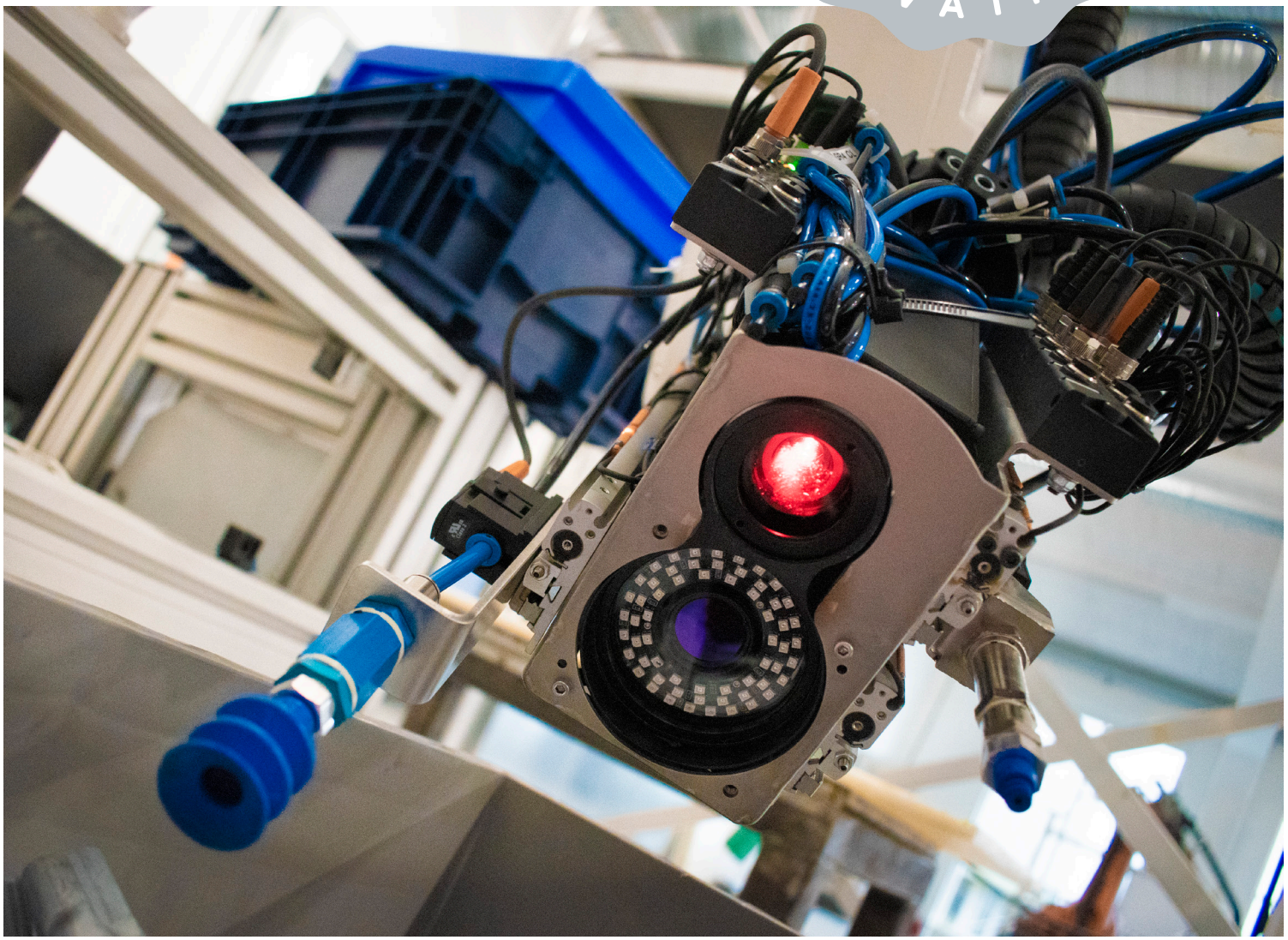
THE GUIDE TO BIN-PICKING

MINIGUIDE

KNOW-HOW 17 YEARS INNOVATION



DISCOVER HOW AUTOMATED SCAPE BIN-PICKING SOLUTIONS COMPLETELY CHANGE INDUSTRIAL HANDLING AND PRODUCTION OF COMPONENTS

SCAPETECHNOLOGIES.COM

SCAPE
THE BIN-PICKING COMPANY

TABLE OF CONTENTS

01 WHY YOU SHOULD START AUTOMATING BIN PICKING

Nearly 40% of the manual labor force is physically transferring parts from bins into machines.

