



FINDER

LEADING PLATFORM FOR ROBOTIC GUIDANCE

 **mabema**

FINDER

RobotVision is key for efficient and profitable material handling and machine tending applications.

FINDER is our machine vision platform for robot guidance* applications.

FINDER is available in several versions, from basic 2D solutions to full 3D bin picking applications. All solutions are proven, with a total of more than hundred successful installations.

FINDER is the complete toolbox for vision-based material handling.

The individual products are world-leading in terms of user-friendliness, technology, performance and price.

All products within the FINDER platform are primarily intended for pallet picking and have incorporated communication protocols for the market leading robot manufacturers.

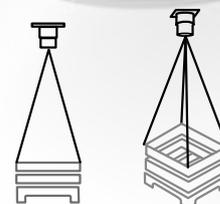
Mabema's vision solution reduces cycle time and increases the robot cells availability.

Select your FINDER solution

FINDER is the solution for robotic guidance in 2D, Stereo or 3D applications. The product has a graphical user interface, allowing for an uncomplicated, quick installation with high flexibility. FINDER is our concept for modern and efficient robotic guidance.

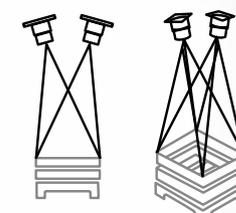
FINDER 2D

The best seller for picking items organized in layers or at conveyor belt.



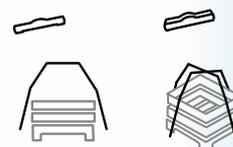
FINDER Stereo

The cost effective solution when height (z-value) is required for picking organized stacked items.



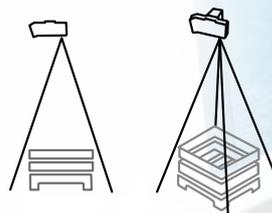
FINDER 3D

The solution when shape-based matching provides the best results.



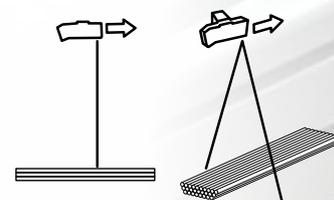
FINDER BinPicker

Our main product with full 3D for picking unsorted goods straight from pallet.



FINDER Tubes

The unique 3D product for picking tubes and rods.



**) Robot guidance means that FINDER searches and finds defined items in an image. The image may be 2 or 3 dimensional (depth image/point cloud) depending on the camera type. FINDER sends a calibrated position to the robot or a list of positions depending on how the system is used.*



Robust and proven vision solution

More than hundred FINDER installations.



User-friendly

The same simple operator interface regardless of 2D or 3D.



Adaptable

Script function with C# for customer needs.



No risk of collision

Advanced collision management in 2D and 3D.



Backup function

Secures production with a "click".



Flexibility

Camera configuration for complex production solutions.



Robot communication

Communicates with market leading robot brands.

ABB

KUKA

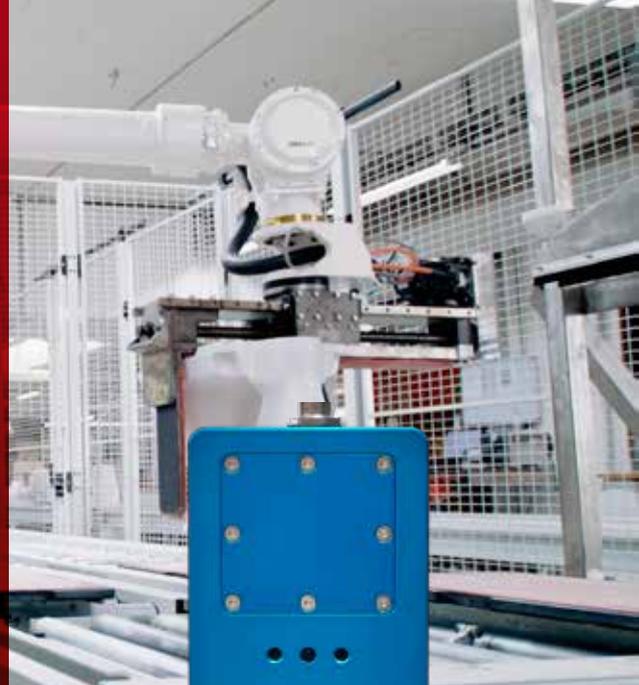
YASKAWA

FANUC
Robotics

HYUNDAI
Robotics

FINDER 2D

The solution for traditional robot guidance, where the items are located in one layer.



