Mühlbauer
High Tech International

IC MODULE

PRODUCT OVERVIEW

DIE & WIRE BONDING | ENCAPSULATION | INSPECTION | MOLDING | PRE-PERSONALIZATION

www.muehlbauer.de

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 2-hour time frames.

Seeing is believing

In the 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, 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 superior 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.

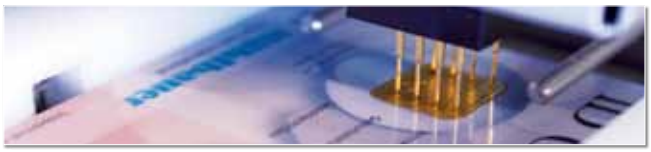
Open communication

While aiming to extend the 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).

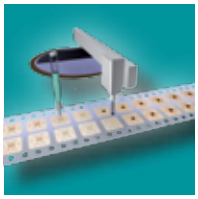
Business unit Parts & Systems

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.

CONTENT

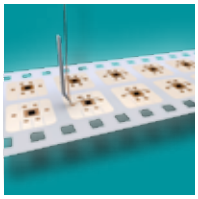
PROCESS OVERVIEW

Complete Turnkey Solution for IC Module Production



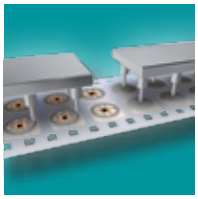
DIE BONDING

The chip is placed onto an IC module tape (leadframe). Typically, epoxy glues are used to fix the chip on the rear side of the tape. The exact pick-up and place position of the chip from the wafer is controlled by several vision systems. After chip attach the resin is cured by an inline thermal curing oven before the tape is finally rolled up.



WIRE BONDING

The contact pads of the chip are electrically connected to the contact pads of the tape by an approximately 30µm thick gold wire. The wires are fixed to the contact pads using the thermosonic bonding method.



ENCAPSULATION

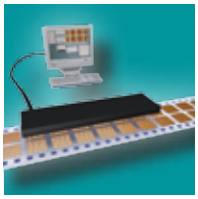
The resin is now dispensed in order to protect the chip and open wires against mechanical and environmental stress. Typically a transparent UV curing material or a black thermal curing material are used for encapsulation. Due to the high accuracy of this method, no additional surface treatment like milling is necessary. For the dispensing process itself, two different methodes can be used: *Dam&Fill* or *Glob Top*. In the *Dam&Fill* mode, the first dispensing head places a dam bar to limit the glob top area. Then, a second dispensing head fills the area inside the dam. In the *Glob Top* mode, both dispensing heads completly fill the whole module.

TAPE INSPECTION

The fully automatic optical inspection carries out a thickness measurement and checks the glob tops and the surfaces. The front and/or rear side of the tape is controlled for surface defects like open wedges or scratches, fingerprints, etc. Faulty modules are clearly marked by a reject punch hole.

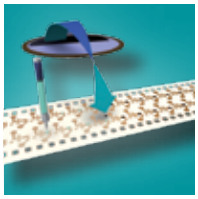
MOLDING

This process step is typically used for 3-row tapes for contactless cards, ID applications and ePassports. The multi plunger mold system works with an electro-mechanical press. The process includes off-line cleaning which increases the productive uptime.



ELECTRICAL TEST & PRE-PERSONALIZATION

As an output functional test, the IC modules are electrically singulated and tested or even pre-personalized in one process step. Depending on the chip type (memory or microprocessor chip) complex test routines and parameter tests are performed by best-in-class test readers. Faulty modules are clearly marked by a punch hole.



THE ALL IN ONE FLIP CHIP IC MODULE PRODUCTION SYSTEM

The flip chip IC module production system combines all single process steps in only one single machine. Starting from glue dispensing through to high accuracy flip chip die attach to final bonding, followed by optical and electrical quality control as well as bad unit reject punching - just one machine is completing the whole IC module assembly. Neither wire bonding nor encapsulation is required, which makes flip chip IC module production very cost-competitive.

