Mühlbauer
High Tech International

ePASSPORT PRODUCTION TECHNOLOGY

PRODUCT OVERVIEW

HOLDERPAGE PRODUCTION | BOOKLET PRODUCTION | SOFTWARE SOLUTIONS

www.muehlbauer.de

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 3,500 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, for example 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 every 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 on wheels. 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.

CONTENTS

One Stop Shop Technology Partner

Comprehensive Competence in End-to-End Systems

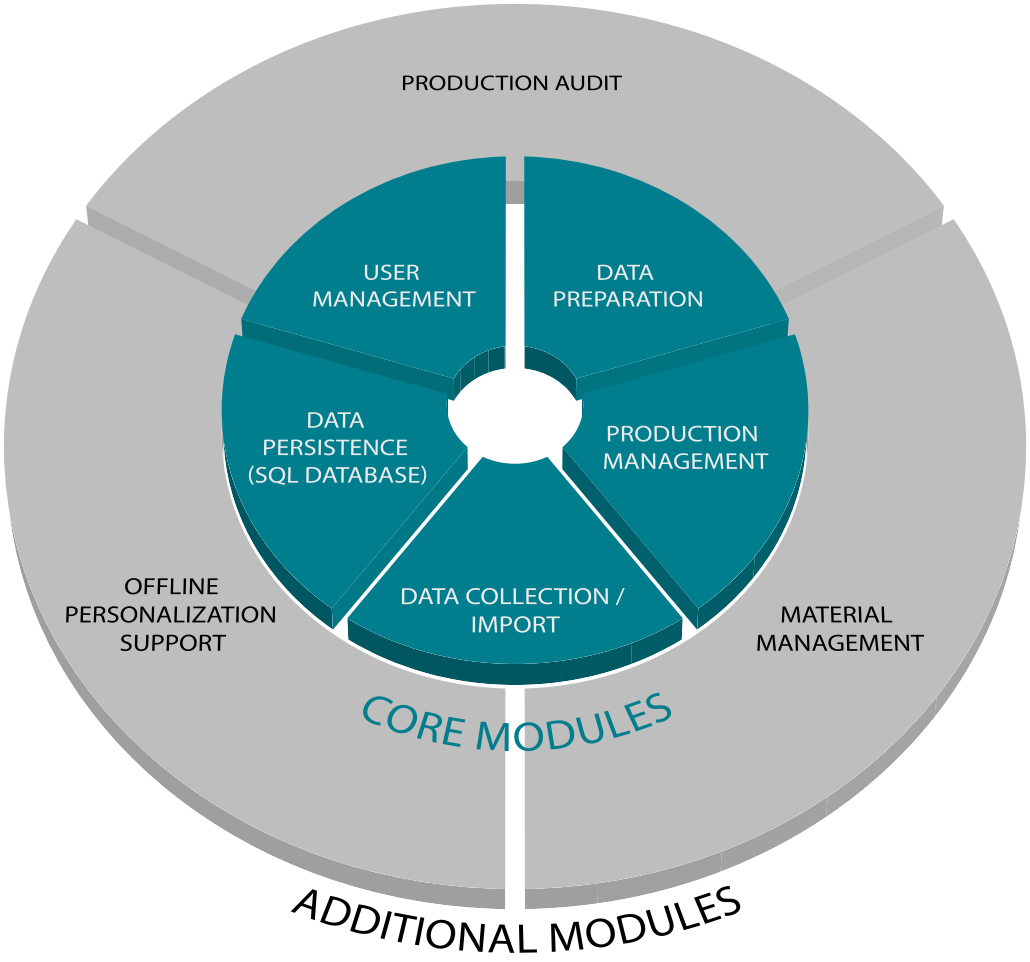
Mühlbauer Group provides a complete one stop shop for end-to-end production of solutions and systems for the smart card, ePassport, semiconductor industry and inspection technology. We incorporate significant competence in providing optimized and state-of-the-art technology as well as customized equipment. 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

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 INCAPE/BASIC

Integrated Production & Personalization Management Software

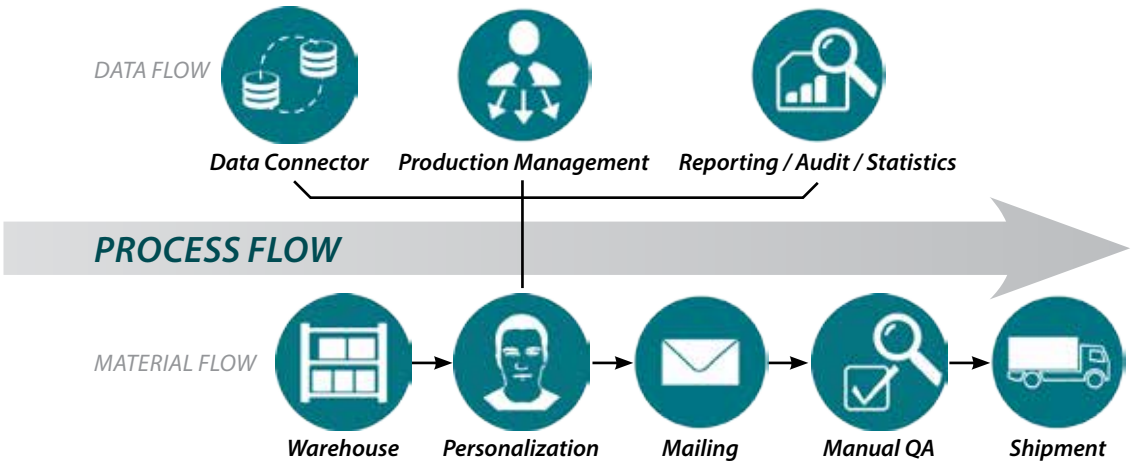


KEY FEATURES

- Streamlined web-based user interfaces with easy localization / internationalization support
- Out-of-the-box support of current Microsoft® operating systems
- Highly automated workflows with less operator interaction
- The only software solution in the world for combined data management, complete production control and material management
- Modular solution to organize the complete production of premium high-secure documents
- Covers the full production control requirements (security industry and EMV standards)

FEATURES

MB INCAPE/BASIC is Mühlbauer's PMS Solution (Production Management Software) for the personalization of electronic cards and documents (e.g. ID cards, ePassports, driver's licenses, EMV or GSM cards).



