# BRINGING ORDER TO CHAOS WITH ROBOT GUIDANCE SYSTEMS

SICK, Inc.'s system-solution approach provides you the answer to running a more efficient, cost-effective, and accurate production line. With multiple robot guidance systems, SICK has the solution to fit your business needs that can help you gain flexible material handling operations.

SICK
Sensor Intelligence.


SEE THE POSSIBILITIES OF ROBOT GUIDANCE SYSTEMS

## INTRODUCTION

Manufacturers across multiple industries face a number of current challenges, including shorter production series, lower costs, and a need for increased flexibility. But perhaps the greatest challenge is effectively implementing automated material handling solutions.

Manual part picking is an expensive, labor-intensive process. As a result, repetitive manual handling is increasingly being replaced by robots. The challenge with robots, however, is that they are blind and many are not flexible enough to accommodate ever-changing automated production processes.

With robot vision guidance systems from SICK, flexible material handling is made possible for industrial production. These customizable vision systems provide the competitive advantage many manufacturers are looking for in part localization applications.

"With the creation of many new technologies for the industrial automation industry, this is a very exciting time," said Kevin Gagliostro, SICK Market Product Manager for Track & Trace Systems. "Simple and repetitive tasks of lifting heavy parts from deep bins, conveyors, and racks has always been a primary source of long-term back injuries, accidents, and inefficiencies."

In this eBook, you will find three different robot guidance systems that use SICK vision technology to provide flexibility in the production process.

***"With the creation of many new technologies for the industrial automation industry, this is a very exciting time!"***

—KEVIN GAGLIOSTRO
SICK MARKET PRODUCT MANAGER
FOR TRACK & TRACE SYSTEMS

## PART LOCALIZATION FOR BIN PICKING

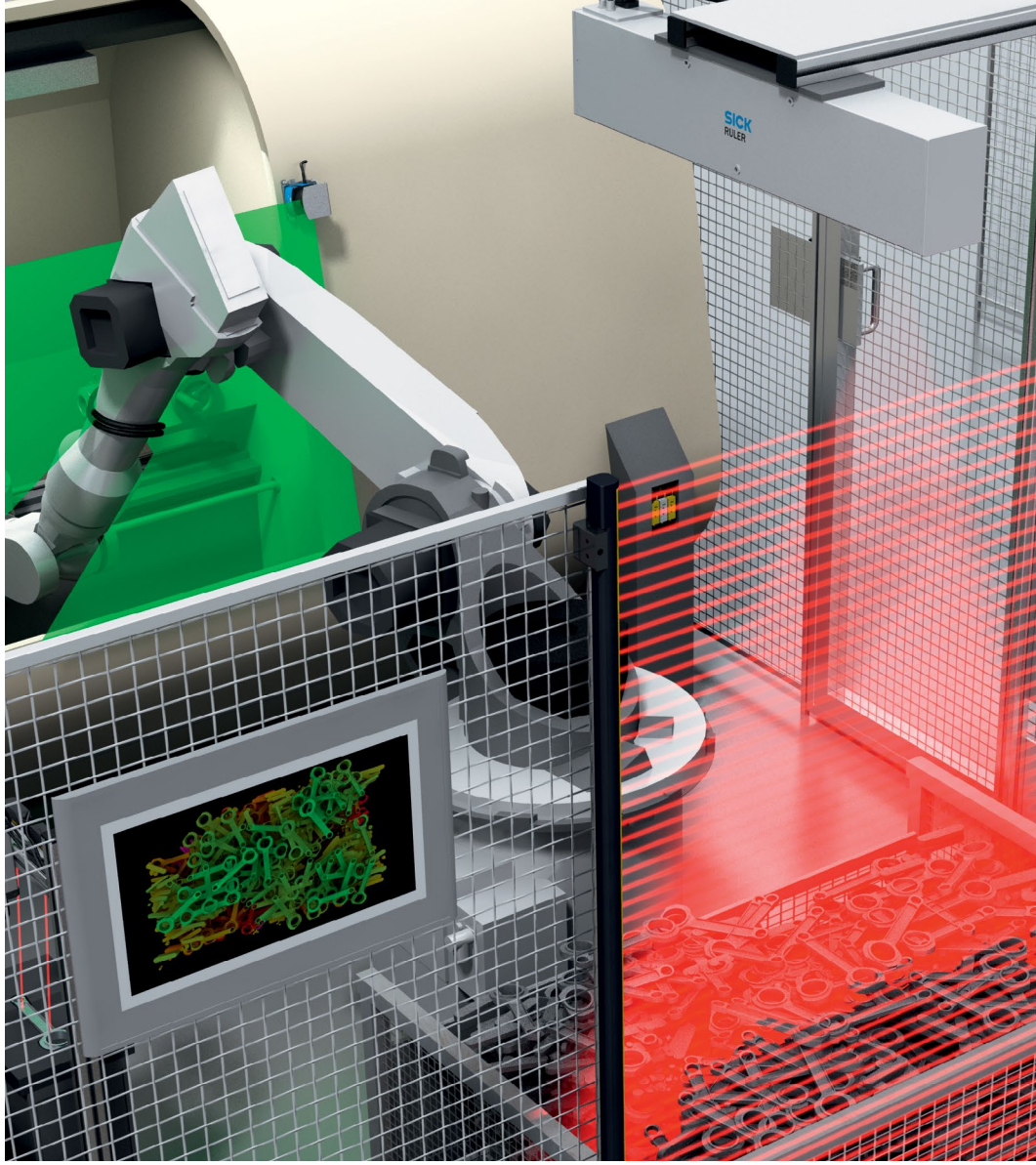
SICK's PLB is a vision system that can be used for high-precision localization of parts that are randomly oriented in bins and boxes. The vision system consists of a 3D camera, part localization software, and tools for easy integration.