CONTACT BASED

CONTACTLESS

DUAL INTERFACE

CME 3060

TI 2280

PACKSTAR

CMT 6560

FLIP CHIP

CME 3060

Chip Module Encapsulation

GSM cards

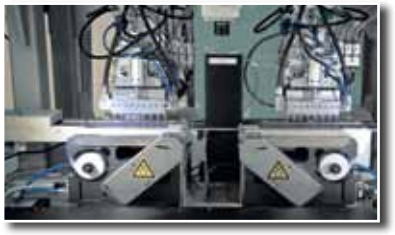
Banking cards

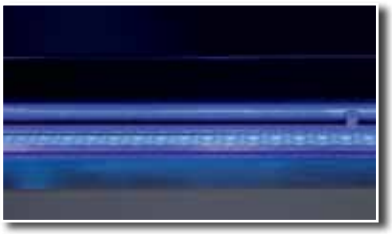
Contact &
Contactless ID
cards

Any other
type of
Smart Card

UP TO 40,000 UPH IN GLOB TOP PROCESS

- High speed process *Dual Glob Top* with up to 40,000 UPH
- Integrated thermal and/or UV (LED) curing station
- New dosing design program for easy recipe creation
- Optional inline integration of Tape Inspection System TI 2280
- 50% more curing capacity compared to other systems





FEATURES & ADVANTAGES

New on CME 3060

- 16-fold shaft dosing head V66
- 16-fold membrane dosing head V60
- Purging stations for dosing heads in stop or standby mode by vision cameras
- Inline automatic process control to monitor the encapsulation of all nozzles
- CNC programming software for easy and fast dosing layout creation
- Visualization cameras for accurate dosing head adjustment

Design

- Automatic spooling systems for 35 mm reel-to-reel module tapes and spacer tapes incl. reverse mode
- Automatic tape indexing system
- Vacuum fixing of the tape at dispensing positions
- Tandem dosing head for *Dam&Fill* or *Dual Glob Top* (without buffer)
- IC module output counter
- Locked production cabinet
- ETS menu-driven operator interface
- Spooling systems TS 1150/I, /O

Workstations

- CME 3060 for *Dam&Fill* or *Dual Glob Top* process
- TI 2280 for inline quality inspection

Accessories

- Ultrasonic cleaning station
- UV measurement tool
- Resin rolling system
- Fridge

Tape material

- Module tape: 35 mm / super 35 mm
  reel Ø max. 700 mm
  pitch 9.5, 14.25 (others on request)
- Spacer tape: 35 mm; reel Ø max. 700 mm

Curing systems

- UV/discharge: up to 3 UV systems (each 3 lamps)
  315 - 400 nm (75 W)
- UV/LED: different lengths of LED bars
  with 365 nm (up to 250 mW/cm^2)
- Thermal curing support up to 170° C programmable
- Extended thermal curing oven (option)

Facilities

- Power: 400 V, AC, 3 x 16 A, 50 Hz
- Compressed air: 6 bar, oil-/water-free 100 l/min
- Vacuum: -0.7 bar 35 l/min

Environmental conditions

- Room temperature: 23 °C ± 3 °C
- Humidity: 50% ± 10%

Dimensions

- Height: 2300 mm
- Length: 4935 mm
- Depth: 1100 mm
- Weight: 1650 kg

Throughput

- up to 40,000 (*Dual Glob Top*)
  up to 23,000 (*Dam&Fill*)

The CME 3060 represents a new generation of high speed chip module encapsulation equipment. While concentrating on 100% INLINE PROCESS CONTROL the machine also features 50% more curing capacity compared to other systems. Based on the new dosing head design program with 16-fold encapsulation and improvements in terms of quality and maintenance friendliness, an easy and quick recipe creation is now possible. CME 3060 can work with thermal-, UV and even an LED UV curing station. The LED UV curing system requires significantly less space while having more power (compared to standard UV discharge lamps) thus enabling high speed production with reduced warpage and higher process control. In order to guarantee best output quality control, the Tape Inspection process of TI 2280 can be integrated inline. The TI 2280 controls the thickness or optically inspects the front and back side. It is even possible to integrate an electrical test station to get completly finished modules ready for shipment.

