



# MB IMAGE ENHANCEMENT SDK

IMAGE ENHANCEMENT SOFTWARE



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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.



**MPS**  
Precision Parts & Surface Engineering



**AUTOMATION**  
Production Equipment & Systems



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



## QUALITY PORTRAITS FOR IDENTIFICATION DOCUMENTS

The Mühlbauer Image Enhancement SDK is a set of easy-to-use image processing methods for desktop or server software solutions for biometric system developers and integrators. It is aimed at eliminating the most common problems encountered with portrait images captured from various differing sources in the field and ensure a constant quality of captured face images.









Automated image optimization and evaluation can be fairly complex and has to be handled carefully in order to assure that face images are suitable for printing and automated face recognition systems. That is why Mühlbauer is using specialized highly reliable AI methods as the base for our Image Enhancement SDK.



Our technology ensures constant performance and reliability with various state-of-the-art image-processing functions and is highly scalable. The Mühlbauer Image Enhancement SDK can be used in data enrolment directly on the capturing client, but it can also run as a service in the backend systems to prepare previously enrolled images for biometric data verification, identification or printing.

The integration of the Mühlbauer Image Enhancement SDK is straightforward and can be as simple as calling a web service when relying on the preconfigured automatic, but it also allows direct control of the individual processing steps.

## SOLUTION FEATURES

- 
**FACE FINDING**  
 Using powerful AI to recognize the face in a captured image & extract it's biometrical landmarks
- 
**BACKGROUND REMOVAL / MANIPULATION**  
 Using powerful AI to separate the face from the background / Option to insert a new background
- 
**POSITION CORRECTION**  
 Rotating & aligning the image horizontally & vertically
- 
**IMAGE CROPPING**  
 Cutting & resizing the image according to defined settings
- 
**COLOR CORRECTION**  
 Adjusting the colour palette & white balance
- 
**BRIGHTNESS & CONTRAST ADJUSTMENT**  
 Adjusting of the image's brightness & contrast
- 
**IMAGE CHECK & EVALUATION**  
 AI supported checks & evaluations of the image quality according to ICAO recommendations
- 
**INTUITIVE APPLICATION PROGRAMMING INTERFACE (API)**  
 Easy to integrate into any software solution



# IMAGE PROCESSING

## REQUIREMENTS

The biometric data captured during the enrollment procedure need to be optimized and digitally enhanced by processing the images either manually or automatically. This is necessary to both improve the quality and ensure compliance with international standards.