Using a high-quality 3D camera, the robot can locate the part, regardless of orientation, and provide pick coordinates to the robot. The robot then verifies that a collision-free space is available for the gripper in reported pick positions. The system provides a localization time typically ranging from 3 to 10 seconds with a typical accuracy of < +/- 1 mm and < +/- 1° depending on the model number.

This also can all be done under ambient or varying light conditions while still maintaining superior image quality. The integrated tools in the system enable coordinate alignment and communication with the robot for accurate part picking and localization.

The part localization software implemented in the PLB system is what drives it. The software is teaching the camera what to target based on a CAD drawing. A visual graphical user interface (GUI) works with the CAD software to provide a visual dashboard for the user to see everything the system is locating.

The PLB is an easy-to-use solution that makes it possible to configure new applications quickly and efficiently with its CAD-based, 3D-shape matching part localization software, edge algorithm, and available plugins. It noticeably reduces




**PLB CASE STUDY:** AUTOMATING THE POSITIONING OF EXHAUST MANIFOLDS AT GEORG FISCHER

click to read the case study

the effort of analyzing and designing solutions for new applications. The software simply matches the CAD model of a part to the 3D image it takes and the part is then picked by the robot. In addition, advanced users gain additional versatility with the ability to develop plugins for localization, letting the PLB to do the rest of the work.

Robot-automated part picking eliminates the need for precise part placement in the bin or the pallet, thereby maximizing part-handling uptime. With the PLB vision system, you'll get a complete solution that comprises of hardware and preconfigured and tailored software. With this system, you can identify and pick objects of sizes, typically ranging from 15 mm to 100 mm.

This system is ideal for the automotive production industry, primarily in powertrain manufacturing, part suppliers, and machine loading operations in component production. In addition, the system has intralogistics applications in de-palletizing and de-stacking tasks and parcel singulation. There are also some process automation applications for the handling of foundry and forging parts.

