

Technical Story

Bosch Rexroth Automotive Team
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Modular *Programmable Lift Platform* Concept Brings Greater Flexibility to Auto Manufacturing

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As automotive manufacturing becomes increasingly competitive, machine builders must look at new ways to satisfy customer demands for greater efficiency, cost reductions and productivity enhancements, even as engineering resources are trimmed back.

One solution OEMs are beginning to request is the use of modular components which are easy to combine, simplify designing and engineering tasks, and provide more flexibility for multiple car bodies to be produced on the same line.

Bosch Rexroth has joined resources within its technology groups to begin developing these types of modular solutions. One of the key concepts to come out of this collective effort is the Programmable Lift Platform (PLP)—a concept from which lifting capabilities now performed with expensive pallets and robots are replaced by simple programmable gantry style platforms. These platforms are easily constructed along the automotive assembly line using modular automation

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components such as ball screws, linear elements, PC control and electric servo motors and drives.

PLP Benefits in Production

Within the automotive industry, the flexible body shop has been a major innovation that permits multiple car bodies to be produced on the same line. Some older lines use expensive pallets designed to hold specific body parts in place for different cars, or the parts may be held in place by complex programmable robots. For example, four fixturing robots might be programmed to lift a vehicle body for spot welding. If the next vehicle were a different model, the robots would be programmed to accommodate the new model. However, the programming of these robots can be much more time consuming and costly than the programming for a PLP because many robots have more than X-, Y- and Z-axis movements. Also, the PLP cell can cost significantly less than fully dressed robots and require far less floor space since units can be mounted within the line.

Compared to pallets and robots, the PLP is specifically designed for lift and locate applications and does not need or use more than the three programmable axes of X, Y and Z. Thus, the PLP is simpler to program and implement into an assembly line. Variations in PLP quantities are based on the weight of the part or body, the size of the part or body, and how the weight is distributed (i.e. the center of

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gravity). A full car body may require a minimum of four PLPs in one work cell while a fender application might require only one or two PLPs.

The flexibility of the lift platform allows multiple vehicles or parts to be processed on the same production line without any downtime required to reset parameters or interrupt the line. Along the “body in white” line, the PLP concept could be applied as an integrated cell that has the ability to move locking pin points on each PLP to adjust for multiple body or component sizes without resetting parameters. For example, the PLP could be programmed to lift a vehicle so that a welding robot could perform its tasks on car underbodies, fenders, frames or other items.

The PLP could also be used to lift and locate components such as fenders into an assembly station, where a tightening power head could then be moved into position to attach it to the body of car. The lift could be programmed to automatically change locking pin parameters to the proper position according to the next vehicle coming down the line. The change for different body types could be calculated automatically, such as by bar code scan, or the operator may make the body type selection from a handheld pendant.

For a flexible body shop, the range of body styles one line can typically accommodate is no more than four, but using the Rexroth PLP concept a line could

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handle multiple body styles with six PLP units all controlled via *one* Rexroth controller. This represents a significant reduction in the number of control components and their related costs and space requirements. Other manufacturers would need to use six PLC controls and then write a synchronization program to handle this number of PLP units and body styles.

Other companies have tried to develop PLP-like solutions by combining components piecemeal from multiple manufacturers, but this presents compatibility and logistics issues. Bosch Rexroth is in the unique position to offer the motion control architecture, rotary and linear motion components and operator interface from its technology groups to form the complete solution, thereby ensuring smooth compatibility and providing a single point of contact. Ultimately, the modularity of the PLP comes together in nearly plug-and-play fashion, which allows OEMs to save valuable design and engineering time, reduce the complexity of the process and add new levels of productivity and flexibility.

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Photo Reference and Caption:



(Programmable Lift Platform) The concept of the Programmable Lift Platform (PLP) replaces expensive pallets and robots with easy-to-build programmable gantry style platforms that use modular automation components such as ball screws, linear elements, PC control and electric servo motors and drives.

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