Main Functions

- Production management
- Data management
- Seamless integration of Mühlbauer materials management

MB INCAPE/BASIC is targeting

- Cost-effective and scalable data, workflow and material management for card and document personalization
- Configurable workflow steps (personalization, quality assurance, mailing)
- Main focus on automated processing (minimum operator intervention except for personalization on machines and manual quality checking)
- Web-based operator clients:
  UI is customizable (localization, internationalization, branding)
- ICAO compliant data preparation
- Scalability regarding:
  - Document types
  - Connected machines (up to 20 desktop machines)
  - Personalization offices (up to 10 sites)
- Seamless tracking of document life-cycle inside the personalization with integration of Mühlbauer materials management (MB Warehouse)
- Connection to card or document management systems (e.g. civil register): Via web service, database or file-based interface
- Direct interface to MB personalization machines (integration of 3rd party machines possible)
- Integration of MB User Management

The MB INCAPE architecture consists of a modular concept to fulfil the needed scalability in all kinds of document body production steps as well as in all types of personalization characteristics (e.g. centralized and decentralized processes, various types of personalization machines, application specific data preparation scenarios etc.).

Concerning hardware and software components the scalability applies to the implementation of all kinds of ID documents, fulfils performance requirements and allows to process customer and application specific production, personalization, quality control and document delivery scenarios with highest solution flexibility.

SSH 2008

Semiautomatic Sheet Hot Stamping System

KEY MODULES

- x/y sheet table
- Hot stamping unit
- DOVID application

UPH

500 | 750 | 1,000 | 1,250 | 1,500 | 1,750

FEATURES & TECHNICAL DATA

Key Features

- Semiautomatic hot stamping system for the application of security features on sheet-layers
- Wide range adjustable process parameters suitable to process all security features available in the market
- Highly accurate and programmable positioning system
- User and operator friendly, easy to learn and maneuver
- Fast and easy use of interchangeable parts and / or products
- Customizable stamping tool design and manufacturing
- INCAPE ready

Productivity / Process Units

- Manual sheet loading
- Vacuum fixing of the sheet on application table
- SPS controlled machine operation
- Easy teach mode of application position
- Flexibly programmable x/y table
- DOVID alignment to print mark or programmable fixed transport steps
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical Data

- Sheet materials: PVC, PC, ABS, TeCoLas®; others on request
- Sheet size: Max. 630 x 535 mm
- Sheet thickness: 50 µm to 3,000 µm
- Max. tape width of security material: 55 mm
- Max. hologram diameter: Typically 20 mm
- Application accuracy: +/- 0.1 mm
- Hot stamping force: Continuously adjustable up to 3 kN
- Temperature range: 20°C – 170°C
- Throughput: Up to 1,250 units / hour; depending on application processes and operator

The semiautomatic sheet hot stamping system SSH 2008 is used for applying security features on overlay or core sheets. Prior to the sheet lamination process, the hologram is embedded inside the document. This is a cost efficient, economical and easy to operate solution that provides high-quality security features for different applications including ID documents like ID cards and passport holderpages etc. DOVID are processed from the reel and transferred directly to the core or overlay sheet.

This is achieved through freely programmable parameters such as time, pressure and temperature. The carrier material is rewound onto the reel saving space and reducing changeover time. An integrated vacuum system ensures smooth handling without damaging the sheets and guarantees a highly accurate placement of the hologram. This system can be flexibly integrated into any production environment making the SSH 2008 extremely versatile.

FP 201

Foil Punching System

KEY MODULES

- Manual foil input
- Foil punching unit
- Automatic waste output
- Manual foil output

UPH

50 | 100 | 150 | 200 | 250 | 300 | 350

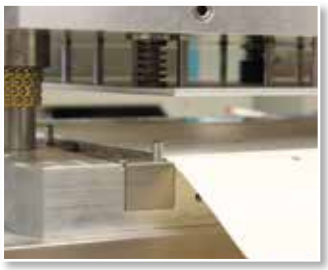
FEATURES & TECHNICAL DATA

Key Features

- Manual input of foils
- Punching in one stroke with highest accuracy
- Manual output of foils
- In-house tool manufacturing assuring highest flexibility of tools
- Special / customized tool design
- Fast in-house regrinding service
- Most proven punching system for various materials

Productivity / Process Units

- Pneumatic driven punching system (direct drive)
- No electronic, easiest operation and maintenance
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%



Technical Data

Sheet materials:	PVC, PC, ABS, PET; others on request
Sheet size max.:	350 mm x 500 mm
Sheet thickness:	50 µm - 300 µm
Punch drive:	Pneumatic driven (air pressure connection 6 bar)
Punching accuracy tool:	+/- 0.02 mm
Punching accuracy position:	+/- 0.1 mm

Mühlbauer´s FP 201 is a semiautomatic system to punch thin plastic material. It is the ideal solution for low-cost punching of compensation layers, as well as for contactless cards, hybrid cards and RFID tickets.

Additionally the FP 201 can be used for the production of windows in e-cover inlays.
As you can place more foils in one cycle, a throughput up to 300 foils / hour can be achieved.

ITH 540 - IT 50

Inlay Test Handling & Inlay Testing Systems

ITH 540

IT 50

KEY MODULES

- Y-axis sheet table
- Contactless test station
- Reject marking

UPH

500 | 750 | 1,000 | 1,250 | 1,500 | 1,750

FEATURES & ADVANTAGES

Key Features

- ITH 540
  - Realization of testing and pre-personalization
  - High flexibility regarding materials and different sheet layouts
  - Operator friendly easy operation
  - Automatic reject marking
  - Automatic counting of functional and rejected antennas
- IT 50
  - Manual inlay testing device
  - Test based on ATS (Answer To Select) test of antennas
  - Configuration is adjustable to customer requirements according to ISO 14443 A or ISO 14443 B

Productivity / Process Units

- ITH 540
  - Y-axis sheet table
  - Contactless testing station
  - Reject marking
  - Availability: Up to 95%
  - Yield: Up to 99.7%
  - Environment conditions: Room temperature: 23°C; +/-3°C
    Humidity: 50%; +/-10%

Technical Data

- Max. sheet size: 800 x 800 mm
- Sheet thickness: 0.10 to 1.00 mm (others on request)
- Configuration: Adjustable to customer requirements according to ISO 14443 A or B
- Throughput: Up to 1,000 sheets / hour; depending on material and test parameters as well as on operator speed

The inlay test handler ITH 540 is a semiautomatic machine for the testing of transponders integrated in sheets. The system is well-proven, easy to operate and has the possibility to freely program different sheet layouts. Testing and pre-personalization of RFID pre-laminated sheets, collated sheets, laminated sheets and inlay sheets have never been so simple. The integrated ETS-surface for ergonomic operations guarantees convenient functionality for operators and the maintenance friendly, long lifetime construction, reduces running costs.

The IT 50 inlay tester is used to manually check the functionality of the transponders integrated into sheets. The simple device offers highest flexibility as it can be transported to any location and allows an operator to quickly determine if the antenna is faulty. Two LEDs indicate the test results; green indicating a functional antenna and red indicating a fault. Faulty antennas can then be marked to ensure all antennas used in production are fully functional.

