Kollmorgen

3D camera system for pallet detection

More flexibility in pallet handling

How Kollmorgen and ifm are making AGVs and AMRs smarter

Kollmorgen is an international company specialising in drive technology and automation solutions.

The innovation and development centre for mobile robotics and vehicles in logistics is located in Mölndal, near Gothenburg. There, Kollmorgen is developing a comprehensive automation platform for leading manufacturers of automated guided vehicles (AGVs) and autonomous mobile robots (AMRs). This ranges from vehicle software and hardware to tools for set-up and fleet management systems that enable safe and efficient operation in intralogistics.

At its test centre near Gothenburg, Kollmorgen validates and optimises automation platforms on various AGVs and AMRs.

New functions are continuously tested and optimised under real-life conditions at the company's own test centre which provides the ideal environment for working with sensor specialist ifm to develop a camera-based solution for dynamic load handling and bring it to series production.

The challenge: precision in mixed human–robot environments

Many warehouses today rely on AGVs, AMRs and manual processes in parallel. Where people place pallets and vehicles later pick them up, precision determines efficiency. In classic rigid systems, pallets must be placed precisely within a defined field; deviations lead to downtime or manual reworking.
"Yet vehicles depend on precision – and the human factor is not always reliable enough," explains **Johan Loebbert**, Application Engineer, Kollmorgen AMS, describing the initial situation in rigid systems.
Typical problem areas range from unloading a truck in the receiving area to transferring pallets to buffer zones: the ideal parking spot is often occupied, markings are worn, angles and depths vary. This results in delays in the flow of materials. At the same time, there is increasing pressure to operate heterogeneous fleets in a scalable manner without compromising process reliability. Kollmorgen was looking for a solution that would bridge the gap between human flexibility and vehicle-side precision, prevent failures and, at the same time, be easy to integrate into existing vehicle architectures.

> *"The collaboration with ifm demonstrates how adaptable and scalable our solution is – in principle, anything can be integrated into the platform.*

With dynamic load docking, the drive and lifting systems interact optimally to efficiently pick up or set down the load.

The electronic eye of the system is the PMD camera from ifm which uses time-of-flight technology to precisely detect the pallet in front of the vehicle.

The solution:
dynamic load docking with ifm camera and PDS app

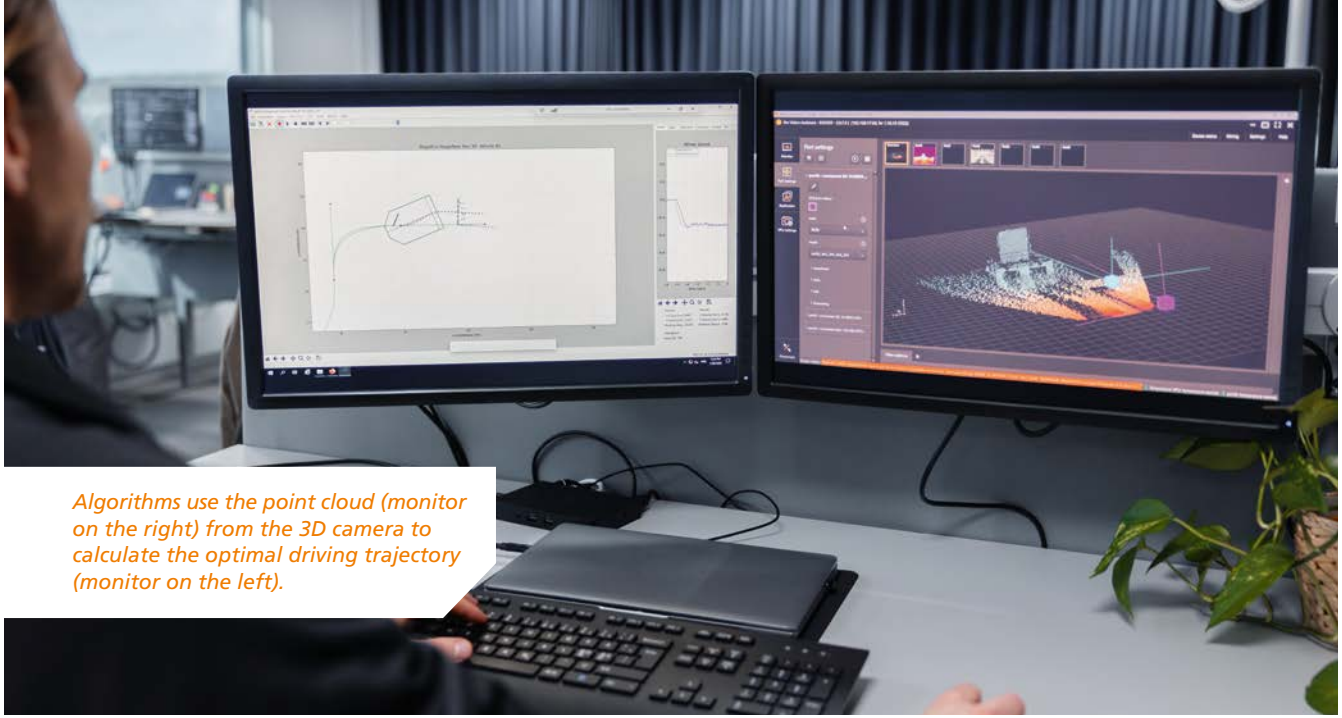
The answer lies in the combination of Kollmorgen's Dynamic Load Docking and an ifm camera system with PDS (Pallet Detection System) functionality. Dynamic load docking refers to a process that is primarily used in automated guided vehicles (AGVs) to pick up or set down loads precisely and efficiently, even while the vehicle or load is still moving slightly.