## FOCUS INDUSTRIES

AUTOMOTIVE & PARTS SUPPLIERS

HANDLING & ASSEMBLY

MACHINE TOOLS MANUFACTURING

PARCEL & POSTAL

RETAIL & WAREHOUSING

CHEMICALS

METAL & STEEL

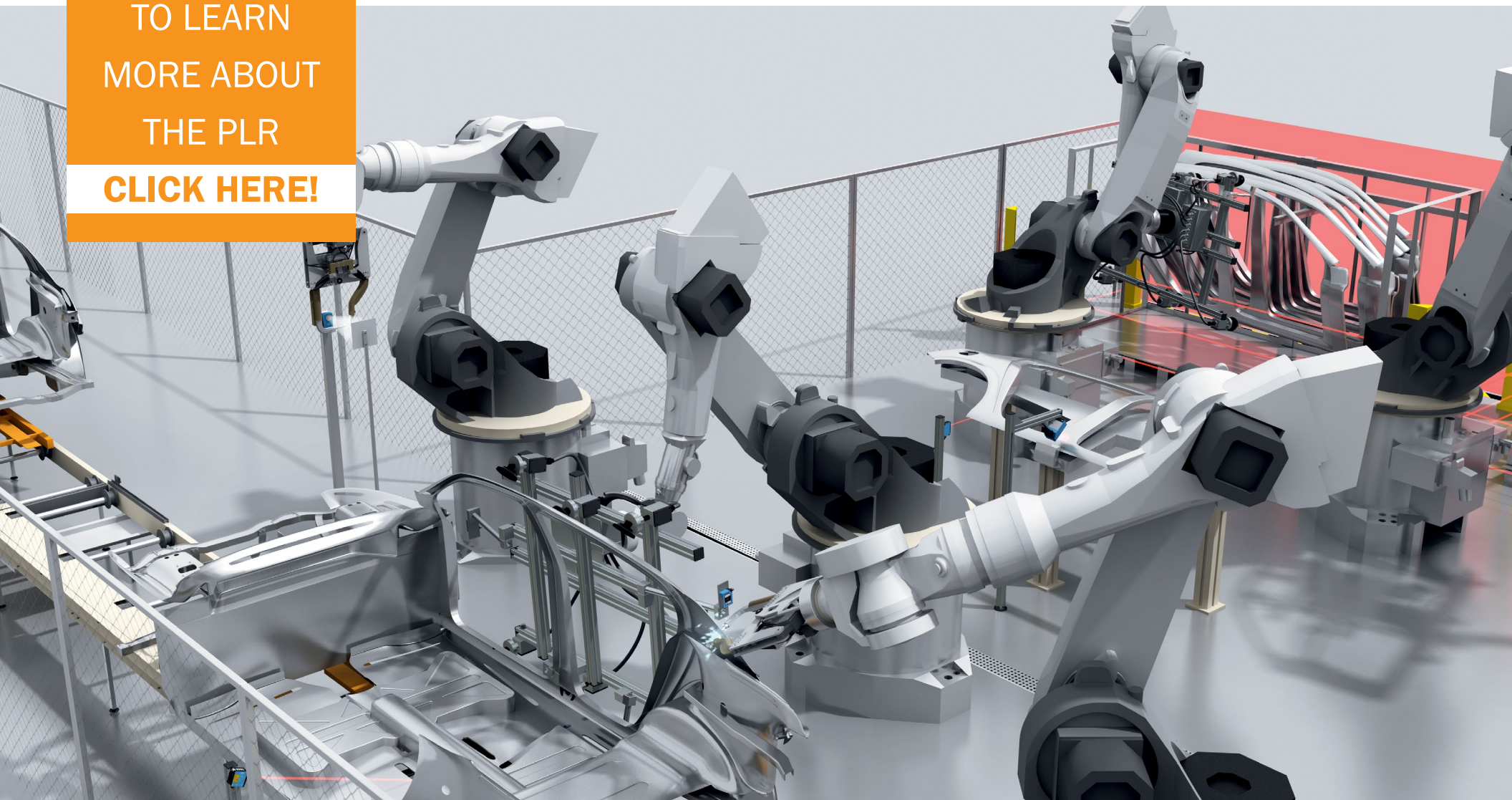
## PART LOCALIZATION IN RACKS

With part handling directly from racks, a vision-based robot guidance system provides flexibility to make adjustments around inaccurately placed or damaged part racks, titled stacks on a pallet, part positions shifting during transport, or natural part manufacturing tolerances. SICK's PLR system has a number of key features that provide reliable robot guidance to shorten cycle times and reduce costs.

The PLR is a factory-calibrated system with preloaded software so it is ready to use out of the box. Simply install the device, connect it to the robot controller, load an existing configuration or create a new one in a few minutes, and PLR is up and running.

TO LEARN MORE ABOUT THE PLR

**CLICK HERE!**



One version of the PLR offers a measurement distance range of 630mm to 880mm, offering robot guidance for effective part localization with an accuracy level of up to ±/- 0.2° and ±/- 0.8mm, depending on material properties such as reflectivity and edge quality. The mm level accounts for the XYZ offset and the degree level accounts for the WPR (rotational) offset. This creates a six degree of freedom offset. The other version of the system offers a measurement distance range of 265mm to 515mm, with a part localization accuracy level of up to ±/- 0.1° and ±/- 1 0.5mm.

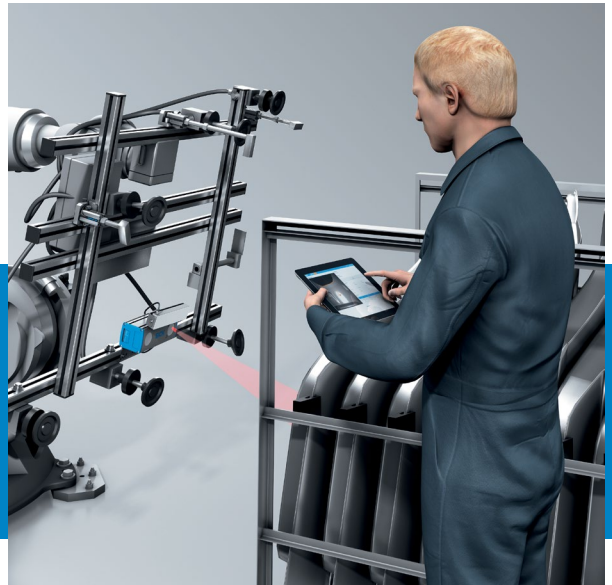
The typical field of view with the system is 260 mm x 260 mm. In addition, the cycle time for the PLR is less than 500ms, which is significantly faster than comparable systems.