SSC 2502 - SSC 2502/1

Semiautomatic Sheet Collating Systems

SSC 2502

SSC 2502/1

KEY MODULES

- Thermal welding unit
- Adjustable stop pins
- Parameter control (SSC 2502)
- Illumination (SSC 2502/1)
- Swivel mounted table

UPH

50 100 150 200 250 300 350

FEATURES & ADVANTAGES

Key Features

- Semiautomatic operated collating system for individual sheet layers and security layers
- Suitable for standard collating tasks as well as for security applications
- Smallest footprint requirements and most easy operation
- Easy set-up and maintenance
- INCAPE ready

Productivity / Process Units

- Alignment of sheet layers based on cutting edge of the sheet
- Adjustable stop-pins on table
- SSC 2502/1 – manual ultrasonic welding unit
- SSC 2502 – foot switch operated thermal welding
- Adjustable welding temperature
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical Data

Sheet materials:	PVC, PC, ABS, TeCoLas®; others on request
Sheet size min. / max.:	290 x 290 - 800 x 800 mm
Sheet thickness min. / max.:	50 - 400 µm
Max. collating thickness:	Up to 1 mm
Max. welding temperature:	Up to 450°C
Throughput:	Up to 100 sheets / hour; depending on material and operator

The semiautomatic operated sheet collating system SSC 2502 is designed for the gathering and pre-fixing of plastic foils into sheet sets ready for lamination. Distinguished by its high flexibility the SSC 2502 is versatile and easy to handle. A swivel table along with a vertically adjustable frame and foot switch operation method make the equipment easy to use for any operator. Adjustable edge guides and additional thermal welding units allow for the collation of a wide variety of products including sheet sets containing contactless inlets.

The manually operated sheet collating system SSC 2502/1 is also designed for collating and welding of plastic foils into sheets ready for lamination. The system is flexibly adjustable in height and table position for operator friendliness. The layers are manually aligned to reference edges and prefixed manually with an ultrasonic welding unit. This allows prefixing of a complete set simultaneously in less than one second and setting a random number of spots. After the collating process the prefixed set is removed manually by the operator.

SSC 2700

Semiautomatic Sheet Collating System

KEY MODULES

- Sheet storage
- Vacuum table
- Vision
- Parameter control
- Two welding units

FEATURES & ADVANTAGES

Key Features

- Semiautomatic collating system for individual sheet layers and security layers
- Suitable for standard collating tasks as well as for security applications which require vision controlled positioning process
- Most precise vision controlled alignment of the sheet layers
- Smallest footprint requirements and easy operation
- Each single layer parameter is individually programmable (correct sequence)
- Optional thickness measurements to avoid double sheets
- Ergonomic shelf for supplying of sheets (optional)
- Integrated register punch for lamination of CLI / MLI feature (optional)
- INCAPE ready

Productivity / Process Units

- Vision system for high-precise sheet alignment on top and back side (see through) of the working table
- Alignment teachable to recognize marks, antenna pads, security features or other visible features on the layers
- Optional UV-illumination system available to check presence of UV-print
- Up to three independent alignment camera systems
- Two thermal welding units from top, optionally from top and bottom
- Programmable welding position, time and temperature
- Thickness measurement unit
- Alignment sensor for magnetic stripe foils optionally available
- Register hole punching 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

Sheet materials:	PVC, PC, ABS, TeCoLas®; others on request
Sheet size min. / max.:	290 x 290 - 750 x 750 mm
Sheet thickness min. / max.:	50 - 400 µm
Max. collating thickness:	Up to 1 mm
Max. welding temperature:	Up to 400°C
Welding time / force:	0 – 10 sec / 78 – 188 N
Throughput:	Up to 100 sheets / hour; depending on material and operator

The semiautomatic sheet collating system SSC 2700 is designed for gathering and pre-fixing the plastic foils into sheets ready for lamination. Besides being versatile, the SSC 2700 is distinguished by its precision and accuracy. An integrated vision system ensures that only sheets that are perfectly aligned to the print marks are collated. Additional thermal welding units and vision systems allow for the collation of a wide variety of products including sheet sets containing contactless inlets and / or magnetic stripes.

SSC 200

Semiautomatic Sheet Collating System

KEY MODULES

- Manual sheet alignment table
- Automatic overlay spooling unit
- Adjustable welding unit
- Parameter control
- Cutting unit
- Sheet stacker

UPH

100 150 200 250 300 350 400

FEATURES & TECHNICAL DATA

Key Features

- Semiautomatic collating system based on reel-to-sheet process
- Automatic feeding and positioning for overlay from reel
- Automatic transport and cutting system
- Manual feeding and alignment to reference edges of core layers in sheet format
- Easy handling and maintenance
- INCAPE ready

Productivity / Process Units

- Integrated spooling systems for overlay foil
- Sensor controlled alignment of overlay to edge or magstripe
- Two adjustable ultrasonic welding units
- Automatic welding parameter control
- Adjustable stop pins
- UV-illumination system optionally available
- Thickness measurement system optionally available to avoid double sheets
- Cutting unit after welding position
- Sensor controlled overlay alignment to edge or magstripe position
- Upgradeable to ASC 200 – fully automatic system
- Easy set-up and maintenance
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical Data

- Sheet materials: PVC, PC, ABS, TeCoLas®
- Overlay thickness: 40 – 300 µm
- Width of overlay reel: Max. 720 mm
- Reel diameter / core diameter: Max. 750 mm / 70 mm
- Center layers min. / max. sheet size: 290 x 290 mm / 720 x 720 mm
- Center layers min. / max. thickness: 45 - 600 µm
- Alignment accuracy: +/- 250 µm
- Throughput: Up to 400 sheets / hour; depending on material and operator

The SSC 200 machine concept is simple and is ingenious. Only one operator gathers the core sheets before aligning them manually at the adjustable stop pins. The machine works completely independently from material and thickness. Depending on requirements, overlays from top and bottom are delivered from reel.

The manually collated core sheets are securely fixed to the automatic fed overlay by two ultrasonic welding systems before the complete set is cut and transferred to the output stacker. The SSC 200 is controlled by one operating panel which also stores pre-set production configurations.