The challenging market that automotive suppliers are operating in is driving continuous improvement efforts to automate more, bigger and better.

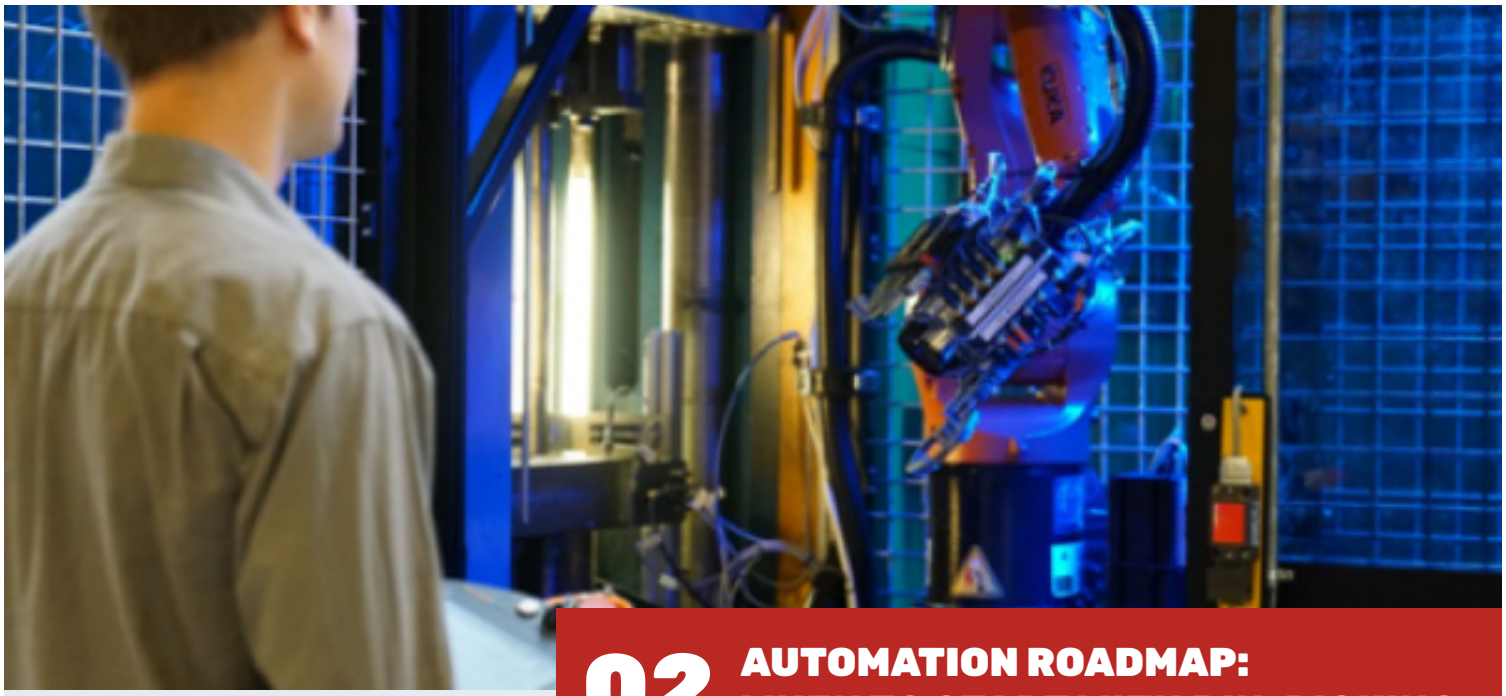
However, a big chunk of labour time is spent on tedious, repetitive and strenuous tasks which, still poorly automated in this day and age. One example of such a process, which has very complicated to automate, is Bin-Picking.

Regular robots cannot handles randomly scattered parts in a bin/box. Most cannot even handle semi-structured parts that are layered on a pallet or in a bin/box. So what if an operator could just drop the parts in the bin and the robot would know what to do next?

This next frontier of automation has been unlocked and proven to work. Handling of randomly placed parts from a bin with a robot is our core competence and what makes us the world market leader in Bin-Picking.

Worldwide 65.000.000 cars are produced annually

An average each car consists of 30.000 parts. At least +12,000 parts per car can be handled by automated high reliable SCAPE Bin-Picking solutions, removing monotonous and strenuous manual tasks.



02 AUTOMATION ROADMAP: WHEN TO START WITH BIN-PICKING

Are you ready for robots with eyes and hands?

