



# MB COLOR FAMILY

PRODUCT OVERVIEW



# MB COLOR FAMILY

## UNIQUE & SMART SECURITY CONCEPT

The main target of a smart security concept is to reach the highest document security level possible. It enables our clients and related authorities to quickly discover trials of fraud. During investigation of the ID document, government officers shall be able to verify a manipulated document on the 1<sup>st</sup> and / or 2<sup>nd</sup> security level.

Generally speaking, the security concept of the issued ID document can be divided in two parts. Firstly, the blank ID document, which is not yet personalized but is already equipped with a forgery-proof security design and security elements which protect

the document against copying and imitation. Secondly, additional security features which are applied during the personalization process to protect the individual information against forgery. In a sophisticated security concept, the blank document features and personalized security elements closely interact and together form a high-secure document.

With our MB COLOR FAMILY, the smart security concept is extended by various features which enable our clients or the relevant authority to easily conduct an automated and reliable verification by means of standardized reader systems.

## HIGH-SECURE PICTURE PERSONALIZATION OF ID DOCUMENTS

The photo on the personalized identity card is the main visual identifier of the document's holder. It is of utmost importance to present this main identifier in a perfect quality and to apply suitable protection against counterfeit attempts to change or manipulate the picture. Another main influence factor of the document specification is the service lifetime for the entire identity document in general and for the document's picture in particular.

The launch of the greyscale-laser engraving technology on polycarbonate documents marked a breakthrough for the personalization of identity documents. During this process, the holder's black-and-white portrait is laser-engraved inside the multi-layered polycarbonate document structure and thereby protected against any kind of manipulation or substitution. This greyscale-laser technology allows for the engraving of high-resolution pictures while at the same time keeping all the original picture details. Thus, a perfect cardholder authentication, a high durability, as well as a secure protection of the image against any kind of manipulation or substitution are ensured. For this

very reason, the greyscale-laser engraving technology is the preferred choice in different forensic committees around the world.

An identity project, however, must not only fulfill highest security and durability demands, but also needs to gain the general public's acceptance. In spite of the fact that greyscale-laser processes have become very well established, this technology has yet failed to reach the same level of acceptance in the general public as color personalization. In this context, many authorities hold the opinion that the implementation of greyscale images in identification documents means taking a step backwards in technology.

For this very reason, Mühlbauer has extended its comprehensive portfolio by the MB COLOR FAMILY, consisting of full Color DoD Picture, MB ALFRESCO®, MB ALFRESCO® PLC, MB ALFRESCO® PPL and MB EMBEDDED PICTURE. These different technologies are designed to meet the various demands for identification documents with regard to quality, cost-efficiency and durability.

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# MÜHLBAUER GROUP AT A GLANCE

