PWPW SA

Polska Wytwórnia Papierów Wartościowych S.A.
(Polish Security Printing Works)
ul. R. Sanguszki 1
00-222 Warszawa

PWPW
POLSKA WYTWÓRNIA
PAPIERÓW WARTOŚCIOWYCH

Description of Laser Engraving Equipment - based on IAI offer

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Prepared by

PWPW SA
Polish Security Printing Works

Service for:

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ⓘ *Below description and specification is based on materials provided by original manufacturer of the personalization equipment IAI Industrial Systems Company.*

Scope of the document

On the following pages we present the features of laser engraving equipment dedicated to electronic passport personalization with polycarbonate eDataPage.

The document covers also in details the list of mandatory features as required by the tender.

Statement of the equipment manufacturer confirming its originality is provided separately.

Table of Contents

Introduction

IAI has been at the forefront of secure document personalisation for more than 25 years, providing unique and advanced systems for governmental document issuance. With extensive knowledge and proven performance, we have gained an excellent reputation for the design and supply of personalization systems where laser and inkjet technologies together, with precision mechanics and control software, play key roles.

Whether we work for a government agency or printing house, IAI strives to produce the most secure documents possible. Many governments, enterprises, and innovative technology experts work closely with us to develop effective new security measures and systems that lockout counterfeiters in every corner of the world.

Customers and partners entrust IAI with their most challenging projects because they know we are knowledgeable, accountable, reliable, and able to deliver results. However, that is just the start. As one of the world's most successful pioneers in laser and inkjet technologies, we help you take the next step to the future. We have built our reputation on developing unique industrial applications and solutions that meet your expectations.

In the following chapters, we will provide you with the required information regarding our proposed solution for laser engraving devices for personalization of passports with polycarbonate.

We confirm that to our understanding all requirements for laser engraving devices as laid down in Appendix no. 1 are met by our **BookMaster Desk** system as offered below. At the same time, we would like to address some of the requirements in more detail which are explained in *Appendix no. 1. Address all requirements listed in "Requirements for laser engraving device, e-DataPage – 6 pcs".*

IAI's BookMaster Desk is a desktop system for the graphical personalisation of passports using laser-engraving technology. The system performs the electronic and graphical personalisation according to ICAO's latest recommendations. For further description, please refer to *Appendix no.2. Systems description BookMaster Desk.*

Appendix no. 1 "Requirements for laser engraving device, e-DataPage – 6 pcs

This section addresses the Requirements for laser engraving device for personalization of passports with polycarbonate e-DataPage – 6 pcs.

1. General equipment requirements:

No.	Requirement	Compliance to requirements		Supplier Address of requirements
		YES	NO	
1.1	The equipment shall include system elements such as: document submission element, received personal data processing element, data personalization element by laser engraving method of polycarbonate-type blank data page (chip module in data page), personal data personalization element by the method of the integrated circuit electronic programming, element of final verification of the visual and electronic data of the completed document.	Yes		The offered IAI's BookMaster Desk is a desktop system for the graphical personalisation of passports using laser engraving technology. The System enables the personal data to be encoded into the integrated contactless electronic chip and verification of the applied data after encoding, to check whether the data is stored correctly. The system performs the electronic and graphical personalisation according to ICAO's latest recommendations.
1.2.	Modular system that allows further extensions according to needs. The proposed equipment shall be integrated and have a block-type construction of the technological process' elements and supplied with equipment that processes a set of blank forms with uninterrupted loading and adjustment. The size of the equipment shall be such that the cost of its location is minimal, desktop-type equipment.	Yes		The BookMaster Desk can be composed with functional units as required. Within a functional unit, there are options to choose from. Please refer to *Annex 2 (datasheet is included)*. The BookMaster Desk has a robust industrial design and is easy and safe to operate and maintain.
1.3.	Storeroom-type blank forms supply system. The supply system shall allow	Yes		The system can be manually loaded and unloaded. Once the system is loaded the operator will be responsible for continuous loading.