TI 2280 & TI 2281

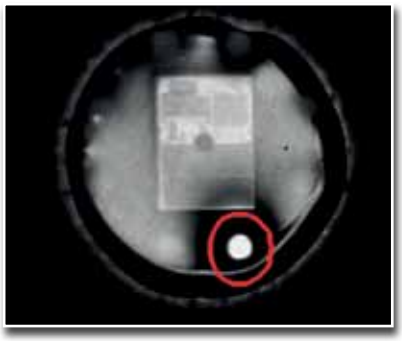
Tape Inspection

GSM cards

Banking cards

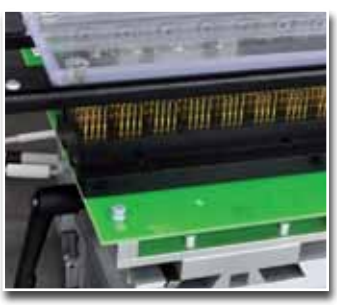
Contact &
Contactless ID
cards

Any other
type of
Smart Card



FOR 100% TESTED OUTPUT

- 100% mechanical thickness measurement check
- Fully automatic optical inspection of glob tops and surfaces
- Can be operated as stand-alone or inline system
- Reject punch for marking faulty modules
- Integrated electrical final test station



FEATURES & ADVANTAGES

New on TI 2280

- Automatic, x/y movable reject punch tool
- 8-fold thickness measurement

New on TI 2281

- Electrical test station for top/ bottom/ Dual Interface test
- Optional vision inspection station for top and/or bottom side

Design

- Automatic spooling systems for module tapes and spacer tapes with integrated tape buffers
- Automatic tape indexing system
- Vacuum fixing of the tape at measurement position
- Detailed production data report (good/reject modules)
- Graphical display and traceability file (option)
- Menu-driven operator interface ETS
- Spooling systems or TS 1150/I, /O
  Variant: Diameter: 12.5, 25, 40, 56, 76 mm
- Integrated tape buffer for inline solution with CME 3060 (option)

Workstations

- Tape break
- Thickness measurement
- Test or inspection stations
- Reject punch
- Tape transport

Options

- Glob top inspection
- Module surface inspection
- Printer
- Barcode reader
- United power supply
- Statistical analysis
- Electrical test station in case of already pre-disconnected IC Modules

Tape material

- Module tape: 35 mm / super 35 mm
  reel Ø max. 700 mm
  pitch 9.5, 14.25
- Spacer tape: 35 mm
  reel Ø max. 700 mm

Facilities

- Power: 400 V, 50 / 60 Hz, 0.5 kW
- Compressed air: 6 bar, 230 l/min

Environmental conditions

- Room temperature: 23 °C ± 3 °C
- Humidity: 50 % ± 10 %

Dimensions

- Height: 2300 mm
- Length: 2185 or 2700 mm
- Depth: 1100 mm
- Weight: 615 kg

Throughput

- Up to 40,000 UPH
  depending on process parameters

The Tape Inspection Systems TI 2280 and TI 2281 perform a 100% thickness measurement check on 35mm IC Module tapes. Faulty modules are clearly marked using an automatic and x/y movable reject punch tool. The systems can be integrated to the encapsulation system CME 3060 for inline inspection or can be operated as a stand-alone system for off-line quality control. The highlights of Mühlbauer's TI system are the integrated electrical test station which can finish the module if the material is already isolated (disconnected), and the fully automatic optical inspection of the glob tops and surfaces. Furthermore, the TI series guarantees a 100% output quality control.