ASC 200

Automatic Sheet Collating System

KEY MODULES

- Automatic input sheet feeder
- Automatic overlay spooling unit
- Ultrasonic welding unit
- Cutting unit
- Output stacker

FEATURES & ADVANTAGES

Key Features

- Automatic sheet collating system for individual sheet layers and security layers
- Reel-to-sheet handling system for overlay foils
- Sheet-to-sheet handling system for core layers
- Output stacker for collated and prefixed sheet sets
- Modular design for flexible individual configuration of collating-units, on-site upgrade / extensions possible
- Easy set-up and maintenance
- INCAPE ready

Productivity / Process Units

- Spooling system for two overlay foils on reels
- Up to three core-layer-sheet feeding systems
- Alignment of core layers based on the cutting edge of the sheet
- Automatic overlay alignment according cutting edge or magstripe position
- Thickness measurement unit optionally available to avoid double sheets
- Programmable welding parameters (time, pressure, position)
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical Data

Sheet materials:	PVC, PC, ABS, TeCoLas®; others on request
Overlay thickness:	50 – 300 µm
Reel diameter / core diameter:	Max. 750 mm / 70 mm
Width of overlay:	Max. 720 mm
Sheet size min. / max.:	290 x 290 - 720 x 720 mm
Sheet thickness min. / max.:	100 - 600 µm
Max. collating thickness:	Up to 1 mm
Alignment accuracy:	+/- 250 µm
Throughput:	Up to 400 sheets / hour; depending on material and layout

The fully automatic sheet collating system ASC 200 is designed for the collating and welding sheets for the lamination process. The ASC 200 is highly flexible using ultrasonic welding units from the bottom. The different core layers are automatically inserted and aligned to edge before welding the complete set. Configurations of up to three core layers and two overlays from reel are possible. The alignment of the overlay is possible according to the edge or the magstripe. The fully collated and welded set is transferred to the output stacker.

ASC 2900

Automatic Sheet Collating System

KEY MODULES

- Automatic sheet feeding system
- Automatic overlay feeding system
- Movable control panel
- Vision system for print mark alignment
- Ultrasonic foil welding
- Cutting unit
- Sheet stacker

UPH

300 400 500 600 700 800

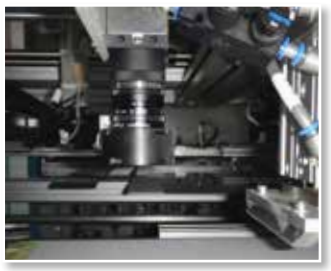
FEATURES & ADVANTAGES

Key Features

- Automatic high-speed sheet collating system
- Sheet-to-sheet and reel-to-sheet handling system available
- High-precision alignment by camera systems
- Proven solution for high-end products like security documents or contactless cards
- Sheet-to-sheet handling system for core layers
- Output of collated and pre-fixed sheet to stacker system
- Modular design for flexible configuration of individual collating-units, on-site upgrade / extension possible
- INCAPE ready

Productivity / Process Units

- Spooling system for overlay foils
- Up to five core-layer-sheet feeding systems; pallet handling system for fastest material feeding
- Two programmable ultrasonic welding units
- Vision controlled alignment system
- Alignment programmable to print marks, antenna pads, security features or other individual shapes on the layers optional
- Continuous edge control system for magnetic stripe overlays optional
- UV-illumination system optionally available
- Thickness measurement unit optionally available
- Register hole punching 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

Sheet materials:	PVC, PC, ABS, TeCoLas®; others on request
Overlay thickness:	50 – 300 µm
Width of overlay:	Max. 720 mm
Reel diameter / core diameter:	Max. 750 mm / 70 mm
Sheet size min. / max.:	290 x 290 - 720 x 720 mm
Sheet thickness min. / max.:	100 - 600 µm
Max. collating thickness:	Up to 1 mm
Alignment accuracy:	+/- 150 µm
Throughput:	Up to 600 sheets / hour; depending on material and layout

The Mühlbauer ASC 2900 is a fully automatic, absolutely flexible sheet collating system, unrivaled in the market. It serves standard as well as highly specific production requirements. Due to its high-precision optical collating process this machine is suitable for various ID applications. This fully automated system offers a throughput of up to 600 sheets / hour. Despite the complete automation it still allows flexible usage for the producer. The easy change-over between different materials and the handling of up to five core layers enable a variety of product configurations. The system can push your business forward and increase the efficiency of your production intensively, keeping quality and precision.

LP 5570/E

Full Size Sheet Lamination System – TWIN STACK

picture similar

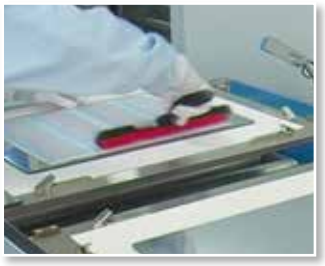
KEY MODULES

- Automatic loading and unloading basket
- Automatic loading and unloading table
- Lamination press
- Press force reduction
- Free programmable process parameter
- Product temperature measurement
- Cooling unit
- Weight compensation
- Thermal oil heating

UPH

50 | 100 | 150 | 200 | 250 | 300 | 350

FEATURES & ADVANTAGES



Key Features

- Automatic TWIN STACK sheet lamination system
- Features the most accurate heating technology worldwide
- Suitable for PVC volume production and for PC
- Wide range of programmable process parameters
- Intuitive human interface ensuring easy and efficient system and process handling
- Optimized energy management system for environment friendly and cost-saving operation
- Uniquely designed heating plates for perfect homogenous temperature conditions
- Fully modular system design
- INCAPE ready

Productivity / Process Units

- Eight or ten openings
- Weight compensation system
- Average heat variation on heating plates +/- 1°C
- Average heat variation overall heating plates +/- 3°C
- Special temperature management
- Programmable cycle time, lamination pressure, lamination temperature
- New product-parameter teach / set-up in just five minutes
- Heating and cooling in both presses possible
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical data

- Sheet materials: PVC, PC, ABS, TeCoLas®; others on request
- Sheet sizes: 530 x 680 mm (other size on request)
- Openings: 8 / 10
- Lamination force / hot press: 25 - 630 kN
- Lamination force / cooling press: 50 - 1,250 kN
- Repeat accuracy: +/- 0.5%
- Temperature tolerance: +/- 1°C
- Surface finish (ground): ≤ 1.2 µm
- Throughput: Up to 350 sheets / hour; depending on material and layout

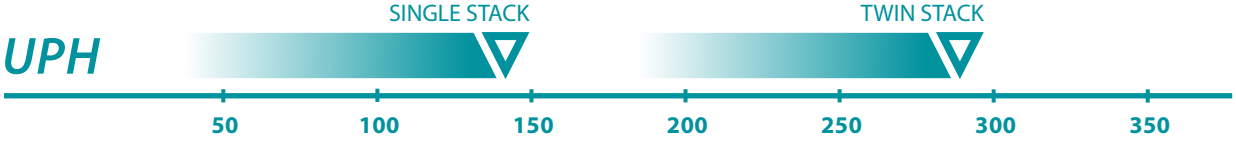
The Mühlbauer lamination system LP 5570/E is designed to laminate pre-lams, holderpages and similar products such as plastic cards, smartcards and contactless cards. The system is in compliance with the latest demands regarding economics, environment as well as product and process quality. All important process parameters such as temperature, pressure and cycle time are controlled continuously and individually. These features make it possible to laminate under optimal conditions with all current card materials such as ABS, PVC, PC, PET, PETG, PS, PE and PP. An available option is the weight compensation for the hot press, which allows for the lamination of plastic holderpages. The LP 5570/E can be configured with eight or ten openings and both systems are capable of holding between six and twelve layers per opening depending on production material.