At its heart is an app that recognises the position, orientation and dimensions of a pallet in the camera's field of view. *"In this case, we use ifm's 3D camera system with PDS function in conjunction with our solution for dynamic load docking,"* explains **Johan Loebbert.** *"In the receiving area, a person can place the pallet in a general area in a variable position and at any angle. The AGV then takes a 3D image, determines the exact position and generates an individual travel trajectory to safely pick up the pallet."*

The technical added value is already evident in the integration: install the camera, connect it to the vehicle CPU and controller, perform a quick calibration process and some fine tuning – done, virtually plug and play. The development was a joint project between Kollmorgen and ifm: *"The collaboration with ifm was outstanding. ifm developed the PDS solution while we tested our dynamic load docking. Thanks to continuous feedback, we were able to further optimise the functionality,"* concludes **Johan Loebbert**.
Even after the market launch, the teams remain in contact to ensure quality and support globally.

Camera platform from ifm

The versatile O3R perception platform forms the technological basis for reliable pallet detection on autonomous guided vehicles (AGVs). The central processing of image and sensor data in the integrated Video Processing Unit (VPU) allows up to six 2D/3D camera heads to be operated synchronously, enabling complete 360° environment detection.



Algorithms use the point cloud (monitor on the right) from the 3D camera to calculate the optimal driving trajectory (monitor on the left).

At the heart of image processing is ifm's Video Processing Unit which runs the "Pallet Detection System" (PDS) app.

This hardware runs the specially developed "Pallet Detection System" (PDS) software which recognises all standard pallet types regardless of their position and with high precision. The combination of a powerful processing unit, the latest time-of-flight imager with high extraneous light stability and a high frame rate ensures robust and dynamic object detection – even under challenging lighting and movement conditions. Thanks to its standardised Docker architecture and support for common development environments such as Python, C++, CUDA and ROS, the system can be flexibly integrated into existing AGV controllers. The O3R platform enables efficient and safe pallet detection, supporting the autonomous approach, positioning and picking up of pallets with precision and reliability – a decisive contribution to the automation and increased efficiency of modern intralogistics processes.

The benefits: greater flexibility, less downtime, higher availability

Camera-based load handling shifts the focus away from rigid rules towards robust processes adapted to the respective situation. The greatest leverage is flexibility: pallets no longer need to be placed in fixed areas. This reduces rework and shortens cycle times in mixed zones where people and vehicles work together. For operators this means: fewer blockages, fewer manual interventions, higher throughputs – with consistent safety. In addition to its process benefits, the solution also impresses in practice with its simple and quick installation. This simplicity facilitates roll-outs across fleets and locations. Another advantage arises from the openness of the Kollmorgen platform: *"Our collaboration with ifm demonstrates just how adaptable and scalable our solution is – in principle, anything can be integrated into the platform,"* explains **Per Hansson**, Partner Channel Coordinator at Kollmorgen AMS.

For users, this results in technological sovereignty: the fleet remains expandable, and new functions can be added gradually.

"The most important points are efficiency and reliability. There must be confidence that the system will work over time. This is precisely the quality we deliver. We can pool our experience and turn it into a product. It is great to see the problems this solves for our customers," says **Per Hansson**.

Sensor intelligence and fleet expertise thus combine to create a practical complete package with tangible added value in everyday intralogistics.

Conclusion

The joint solution from Kollmorgen and ifm combines the best of both worlds: robust, industrial-grade camera sensor technology with a sophisticated automation platform for AGVs and AMRs. If you want to make your intralogistics more resilient, efficient and future-proof, you will find a pragmatic approach here: pallets can be placed flexibly, cameras capture the situation, vehicles operate intelligently – keeping the flow of materials moving.

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