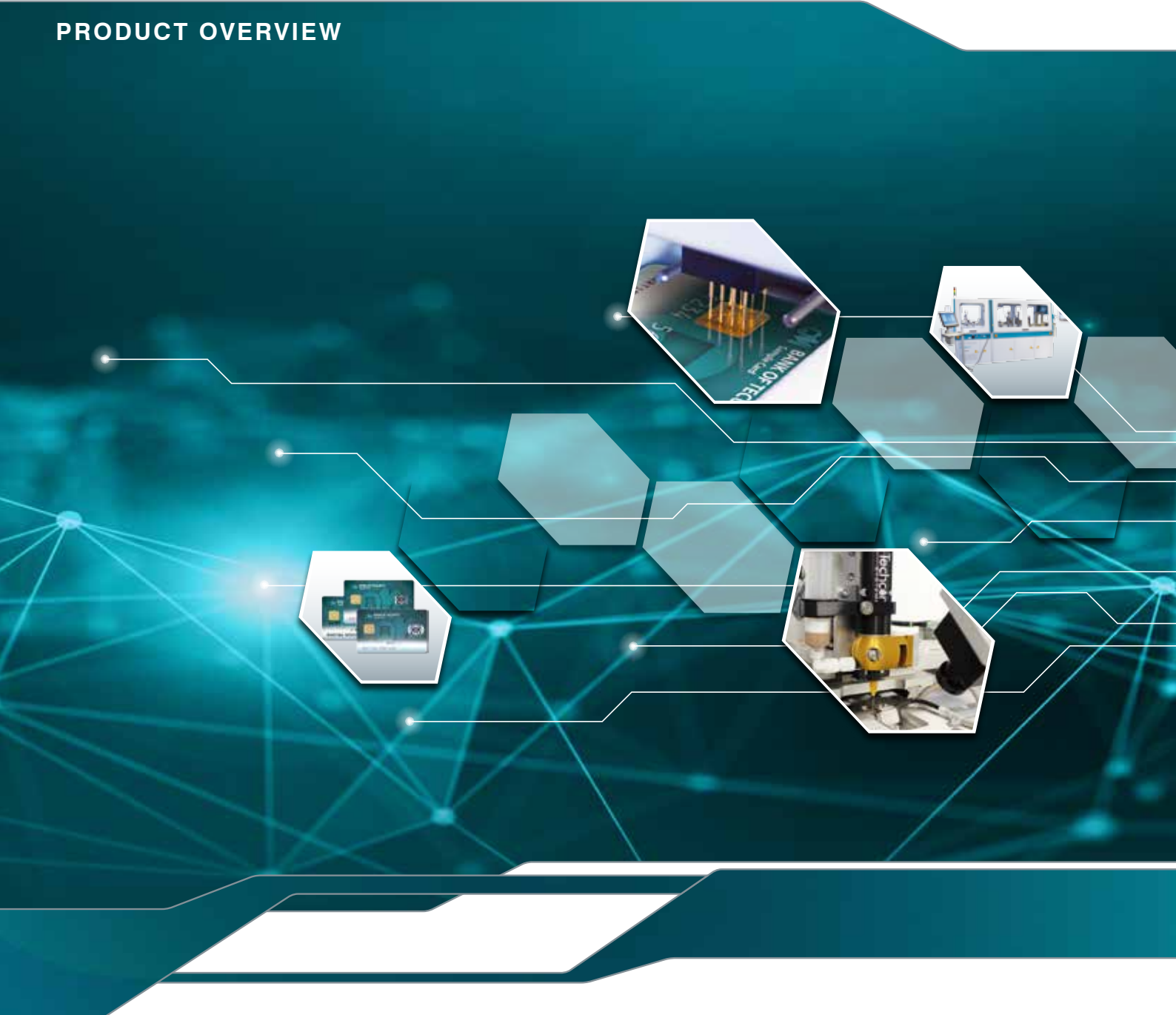
MÜHLBAUER GROUP

State-of-the-Art Technologies and Solutions

Cutting-Edge Technologies and Solutions

The Mühlbauer Group is the only single-source technology partner for the production and personalization of cards, passports and RFID applications worldwide. With around 3,000 employees, technology centers in Germany, Malaysia, Slovakia, the USA and Serbia, and a global sales and service network, we are the world's market leader in innovative systems and software solutions, supporting our customers in project planning, technology transfer including system integration and production support.

Exclusive Manufacturer Service

35 production and service facilities on five continents, worldwide spare parts repositories and individual service and financing concepts enable us to provide a unique service quality, allowing us to react and bring solutions within two hours.

Seeing is Believing

In our global technology centers, such as the ones in Germany, Malaysia, South Africa and the USA, we exhibit our complete range of smart card and ePassport production and personalization products, as well as RFID inlay production and converting processes. Almost any system is available and ready for demonstrations. Additionally the company's know-how can be experienced in the TECURITY EXPRESS show truck, an unrivaled mobile high-security production center. Convince yourself of the superiority of Mühlbauer technologies.