Let's compare different alternatives for

- » Fixed automation
- » 2D Vision
- » 3D Vision

FIXED AUTOMATION

FIXED AUTOMATION SOLUTIONS CONSIDERED RELIABLE. THEIR MOST SIGNIFICANT ADVANTAGE IS **HIGH THROUGHPUT**

MOST OF THE FIXED SOLUTIONS **LACK FLEXIBILITY** AND THERE ARE SEVERAL DRAWBACKS

- Designing a fixture (trays, jigs) for my parts is costly.
- I have different parts; therefore, I need many custom fixtures.
- Changeovers are complicated and may take long.
- Machine loading/part preperation takes a lot of my operators' working time.
- Time to market is crucial, and I can't wait for the delivery of custom-engineered solutions.

- My parts do not fit the bowl feeder.
- For each one of my many parts, I need a bowl feeder which is beyond my budget.
- Bowl feeders congest, scratch or damage my parts.
- I want to avoid adding more noise to my factory.
- My space is limited and bowl feeders are bulky.

CONCLUSION

SCAPE uses 3D vision systems ensuring added flexibility for applications with varying positions and locations of the parts. 3D vision-guided robotics are far better equipped to handle complex geometry parts, parts with reflective properties or parts in low light conditions.

SCAPETECHNOLOGIES.COM

SCAPE
THE BIN-PICKING COMPANY

2D VISION

2D VISION IS OBVIOUS FOR PICK AND PLACE APPLICATIONS AND IT IS **A COST EFFECTIVE** SOLUTION FOR SIMPLER OPERATIONS.

HOWEVER, IT ALSO **LACKS FLEXIBILITY** AND ADDS COMPLEXITY IN SEVERAL WAYS.

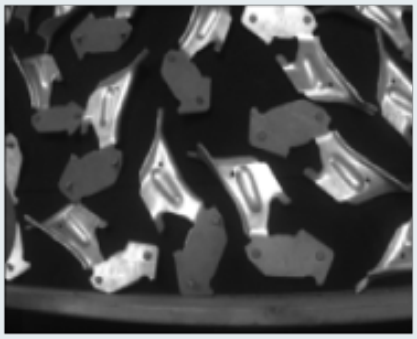
Flat parts. 2D often works well when the flat parts are placed in only one layer and well separated without touching each other. Adding a shaker table and a feeder helps, but it increases hardware and integration costs.

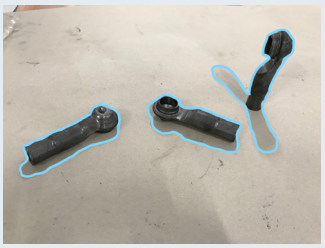
Light dependency. Stable lighting conditions are a must. This typically requires costly installations of light curtains and extra light sources.

Shape-deviating parts are quite difficult to locate for a 2D system.

3D-shaped parts. These can look very different depending on their orientation. It is seldom sufficient having them placed non-touching on a flat surface.

Contour tracking is a fundamental component of 2D image processing. But how would or could a 2D camera define the drive shafts depicted below?





A 2D camera would see these three drive shafts as three different parts. The slightest change in light and shadows would present new contours and confuse the camera even more.

CONCLUSION

2D vision is a cost effective solution as long as your parts are A) Flat, B) Non-touching and C) Lying on a flat conveyor belt or a table. It is not a good idea if A) Your parts are not flat, B) There is an insufficient contrast between the parts and the underlying surface, or C) Outside light sources creates shadows. These elements will confuse the camera.

3D VISION

COMPARED TO OTHER SOLUTIONS 3D VISION ENSURES THE **HIGHEST FLEXIBILITY**

HOWEVER, THERE ARE **POTENTIAL INCONVENIENCES**.

3D vision handles applications
where parts are A) Overlapping, B) Glossy or C) of varying size and shape.

Multiple parts handling.
3D Vision systems can easily be taught to detect and handle a variety of objects.

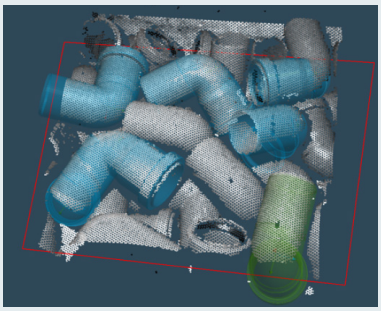
Fast changeover.
When the bin is empty, simply replace it with a new one and continue with your next component.