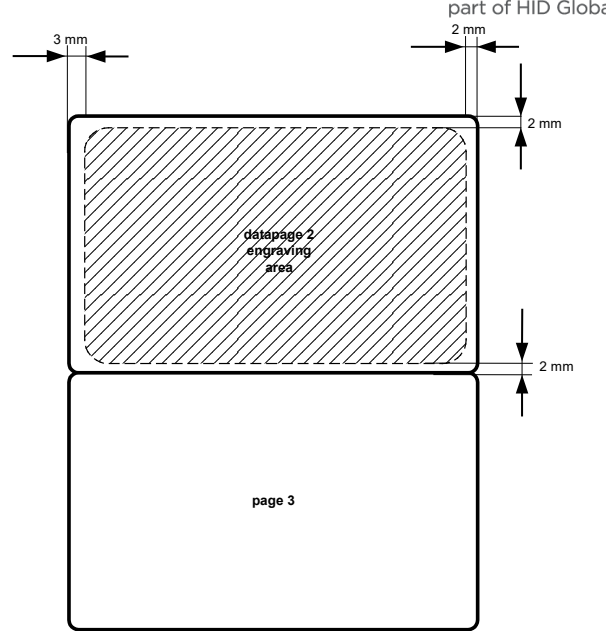| No.	Requirement	Compliance to requirements		IAI Clarifications
		YES	NO	
	continuous supplying without stopping the equipment as well as without scratching or deteriorating the blank forms. Additionally, it shall have the possibility of manual loading of the blank forms.			The transport and all components of the machine have been designed to protect passports against scratching during the personalisation process.
1.4.	The chip personalization module shall provide contactless blank encoding. The personalization of visual and electronic elements shall be carried out within a technological process, without using separate steps of the personalization procedure. Unique process of integrated circuit visual personalization, quality verification. .	Yes		The offered BookMaster Desk is a desktop system for the graphical personalisation of passports using laser engraving technology. All functionalities are performed in one pass and in-line, including a verification of the applied data after encoding to check whether the data is stored correctly.
1.5.	The necessity to verify the quality of the visual data page before personalization and adjust the location of the data (including text and graphics in the MRZ area) depending on the parameters of the document	Yes		The BookMaster Desk system is connected to the host computer which supplies the data needed for the graphical personalisation. The BookMaster Desk system interfaces with the customer's host computer using an open host protocol. The layout files determine the position, font, and properties, of the engraved content. IAI prepares the required personalisation layout.

2. The laser engraving module shall meet the following requirements

No.	Requirement	Compliance to requirements		IAI Clarifications
		YES	NO	
2.1	Preparing blank forms for the visual and electronic personalization process - to ensure that the quality of the visual page (excluding dirt)	Yes		The offered system enables the identification of passports prior to applying the related personal data in the document. Identification can be performed in two ways: · Data which identifies the blank passport is pre-stored in the integrated contactless chip. The

	and integrated circuit is checked before the personalization.			offered system is equipped with a chip-encoding unit to read the chip. · A pre-printed barcode or number which identifies the passport is available in or on the booklet. The offered system is equipped with an internal barcode scanner which reads out the barcode on the cover of the passport, from a sticker for example. The machine uses the read-out data to find the matching personal particulars in the job.
2.2	Video inspection system allowing the inspection of blank forms. The video system shall recognize the alphanumeric series (OCR capability) as well as reprinted elements on the blank forms and shall inspect each blank form individually. The video system shall ensure, through the software of the equipment, any positioning corrections on both x and y axes for the correct positioning of the personalization data. OCR readability shall ensure the possibility to transfer the read data and their inclusion in the personalization process. The ability to read bar codes of type ID and 2D. .	Yes		The offered system includes an integrated camera that detects the position of a pre-printed object on the passport. The machine software uses this position as a reference when determining the location of the other personal details to be engraved. Any variation in the position of the document with regards to this personal information shall in that case not result in any deviation in the position of the engraving. The system enables OCR capability and the ability to read bar codes of type ID and 2D.

2.3	To allow laser engraving on the data page of the blank form with alphanumeric data.	Yes		
2.4	To allow engraving of CLI/MLI security features m parallel with the alphanumeric engraving.	Yes		The systems offer a high quality laser engraving, including tactile engraving and MLI. Optionally the system can be equipped with CLI.
2.5	To allow the equipment to operate at a lower speed than guaranteed if one or more lasers are inoperative.		No	The BookMaster Desk system contains one laser which engraves personal data, photograph and MRZ into the data page. **However, thanks to 6 machines they are fully replaceble in case of one of them failed**. The desktop system is equipped with the same industrial laser head as our highvolume personalisation equipment. This results in a forensically identical high quality laser engraving.
2.6	To be equipped with an exhaust system in order to eliminate any emissions released during the engraving process	Yes		The laser in the BookMaster Desk has been designed to ensure that the operators are not exposed to any emissions. Systems are built with a colling system and active carbon filter to remove any emissions during the engraving. The lasers are recommended for PC datapages with laser engravable layers.
2.7	Adjustable resolution in the range of 300-1200 dpi.	Yes		The standard setting of the BookMaster desk is at 600 dpi. It is adjustable for resolution range of 300-1200 dpi. Highest Levels of Greyscale (True Grey Scale Laser Engraving - full coverage no gaps dots)
2.8	Verification module of the data after laser engraving. The module shall allow to check the quality and integrity of the data on both sides. The	Yes		