PACKSTAR

Molding

ePassport

Contact &
Contactless ID
cards

Any other
type of
Smart Card

TYPICALLY USED FOR CONTACTLESS 3-ROW

- Most cost-efficient reel-to-reel transfer molding system on the market
- Perfect fit for ID- and contactless applications
- Capable of transfer molding flex tape (contact cards) or metal tape (contactless cards)
- Advanced process control to ensure reliable and high quality transfer molding for ultra thin devices

FEATURES & ADVANTAGES

Design

- Synchronous friction and force free reel transport system enabling very gentle handling of the thinnest lead frames and tapes
- Low force de-gating principle
- Module cavity block design assures minimal offset and precise thickness control

Workstations

- Electromechanical press with unique patented clamp systems ensuring minimal bleed
- Separate mold cleaning by vacuum, air jet and vibrating brushes to ensure a clean mold
- Controlled and programmable lead frame pre-heating
- Advanced process control are standard features
- Fully automatic lead frame transport
- Complete set of data management features for easy process and production control
- Live transfer and temperature graphs for process monitoring

Optional modules

- Non-fill detection unit
- Inline microscope inspection unit
- Multi language on man-machine interface

Spooling systems

- Spooler accepts standard reel dimensions
- Automatic signal occurs when spooler is empty (input) or full (output)
- Spacer tape can be wind off (input) or on (output)
- Spoolers can be removed for inline operation with wire bonders

Configuration

- Molding length: 342 mm
- Tape width: 35 mm

Measurements

- Cycle time: >16 sec. (35 mm single tape)
- Mold temperature: ± 2.5 °C
- Plunger speed: 0.1 - 10 mm/s
- Fast change over times: 5 min for mold, 15 min for de-gater

Facilities

- No water-cooling is required
- Low energy consumption

Environmental conditions

- Room temperature: 23 °C ± 3 °C
- Humidity: 50 % ± 10 %

Dimensions

- Height: 2283 mm
- Length: 4383 mm
- Depth: 1305 mm

Throughput

- Up to 6,500 UPH (with width of lead frame: 35mm; pitch: 95mm)

The PACKSTAR is a reel-to-reel stand-alone, fully automatic, multi plunger mold system with electromechanical press, for lead frame tapes of 35 mm. The system is designed for off-line cleaning thereby increasing the productive uptime to the highest level as well as a the related machine time for single 35 mm tape to less than 16 seconds (compound and product specific transfer and curing time to be added).

CMT 6560 & CMT 2280

Electrical Test & Pre-Personalization

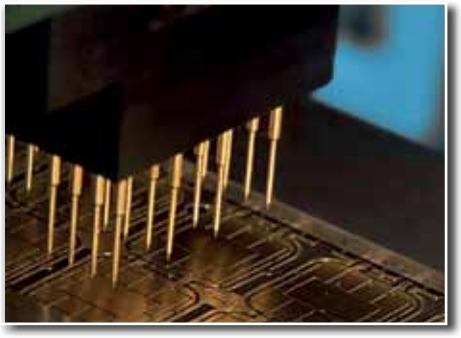
GSM cards

Banking cards

Contactless ID Cards

ePassport

Any other type of Smart Card

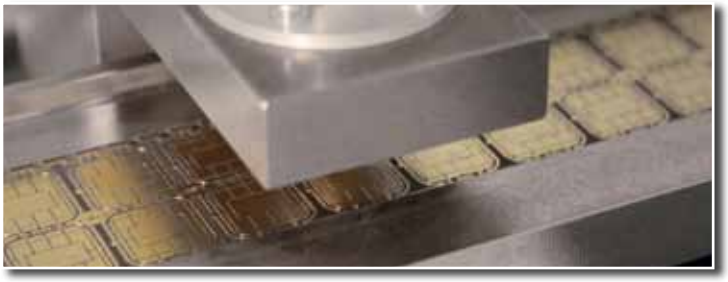


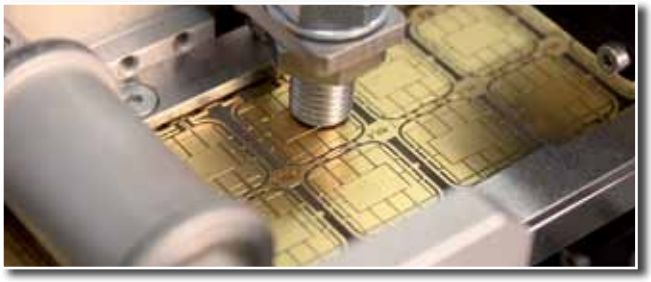
CMT 6560

CMT 2280

HIGH SPEED TEST HANDLER

- Up to 69,000 UPH
- Simultaneous electrical test and pre-personalization / initialization
- Perfect design for reel-to-reel module initialization, personalization and test
- Encoding of up to 64 modules with Basic CMT 6560 or even128 modules in parallel with Extension Module