## MÜHLBAUER'S BUSINESS UNITS AND SITES

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

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

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

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



Mühlbauer  
Bosnia & Herzegovina



Mühlbauer  
China



Mühlbauer  
Germany



Mühlbauer  
Malaysia



Mühlbauer  
Serbia



Mühlbauer  
Slovakia



Mühlbauer  
USA



**MPS**  
Precision Parts & Surface Engineering



**AUTOMATION**  
Production Equipment & Systems



**WORLD OF TECURITY®**  
Government & Technology Solutions



# MANUFACTURING EXECUTION SYSTEMS

## **MB MCES** PERSONALIZATION MANAGEMENT SYSTEM

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

## **MB INCAPE** INTEGRATED PRODUCTION MANAGEMENT SOFTWARE

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

## **MB PALAMAX®** TOTAL PROCESS TRANSPARENCY

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

## **MB TOOL LEADER** CONNECTOR BETWEEN SYSTEMS

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

## FEATURES & ADVANTAGES

-  Configurable workflow steps regarding personalization, quality assurance & issuance
-  Fully-automated processing & production management
-  Scalability regarding different documents, machines & personalization locations
-  Flawless integration of Mühlbauer's material management system (MB INCAPE WAREHOUSE)
-  Connection to card / document management systems via web service, database, file-based interface
-  Standard interface to personalization machines with integration of third-party machines possible
-  Integration of MB USER MANAGEMENT
-  Full coverage of production control requirements (security industry & EMV standards)
-  Seamless connection to MB PALAMAX® & MB DATA PREPARATION
-  Simplified administration due to web-based operator clients
-  Monitoring of real-time performance of the production
-  Seamless tracking of documents from point of production to issuance
-  Statistical tool analyze collected data & deliver customized statistics on OEE
-  Tool which enables the remote operation of machines on the shop floor from a control centre
-  Tool which increases effectiveness & efficiency so that production becomes more profitable
-  Enables production engineering to prepare & test a repeatable factory set-up. Factories can switch between products within minutes.



Mühlbauer's sophisticated MB ALFRESCO® technology smartly combines color picture personalization with laser engraving. To achieve the high-secure personalization result, the image of the holder is split into two parts by means of special image processing algorithms. The converting process transfers all picture information, which describe the details (forensic information), into a greyscale and a color image (without picture's black component). During the pre-personalization process, the greyscale information which contains all of the picture's contrast information is laser-engraved in the polycarbonate card body's inner layer. The picture's remaining color parts are converted to a separate color image and inkjet-printed on the blank document's surface.

The final result is a high-resolution color picture, which shows utmost details and has the same long-lasting durability characteristics (10+ years) as a pure laser-engraved picture. Since the color part of the photo is inkjet-printed on the document surface, as part

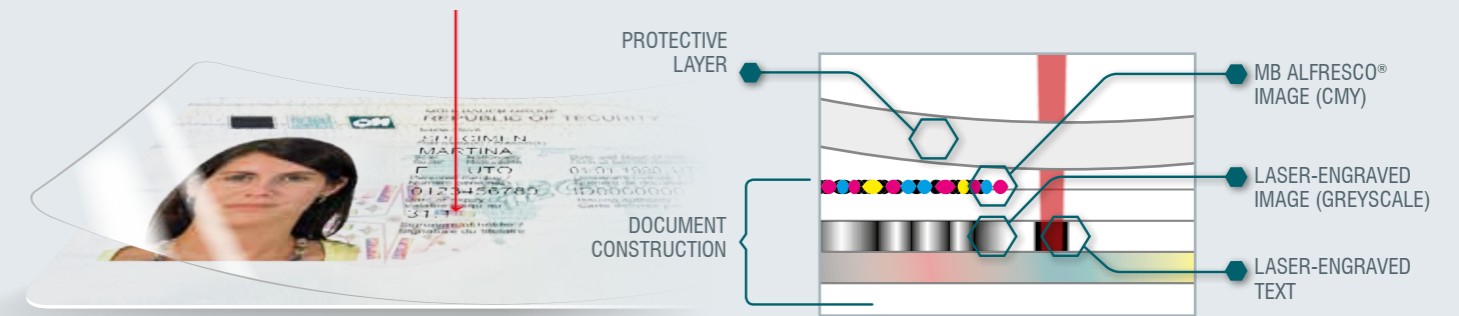
of the "MB ALFRESCO®" technology, the document holder's picture has to be secured by an additional protective layer to durability reasons. Attempts to remove the photo are securely protected as the greyscale information always remains on an inside layer within the document body. The greyscale picture can additionally be verified under IR light. Due to MB ALFRESCO®'s special color properties, optical variable features (e.g. holograms) shine through the color picture and protect it thereby against replication by photo copying. Furthermore, according to ICAO recommendations, the background printing still remains visible through the color picture – a special feature which increases the document's security even more. The highest level of security is reached by laser engraving the biographical data and a secondary holder's portrait into the document material.

The MB ALFRESCO® technology is suitable for decentralized as well as for centralized personalization concepts.