process of personalization of the blank form shall be finished by successfully verifying the completion of the data page and the correct personalization of the integrated circuit, with creation of the verification report and presentation of information concerning the operation carried out.			

3. The contactless coding module shall meet the following requirements:

No.	Requirement	Compliance to requirements		IAI Clarifications
		YES	NO	
3.1	Open platform system for the integration of any coding software.	Yes		
3.2	Multifunctional coding system for contactless chip cards for 13.56 Mhz transponder	Yes		
3.3	Protocols supplied in accordance with ISO 14443 of type A and B, ISO 15693, Mifare, Mifare +	Yes		
3.4	Compliance for radio inlet: EN 300 330, EMV EN 301 489	Yes		
3.5	Compliance with safety regulations: EN 60950	Yes		
3.6	Support for personalization of ICAO 9303 compliant chips, [with LDS 1.7 and higher]	Yes		

4. Technical requirements for the equipment management software:

No.	Requirement	Compliance to requirements	IAI Clarifications

		YES	NO	
4.1	The equipment management software shall have the possibility to interact with external information systems with the ability to load text and graphic data (pictures and other graphics) for integrated circuit programming.	Yes		The system controller consists of an embedded computer with hard drive and software, which controls all activities within the BookMaster Desk system. The BookMaster Desk system is connected to the host computer which supplies the data needed for the graphical personalisation. The BookMaster Desk system interfaces with the customer's host computer using an open host protocol.
4.2	Meet international ICAO standards	Yes		
4.3	System integration via TCP/IP network protocol and XML-file communication protocol or the equivalent one.	Yes		
4.4	Modular, flexible and permanently upgradeable solution depending on requirements.	Yes		
4.5	Possibility to present the Report concerning the blank forms drawn up with the result's personalization.	Yes		The BookMaster Desk system offers following standard reports: • Production overview report • Passport detail report • Error message report Other reports can be customized upon request.
4.6	Possibility to adjust the data page, the location of the text data, the holder's photo, the user's interface for creation of the data placement sample on the visual page. Graphic layout editor. Graphical operation interface (GUI) - to ensure easy and intuitive operation.	Yes		Passports are fixed in the input/output tray ensuring the document is always in the same position in relation to the engraving laser before personalization. The system software enables the adjustment of fields (test data, holders'photo, etc) . Operating the BookMaster Desk is easy and safe. The BookMaster Desk system is controlled by the operator through a touch screen that is mounted on the system. The menu driven design of the software offers flexible and easy operation of the system. Menus are available in English and optionally in another language.

4.7	Control of the personalization machine, by displaying the degree of the machine's loading in the personalization site, including the possibility of activating and deactivating jobs, etc.	Yes		Each BookMaster Desk system is controlled by the operator through a touch screen that is mounted on the system. The operator interface shows the activities performed in the system and allows the operator to control the system. Among others, the operator can select one or more jobs to be processed on the system and start and stop the production.
4.8	Supervisor workstation for monitoring and managing equipment, including all machines in the personalization center	Yes		
4.9	The software solution offered shall contain all the necessary licenses and hardware equipment for proper operation	Yes		All systems are delivered with all necessaries licenses and hardware.

5. Equipment productivity requirements

No.	Requirement	Compliance to requirements		IAI Clarifications
		YES	NO	
5.1	Equipment productivity: minimum 60 blank forms/ hour	Yes		Based on the final specifications for the electrical and graphical personalisation of the passport we would be able to calculate the actual throughput of the BookMaster Desk systems.