FEATURES & ADVANTAGES

Design

- Easily accessible control electronics and pneumatics
- Automatic spooling systems for module tapes and spacer tapes
- ETS menu driven software, available in different languages
- TCP/IP interface for external data transfer
- Spooling systems TS 1145/I, /O

Workstations CMT 6560

- Electrical test and pre-personalization (64-fold, up to 128)
- Input and output module counting
- Moveable x-y-reject punch

Workstations CMT 2280

- Electrical test and pre-personalization (32-fold)
- Input and output module counting
- Moveable x-y-reject punch

Optional modules

- Test upgrades for Dual Interface modules
- Extension module EM600/ DPU disconnect punch with either pneumatic or motoric punch
- PRS inspection for disconnect punch
- Extension module EM600/ T for 128-fold test/ personalization
- Camera system for module counting

Reader systems

- Mühlbauer chip encoding system (MCES) for module test and/or pre-personalization
- Optional Micropross or Smartware Reader available
- Open platform for using customer test/personalization systems

Tape specification

- Module tape: 35 mm, super 35 mm
  reel Ø max. 700 mm
- Spacer tape: 35 mm
  reel Ø max. 500 mm

IC module types

- Processor modules: T=0, T=1 protocol
- Memory cards: I2C BUS/2-wire/3-wire
- Special adaption to other applications upon request

Facilities

- Power: 400 V, AC, 16 A, 50 Hz
- Compressed air: 6 bar, oil- /water-free, 80 l/min
- Suction: -0.12 bar, 1,300 l/min

Environmental conditions

- Room temperature: 23 °C ± 3 °C
- Humidity: 50 % ± 10 %

Dimensions (basic configuration)

(closed/open doors)

- Height: 2100/2100 mm
- Length: 3320/3320 mm
- Depth: 1000/2065 mm
- Weight: 520 kg

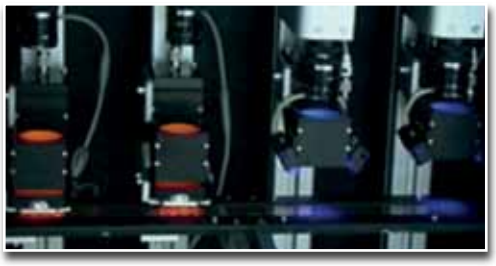
Throughput

- Up to 69,000 UPH
  (depending on encoding time)

The chip module encoding and testing system CMT is designed for counting, testing and initialization of IC modules and RFID products on standard or 35 mm tapes. Depending on the configuration, the system can be used as an output quality measurement system for tape manufactures incl. integrated disconnect punch tool as well as an input quality measurement and pre-personalization system for card manufacturers. High speed test-handling or module counting with up to 69,000 modules per hour can be realized through the synchronization of test and pre-personalization. Testing of contact, contactless, dual interface and single or multirow modules as well as for RFID applications can be realized with the best performance and yield in the market. Faulty modules are clearly marked by a reject punch hole.

FCM 10000 + CMTI

Flip Chip IC Module Production



GSM cards

Banking cards

Any other type of Smart Card

THE ALL IN ONE SOLUTION

- High speed flip chip mounting of up to 9,500 UPH
- High placement accuracy of ±20µm
- A compact production and high speed inspection line for IC modules
- Both optical and electrical quality control of the finished product

FEATURES & ADVANTAGES

Design
- High security access control with individual operator and service identification
- Menu-driven software, available in different languages
- Storage of process data
- Vacuum fixing of the tape at inspection position
- Input and output IC module counter
- Detailed production data report (good/reject modules)

Workstations
FCM 10000
- Adhesive application
- Linear bond head
- Optical tape positioning
- Flip chip die attach
- Final bonder