Small footprint.
Simply mount the camera on the robot. You will not need any bulky fixtures or extra hardware. Modern 3D vision systems are compatible with all major robot brands.

Slower cycle times
when compared to manual handling. A typical detection cycle takes one second during which the 3D vision system can recognize multiple parts. However, gripping and in some cases re-gripping adds to this.

Gripper/vision limitations.
There are still certain objects difficult to grab. For the gripper this could be very complex shapes, or deformable parts that may tangle. For the 3D vision system transparent objects, or parts with mirror-bright surfaces would be rather challenging.

Ease of use.
There is still no common market standard. Some 3D vision systems may therefore be complex to implement and operate.



3D vision considers the actual shape rather than a 2D image. The part is initially gripped via the SCAPE 3D Stationary Scanner. Step two is the orientation control via the 2D camera before delivery to the next working station.

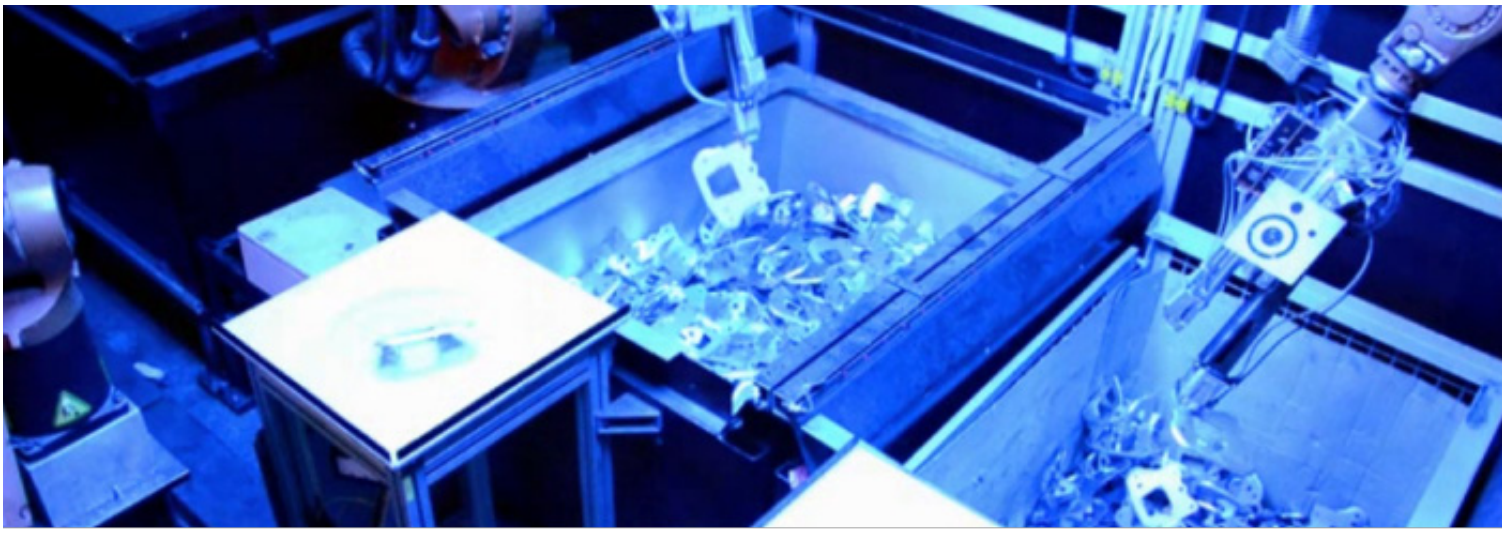
CONCLUSION

Scape uses 3D vision systems backed up by flexible provisions for parts whose location and position may vary. For parts with complex geometries, reflective surfaces or in low light environments 3D vision robotics are far better equipped for efficient and secure handling.

03 BEST APPLICATIONS IN AUTOMOTIVE

50% of the leading 100 automotive suppliers now **automate Bin-Picking** with 3D vision or plan to introduce it within 1-2 years

This section outlines typical examples of production applications with proven track records.



RANDOM BIN-PICKING APPLICATIONS

Scape Technologies offers complete automatic bin-picking solutions integrating gripping devices, sensors, cameras and proprietary software for a fast, reliable and accurate collection, control and placement of components supplied randomly and unstructured in bins or boxes.

Examples of the parts

Metal cylinders, shocks, bolts, wheel, tire, cylinder engines, stabilizer bar, metal sleeves, connecting rods, connectors, tandwheels, metal rubber sleeves, camshaft, fasteners, gear feeding.