Technology and Market Leadership

To ensure and expand the technology and market leadership, Mühlbauer continuously invests in innovative products and processes. Our research and development centers with over 400 highly qualified engineers and technicians collaborate closely with customers and research institutions in order to efficiently launch reliable solutions in increasingly shorter development and production cycles.

Open Communication

While aiming to extend our current leading market position in the emerging areas of government security and biometric applications, we ensure strict privacy in all projects and serve as a reliable partner for sophisticated industries. We are committed to provide the highest speed, best quality and strict customer oriented services.

Business Unit TECURITY®

Mühlbauer specializes in innovative one-stop solutions encompassing the production, personalization and issuance of ePassports, ID cards and other card related security documents, and fully automatic border control systems. The business unit Tecurity® bundles the extensive know-how of the development of tailor-made security solutions. In the last 30 years we have been intensively involved in over 300 government related ID projects across the globe.

Business Unit Automation

More than 100 different standard and customized products and intelligent software solutions for data enrollment, border control as well as personalization and production management are the core of the business unit Automation. The division is responsible for the development and manufacturing of Mühlbauer technologies. In addition to systems used for high-quality document production and personalization in high-end security products, we manufacture one-stop turnkey solutions for industrial image processing of cards, coins and bank notes, tubes and other products. Moreover we develop and produce innovative systems such as microchip die sorting, flexible solar cells or carrier tape equipment for specific niche applications in the semiconductor back-end area (semiconductor related products), as well as labeling and marking systems for traceability of electronic components (traceability).

Business Unit Parts & Systems

Mühlbauer's Parts & Systems segment produces high-precision components both for the manufacturing of Mühlbauer products and as a supplier to security-sensitive industries such as aerospace, motorsports, semiconductor and medical engineering.

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MB Software Solutions

Chip Module Testing

Pre-Personalization

Glue Tape Lamination

Milling

Dual Interface

Implanting

Milling & Implanting

Chip Module Punching

Single-Source Technology Partner

Comprehensive Competence in End-to-End Systems

Mühlbauer Group is the only global acting single-source provider for end-to-end production of solutions and systems for the smart card, ePassport and semiconductor industry. We incorporate significant competence in providing optimized and state-of-the-art technology as well as customized equipment.

Our products merge the main three factors for our customers' success story:

- In-house development and research
- In-house production and assembly
- In-house training and technology transfer

GLOBAL SERVICE & SUPPORT

RESEARCH & PROCESS ENGINEERING

SEMICONDUCTOR BACKEND & RFID COMPETENCE CENTER

QUALITY ASSURANCE & PROCESS CONTROL

MECHANICAL ENGINEERING

SOFTWARE & ELECTRONIC ENGINEERING

GLOBAL HEADQUARTERS

BI

BIII

BII

CIII

CII

CI

CIV

K

L

M

H

E

DI

DII

DIII

DIV

DV

G

F

SYSTEM ASSEMBLY

N

SHOWROOMS & DEMOCENTERS

TRAINING CENTER & KNOW-HOW TRANSFER CENTER

PRECISION PARTS MANUFACTURING

LARGE & SPECIAL PARTS MANUFACTURING

STORAGE

PACKAGING & DISPATCHING

The Mühlbauer Group's core competences in delivering perfected machine products are the manufacturing of the precision parts, the development and constant enhancement of mechanics and electronics, the process and the software solutions. Due to constant investments and a well-trained R&D team, Mühlbauer has grown to be a most innovative technology partner that guarantees optimized systems. We excel in perfectly coordinating every single step of the process, thus ensuring the most efficient and reliable products for our customers.