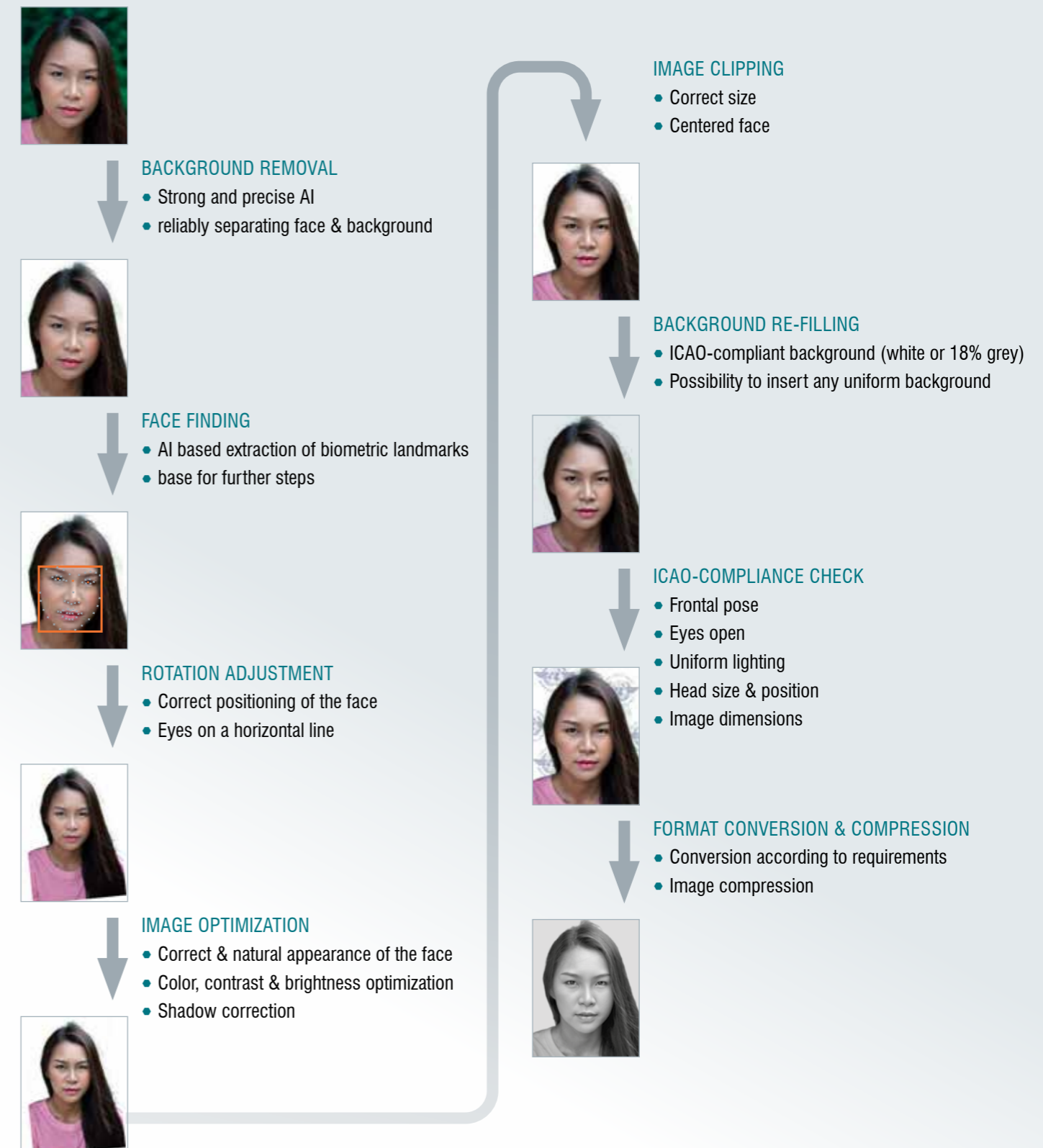
## AUTOMATIC PROCESSING

The objectives of facial image processing are the automatic preparation and quality enhancement of the digitized passport photos.

THE FOLLOWING PROCESSING STAGES CAN BE CALLED ALL AT ONCE AS AN AUTOMATIC PROCESSING CHAIN OR SEPARATELY ACCORDING TO THE REQUIREMENTS:

- Positional correction of the original image (i.e. twisted paste-up)
- AI based extraction of the facial contour & elimination of the background
- AI based face finding and extraction of biometric landmarks
- Face alignment & cropping according to ICAO standards
- Color, contrast & brightness correction
- Reducing shadows & increasing sharpness
- Background filling with homogenous colour according to ICAO standards
- AI assisted image assessment, including ICAO-compliance check

# AUTOMATED PROCESSING STEPS



# TEST APPLICATION

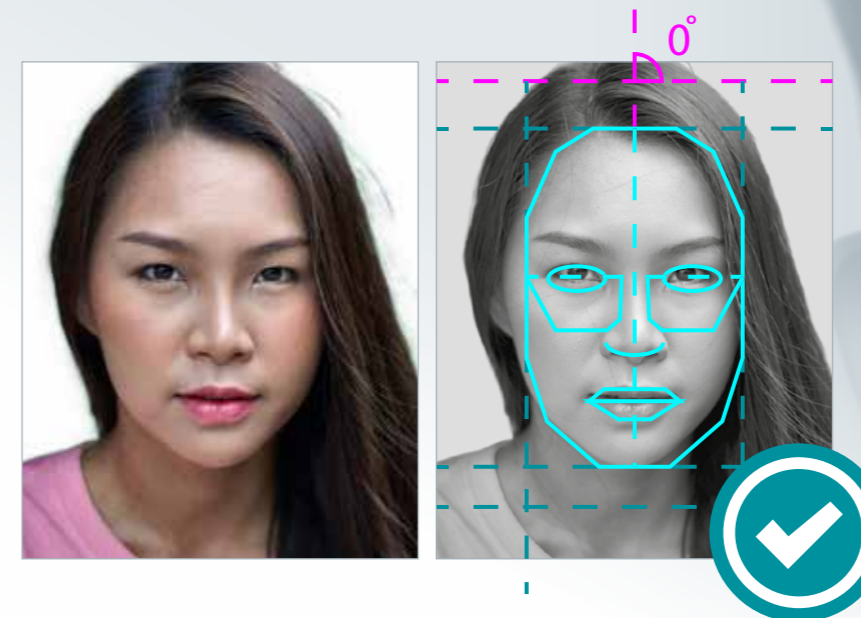
The test application of MB Image Enhancement SDK (Software Development Kit) demonstrates the capability and provided functions for enhancing facial images. An input file is automatically processed by a set of configurable features and the enhanced image is saved in an output file.



Original image (input, left) and enhancement result (output, right)

## CONFIGURABLE FEATURES:

- Rotation adjustment
- Correct positioning of the face
- Image cropping
- Correct size
- Centered face
- Background removal
- Histogram adjustment
- Unsharp mask
- Optimized contrast between person & background
- Brightness & contrast optimization
- Shadow correction
- Color & contrast adjustment
- Background refilling: unicolor or pattern (e.g. resized or tiled logo)



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