LP 5570

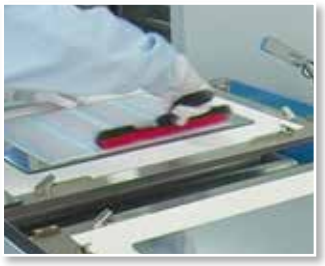
Full Size Sheet Lamination System – SINGLE or TWIN STACK

KEY MODULES

- Automatic loading and unloading basket
- Automatic loading and unloading table
- Lamination press
- Press force reduction
- Free programmable process parameter
- Product temperature measurement
- Vacuum
- Cooling unit
- Weight compensation
- Thermal oil heating



FEATURES & ADVANTAGES



Key Features

- Automatic SINGLE / TWIN STACK sheet lamination system
- Suitable for complex constructions like passports
- Wide range of programmable process parameters
- Intuitive human interface ensuring easy and efficient system and process handling
- Optimized energy management system for environment friendly and cost-saving operation
- Uniquely designed heating plates for perfect homogenous temperature conditions
- Fully modular system design
- INCAPE ready

Productivity / Process Units

- Up to eight openings
- Vacuum system optional
- Weight compensation system optional
- Average heat variation on heating plates +/- 1°C
- Average heat variation overall heating plates +/- 3°C
- Special temperature management
- Programmable cycle-time, lamination pressure, lamination temperature
- New product-parameter teach / set-up in just five minutes
- Heating and cooling in both presses possible (TWIN)
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical data

- Sheet materials: PVC, PC, ABS, TeCoLas®; others on request
- Sheet sizes: 530 x 680 mm (other size on request)
- Openings: 4 up to 8
- Lamination force / pressure: 50 – 1,250 kN
- Repeat accuracy: +/- 0.5%
- Temperature tolerance: +/- 1°C
- Surface finish (ground): ≤ 1.2 µm
- Throughput: Up to 144 (SINGLE STACK) / 288 (TWIN STACK) sheets / hour; depending on material and layout

The Mühlbauer lamination system LP 5570 is designed to laminate pre-lams, holderpages and similar products such as plastic cards, smartcards and contactless cards. The system is in compliance with the latest demands regarding economics, environment as well as product and process quality. All important process parameters such as temperature, pressure and cycle time are controlled continuously and individually. These features make it possible to laminate under optional conditions with all current card materials such as ABS, PVC PC, PET, PETG, PS, PE, TeCoLas® and PP. Available options are weight compensation and vacuum chamber for the hot press, which allows for the lamination of more complex cards. The LP 5570 can be configured with four, six or eight openings and each system is capable of holding between six and twelve layers per opening depending on production material.

HPM 300

Holderpage Milling System

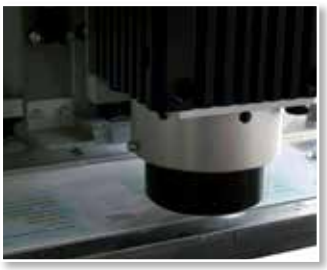
KEY MODULES

- Input module
- Input control
- CNC milling station
- Thickness measurement station
- Cutting station
- Reject unit
- Output module

UPH

200 | 300 | 400 | 500 | 600 | 700

FEATURES & ADVANTAGES



Key Features

- Designed for the unique Mühlbauer Hinge Technology
- Fast and easy to handle production of the Hinge by milling procedure
- Higher flexibility of the Hinge because of adjustable and variable parameters such as thickness
- The milling of the special composition material within the holder page, results in a flexible and robust Hinge
- The high accuracy of the milling process, leaves a smooth finish transition between holder page and the Hinge
- Additional processes, like attaching the hinge to the holder page, are eliminated

Productivity / Process Units

- Suction units guarantee scratch free handling
- Input control ensures the processing of one holderpage at a time
- Milling head with adjustable rotation speed
- Integrated cleaning station for waste removal
- Thickness measurement and reject unit for holderpages outside the predefined tolerance
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical Data

- CNC milling head: Setup of Hinge thickness and size
- Movable axis: X, Y and Z
- Material: PC; others on request
- Holderpage dimensions: According to 2-up ID-3 format
- Y accuracy: ± 0.20 mm
- Z accuracy: ± 0.05 mm
- Throughput: Up to 300 (2-up) holderpages / hour

The HPM 300 is designed to manufacture the holderpage Hinge, a thin and flexible, yet robust layer which is sewn into the passport. Mühlbauer´s patented Hinge Technology offers fast and effective production of Hinges adaptable to any production. This is due to the adjustable and variable parameters, such as Hinge thickness or the flexibility in the composition of the material. Ultimate quality and reliable production are guaranteed by integrating various features such as input separation, thickness measurement control and output reject sorting. Processing of holderpages in 2-up format allows for the effortless integration of the machine into the existing and proven Mühlbauer passport production line providing a throughput of up to 300 holderpages per hour.

HPP 2021/A - HPP 2021/M

Holderpage Punching Systems

HPP 2021/A

HPP 2021/M

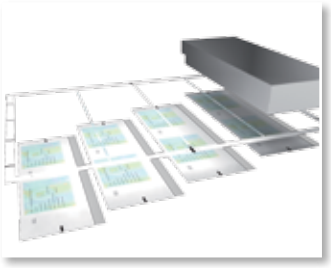
KEY MODULES

- Sheet feeding
- Optical sheet alignment
- Double sheet recognition
- Hydraulic punching unit
- Automatic skeleton ejection
- Output module

UPH

3,500 | 5,000 | 6,500 | 8,000 | 9,500 | 11,000

FEATURES & ADVANTAGES



Key Features

- Automatic punching system for polycarbonate and PVC passport holderpages
- Manual or automatic sheet feeding
- Highly accurate and precise hydraulic driven punching unit
- Easy to operate and to maintain
- Customized tool design, in-house tool manufacturing and regrinding services
- INCAPE ready

Productivity / Process Units

- HPP 2021/M based on manual sheet feeding
- HPP 2021/A with automatic sheet feeding from sheet stacker
- Hydraulic driven punching system
- Programmable punching speed and punching distance
- Optical sensor system top and bottom for sheet positioning in punching position available
- 1- / 2-up punching tools
- Adjustable punching parameters for punching speed
- Automatic holderpage output to conveyor belt or to stack handling system
- Availability: Up to 95%
- Yield: Up to 99.7%
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical Data