- Quick and easy learning of products
- Supports up to 8 cameras
- Support for communication with multiple robots
- Collision management
- Provides robotic coordinate in 2D, x + y and rotation angle



FINDER 2D is characterized by its simplicity. The user interface guides the operator step by step through the process of creating new models. Complementary features such as cloning and master models make learning trivial. Only a few “clicks” and the work is done!

FINDER is the solution for traditional robot guidance, where the items are located in one layer. The product is outstanding for picking sorted goods from a carrier or pallet. The vision system provides a 2D position (X + Y) and rotation angle. FINDER 2D can be supplemented with multiple cameras and is able to communicate with one or more robots. The process is robot-controlled, with ready-made communication interfaces delivered by us, for all leading robot manufacturers.

The system includes software, processor, camera optics and cabling. All solutions can be supplemented with custom lighting and other accessories, such as camera housings, electrical cabinets etc.



Example of positioning in 2D where hole patterns is used as contours.

FINDER 2D Technical data

Calculation unit	Camera	Communication	Functions	Accuracy	Software	Options
Industrial-PC Intel i5 RAM min 8 GB 24 VDC/5 A	BASLER ACE 3MP ACA2040-35GM 2048x1536 px Option: 5 MP	Camera: LAN 2 X PoE Gb/s Robot: LAN 100Mb/s	Contour based model Grey corr. model Collision management	Depending on field of view and camera. EU-palletet approx. 0,6 mm	Win 10/64bit FINDER 2D with software protection dongle	Extra camera Camera housing Illumination Electrical cabinet

FINDER Stereo

For pallet picking with spacers when the variation in height is essential for the application.



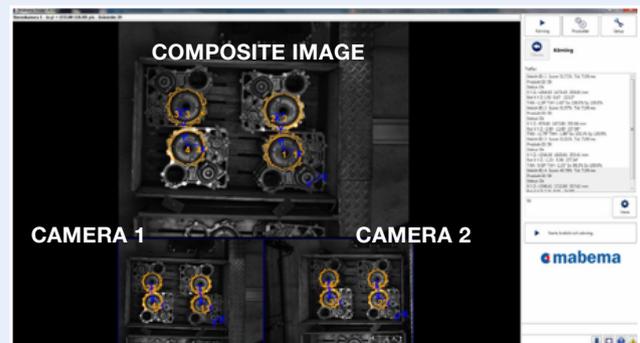
- With unique matching methodology
- Provides fast and secure results
- Easy operation
- Flexible camera and robot communication

FINDER Stereo is the vision system for contour-based 3D applications where the height is calculated and sent to the robot (X + Y + Z and rotation angles).

The product is perfect for pallet picking with spacers or other applications when the variation in height is essential for the application. FINDER Stereo has the same straightforward and intuitive user interface as FINDER 2D and also handles multiple camera pairs and/or complementary cameras.

Perform model learning with FINDER 2D and FINDER Stereo

- 1. Take the model picture.** The image is saved and can be reused for later correction.
- 2. Edges and search plan.** Define which contours to be used and specify the position to send to the robot
- 3. Search.** Configure search terms and sort.
- 4. Collision management.** Define product distribution and tool areas.