These automotive examples illustrate Scape Bin-Picker Solutions delivering a part into the turn table fixtures every 3.5 seconds.

The very fast cycle time is achieved with a Scape 3D Scanner for the two robots. Additionally, two “line feeder” robots pick the parts from the Scape Handling Station to place them into the fixtures. The system can handle 7 different parts.

CYCLE TIME:
3,5 seconds

PART WEIGHT AND DIMENSIONS:
0.08-0.290 kg; 170 x 140 x 55 mm

PART DELIVERY:
High precision delivery into fixture

VISION SENSOR:
One SCAPE Sliding Scanner is shared between the two robots, it scans all four bins to keep the cost low

04 SCAPE BIN-PICKING CUTS COSTS WITH EASE-OF-USE

WIDEN YOUR PERCEPTION

OF USER-FRIENDLY SCAPE BIN-PICKING - AND

LET US TEST YOUR PARTS FOR FREE

SCAPETECHNOLOGIES.COM

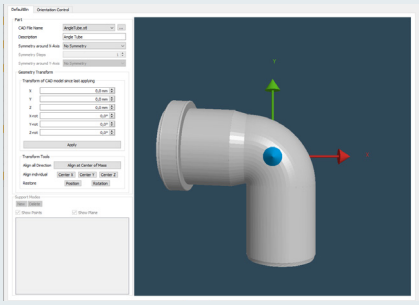
SCAPE
THE BIN-PICKING COMPANY

GRAPHICAL AND INTUITIVE OPERATION OF THE SCAPE BIN-PICKING SYSTEM. NO COMPLEX PROGRAMMING NEEDED.

With Scape everyone can solve even the most complicated Bin-Picking problems without technical know-how. Part training with Scape's Part Training Studio is easily done with 4 simple steps in 12 minutes.

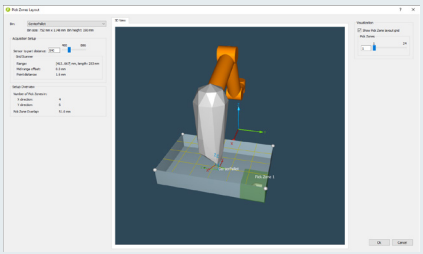
1
Import your CAD files

The Scape Part Training Studio supports most CAD-file formats. It generates the optimal Bin-Picking settings with the highest accuracy without needing to scan any parts.



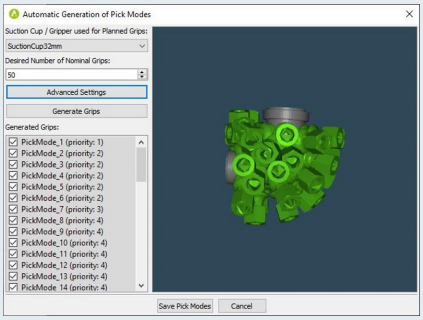
2
Generate recognition data and acquire images

From the CAD-file the Scape software generates a recognition database. It acquires images from the bin to verify the settings and test the recognition.



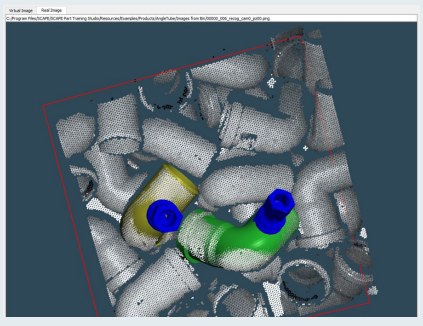
3
Generate grips automatically

For suction cups or vacuum grippers the Scape system automatically generates optimal grips, thus avoiding time consuming fine tuning grip settings.



4
Optimize recognition settings

Finally, all settings can be easily edited and customised to achieve the best performance and the desired functionality.



CONCLUSION Scape Bin-Picking cuts production costs with ease-of-use. Changeovers are quicker, not causing a lot of downtime.

SCAPETECHNOLOGIES.COM

SCAPE
THE BIN-PICKING COMPANY

GET IN TOUCH

We will help you save valuable time, lower your costs and ensure a reliable output with a Bin-Picking Solution ensuring the fastest ROI on the market.

Contact us or one of our SCAPE systems integrators today.

Scape Denmark: Phone: +45 70 25 31 13
Scape Germany: Phone: +49 170 694 8189
Scape China: Phone: +86 755-86250388 ext: 2611
info@scapetechnologies.com

SCAPETECHNOLOGIES.COM

SCAPE
THE BIN-PICKING COMPANY