- Sheet materials: PC, PVC; other materials on request
- Sheet sizes: Up to 405 x 510 mm
- Sheet thickness: 500 – 1,000 µm; other thickness on request
- Punching speed / pressure: 25 - 200 m/s / 100 kN
- Punching tools: 1- / 2-up
- Single tool size: Up to 205 x 205 mm
- Punching accuracy: +/- 100 µm
- Throughput: Up to 5,000 holderpages / hour; depending on material and layout

The HPP 2021 A and HPP 2021M holderpage punching systems exceed all requirements for high-precision and reliable punching of holderpages in 2-up format. These systems are available in fully and semiautomatic versions depending on production needs and required level of automation. Mühlbauer punching systems are well-proven around the globe. A powerful hydraulic system enables the processing of PC material while the easily accessible punching unit ensures quick and easy tool change, making this system robust as well as easy to operate. More important the systems are designed for continuous quality production. Double sheet recognition and optical sheet alignment sensors ensure that only single sheets are processed and that the punching is done in accordance to the print marks. Handling of double sheet sizes is also possible with an integrated double sheet lift and cutting system. This allows even higher productivity and yield. Both systems, depending on configuration, are able to produce up to 5,000 holderpages per hour.

HPI 3000

Holderpage Inspection

KEY MODULES

- Input module
- Cleaning station (front)
- Vision inspection (front)
- Contacless test station
- Turning station
- Cleaning station (back)
- Vision inspection (back)
- Output module
- Reject
- Reject Marking

UPH

500 | 750 | 1,000 | 1,250 | 1,500 | 1,750

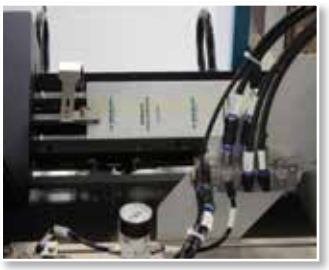
FEATURES & ADVANTAGES

Key Features

- Fully automatic optical inspection, testing and pre-personalization system for holderpages, inlays, pre-lams and eCovers
- Easy self-teach modus for optical systems
- 2-up, 2-up double, 3-up and 3-up double ID-3 formats possible
- Thickness measurement, print or hot stamp marking possible
- Easy to adjust, operate and maintain
- INCAPE and MCES ready

Productivity / Process Units

- Automatic holderpage feeding and stacking from / to input / output stacker
- Individual surface and print inspection systems for front side and back side inspection, inspection features:
  - UV-inspection
  - Microtext inspection
  - Format inspection
  - CLI / MLI / relieve inspection optional
  - Customized inspection features on request
- RFID / chip test / initialization unit
- Customized test procedures on request
- Reject marking by hot stamping or print mark
- Adjustable lamination temperature, speed and pressure
- MCES based chip pre-personalization optional
- TCP/IP interface optional
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%



Technical Data

Holderpage format:	2-up, 3-up, 2- / 3-up double
Holderpage thickness:	500 - 1,000 µm
Resolution print inspection:	2,048 Pixel b/w – ca. 65 µm / Pixel
Resolution surface inspection:	2,048 Pixel color – ca. 65 µm / Pixel
Optical system surface inspection:	Line-Scan color camera
Optical system print inspection:	Line-Scan b/w
IC Module types:	Contactless: ISO 14443 / 15693
Throughput:	Up to 1,500 (2-up) holderpages / hour; depending on process and chip coding time

ITH 5610/Vision is tailor-made for the inspection of PC holderpages. This high-volume system which includes up to ten high-resolution cameras, inspects: UV print, color print, surface, micro text and DOVID, guaranteeing the highest inspection quality. Cutting edge client / server technology as well as statistical error reporting, control the production process, offering live online visualization of the inspection ,which ensures 100% quality output. The system is controlled by our open universal personalization platform MCES and can be connected to various production management systems such as the integrated personalization and production management system MB INCAPE.

ePLS 6000

eCover Lamination System

KEY MODULES

- Input Modules
- Input control
- Thickness measuring station
- Glue Applicator
- eCover Lamination
- Chip and antenna functionality testing
- Reject unit
- Output module
- Movable control panel

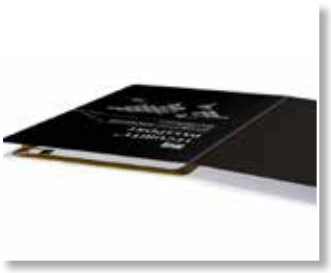
UPH

900 1000 1100 1200 1300 1400

FEATURES & ADVANTAGES

Key Features

- Industrial automatic eCover lamination
- Latest technology for high reliable and efficient eCover lamination
- Intuitive user interface for efficient and productive operation
- MCES / INCAPE / PALAMAX ready



Productivity / Process Units

- Input Feeder Cover Material
- Input Feeder System Antenna Inlay
- Input Feeder Compensation Layer
- Glue Applicator
- Pressing Unit
- Chip Testing Unit
- Output Unit
- Evnironment Conditions: Room temperature: 23°C +/- 3°C

Technical Data

Passport types and formats:	ID-3 MRP, ePassports according to ICAO 9303
Processing format:	2-up
Max pages:	up to 96
Glue type:	Hot melt glue
Throughput:	Up to 1200 eCovers / hour; depending on process parametes

The Mühlbauer ePLS 6000 is a fully automatic machine which produces the booklet eCover, used later in the state-of-the-art Passport production.
The cover material provided by the Cover Input Feeder, is joined together with the RFID Inlay provided by the Antenna Feeder on one side of the future eCover and with the Compensation Layer on the other side of the future eCover, in a gluing application assisted by mechanical and electronic processes, resulting in a raw booklet eCover. The eCover will be collated later with the booklet paper set forming a state-of-the-art eCover Passport.
The required materials are handled through the ePLS 6000 in a 2-up format, with a throughput of up to 1200 eCovers per hour, depending on used material variety and/or applied process parameters.