Matching takes place in the respective camera. The robot position is calculated based on the object, deformation and the cameras' relation to each other (triangulation). The results from the two cameras are visualized at the bottom of the application

FINDER Stereo

Calculation unit	Camera	Communication	Functions	Accuracy	Software	Options
Industrial-PC Intel i7 RAM min 8 GB 24 VDC/5 A	BASLER ACE 3MP 2.2 x ACA2040-35GM 2048x1536 px	Camera: LAN 4 X PoE Gb/s Robot: LAN 100Mb/s	Contour based model and 3D Grey corr. model	Depending on field of view and camera EU-pallet approx. 0,6 mm	Win 10/64bit FINDER Stereo with software protection dongle	Extra camera Camera housing Illumination Electrical cabinet

FINDER 3D

Used when shape-based matching provides the best results.



- Easy installation and very user friendly
- Can handle complex shapes
- Adapted for different cameras
- Full collision management
- Provides fast and secure analysis

Thanks to FINDER's all image processing tools, the user can freely match both simple and complex shapes in a 3D image. FINDER 3D is the market's most competent and flexible 3D system with full freedom to configure cameras and robots in the same way as FINDER 2D.

FINDER 3D is excellent when shape-based matching provides the best results, for example for products with complex shapes, castings, forged components etc.

FINDER 3D offers a full 3D coordinate and includes collision management in 3D (including grips). FINDER 3D has the same clear and intuitive user interface as FINDER 2D.



FINDER 3D includes collision management in 3D.



3D IMAGES – POINT CLOUD

Depth images, called point cloud images, provide a topographic view of the camera scene using triangulation. Each white pixel in the image has a certain value and the yellow pixels represent the model.



Matching means that the model's colored pixels must match the corresponding pixels in the camera image.



To simplify the visualization of the image, they can be bundled together in FINDER to render surfaces.

FINDER 3D

Calculation unit	Camera	Communication	Functions	Accuracy	Software	Options
Industrial-PC Power Intel i7 RAM min 16 GB 24 VDC/5 A	BinPicker 2.0 PhoXi 3D Scanner	Camera: LAN 2 X PoE Gb/s Robot: LAN 100Mb/s	Contour based 3D Formbased 3D model Grey corr. model Collision mangement CAD import	Depending on field of view and camera EU-pallet Width approx. 0,7 mm Heght (z) approx. 2 mm	Win 10/64bit FINDER 3D with software protection dongle	Extra camera Camera housing Electrical cabinet

FINDER BinPicker

World-leading robot guidance product for picking of unsorted goods directly from pallets.



- Picking unsorted goods directly from pallet
- Silent handling
- Quick and easy installation
- System configuration using 3D CAD models

FINDER BinPicker is a world-leading robot guidance product for picking of unsorted goods directly from pallets. The system handles completely randomly oriented bulk packed items.

FINDER BinPicker includes state-of-the-art collision detection, high performance search algorithms and a Binpicking Wizard software guiding you through the complete configuration.

FINDER Binpicker is excellent for picking of products with complex shapes requiring surface-based matching for accurate result (for example casted or forged components). The camera and the laser light unit provide a point cloud image by triangulation. FINDER Binpicker does not require any external illumination.

BinPicker is a complete bin picking product, which is easily installed and quickly connected with a robot. The system supports all of the leading robot manufacturers. The system is flexible and allows for rapid product changeovers. Products and robot grippers are easily imported as 3D CAD files.

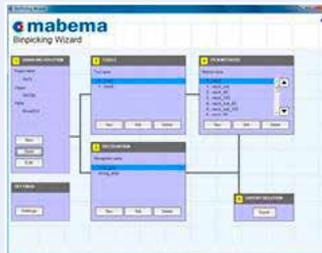


In order to avoid collisions, the 3D collision detection system keeps track of the robot wrist unit, the robot gripper, the products, the pallet collars and other undefined scan data.

