

## A System Architecture Analysis of the Procan Alpha 6 Control System

# Increased Efficiency by Integral Robot Integration

In the highly competitive field of injection molding, automation is a critical factor for optimizing process parameters, increasing production output, and ensuring consistent product quality. Fully exploiting this potential requires a system integration of robotics into the central machine control system. With its Procan Alpha 6 control system, Dr. Boy maintains the standard of a profound robot integration that goes beyond conventional interface functionalities.

A comprehensive control architecture is characterized by the fact that the user can utilize a central control concept for their complex tasks. This is exactly how Dr. Boy designed the Procan Alpha 6 control system for its injection molding machines. In development, the machine manufacturer is currently focusing on enabling customers to exploit their efficiency potential through automation. The complete integration of the in-house LR 5 linear robot series into the Procan Alpha 6 control system (Fig. 1) transforms a production cell of individual components into an intelligent system. This architectural consolidation means significant advantages in the user interface (HMI, human-machine interface), data management, and process reliability.

### *Bidirectional Data Coupling with the Injection Molding Machine Data Set*

The automatic, bidirectional data coupling of the LR 5 with the data set of the injection molding machine represents a fundamental aspect of integration. All process-relevant parameters – from the mold opening position and cycle time up to specific ejector kinematics – are exchanged in real time between the injection molding machine and the LR 5. This eliminates duplicate data entry, minimizes the risk of configuration errors, and significantly reduces setup times.

A consolidated alarm system and event-logging are crucial for proactive fault diagnosis and the maximization of



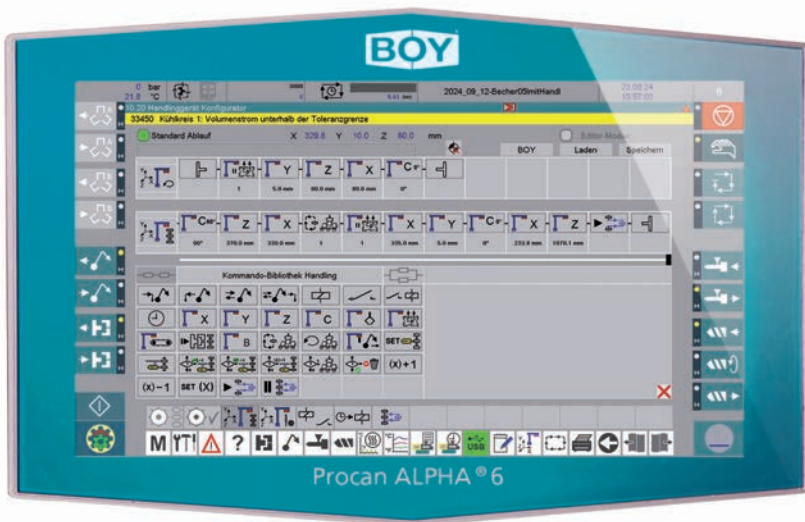
A Boy 80 *Electric* injection molding machine with integrated LR 5 linear robot will be on display at K 2025. © Dr. Boy

the plant availability. All malfunctions, warnings, and operating events generated by the injection molding machine or the LR 5 are compiled in a central logging system. This provides operators with a comprehensive and consolidated overview of the system status of the entire production cell. The efficiency of the cause analysis is increased and unplanned downtimes are minimized.

The restart after a malfunction is significantly simplified, as all position data is known. This prevents collisions between the mold and the robot.

### *Shared Use of Freely Programmable Interfaces*

The homogeneous HMI structure of the LR 5, which corresponds to that of



**Fig. 1.** Homogeneous HMI and intuitive interaction: The configurator for the LR 5 handling robot on the display of the Procan Alpha 6 machine control system. © Dr. Boy

the injection molding machine, is crucial for user acceptance and operational efficiency. Operators familiar with the Procan Alpha 6 can operate the robot functions without extensive additional training. The uniform user interface, consistent menu navigation, and familiar graphical visualization drastically reduce the training period and enable fast and reliable programming.

The option to share freely programmable I/O interfaces simplifies the integration of peripheral devices and the implementation of complex automation tasks. Sensors, external actuators, or other additional modules can be controlled and monitored via the shared I/O infrastructure of both systems – the injection molding machine and the LR 5 (**Title figure**). This significantly reduces costs.

### Precision and Adaptability for Demanding Applications

In addition to the deep system integration, the robot functionality in the Procan Alpha 6 control system offers a comprehensive portfolio of application-specific functions. A freely configurable reference run including pneumatic axes is essential for precise initialization of the robot after a system restart or a mold change. The inclusion of pneumatic axes, which are often used for fast gripping or depositing movements, ensures the exact calibration of the entire robot

system. This increases the process reliability and the repeatability accuracy of the processes.

The ability to create freely configurable operation sequences with synchronized ejector kinematics allows the robot movements to be optimally coordinated with the injection molding process. The robot can adapt its removal movement perfectly to the ejector stroke and the ejector speed. That means a gentle component removal, the avoidance of damage, and the minimization of cycle time.

The electronic gearbox for ejector synchronization is a function that kinematically couples the robot movement with the ejector movement of the injection molding machine. This synchronization ensures an optimum part transfer, with the component being gently and precisely taken over by the ejector.

### From Insertion to Palletizing

Similar to ejector synchronization, the electronic gearbox for mold movement synchronization enables precise coupling of the robot movement with the mold opening and closing movement. This function is perfect for applications in which the robot must precisely place inserts into the mold or remove complex sprue systems during the mold opening process.

The integrated palletizing functionality automates the end-of-line process. Users can define various palletizing

patterns to efficiently stack components on pallets, in containers, or other means of transport. This increases the degree of automation of the production line, reduces manual labor, and optimizes post-injection molding processes.

### Conclusion

The Procan Alpha 6 serves as a link between the injection molding machine and the removal robot. The setup engineer only needs one control unit to implement the manufacturing process. ■

## Info

### Text

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### Features of the Control

The control architecture of the Procan Alpha 6 has the following features:

- Icons for graphical sequence programming
- Consolidated alarm system and event-logging
- Intuitive operation

Its extended range of functions offers a number of advantages, especially for demanding applications:

- Freely configurable reference run inclusive pneumatic axes
- Freely configurable sequence with synchronized ejector kinematics
- Electronic gearbox for ejector synchronization for an optimal part transfer
- Electronic gearbox for mold movement synchronization
- Integrated palletizing functionality

### Service

More information about the manufacturer: [www.dr-boy.de/en](http://www.dr-boy.de/en)