## FACTS & FIGURES

- Applications: high-secure cards, identity cards, Driver's License, polycarbonate passport datapages, others available on request
- Durability: 10+ years
- Resolution: up to 1.200 dpi
- Document Material: PC, other materials available on request
- Consumables: MB ALFRESCO® inks, protective layer
- Central security aspect: personalization on different document layers
- Personalization infrastructure: centralized & decentralized



LIFETIME OF MORE THAN 10 YEARS



HIGH-RESOLUTION COLOR PICTURE (UP TO 1.200 DPI)



MB ALFRESCO® PICTURE INFORMATION ON DIFFERENT LAYERS



HIGHEST DURABILITY



PERFECT LIGHT FASTNESS



IMAGE WITHOUT BLACK (CMY)



LASER ENGRAVED GREYSCALE IMAGE



FULL COLOR IMAGE

MB ALFRESCO®

MB ALFRESCO® PLC

MB ALFRESCO® PPL

MB EMBEDDED PICTURE

MB DOD PRINTING

MB D2T2 PRINTING



# MB ALFRESCO® PLC

PROTEC – LIQUID COATING

**NEW**

Since the color part of the photo is inkjet-printed on the document surface as part of the “MB ALFRESCO®” technology, the document holder’s picture has to be secured by an additional protective layer. This layer can be a special protective varnish called “LIQUID COATING”. As latest update of its “MB COLOR FAMILY”, Mühlbauer has extended its sophisticated combination of “MB ALFRESCO®” and “LIQUID COATING” to the additional security fea-

ture “MB PERSO-SCREEN®”. Furthermore to the “Liquid Coating” varnish, UV fluorescent particles can be admix, which are visible only under UV light called as “MB PERSO-SCREEN® UV” and/or combined with the individualized Data Transition Laser Imaging (DTLI) Feature, which is only visible under infrared light. These innovative options are supposed to increase the document’s counterfeit protection even more.



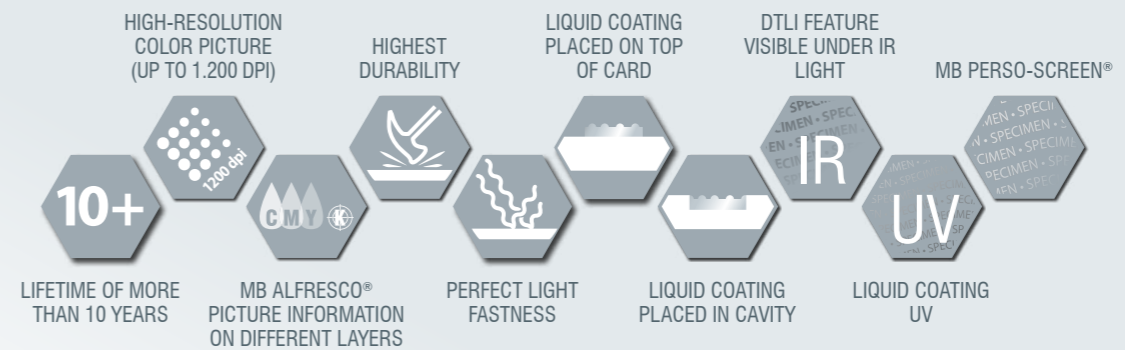
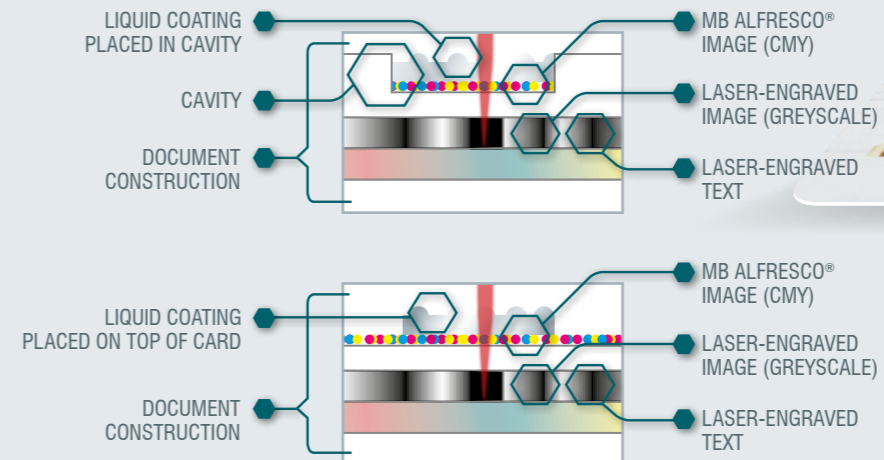
IMAGE WITHOUT BLACK (CMY)    LIQUID COATING WITH MB PERSO-SCREEN®    LASER ENGRAVED GREYSCALE IMAGE    FULL COLOR IMAGE