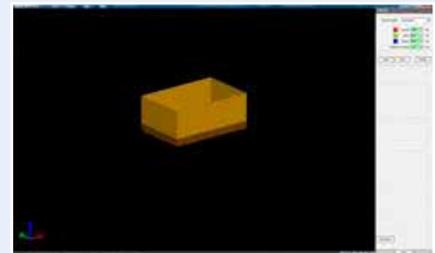


Easy configuration with BinPicking Wizard

BinPicker Wizard is the offline utility that configures the bin picking application through a user interface. The steps help the user through the process. **When the four steps are completed, the project is exported to FINDER BinPicker.**



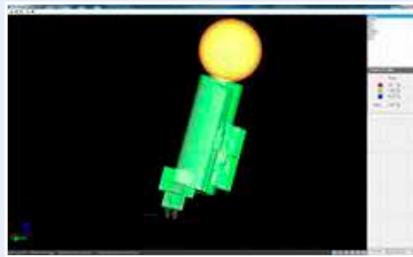
The main menu. Vision projects are created and changed.



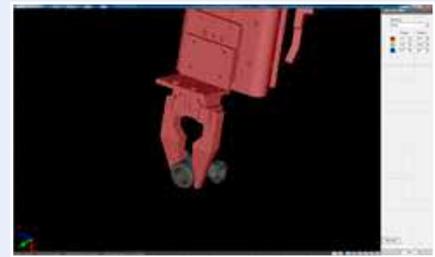
Step 1. The pallet is defined and 3D CAD models of grippers and detail are imported. Enter your own pallet size or use the pallet size templates.



Step 2. Views are created. Then the different views of the product are generated. Unwanted properties are easily removed with cut-out features.



Step 3. Collision volumes are added to the imported gripper. Solid shapes are used to quickly calculate collision risks.



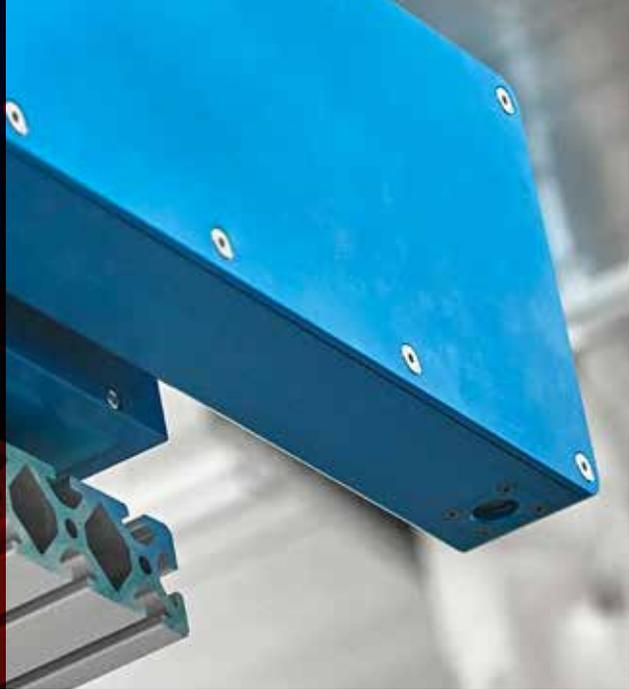
Step 4. Grip positions are defined. Pick positions are indicated by placing the gripper in the desired positions on the component.

FINDER BinPicker

Calculation unit	Camera	Communication	Functions	Accuracy	Software	Options
Industrial-PC Power Intel i7 RAM min 16 GB	BinPicker 2.0 PhoXi 3D Scanner	Camera: LAN 2 X PoE Gb/s Robot: LAN 100Mb/s	Contour based 3D Formbased 3D model Grey corr. model Collision mangement CAD import	Depending on field of view and camera EU-pallet Width approx. 0,7 mm Heght (z) approx. 2 mm	Win 10/64bit FINDER Binpicker, BinPicker Wizard with software protection dongle	Extra camera Camera housing Electrical cabinet

FINDER Tubes

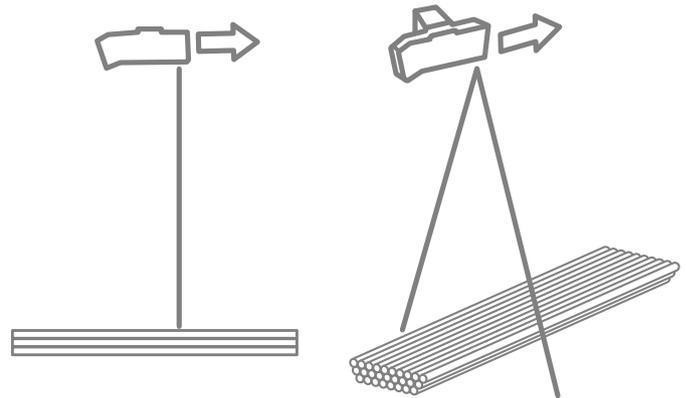
3D system for picking pipes, shafts and rods.