SABL 100

NEW

Semi Automatic Booklet Line

SABL100RF

SABL100CS

SABL100LS

SABL100CF

SABL100BP

IDENTIFIER 60 PERSYS

SABL100IP

KEY MODULES

- Passport Collating & Sewing
- Lamination
- Passport Finishing
- Final Booklet Punching
- Laser Number Perforation
- Passport Number Impact Print

UPH

100 110 120 130 140 150

FEATURES & ADVANTAGES

Key Features

- Industrial semi-automatic booklet production and pre-personalization
- Perfectly suitable for product development, small and medium batch production
- Identical processes equipment with the Automatic Booklet Line, e.g. sewing, laser perforation, impact print numbering
- MCES / INCAPE / PALAMAX ready

Productivity / Process Units

- SABL 100 RF: Reinforcement Tape Application on flyleaf
- SABL 100 CS: Collating and Sewing System of inner paper set of the booklets
- SABL 100 LS: Lamination System of the cover to the paper set and bonding system
- SABL 100 CF: Cutting and Finishing System (2-up cutting, booklet folding, booklet spine forming)
- SABL 100 BP: Booklet Punching to ICAO format
- IDENTIFIER 60 - PERSYS: Laser Perforation Numbering with optional chip pre-personalization
- SABL 100 IP: Booklet Impact Printing

Technical Data

Passport types and formats:	ID-3 MRP, ePassports according to ICAO 9303
Processing format:	2-up
Max pages:	up to 96
Max booklet format:	according ICAO 9303
Glue type:	Water based cold glue
Throughput:	Up to 130 booklets / hour; depending on process parametes

The Semiautomatic Booklet line (SABL) provides the flexibility of passports and ePassports production, in circumstances like: product development, product evaluation and/or small to medium production volumes.
The standalone semiautomatic machines – SABL 100 RF, SABL 100 CS, SABL 100 LS, SABL 100 CF, SABL 100 BP, IDENTIFIER 60 PERSYS, SABL 100 IP – form a highly flexible production system for collating and sewing, laminating and bonding, booklet finishing and booklet pre personalization.
Booklets are handled through the SABL line in a 2-up format, with a throughput of up to 130 passports per hour, depending on used material variety and/or applied process parameters.

Booklet Line

Passport Booklet Production Systems

PCS 6000

PLS 6000

PFS 6000

PBS 600

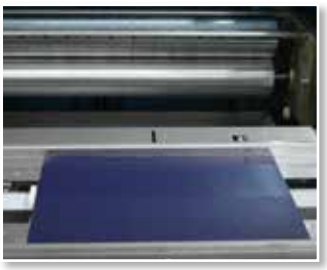
KEY MODULES

- Cover embossing
- Passport collating and sewing
- Passport lamination
- Passport bonding
- Passport finishing

UPH

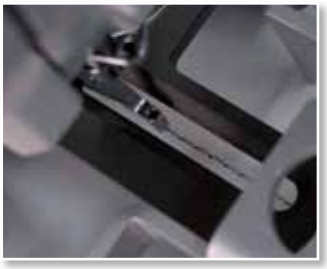
1,500 | 2,000 | 2,500 | 3,000 | 3,500 | 4,000

FEATURES & ADVANTAGES



Key Features

- Highly modular designed process modules and units for stand-alone and in-line production
- Latest technology for highly reliable and efficient ePassport production
- High secure "interlock stitching" sewing process supported
- Most gentle and sensitive material handling for high-quality booklet production
- Intuitive user interface for efficient and productive operation
- MCES / INCAPE ready / PALAMAX



Productivity / Process Units

- PCS 6000 – passport collating system
  Collating and sewing of the inner set of booklets
- PLS 6000 – laminating system
  Lamination of the cover to the inner set;
  suitable as well for eCover production
- PBS 600 – passport bonding system
  Pressing system for post pressing of glued covers
- PFS 6000 – finishing system
  Embossing, Cutting, folding and punching system to finalize the booklet
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical Data

Passport types and formats:	ID-3 MRPs; ePassports according to ICAO 9303
Processing format:	2-up
Max. pages:	Up to 96
Max. booklet format:	Booklets according to ICAO 9303
Glue type:	Cold / hot
Throughput:	Up to 3,000 passports / hour; depending on process parameters

The Booklet Line comprises the complete systems for the production of passports and ePassports. Five stand-alone machines – PCS 6000, PLS 6000, PES 600, PBS 600 and PFS 6000 – form a highly effective production system for collating and sewing, laminating, embossing, binding and finishing. Separated processes allow highest production flexibility.
Materials are handled through the Booklet Line in a 2-up format with up to 3,000 passports / hour (depending on material and process parameters).

IDENTIFIER 6000 - PERSYS

Booklet Perforation & Numbering System

KEY MODULES

- Multi booklet input (stacker or magazine)
- Booklet opening / pageturning
- Passport identification module (e.g. serial number detection)
- Contactless chip encoding
- Quality assurance including reject and data verification
- Numbering station (with unique matrix unit optionally)
- Inkjet printing (serial number / barcode)
- Laser Number perforation
- Laser engraving (serial numbers)
- Multi booklet output (stacker or magazine)
- Booklet closing
- Labeling module
- Packaging module

UPH

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

FEATURES & ADVANTAGES

Key Features

- Combinable with IDENTIFIER 6000 process modules
- Fully automatic high-speed passport perforation system
- Highly modular system design - upgradeable even on-site
- Parallel process tracks to achieve max. speed and availability
- Multiple RFID / chip coding stations for pre-personalization optional
- Laser perforation technology
- Patented impact print technology (random numbering, mixed characters, special characters)
- Inkjet and / or laser printing technology as an option
- Online support
- MCES / INCAPE ready / PALAMAX

Productivity / Process Units

- Automatic passport feeding and stacking
- Automatic page turning units
- 400 W laser perforation system with integrated exhaust system
- Unique matrix numbering system with highest embossing flexibility
- Fully flexible numbering e.g. sequence, random and position
- Up to 24 chip coding units (optional)
- Electrical and / or optical output quality control optionally available
- Packing module optional
- On-site upgradeable to complete passport personalization with laser systems, inkjet printing systems, lamination modules, packing modules, labeling modules, etc.
- Environment conditions: Room temperature: 23°C; +/-3°C
  Humidity: 50%; +/-10%

Technical Data

- Passport types and formats: ID-3 MRPs; ePassports according to ICAO 9303
- Perforation technology: 400W CO2 laser
- Inkjet printing system: Max. continuous ink printer, DOD printing
- Interface: TCP / IP
- IC Module types: Contactless: ISO 14443 / 15693
- Throughput: Up to 3,000 passports / hour; depending on process and chip coding time

Mühlbauer's PERSYS 6000 is a state-of-the-art booklet perforation and numbering system for passports according to ICAO 9303. The IDENTIFER 6000 is designed to meet highest industrial demands regarding modularity, integration of process modules as well as latest electronics and software technology. The machine covers all processes, necessary for high-class perforation and numbering requirements.
In addition, the system can also be used for inkjet printing, impact print with sequent or random numbering, chip initialization and / or encoding, as well as labeling. The highlight is the new numbering unit with a unique matrix minting process; a Mühlbauer development already proven in the card personalization sector.
The operator friendliness was enhanced regarding ergonomic design and a new graphical user interface (GUI). Due to its highly flexible design, the IDENTIFIER 6000 can be easily configured according to customer and project demands as well as extended to a fully automatic passport personalization system, even on-site.