MB Software Solutions

Chip Module Testing

Pre-Personalization

Glue Tape Lamination

Milling

Dual Interface

Implanting

Milling & Implanting

Chip Module Punching

PalaMax

Total Process Transparency
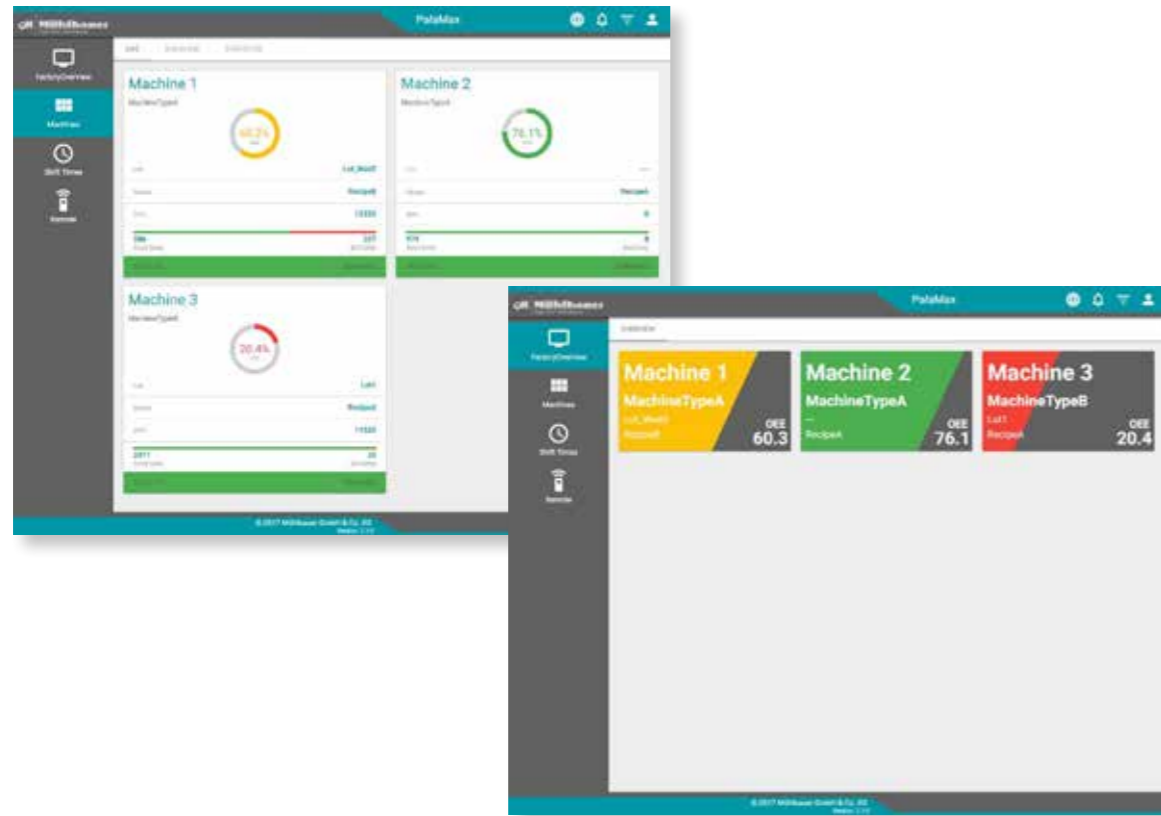
- Monitor your production in real time and generate real production statistics with your preferred KPIs
- Improve cost transparency
- Gain better data to investigate, understand and portray process flows and relationships
- Run your production with fewer staff and improved security
- Intuitive and easy to use web interface
- Responsive user interface design allows optimal presentation on any chosen device
- Data collection from the shop floor of Mühlbauer equipment and also third party equipment
- State-of-the-art big data software architecture ensures future reliability

CORE MODULES

PalaMax.Monitor

Monitors the real time performance monitoring of your machines on the shop floor, e.g. state of machine or metrics in order to react efficiently in time.

PalaMax.Stats

Statistical tool to easily analyze historical data. Select your desired time interval and get customized statistics, e.g. OEE, yield, performance and availability.

FURTHER MODULES

Palamax can be extended according to your needs.

PalaMax.Remote

Operate machines on the shop floor remotely from a control centre, allowing enormous time savings. This first step shop floor automation reduces staff requirements on the shop floor. Thus improves staff effectiveness and security due to fewer personnel.

PalaMax.Trace

Trace your product through the entire production process. This allows the comparison of manufacturing runs between each other and to determine the possible reason for a production fault.

PalaMax.Maintain

Manages the maintenance tasks on the shop floor. The aim is to switch a process from random stoppages to scheduled and preventive maintenance in order to be able to plan production down times in a deterministic manner.

PalaMax.Cost

Collects process timings and allocates machine cost to generate unit cost. Profit from a tighter cost control and make your production more profitable.

PalaMax.Recipe

Manages recipes and their versions, enables production engineering to prepare and test a repeatable factory set up. Factories can switch between products within a matter of minutes. PalaMax.Recipe can set up verification systems in a repeatable manner, providing comparable quality performance indicators.

PalaMax is Mühlbauer's SmartFactory implementation developed for card, tag or booklet productions, personalization factories and semiconductor backend shop floors. It is designed to set and collect process data to and from the shop floor. The collected process data is stored in a big data sets for the later processing and statistical analysis. Consisting of an NOSQL Database, PalaMax collects data and several modules for processing and visualization.

CMT 200

Chip Module Testing System
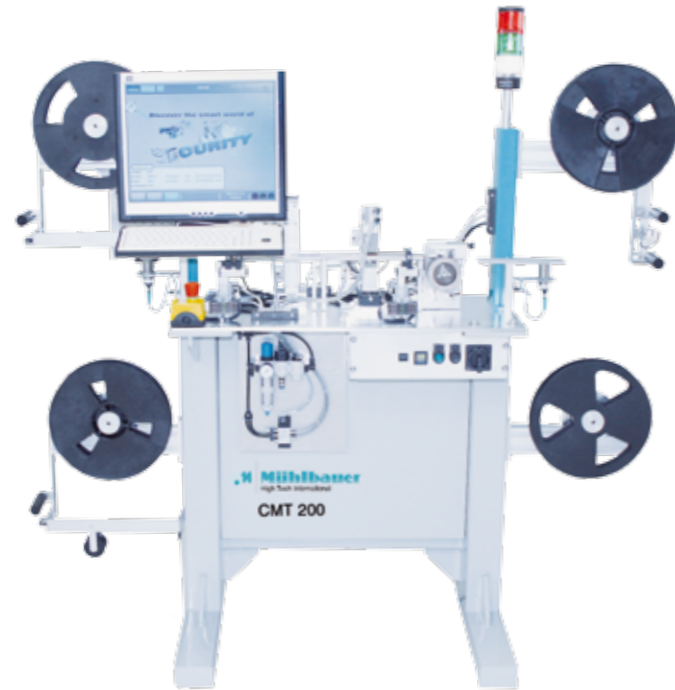
KEY MODULES

Spooling unit
(IC Module)