IMAGE UNDER DAY LIGHT    IMAGE UNDER IR LIGHT WITH DTLI FEATURE    PERSO-SCREEN® UV UNDER UV LIGHT

## FACTS & FIGURES

- Applications: high-secure cards, ID cards, Driver’s License, polycarbonate passport datapages, others available on request
- Durability: 10+ years
- Resolution: up to 1.200 dpi
- Document Material: PC, other materials available on request
- Design of individualized Liquid Coating: a multitude of shapes & styles is available
- One single personalization system (scalable from high- to low-volume)



- MB ALFRESCO®
- MB ALFRESCO® PLC
- MB ALFRESCO® PPL
- MB EMBEDDED PICTURE
- MB DOD PRINTING
- MB D2T2 PRINTING



### 1) CAVITY (OPTIONAL)

A high-resolution “MB ALFRESCO®” picture is personalized inside this cavity and covered by the “Liquid Coating” varnish, for high durability. Image and coating is even with the card surface and build a maximal protection against abrasion.



### 2) DTLI FEATURE

By the Data Transition Laser Imaging (DTLI) Feature, the “MB PERSO-SCREEN®” structure is directly transferred into the individual laser engraved image. Both, the high-resolution picture’s greyscale and color parts reflect visible light. However, it is only the greyscale part of the “MB ALFRESCO®” picture which reflects infrared light. That is why the greyscale image including the individual information of the “MB PERSO-SCREEN®” (in this case the lettering: “SPECIMEN”), is only visible under infrared light.



### 3) LIQUID COATING UV

The standard clear “LIQUID COATING” varnish protects the printed high resolution picture and is used for individual personalized design features on the document. To increase the document’s counterfeit protection even more, the “LIQUID COATING UV” varnish can be optional used, which admix with UV fluorescent pigments, only visible under UV light.