CMTI
- Input module counter
- Tape break
- Reject punch
- Tape transport

Options
FCM 10000
- ACP or NCP
- Epoxy dispensing
- Plasma cleaning
- Wafer mapping
- Several thermode stations can be configured
- Motorized wafer zoom inspection

CMTI
- Electrical test system (Microprobe or Smartware)
- Flip chip inspection
- Binocular microscope
- Printer
- Bar code reader
- United power supply
- Statistical analysis

Spooling systems
- In- and output spooler TS 1145/I, /O with integrated tape buffer for module tape and spacer tape

Placement accuracy
- Placement accuracy +/- 20 µm
- Final bond accuracy +/- 30 µm

Wafer
- 6", 8" or 12" wafer

Tape specification
- Module tape: 35 mm, super 35 mm
  reel Ø max. 700 mm
  pitch 9.5, 14.25, 19 mm
- Spacer tape: 35 mm, reel Ø
  max. 500 mm

Process parameters
- Chip position and size: repeatability: ± 5 µm, rotation: ± 1°

Pitch
- x = direction of transport
- y = 90° to direction of transport
  min: x = freely programmable, y = 35 mm

Die sizes
- min: 0.5 mm x 0.5 mm
  max: 5.0 mm x 5.0 mm

Facilities
- Power: 400 V, AC, 16 A, 50 Hz
- Compressed air: max. 10 bar, 85 l/min.
- Suction: 6 bar, 65 l/min.

Environmental conditions
- Room temperature: 23 °C ± 3 °C
- Humidity: 50 % ± 10 %

Dimensions (FCM 10000 + CMTI incl. spoolers)
- Height: 2200 mm
- Length: 7300 mm
- Depth: 1300 mm
- Weight: 3300 kg

Throughput
- Up to 9,500 modules per hour (depending on process specification)

Mühlbauer's FCM 10000 excels thanks to its compact design, high output yield and excellent cost-efficiency. This system assembles the module tapes with chips directly from the wafer through Mühlbauers proven flip chip technology. Despite a placing accuracy of ± 20 µm, a throughput of up to 9,500 UPH can be achieved, the equivalent of an annual capacity of 50 million modules. The CMTI is integrated inline to the FCM 10000 for a fully automatic optical and electrical inspection. The CMTI's highlight is the full control of the chip placement with high precision optical measurement of position, size and contamination of chip bottom surface (depending on glue type and contrast). An electrical test station can be integrated as another option for ATR and functional test as well as pre-personalisation. The integrated statistics package allows a long-time process control together with all necessary data for QAM systems. Faulty IC modules are clearly marked by a reject punch hole. The 100% optical inspection during each bonding process guarantees highest production quality.

Mühlbauer MCES

Personalization Management Software

JOB PAGE

Todo, in progress and finished queues

KEY FEATURES

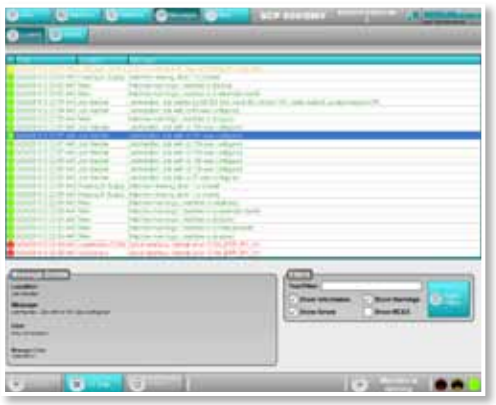
- Intuitive and secure user interface
- Open system
- Adaptable for all purposes
- Identification documents
  - Telecommunication
  - Banking
  - Others
- Multiple input formats
- Chip O/S specific coding applications
- Configurable payment application scripts
- High secure document and data processing
- Inline card data testing
  - Data pre-test
  - Sample post-test
  - Full test
- Customizable reporting
- Vendor independent extensions through powerful SDK with system simulator
- Highly scalable system
- Runs on all machine sizes

NEW CODING ELECTRONIC

New Mühlbauer modular coding electronic for standard contact coding, advanced contact coding and testing, contactless coding and resonance frequency measurement.