Electrical test station

Reject punching unit

UPH

Contact-IC Contactless-IC

5,000   10,000   15,000   20,000   25,000   30,000
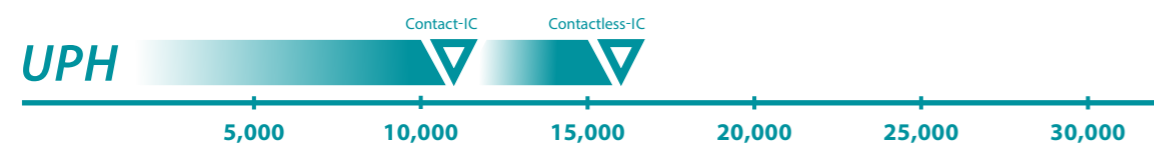
FEATURES & TECHNICAL DATA
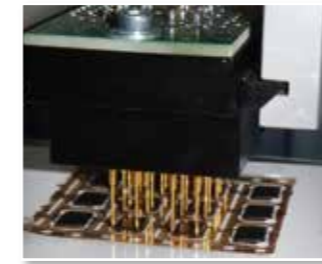
Key Features

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

Productivity / Process Units

- Integrated spooling systems for module tape and spacer tape
- Highly flexible testing solution for various IC Module applications
- 4-fold test heads for 9.5 and 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%
- Environment 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 and Contactless-IC up to 16,000 uph based on 1.0 sec ATR (ATS) test

Designed as an open platform, the test handling system CMT 200 is suitable for counting and testing of IC Modules. Built on a compact basis with integrated spoolers, CMT 200 can be used for input quality measurement for card manufacturers handled via the reel-to-reel principle. 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 reject punching.

CMT 2280

Chip Module Pre-Personalization System

 Spooling unit
(IC Module)

 Pre-personalization and initialization

 Reject punching unit

 Thickness measurement
(optional)

UPH

20,000 30,000 40,000 50,000 60,000 70,000
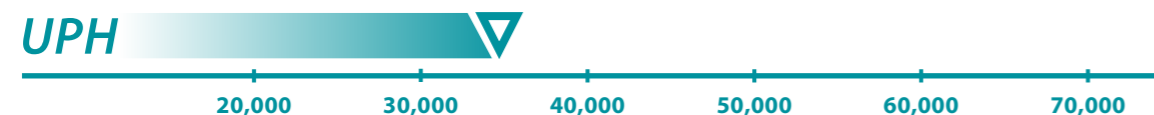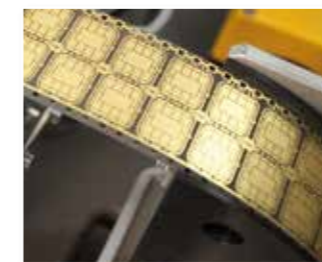

FEATURES & TECHNICAL DATA

Key Features

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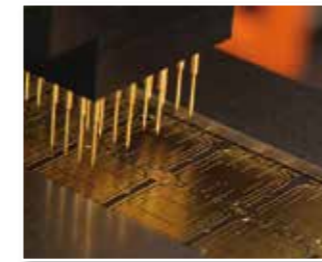
Productivity / Process Units

- Integrated spooling systems for module tape and spacer tape
- Highly flexible testing solution for various IC Module applications
- Sensor based module counting system
- Module thickness measurement optional
- Up to 1-, 16- or 32-fold test / encoding heads
- Programmable positioning of reject punch location in x/y
- Printer for reporting and statistics (reel report)
- Spooling systems TS 1145/I,O for IC Module tape and spacer tape
- UPS (uninterruptable power supply)
- Full performance personalization through MCES (MB coding system)
- Smartware or even micropross compatible capability
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment 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

The new generation of high-speed IC Module pre-personalization and initialization system CMT 2280 is designed for test / pre-personalization of smart card IC Modules especially used for GSM and banking application. Integrated high-end reader technology such as Mühlbauer's MCES as used in card personalization equipments, smartware or micropross guarantees the fastest personalization performance. A mechanical thickness measurement and optical quality control can be chosen optionally to ensure 100% good quality of personalized modules. Faulty modules are automatically marked by the reject punch. The punch – which can move in x- and y-direction – is freely programmable 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. This enables the pre-personalization of a determined quantity of IC Modules and the generating of a total report.