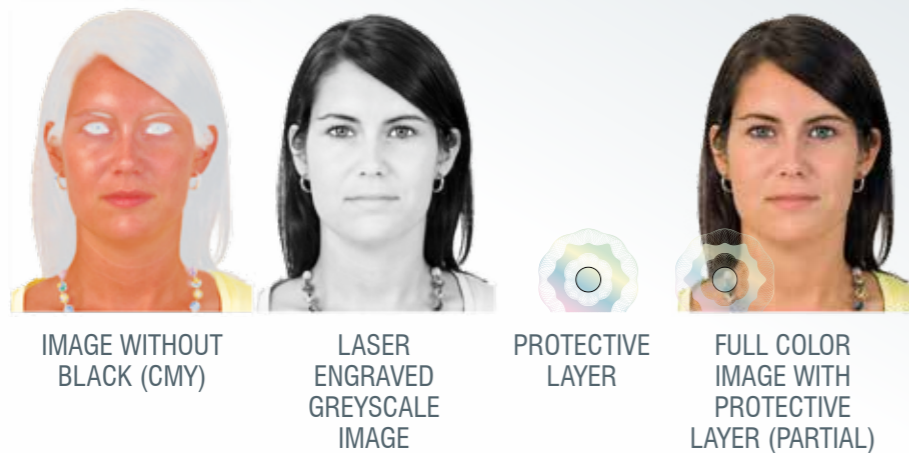


# MB ALFRESCO® PPL

PROTEC – PROTECTIVE LAYER

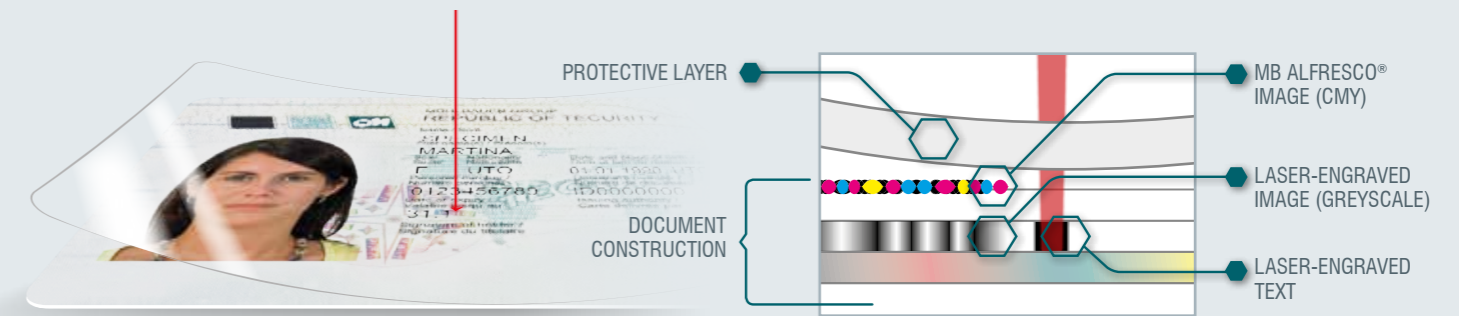
Since the color part of the photo is inkjet-printed on the document surface as part of the MB ALFRESCO® technology, the document holder's picture has to be secured by an additional protective layer. This layer can either be made of a protective varnish (see MB ALFRESCO® PLC) or by means of a protective layer (partial, full-face or

clear) – this one-of-a-kind technology is called MB ALFRESCO® PPL (PROTEC – Protective Layer). In order to endow the document with additional security features, the protective layer can also be supplied with a hologram (transparent, fully metallized or partially metallized; only possible for partial and full-face protective layers).



## FACTS & FIGURES

- Applications: high-secure cards, identity cards, Driver's License, polycarbonate passport datapages, others available on request
- Durability: 10+ years
- Resolution: up to 1.200 dpi
- Document Material: PC, other materials available on request
- Central security aspect: personalization on different layers of document
- Personalization infrastructure: centralized & decentralized



- 10+** LIFETIME OF MORE THAN 10 YEARS
- 1200 dpi** HIGH-RESOLUTION COLOR PICTURE (UP TO 1.200 DPI)
- CMY** MB ALFRESCO® PICTURE COMBINED PRINT & LASER-ENGRAVING PERSONALIZATION
- HIGHEST DURABILITY**
- PERFECT LIGHT FASTNESS**

- MB ALFRESCO®
- MB ALFRESCO® PLC
- MB ALFRESCO® PPL**
- MB EMBEDDED PICTURE
- MB DOD PRINTING
- MB D2T2 PRINTING

## PROTECTIVE LAYERS

### PARTIAL PROTECTIVE LAYER

- shape of protective layer is individually customizable
- protective layer just covers the holder's image
- additional holograms (transparent or metallized) can be included

### FULL-FACE PROTECTIVE LAYER

- protective layer covers the entire card surface
- additional holograms (transparent or metallized) can be included

### CLEAR PROTECTIVE LAYER

- protective layer covers the entire card surface

## HOLOGRAMS IN PROTECTIVE LAYERS\*

### TRANSPARENT HOLOGRAM

- applicable on partial and full-face protective layer

### FULLY METALLIZED HOLOGRAM

- metallic foil inside the hologram
- applicable on partial and full-face protective layer

### PARTIALLY METALLIZED HOLOGRAM

- metallic foil inside the hologram
- applicable on partial and full-face protective layer