- Modular system consisting out of one CPU board and two extension boards (2x combi, 4x contact, 4x contactless coding)
- Supported contact protocols: ISO/IEC 7816-3 and ISO7816-4, T=0, T=1, I^2C, memory chips (SLExxxx, ATxx); special customer protocols with contact coding advanced board also possible
- Open & Short test, Leakage Test with contact coding advanced board
- Supported contactless protocols: ISO14443A/B, ISO15693; Mifare™, Mifare+™, up to 424Kbit/s

FEATURES & ADVANTAGES



MESSAGE PAGE

Info and error messages

THE USER

has an intuitive and easy to use front-end, allowing easy and intuitive control of personalization jobs, processes and reports.

THE ADMINISTRATOR

finds an environment allowing the fine tuning of the security and a system that fully complies the requirement for secure document production in the ID, telecommunication or the banking areas. The MCES is ideally suited to run within the restrictions set out by PCI, the best pratices as set out for EMV personalization, or the regulations prescribed by credit card companies.

THE SUPERVISOR

can get in-depth reporting that allows the management to make informed decisions.

THE MANAGEMENT

gets a tried and proven system, as the MCES has been in use since 1999. It can be adapted easily and cheaply to new card products. Where required this can even be done independently of Mühlbauer, the machine vendor. Thus Mühlbauer gives its clients a speed and price advantage over users of other equipment. Therefore Mühlbauer empowers its clients to be able to take advantage of new opportunities in the market.

The MCES is able to support different interface methods. SQL direct injection can be implemented through ODBC.
The Mühlbauer data acquisition handles the option of input files with a variety of different formats ranging from classics like Tag Length Value (TLV) coded files, through Comma Separated Lists (CSV) flat files, to XML files. The data required for the personalization process is merged with the product information within the MCES.

All personalization data is buffered in encrypted form and deleted after use. The backend of the MCES is the Mülbauer master system and various workstations or pocessing units. After the personalization finishes all stored personalization data is deleted. These processing units operate the individual personalization actions. During this a large amount of logging data is generated allowing to generate reporting information in XML. This in turn can be transformed into any required format.

Electrical Test & Pre-Personalization

Further available personalization&test management software

About Microprocess

Active since 1979 in the field of testing and programming of electrical components, Microprocess is one of the market leading providers for the smart card industry. Active in the test of contact, contactless and dual interface micro-modules, Microprocess supplies the most evolved test features, allowing you to ensure the quality of your production.

Special features Microprocess

- MVPI personalisation environment
- Optimum throughput thanks to embedded programming
- Access to HSM devices available
- On-site training by Microprocess engineers available

About Smartware

Established in 1986, Smartware is one of the leading providers of Software/Hardware solutions and services for smart cards. Smartware designs, develops and manufactures electronic boards and embedded systems dedicated to the personalisation and the test of contact/ contactless and dual interface GSM, banking, transport and ePassport smart card chips.

Special features Smartware

- SmartGear personalisation environment
- Embedded application for faster personalisation
- Script language for easy application development
- Full range of accessories for development and de-bugging
- Training and on-site assistance available

Standard features/supported tests:

- Contact and contactless parametric testing:
  - open/short
  - leakage current
  - resonance frequency
  - retro modulation measurement
  - remote and embedded user applications
  - chip consumption
  - drivability testing
  - chip impedance
- Personalisation of cards or chip card modules
- OS loading, pre-personalisation, personalisation

Supported protocols:

- ISO 7816 (T=0 T=1)
- Memory chips (SLE 4406, AT24CXX, …)
- SWP
- USB 2.0
- SD
- ISO 14443 (A/B)
- ISO 15693
- FeliCa
- Mifare (Classic, Ultra Light, Ultra Light C, DesFire, …)

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 & Forming
- Die Sorting

Industrial Inspection Systems

- Packaging
- Metal Working
- Special Solutions

Flexible Solar Technology

- Concentrator Solar Technology
- Flexible Solar Cell Technology
- Solar Panel Technology

TECURITY®

- ID Card Solution
- ePassport Solution
- 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
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