CMT 6560

Chip Module Pre-Personalization System

Key Features

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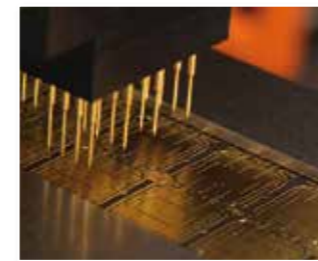
Productivity / Process Units

- Integrated spooling systems for module tape and spacer tape
- Highly flexible testing solution for various IC Module applications
- Sensor based module counting system
- Module thickness measurement optional
- 16- or 32-fold test / encoding heads
- Up to 2 test stations for 64-fold parallel test
- With extension module EM/600 up to 128 fold parallel test
- Programmable positioning of reject punch location in x/y
- Printer for reporting and statistics (reel report)
- Spooling systems TS 1145/I,O for IC Module tape and spacer tape
- UPS (uninterruptable power supply)
- Full performance personalization through MCES (MB coding system)
- Smartware or even micropross compatible capability
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment 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
                                    on request

KEY MODULES

Spooling unit
(IC Module)

Reject punching unit

Pre-personalization and initialization

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

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

UPH

| 20,000 | 30,000 | 40,000 | 50,000 | 60,000 | 70,000 |

CML 201

Glue Tape Lamination System

KEY MODULES

Spooling unit
(IC Module)

Punching unit
(Glue tape)

Tape application
(Glue tape)

Lamination
(IC Module - glue tape)

UPH

8-contact module tape

6-contact module tape

5,000 6,000 7,000 8,000 9,000 10,000

FEATURES & TECHNICAL DATA
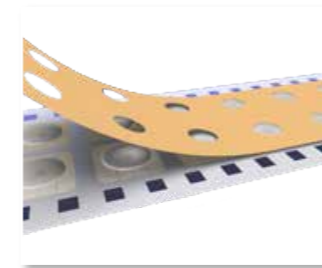
Key Features

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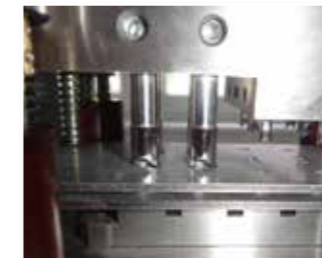
Productivity / Process Units

- Integrated spooling systems for module tape, spacer tape and glue tape
- Highly flexible solution for various IC Module applications
- 4-, 6-fold lamination and glue tape punching tools
- Dual interface module tools
- Customized tool designs on request
- Glue tape position control vision system optionally available
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment 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

The CML 201 is a 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).

Short product changeover and highest autonomy times lead to a great cost of ownership value. Automatic spooling units as well as easy operation allow for a throughput of up to 9,000 modules / hour.

SCM 501

Smart Card Milling System

Key Features

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

Productivity / Process Units

- Card feeding and stacking based on Mühlbauer magazine system
- Automatic magazine changer
- Magazine handlers with magazine buffer optional
- Card orientation and card thickness measurement system optional
- 1 CNC controlled weight optimized milling system
- Patented antenna detection 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 and optical antenna pad control systems optional
- Reject and 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 and material

KEY MODULES

- Magazine card input
- CNC milling station
- Cleaning module
- Cavity depth measurement
- Magazine card output
- Reject bin

UPH

2,500   3,000   3,500   4,000   4,500   5,000
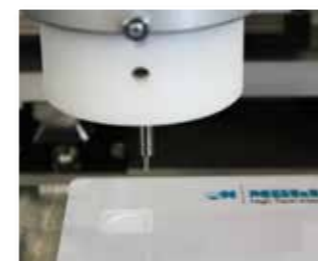
The smart card milling system SCM 501 is used for automatic milling of cavities for IC Modules in plastic cards. This system represents a very economical card milling process for small to medium sized production tasks. Flexibility and modularity are a key benefit of this system providing a variety of options including dual interface production. SCM 501 can reach a throughput of up to 3,500 cards / hour, producing standard cavities.

SCM 5001
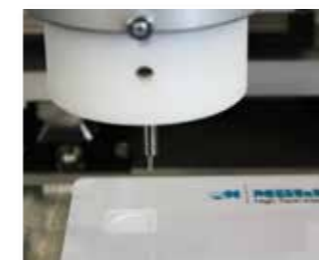
Smart Card Milling System

Key Features

- Fully automatic milling of cavities for IC Modules into plastic cards, with reference card top side for standard contact cards and dual interface cards as well as DUAL-SIM cards
- Best accuracy, process ability and flexibility due to 2 independent milling stations (6 axis)
- Operator friendly, flexible and 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 and fully automatic calibration
- INCAPE ready
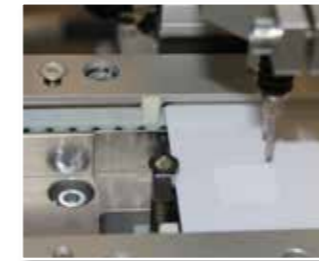
Productivity / Process Units

- Card feeding and stacking based on the Mühlbauer magazine system
- Automatic magazine changer
- Magazine handlers with magazine buffer optional – close to 1 hour system autonomy
- Card orientation and card thickness measurement system optional
- 2 CNC controlled independent milling systems
- Patented antenna detection 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 and optical antenna pad control systems optional
- Reject and 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 and material

KEY MODULES

Magazine card input	2x cavity depth measurement
2x CNC milling stations	Magazine card output
2x cleaning modules	Reject bin

UPH

2.500   3.000   3.500   4.000   4.500   5.000

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. This system features a highly economical card milling process for medium to large sized production tasks.