6. Other requirements:

No.	Requirement	Compliance to requirements		IAI Clarifications
		YES	NO	
6.1	The warranty for the equipment delivered shall be provided for the entire contract period that is by 31.12.2025.	Yes		*In the price for Maintenance*
6.2	Deadline for restoring the proper operation of the equipment constitutes maximum 5	Yes		

No.		Compliance with Requirements		IAI Clarifications
	working days.			
6.3	The warranty shall include all expenses for the operation of the equipment during the contract period. Spare parts, consumables, maintenance or repair services shall be included in the tender offer.	Yes		In the price for maintenance
6.4	Term of operation of the equipment for a period of at least 10 years.	Yes		The BookMaster Desk has a proven track record in the Security Printing market.

7. Requirements for ICT hardware

No.	Requirement	Compliance with Requirements		IAI Clarifications
		YES	NO	
7.1	The device should be ready to be connected to the station with Win	Yes		
7.2	Delivery, DDU: Kishinev, Moldova	Yes		The International Chamber of Commerce (ICC) eliminated DDU (Delivery Duty Unpaid) from Incoterms 2020 and created DAP and DAT (Delivery at Terminal). Systems have been offered with the following delivery conditions: Delivery at terminal DAT Kishinev, Moldova is in conformance with Incoterms 2020 as defined by the International Chamber of Commerce.
7.3	On- site service at Kishinev, Moldova	Yes		In the price for maintenance

Appendix no. 2. Present the concept and description of a device that satisfies tender requirements

The BookMaster Desk

GENERAL SYSTEM DESCRIPTION

This document provides a brief description of *possible functionalities* available on the BookMaster Desk platform and short description of its operation. Please refer to your Project Quotation for the configuration of the offered BookMaster Desk system.

Contents

Introduction

IAI's BookMaster Desk is a desktop system for the graphical personalisation of passports using laser engraving technology. An adapter is available for the personalisation of cards. The system performs the electronic and graphical personalisation according to ICAO's latest recommendations.

Figure 1 - The BookMaster Desk system

- High quality laser engraving, including tactile engraving and MLI
- Contactless electronic chip encoding
- ID-1 and ID-3 in one system
- High yield and high uptime
- Easy and safe to operate and maintain
- Industrial design and long lifespan
- Proven performance in the market of security documents

Functional description

You can compose your BookMaster Desk system with functional units as required. Within a functional unit, there are options to choose from.

Overview

An overview of available functionalities is given in the table below:

Functional units	Options
Input/output tray	
Book identification	Pre-printed barcode or number
Chip encoding	
Laser engraving	MLI

Table 1 – Functional units of the BookMaster Desk platform

Input/output tray

The input/output tray allows the loading and unloading of passports. The tray is primarily designed to handle ICAO compliant passports (containing 32 pages including the synthetic data page).

Figure 2 – Input/output tray

The operator opens the door, pulls out the tray and places a passport in the holder unit inside the tray. The tray can hold one passport at a time for processing. The operator slides the tray

inwards and closes the door. When the personalisation is finished, the system will indicate that the operator can open the input/output tray and remove the processed passport.

Optionally, other passport dimensions can be handled by using different holder units. An adapter is also available in order to process the occasional ID-1 sized card. The operator would have to turn the card manually, so the system is not suitable for high volume card personalisation.

Figure 3 – Adapter for the processing of cards

Book identification

In case a blank passport needs to be identified in order to apply related personal data in the document, the BookMaster Desk offers an identification functionality before personalisation occurs. Identification can be performed in two ways:

- Data which identifies the blank passport is pre-stored in the integrated contactless chip. In case data in the integrated contactless chip is used for identification, the BookMaster Desk system must be equipped with the chip encoding unit. This process will be explained in the next chapter.
- A pre-printed barcode or number which identifies the passport is available in or on the booklet. In case a pre-printed number or barcode has to be identified, the BookMaster Desk system can be equipped with a barcode reader or a handle reader for scanning the pre-printed data. Based on this information, the BookMaster Desk system retrieves the corresponding personal data from the host computer. Alternatively it is also possible to have the identification number typed in by the operator on the touch screen.

Figure 4 – Handheld scanner for identification of the passport

Chip encoding

The system can be equipped with an encoding unit for contactless chip encoding. IAI uses an open software communication interface, allowing you to use your own encoding software. The chip encoding software is not part of the delivery. Following functionalities can be performed by the customer's chip encoding software:

1. Chip-alive-check. The chip can be tested in order to check if it is operational before personalisation. Passports with malfunctioning chips are rejected by the system without being processed. The BookMaster Desk displays a message on the screen to alert the operator to such a reject.
2. Reading of a pre-programmed number to identify the book. The corresponding personal data is then retrieved from the host computer for the personalisation process.
3. High speed programming of the contactless electronic chip. The encoding unit supports among others Active Authentication and Basic and Extended Access Control, following ICAO's recommendations.
4. Verifying applied data after encoding to check whether the data is stored correctly. When the programming of the chip was not successful, the passport will be reported to the operator as reject by displaying a message on the screen.