MCES

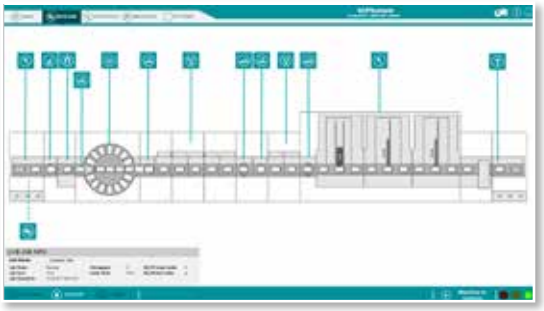
Personalization Software

MBMCES
Machine Management Software

Job Page

Todo, in Progress and Finished Queues

Machine Page



Documents in their Locations

Help Page

Documentation Display

Service Page

Chip Coding Stations

KEY FEATURES

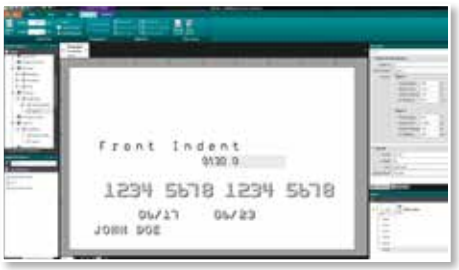
- Intuitive and secure user interface
- Open interfaces
- Adaptable for all purposes
  - Identification documents
  - Telecommunication
  - Payment
  - Others
- Multiple data input formats
- Chip OS specific coding applications
- Configurable payment application scripts
- High-secure document and data processing
- In-line 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

FEATURES & ADVANTAGES

Message Page

Info and Error Messages

ProductDesigner



Embosser Character Mappings

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 with the requirements for secure document production in the ID, tele communication or the banking areas. The MCES is ideally suited to run within the restrictions set out by PCI, the best practices 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 cost-effectively 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.

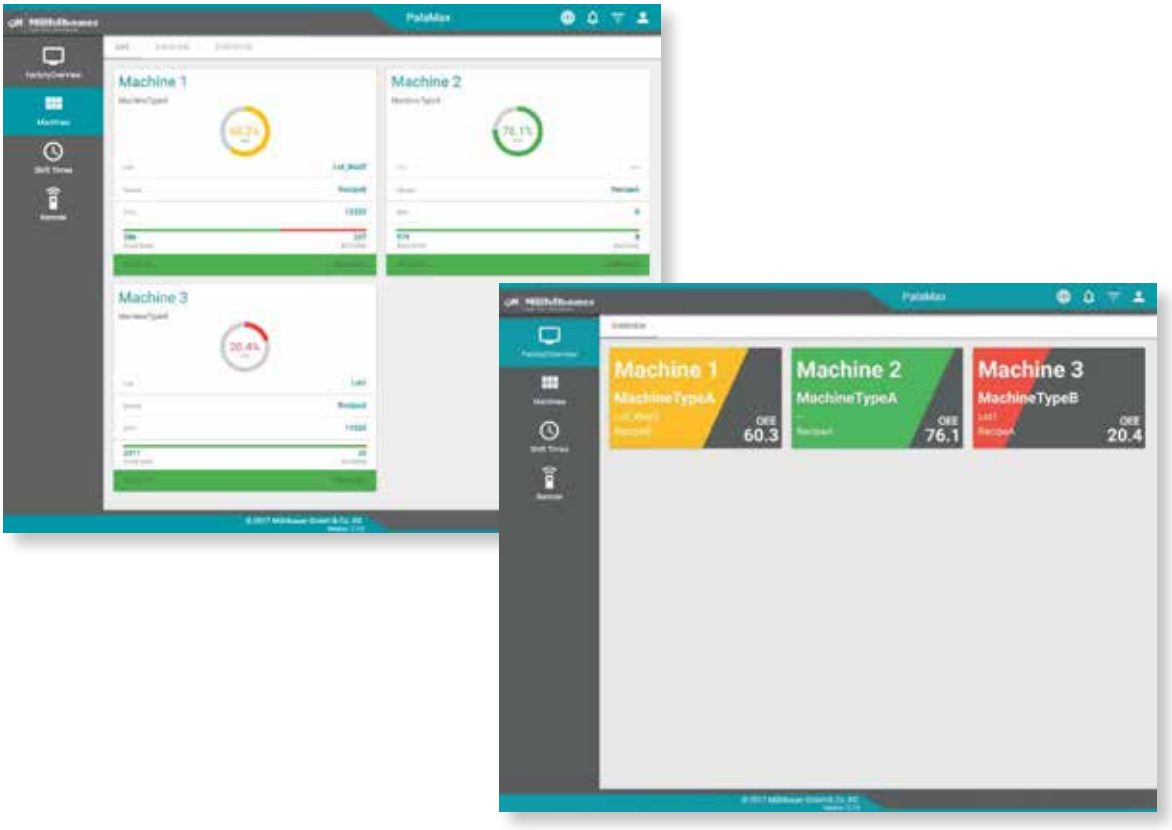
The MCES is able to support different interface methods. The Mühlbauer data acquisition handles the option of input files with a variety of different formats ranging from classic formats like Tag Length Value (TLV) coded files, through Comma Separated Lists (CSV) flat files, to XML files. The data required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

All personalization data can be buffered in encrypted form and deleted after use. The backend of the MCES are the Mühlbauer master system and various processing units. After the personalization finishes all stored personalization data is deleted. These processing units operate the individual personalization actions during which a large amount of logging data is generated allowing the generating of reporting information in XML. This in turn can be transformed into any required format.

The personalization management system integrates incoming data with product definitions in a similar way as a mail merge process. Additionally the MCES is a personalization management system controlling the associated physical and electrical personalization processes. The MCES handles personalization data from a variety of different input methods, formats and applies them to the cards, regardless whether magnetic stripe, chip encoding, or one or more of the various optical personalization processes, such as thermo-transfer printing, laser engraving, embossing or indent printing. The MCES manages all personalization processes within one software system. All this technology has to serve the purpose of helping the customer to make the best use of his investment. Therefore the system has been optimized to give every stakeholder the best value for his money.

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.

QUALITY ASSURANCE

Testing Equipment according to ICAO 9303 Requirements

PPT 2018/A

Abrasion stress test

PPT 2018/BP

Back pocket test

PPT 2018/DB

Dynamic bending test

PPT 2018/I

Impact test

PPT 2018/P

Pen test

PPT 2018/SP

Sheet pull test

PPT 2018/ST

Sheet turning test

PPT 2018/T

Torsion test

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
- 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

NOTES

NOTES

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