Flexibility and modularity are a key benefit of this system providing 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 / hour.

MFB 2500

System for Dual Interface Card Production

KEY MODULES

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

UPH

1,500   2,000   2,500   3,000   3,500   4,000

FEATURES & TECHNICAL DATA

Key Features

- Fully automatic preparation of dual interface card bodies using the patented Mühlbauer Flexible Bump technology
- Automatic milling of the antenna connection pads using the patented Mühlbauer antenna touch system (ATS) suitable for all kinds of antennas
- Graphical based dosing design programming
- Automatic in-line quality control ensuring highest yield and quality
- The Mühlbauer dual interface process – Flexible Bump:
  - 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 and ID for more than 10 years
- INCAPE ready

Productivity / Process Units

- Card feeding and stacking based on the Mühlbauer magazine system
- Magazine handlers with magazine buffer optionally available for high system autonomy
- Input cavity detection optionally available
- Antenna resistance measurement station optionally available
- 1 NC controlled milling system with patented antenna detection system (ATS) for dual interface card production
- Vision system for antenna pad control optionally available
- Up to 2 highly accurate Flexible Bump dosing systems
- In-line quality control of Flexible Bump
- Reject and 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)
Dynamic drive accuracy:	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 and 2 dosing heads

Mühlbauer's Flexible Bump technology offers a well proven system that guarantees an absolutely secure connection between chip and antenna for dual interface cards. This is achieved with the unique and patented Flexible Bump process, ensuring electrical connection even when the card is intensively used. The latest generation MFB 2500 offers even more state-of-the-art ingenuity and the flexibility of integration into existing production lines without additional upgrades. This solution combines the both unique and patented technologies antenna touch milling as well as the Flexible Bump process in one system. The MFB 2500 offers the lowest costs per card especially for high production volumes with a throughput of up to 2,500 cards / hour. Thanks to a vision system as well as the possibility of re-working this system guarantees 100% good cards and a maximized yield.

CMFB 2500

Advanced System for Dual Interface Card Production

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

UPH

ONE DISPENSING STATION   TWO DISPENSING STATIONS

1,000   1,500   2,000   2,500   3,000   3,500

FEATURES & TECHNICAL DATA

Key Features

- Fully automatic preparation of dual interface card bodies using the patented Mühlbauer Flexible Bump technology
- Automatic milling of the module cavity and the antenna connection pads using the patented Mühlbauer antenna touch system (ATS) suitable for all kinds of antennas
- Graphical based milling and dosing design programming
- Automatic in-line quality control ensuring highest yield and quality
- The Mühlbauer dual interface process – Flexible Bump:
  - 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 and ID for more than 10 years
- INCAPE ready

Productivity / Process Units

- Card feeding and stacking based on the Mühlbauer magazine system
- Magazine handlers with magazine buffer optional for high system autonomy
- Antenna resistance measurement station optional
- 1 CNC controlled milling system
- 1 NC controlled milling system with patented antenna detection system (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
- 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 µm
                                z-axis: +/- 10 µm
- Measurement system accuracy: +/- 2.5 µm
- Throughput: Up to 2,500 uph; depending on cavity design / materials and 2 dosing heads

Mühlbauer 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, achieving a throughput of up to 2,500 cards / hour.
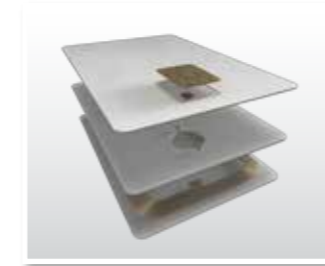
DICL 5000

Dual Interface Card Line

KEY MODULES

 Magazine card input

 2x CNC milling station

 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 and module height measurement

 Optical module inspection

 Electrical test station contact

 Electrical test station contactless

 Resonance frequency measurement

 Magazine card output

 Reject bin

UPH

DUAL INTERFACE   STANDARD

2,200   3,000   3,500   4,000   4,500   5,000

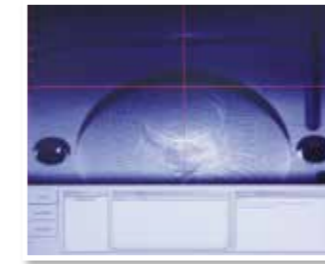### Key Features

- Compact system for inline production of dual interface cards
- Developed for MB TeConnect technology for longest life time and easy handling
- Equipment suitable for milling and implanting of standard contact cards as well
- Operator friendly, flexible and modular system design

Productivity / Process Units

- Card feeding and stacking based on Mühlbauer magazine system
- 2 independent CNC controlled milling systems (6 axis)
- Patented antenna detection 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
- Dosing unit for MB TeConnect solder paste or customized glue on request
- Optical Inspection of bump height and bump position and size
- IC module tape feeding high precision punching system with reject handling
- Pick & Place system with position and 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 and initialization with up to 6 coding heads optional

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: ± 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:	5,000 uph (standard smart cards) 2,500 uph (dual interface cards with TeConnect)
Availability:	Up to 95%
Yield:	Up to 98%

MB Software Solutions

Chip Module Testing

Pre-Personalization

Glue Tape Lamination

Milling

Dual Interface

Implanting

Milling & Implanting

Chip Module Punching

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 size production tasks while providing an economic and flexible design that promises extremely high accuracy.