Laser engraving

The BookMaster Desk system contains one laser which engraves personal data, photograph and MRZ into the data page. The information is engraved with a resolution of 600 dpi. The photograph and text is applied using grey scale levels. Text can be engraved sub-surface and/or tactile. The BookMaster Desk engraves text data using Windows true type font sets.

The personal data can be engraved according to an alignment mark or a text field pre-printed on the card using a camera. This mark can be placed anywhere on the card. In case MRZ data must be engraved, this information is positioned on the back side of the card and relative to the bottom of the card as specified by ICAO.
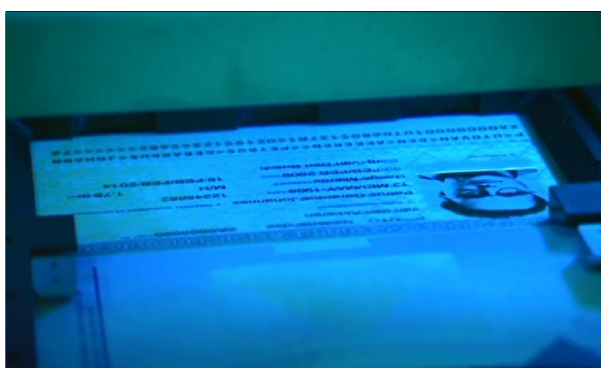

Figure 5 – Laser engraving

Optionally, a Multiple Laser Image (MLI) can be applied.

System control

The system controller consists of an embedded computer with hard drive and software, which controls all activities within the BookMaster Desk system. The BookMaster Desk system is equipped with a write filter to protect the operating system in case of a power failure. The main switch is used as an emergency stop button in case of an emergency so the operator can stop the system immediately.

The BookMaster Desk system is connected to the host computer which supplies the data needed for the graphical personalisation. The BookMaster Desk system interfaces with the customer's host computer using an open host protocol. The layout files determine the position, font, and properties, of the engraved content. IAI prepares the required personalisation layouts. More layout files can be provided upon request.

In case the BookMaster Desk is equipped with the chip encoding unit, the system communicates with a designated PC that runs the chip encoding software. This PC is directly connected to the encoding heads and uses the reader's interface protocol as supplied by the reader's hardware

supplier for communication. For interfacing with the BookMaster Desk system, an open interface is available based on a TCP/IP client-server protocol.

The host computer, the chip encoding computer, its application software and the network infrastructure are not part of the delivery.
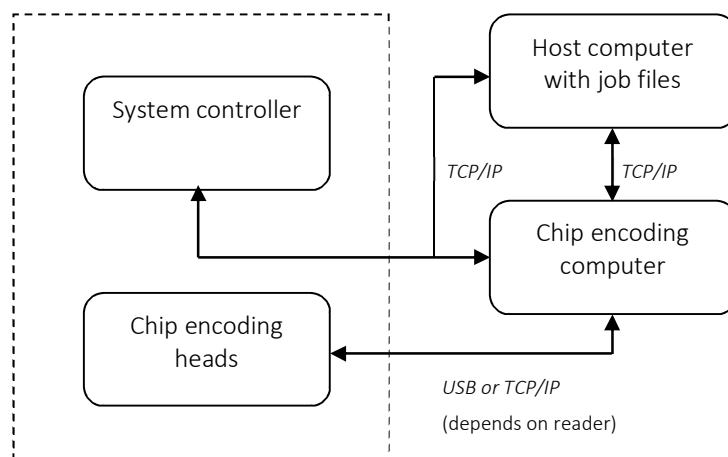

Figure 6 – Schematic overview of BookMaster Desk system control

Operating the BookMaster Desk

Operating the BookMaster Desk is easy and safe. The BookMaster Desk complies with the CE regulations on mechanical, electrical and radiation safety, meaning:

*   The system operator does not need special training on laser safety,
*   The system operator does not have to wear any means for personal protection,
*   No additional measures for the safety of persons in the environment of the system are necessary.