It is best at helping to overcome challenges around handling large, bulky stamped sheet metal parts. The parts that are to be manipulated or transported might move or shift during transport or the racks themselves can be damaged. As a result, the PLR is able to overcome these challenges and keep your production running smoothly.

This system also eliminates the need for precision racks. For example, if creating door panels for a car, you no longer need custom-designed racks that ensures precise orientation and spacing of each part. Panels can instead hang loosely on a rack and the PLR can still identify and pick the part – even if there is variation from part to part.

Integrated via web server, the PLR has a short setup time and combines 2D and 3D machine vision technology to provide a unique solution that can provide flexible material handling, even under varying conditions. The combination of both vision types enables the system to identify more varying shapes. This allows you to have your employees perform more value-driven tasks, instead of having the worker tied to a robot cell to ensure proper function and identification.

This system is ideal for the automotive production industry, primarily in automotive body production. It can also be used for localization of parts stored in containers in spot welding and gluing stations. It could also be used to align a robot mounted to an AGV with an attached work surface or one that it drives up to.



## FOCUS INDUSTRIES

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ELECTRONICS & SOLAR

## PART LOCALIZATION ON CONVEYORS

Robot guidance systems can also be used for conveyor-picking applications. The PLOC2D is a vision system for 2D part localization. It consists of high-quality image processing hardware and is equipped with an extremely high performance localization algorithm for reliable and fast part localization.

The PLOC2D is the perfect choice for conveyor picking applications. It's easily tailored to different parts and can be integrated into numerous robot brands and PLCs. It also works well for picking from any feeders or of kitted parts. In addition, the PLOC2D is not just limited to conveyor work; it could also be robot mounted.

Its typical field of view depends on what lens accessary is used, but when using the PLOC2D with a preassembled lens and lighting, it is 2,000 mm x 2,000 mm at a three meter distance. Manufacturers can select necessary resolution (number of pixels) and lens (standoff distance) to create the system that works best for your application. It also has a typical part localization time of < 200 ms for the first part in the image and then < 10 ms for additional parts in the image. The localization accuracy is +/- 1mm and +/- 0.1°.

Due to its motion synchronization, the PLOC2D accounts for rapid movement on the conveyor system allowing for a collaborative effort between the conveyor and the robot arm to work at a rapid pace. This all enables the effective localization of multiple simultaneous parts and rapid transfer of localization data to the robot.

**PLOC2D SENSOR SYSTEM:** LEARN HOW YOU CAN AUTOMATE YOUR PICKING PROCESSES

click to download the technical brochure

Best of all, the sensor system is ready for measurement as soon as it's unpacked without the expertise of a machine vision specialist. No programming knowledge is required and setup is extremely easy, following a simple configuration and parameterization process via web browser. It is also compatible with most robot brands and PLCs.

This system is ideal for the automotive production industry, primarily in powertrain manufacturing, part suppliers, and machine loading operations in component production. In addition, the system has retail and warehousing applications for depalletizing.

## FOCUS INDUSTRIES

AUTOMOTIVE & PARTS SUPPLIERS

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RETAIL & WAREHOUSING

## INDUSTRY 4.0 READY

From the beginning of the first Industrial Revolution to now, production and assembly lines have come a long way. With the advent of the Fourth Industrial Revolution, manufacturers must continue to adapt assembly lines to keep up with the current wave of technology.

Robot guidance systems help bring manufacturers into the factory of the future – a place where the main asset will continue to be people. Instead, robots will be working for them, minimizing risk of worker injury and human intervention in repetitive, dangerous tasks and reducing overall manual labor costs. This leaves tasks of greater added value to the operators, saving you money and increasing product throughput.

Purposeful data needs to be generated and collected from machines, devices, sensors, and PLCs. SICK is the partner-of-choice in this area of expertise. SICK is known as the supplier of information for Industry 4.0. With our collection of sensor products and integration services, you'll receive complete services and solutions to identify and collect the data required from the sensors, devices, machines, controllers at "the edge." Regardless of asset, sensor, device, machine, or controller, SICK's Safety & Sensor Integration Team (S&SI) will provide the technical consultation and implementation services required to identify and harvest the right data to be collected from the right sensors, devices, and machines.

*"For years, the manufacturing industry has spent millions of dollars finding new ways to present parts to aid in mundane tasks like part picking. These new Robot Guidance Systems from SICK, not only solve that problem, but they are very simple to implement & the ROI is extremely short."*

—KEVIN GAGLIOSTRO

**Have additional questions about Robot Guidance Systems?**

**Ready to implement Industry 4.0 in your facility?**

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