It excels in providing the highest yield with a throughput of up to 5,000 cards / hour. The DICL 5000 provides the continuously proven Mühlbauer technology and quality, known for decades in the smart card business.

SCI 202

Smart Card Implanting System

KEY MODULES

Magazine card input

Implanting station

Hot press

Cold press

Electrical test station

Magazine card output

Reject box

UPH

1,500   2,000   2,500   3,000   3,500   4,000

Key Features

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

Productivity / Process Units

- Card feeding and stacking based on Mühlbauer magazine system
- Cavity detection
- Automatic card and IC Module tape transport and 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 and initialization
- Customized system extension on request
- Reject and sampling station (up to 2 fold max. optional)
- Availability: Up to 95%
- Yield: Up to 99.7%
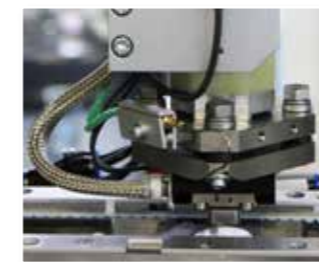
Technical Data

- 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
- 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

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, offering minimum footprint, 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 / hour.

MB Software Solutions

Chip Module Testing

Pre-Personalization

Glue Tape Lamination

Milling

Dual Interface

Implanting

Milling & Implanting

Chip Module Punching

SCI 5001

Smart Card Implanting System

Key Features

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

Productivity / Process Units

- Card feeding and stacking based on the Mühlbauer magazine system
- Magazine buffer optional for high system autonomy
- Fully automatic card and IC Module tape transport and 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
- Optional multi encoding system up to 6 stations for pre-personalization and initialization
- Customized system extension on request
- Reject and 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
- 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

KEY MODULES

- Magazine card input
- Implanting station
- 3x hot press
- Cold press

- Electrical test station
- Magazine card output
- Reject box

UPH

2,500   3,000   3,500   4,000   4,500   5,000

SCI 5001 is a high-speed IC Module implanting system for ID-1 smart cards. The system is designed for medium to large size production tasks.
With an economical implanting process, flexible design and extremely high accuracy this system excels with an outstanding uptime providing the highest yield with a throughput of up to 5,000 cards / hour.

MB Software Solutions

Chip Module Testing

Pre-Personalization

Glue Tape Lamination

Milling

Dual Interface

Implanting

Milling & Implanting

Chip Module Punching

CMI 202

Combined Milling & Implanting System for Medium Volumes

KEY MODULES

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

UPH

| 1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000 |

FEATURES & TECHNICAL DATA

Key Features

- Fully automatic cavity milling and 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 and customizing
- Operator friendly, flexible and modular system design
- MCES / INCAPE ready
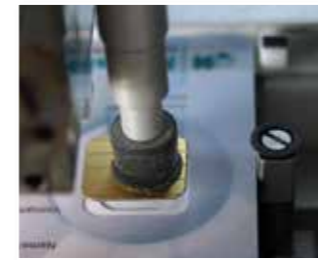
Productivity / Process Units

- Card feeding and stacking based on Mühlbauer magazine system
- Card orientation and card thickness measurement system optional
- Fully automatic card and IC Module tape transport and indexing system
- 1 CNC controlled milling system
- 1 cavity cleaning station and cavity 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 and 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 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
- 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

CMI 202 is an combined milling and implanting system for standard ID-1 smart card applications. The system is designed for small to medium size 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 / hour. The CMI 202 provides all the proven Mühlbauer technology and quality, known for decades in the smart card business.

CMI 5001

Combined Milling & Implanting System for High Volumes

KEY MODULES

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

UPH

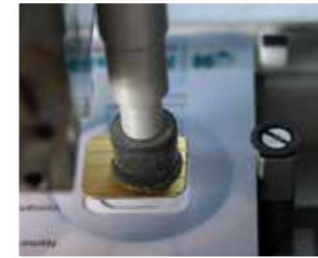2,500   3,000   3,500   4,000   4,500   5,000

FEATURES & TECHNICAL DATA

Key Features

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

Productivity / Process Units

- Card feeding and stacking based on Mühlbauer magazine system
- Magazine handlers with magazine buffer optional
- Card orientation and card thickness measurement system optional
- Fully automatic card and IC Module tape transport and indexing system
- 2 independent CNC controlled milling systems (6 axis)
- Patented antenna detection system (ATS) for dual interface card production optional
- Up to 4 hot press stations possible
- 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 and initialization
- Customized system extension on request
- Reject and 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 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 5,000 uph; depending on material

CMI 5001 is an efficientky combined milling and implanting system for standard ID-1 smart card applications. The system is designed for large size production tasks while providing an economic yet flexible design that promises extremely high accuracy. It excels at providing the highest yield with a throughput of up to 5,000 cards / hour. The CMI 5001 provides the continuously proven Mühlbauer technology and quality, known for decades in the smart card business.