\*Only available for partial and full-face protective layers



Partial protective layer

Metallized hologram

# MB EMBEDDED PICTURE

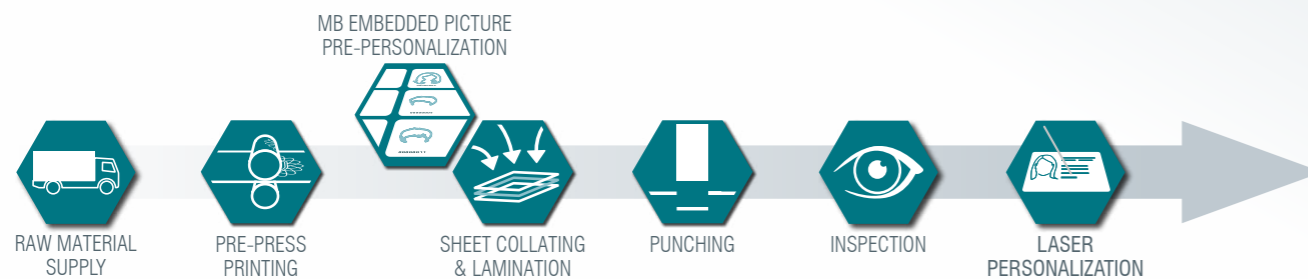
## COLOR PICTURE INTEGRATED IN CARD BODY

Common color picture technologies have their limitations in durability, especially with regard to light fastness. For this very reason, Mühlbauer has developed the unique MB EMBEDDED PICTURE technology: The ordinary, already well-proven ID document production workflow has been extended by an additional pre-personalization process step before the different polycarbonate layers are collated and laminated together. The special inkjet personalization technology guarantees perfect picture quality (up to 1.440 dpi) and long-lasting durability – also with regard to light fastness. Furthermore, the well-proven document production workflow was extended by an additional pre-personalization process step before the different polycarbonate layers are collated and laminated

together. With this approach, the holder's image is irreversibly incorporated in the multi-layered document body. Thus, the ID document is reliably protected from substitution and manipulation. Furthermore, as each document is already pre-personalized with the document holder's photo on sheet-base, there are no more blank documents in circulation which could potentially be used for fraudulent activities.

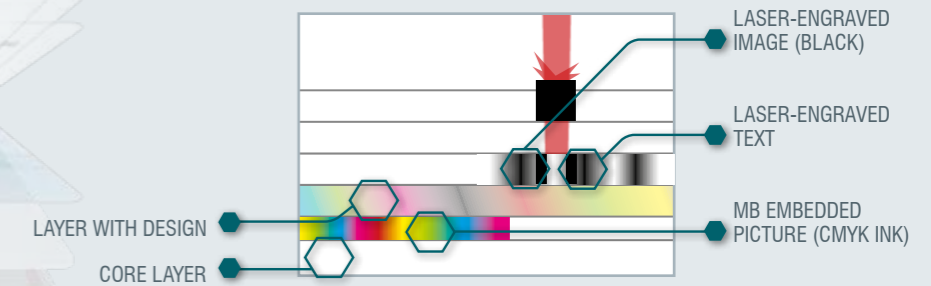
Mühlbauer's production management softwares MB INCAPE and MB MES enable the precise tracking of every single pre-personalized document. As this tracking noticeably simplifies for example the reject handling, a much higher yield can be achieved.

### MB EMBEDDED PICTURE PRODUCTION FLOW: CONTROLLED BY THE PRODUCTION MANAGEMENT SOFTWARES MB INCAPE & MB MES



### FACTS & FIGURES

- Applications: high-secure cards, identity cards, Driver's License, polycarbonate passport datapages
- Durability: 10+ years
- Resolution: up to 1.440 dpi: easy detection of forgery, automated verification
- Document Material: PC, PVC, other materials on request
- Consumables: MB EMBEDDED PICTURE ink
- Central security aspect: no blank documents, personalization on different layers of document
- Personalization infrastructure: centralized with accompanied document production



COLOR PICTURE  
INTEGRATED  
INTO THE CARD  
BODY



NO MORE BLANK  
DOCUMENTS IN  
CIRCULATION



HIGH-RESOLUTION  
COLOR PICTURE  
(1.440 DPI)