- Guiding an industrial robot sideways and in depth
- Picking from hanging conveyors and stacked products
- Edge detection, rotation angle and axis center, etc
- Laser based 3D scanning technology

FINDER Tubes is specially developed for picking of oriented pipes, rods and shafts from racks or pallets. This cost-effective solution replaces mechanical tube feeders.

The scanning process is very fast, each laser line profile is continuously processed. The output is forwarded lag-free to the robot. No external illumination is required.



Longitudinal scanning, each laser line profile used to detect the direction, inclination and sum of the lines gives a center point.

FINDER Tubes

Calculation unit	Camera	Communication	Functions	Accuracy	Software	Options
Industrial-PC Power Intel i7 RAM min 8 GB 24 VDC/5 A	Tracker <i>BinPicker 2.0</i> motor unit <i>excluded</i>	Camera: LAN 2 X PoE Gb/s Robot: LAN 100Mb/s	Konturbaserad 3D Formbased 3D model Grey corr. model Collision mangement CAD import	Depending on field of view and camera EU-pallet Width approx. 0,7 mm Heght (z) approx. 2 mm	Win 10/64bit FINDER Tubes with software protection dongle	Extra camera Camera housing Electrical cabinet

CAMERAS

Selected for best performance in combination with the FINDER products.



FINDER uses different types of Ethernet-based GigE cameras. For more information or guidance please contact Mabema AB.

FINDER 2D, FINDER Stereo



**BASLER
ACA2040-35GM**

Lens	Camera Scene size in pixels		
	1200x900	800x600	400x300
8	1366	913	461
12	2049	1370	691
16	2732	1826	921
25	4268	2854	1439
Resolution mm/pi X	0,59	0,39	0,20
Resolution mm/pi Y	0,59	0,39	0,26

FINDER 3D, FINDER BinPicker, FINDER Tubes



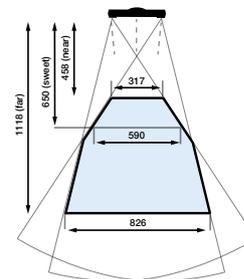
**FINDER
BinPicker**

Camera Scene	Distance	Resolution mm/pi	
		Z	Width
Width	mm		
600	1000	1	0,49
800	1400	2	0,68
1200	1950	3,5	0,95
1600	2600	6	1,27

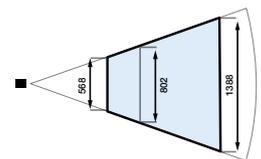
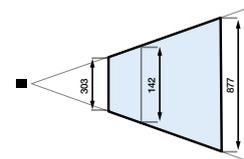
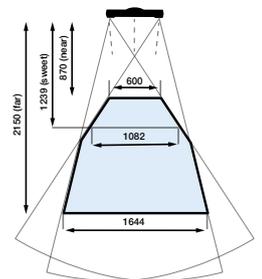


**PhotoNeo PhoXi
3D Scanner**

Medium



Large



Note: rounded numbers.

FINDER increases product quality and productivity, which reduces costs for errors and complaints.



Robot guiding, bin picking or inspection?
Mabema delivers complete vision systems
that solves the task.

Mabema's vision system solutions are based on the proprietary unique FINDER platform. With the help of a broad and well-functioning network of partners, we can deliver turnkey vision-equipped robotic cells and automation.

Contact us if you would like to know more about pre-studies and customized training for your automation venture.

Read more at
www.mabema.se



Youtube channel – MabemaTV



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