User interfacing

The BookMaster Desk system is controlled by the operator through a touch screen that is mounted on the system. The menu driven design of the software offers flexible and easy operation of the system. Menus are available in English and optionally in another language.

Figure 6 – The operator controls the system via a touch screen

The operator interface shows the activities performed in the system and allows the operator to control the system. Among others, the operator can select one or more jobs to be processed on the system and start and stop the production. The system can produce multiple batches. Subsequently a few working procedures can be adopted:

- With job files
- With passport identification (number reading)
- With a selected range of numbers

The operator has to log-on by entering his name and password on the virtual keyboard displayed on the Touch Screen in order to perform any actions on the BookMaster Desk system. Alternative to or in addition to a password, a fingerprint scanner and/or a smartcard reader are optionally available for secure operator log-on.

The BookMaster Desk system logs information of the processed cards, the operator log-on/log-offs and error messages that have been displayed. All data is logged on the system controller's hard disk and when a certain maximum is reached the oldest data is removed automatically. Such productions logins normally cover a period of approx. one month. All logged data can be retrieved from the system controller as files if needed.

The BookMaster Desk system offers following standard reports:

- Production overview report
- Passport detail report
- Error message report

System Description BookMaster Desk   8

The BookMaster Desk is equipped with a start button next to the door of the input/output tray. The light in the button shows the operator which actions can take place. The functions are as follows:

- Light is on: A passport has been placed in the input/output tray and the system is ready to be started. The operator presses the lit button.
- Light is flashing: A passport is currently being processed.
- Light is out: The passport is finished; the operator must prepare the system for the next passport.

Figure 7. Start button next to the input/output tray

Operator handling

The operator handling consists of operating the user interface, identifying passports if this option is included, placing and removing passports in the input/output tray and inspection of personalised passport if needed.

Training and manual

An operator training and operator manual are part of the delivery. During the operator training the operators will be instructed how to operate the system and how to perform the first line maintenance activities as described before.

Data sheet

A table with main technical data is given below.

Document specifications	Passports: ID-3 format (ISO 7810/ICAO 9303)
	Cards: ID-1 (ISO 7810/ICAO 9303)
Material	Polycarbonate[1]
Contactless chip	ISO 14443 compliant, type A/B
Software platform	Defined communication protocol
Resolution	600 dpi (standard), 450 – 1200 dpi (optionally)
Production rate	Up to 100 documents/hour, depending on the design of the passport and operator skills
Dimensions	Approximately 56 cm (W) x 68 cm (H) x 67 cm (L)
Weight	Approximately 80 Kg
Power connection	110 VAC - 240 VAC
Network requirements	UTP (100 Mbs), USB-2 to host/encoding computer
Temperature	18-30 °C
Humidity	45-60 % (non-condensing)

[1] Other materials might be processed as well. IAI can perform tests on your material to see if it is suitable.

Table 2 – Technical data

The BookMaster Desk platform can be customised in order to reach *most* project requirements. However much we strive to make the BookMaster Desk platform as flexible as we possibly can, there are some technical limitations with regard to the described functionalities. You can find information about the margins and limitations in the further documentation, which is available on request. In order to prevent disappointment in a later stage, we would very much like to discuss the possibilities with regard to lay-out and production speed with you before placing your order.

Further documentation

More in-depth technical information is available on request. A list of topics on which we have documentation available is given below:

- Chip Encoding Interface
- Host protocol
- Example of operator manual
- Example of spare parts list

General remarks

The laser engraving quality depends among others on the materials used in the passport. It is advised to produce some test documents, using the original passports in order to check if acceptable results can be achieved.

Engraving of specific materials may require additional filter or precautions. Such filtering or precautions are not part of the delivery and must be provided by the customer. The system is cooled by internal fans. Air from the BookMaster Desk is sent to the ambient environment and the customer must provide precautions to keep ambient temperature of the room at acceptable levels.

Special laser engraving features may be subject to Intellectual Property Rights (IPR) owned by third parties. Although the BookMaster Desk system is technically capable to apply these features, the procurement of the BookMaster Desk system does not grant license for the use of such features covered by IPR and licenses must be procured separately from the respective IPR owners.

The processing time of the cards depends among others on the amount of data to be encoded and engraved. Also the system can be delivered in various configurations to optimize the system to the desired throughput. Upon request, we can specify what performance can be obtained for your specific card designs and system configurations.

We strive to keep information in this document correct and up to date. However, the information in this document is not legally binding. Please note that specifications may change without prior notice.