ON-DEMAND  
PRODUCTION



10+  
LIFETIME OF  
MORE THAN  
10 YEARS

MB ALFRESCO®

MB ALFRESCO® PLC

MB ALFRESCO® PPL

MB EMBEDDED  
PICTURE

MB DOD PRINTING

MB D2T2 PRINTING





# MB DOD PRINTING

DROP ON DEMAND PERSONALIZATION

Mühlbauer's sophisticated drop-on-demand technology provides the perfect solution for the personalization of documents with individualized, colored data elements. MB DOD PRINTING is suitable for any kind of cards and passports – with and without ICs – as well as for the edge-to-edge printing technology which is particularly often used with banking cards. Furthermore, to achieve a high-secure and forgery-proof document, MB DOD Printing can also be combined with innovative security technologies such as

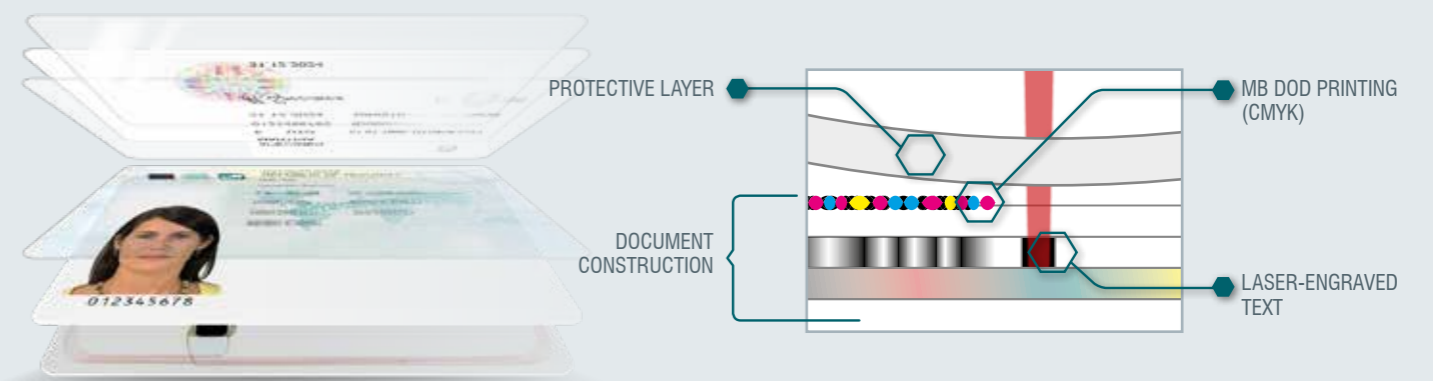
MB ALFRESCO® - fused print & laser personalization (see pages 8/9). Depending on the individual use case, multi- or single-pass technologies are available as well. This technology provides the possibility to produce documents with extra durable color elements, perfectly suitable for any kind of cards and passports with and without IC's. Depending on use case, multi or single pass technologies are available.



## FACTS & FIGURES

- Applications: identity cards, driver's license, polycarbonate & paper passport datapages, banking cards, loyalty cards
- Durability: 5+ years without protective Layer  
10+ years with protective Layer
- Resolution: 600 up to 1.200 dpi
- Document Material: PC, PVC\*, other materials available on request
- Personalization infrastructure: centralized & decentralized

\*only for single-pass technology



MB ALFRESCO®

MB ALFRESCO® PLC

MB ALFRESCO® PPL

MB EMBEDDED PICTURE

MB DOD PRINTING

MB D2T2 PRINTING



LIFETIME OF 5+ YEARS WITHOUT PROTECTION



LIFETIME OF 10+ YEARS WITH PROTECTION



HIGH-RESOLUTION COLOR PICTURE (UP TO 1.200 DPI)