CMP 2000/M

Semi-automatic Chip Module Punching System

Key Features

- Semi-automatic system for punching and 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

Productivity / Process Units

- Punch cycle start 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 driven
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

1,500	2,000	2,500	3,000	3,500	4,000

MB Software Solutions

Chip Module Testing

Pre-Personalization

Glue Tape Lamination

Milling

Dual Interface

Implanting

Milling & Implanting

Chip Module Punching
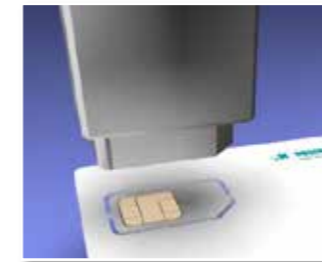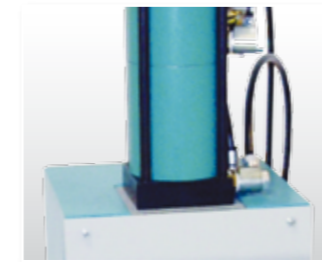
The manual table top chip module punching system CMP 2000/M is designed for punching and cutting of SIM cards in compliance with the ISO standards. ID-1 cards are placed manually under the punching respectively / cutting unit and the hydro-pneumatic punching process is activated by a foot switch. The "combi 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 depends on the operator.

CMP 2020

Fully Automatic Chip Module Punching System

KEY MODULES

 Magazine card input

 GSM punching tool

 GSM cutting unit

 3rd Punching / stamping tool (optional)

 Vision system (optional)

 Reject box

 Card output

UPH

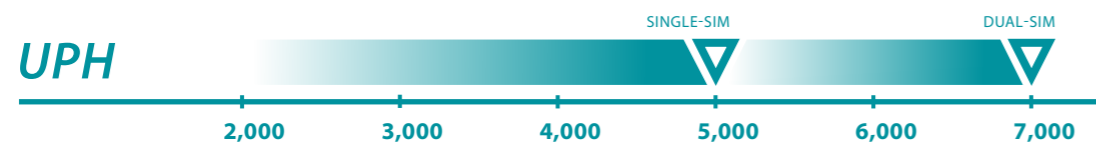|					
			SINGLE-SIM		DUAL-SIM
2,000	3,000	4,000	5,000	6,000	7,000

FEATURES & TECHNICAL DATA

MB Software Solutions

Chip Module Testing

Pre-Personalization

Glue Tape Lamination

Milling

Dual Interface

Implanting

Milling & Implanting

Chip Module Punching

Key Features

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

Productivity / Process Units

- Card feeding and stacking based on Mühlbauer magazine system
- Magazine handler with magazine buffer optional for high system autonomy
- Up to 3 punching / pre-cutting stations
- Card orientation and card thickness measurement system optional
- Inspection system for punching quality control optional
- Reject and 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

The 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 standard 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 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.

QUALITY ASSURANCE

Testing Equipment

CSG 100 / 200	CTG 100 / 200	DLT 500
Card size gauge	Card thickness / cavity depth gauge	Peel force tester
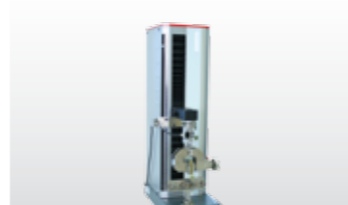
Card Body Testing Equipment

SCF 2300	TWT 2500	SCT 2400	MAT 1230
Flexion test system	Three wheel testing system	Torsion test system	Module adhesion testing system

Smart Card Testing Equipment

Measuring Microscope	Color Densitometer	UV-Light Cabinet
Measuring of embossing distances	Measuring of color density	Inspection of various printing processes
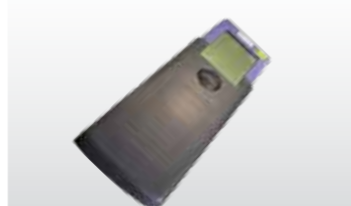
Card Personalization Testing Equipment

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

Traceability

- Marking
- Process Automation & Board Handling

Semiconductor Backend

- IC Module Production
- Carrier Tape Production & Forming
- Die Sorting
- Flip Chip LED

Vision Inspection Systems

- Industrial Inspection Systems
- Security Inspection Systems

Flexible Solar Technology

- Flexible Solar Cell Technology

TECURITY®

- Document Issuance Solutions for eID, ePassport, Driver's License, Vehicle Registration
- Border Managment Solutions
- Production Facilities

Parts & Systems

- Precision Engineering
- 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
- Training & Support on Different Levels
- Production & Administration Support

Mühlbauer
High Tech International

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