DOD FULL COLOR IMAGE



HIGHEST DURABILITY



PERFECT LIGHT FASTNESS

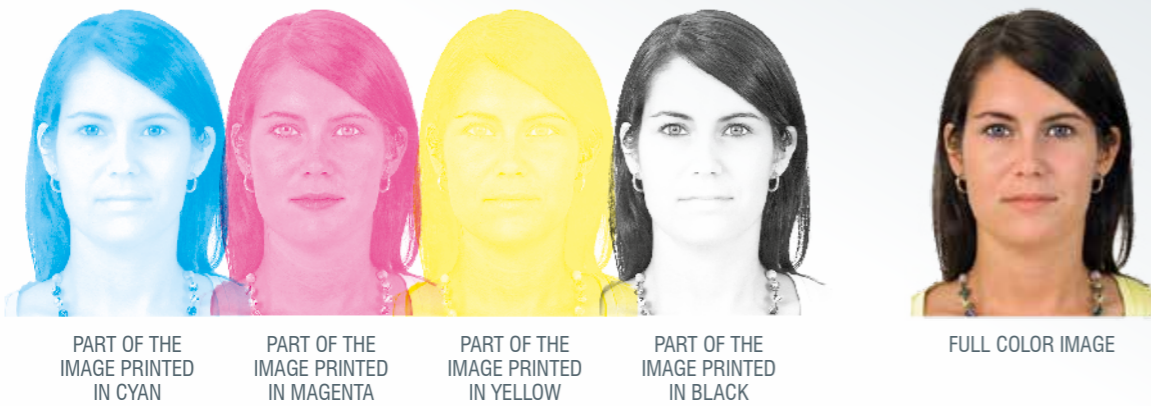


# MB D2T2 PRINTING

## DYE-SUBLIMATION PERSONALIZATION

To meet also the demand for color images on identity documents, made of PVC or PC with functional layer, Mühlbauer will offer the well known MB D2T2 PICTURE technology. Using the technology of dye sublimation print, the color image is directly printed on the blank document's surface with a resolution of up to 300 dpi.

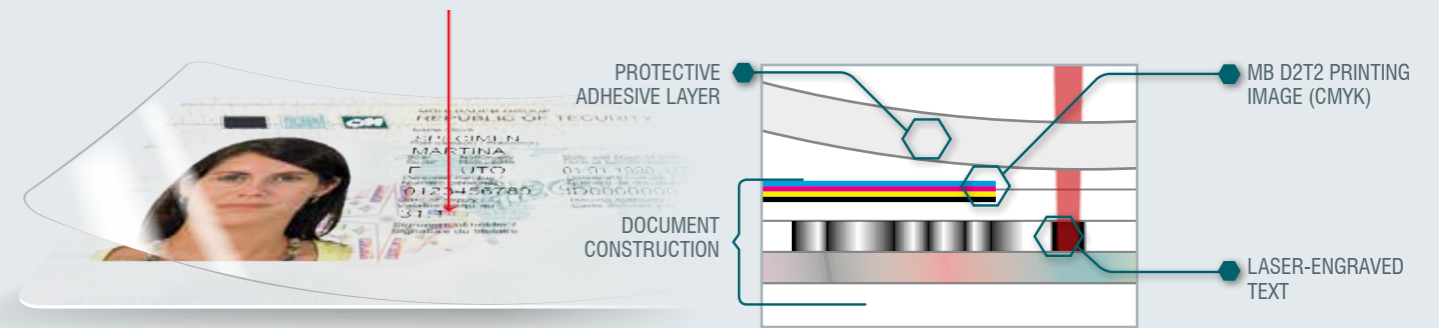
The final result is a high quality color picture, which shows utmost details. Since the four color parts of the photo are printed directly on the document surface, the image must additionally be protected by an overly foil. Partially or full face foils are available.



### FACTS & FIGURES

- Durability: 5+ years\*
- Resolution: up to 300 dpi
- Card Material: PVC, PC with functional layer
- Consumables: D2T2 color ribbon, protective layer
- Personalization infrastructure: centralized & decentralized

\*depending on normal use conditions, use of protective layer and card material used.



HIGH RESOLUTION COLOR PICTURE (300 DPI)



MB D2T2 PERSONALIZATION



PERFECT FOR DECENTRALIZED PERSONALIZATION INFRASTRUCTURE

MB ALFRESCO®

MB ALFRESCO® PLC

MB ALFRESCO® PPL

MB EMBEDDED PICTURE

MB DOD PRINTING

MB D2T2 PRINTING





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