

Pick & Place Machine

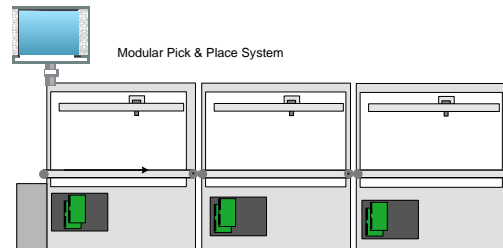
Distributed motion control in a modular machine

Application Challenge:

Create motion control architecture that simplifies programming, provides fast pick & place transfers, and supports multiple motor types.

Application considerations:

Feature/Function	Units
Control architecture:	Card-based
Number of axes:	4 per unit
Motion mode:	Point-to-point, multi-axis point-to-point



Motion Control Solution

An implementation using Prodigy® Stand-Alone Motion Cards for each of the modular units in the Pick & Place machine resolves several issues. The three axes for the pick & place gantry benefit from S-curve motion profiles for smooth operation and feed-forward control for faster system performance. Utilizing the downloadable programming capabilities enables the motion cards to off-load the motion programming execution from the PC host allowing it to focus on running the overall system application and eliminates the need for a PC host controlling each modular unit.

C-Motion® & Downloadable Programming

PMD's C-Motion library can be used to develop code that runs on the motion card independently of a host PC, freeing the host PC to focus on other machine application software. C-Motion is the foundation from which the programming code is developed. It enables machine designers to quickly program motion into demanding applications using standard C/C++ programming. A suite of software tools is provided with the Prodigy Motion Cards in addition to C-Motion to facilitate the creation and downloading of the programs within a PC environment. These include a programming editor, compiler, download utility and debugging tool.

S-Curve Motion Profiling for reduced vibration

Adding S-curve motion profiles can substantially reduce vibration over trapezoidal profiles. This translates to significantly faster transfer speeds. Often, only a small amount of "S" (transition between acceleration and no acceleration) can substantially reduce induced vibration. The form of the s-curve will depend on the desired performance required. Prodigy Motion Cards which include the Magellan Motion Processor can also provide trapezoidal, velocity contouring, and electronic gearing motion profiles as alternatives to s-curve profiles.

Feed-forward

Adding feed-forward velocity and acceleration to the position loop minimizes the tracking error without having to increase the PID gains. This minimizes the risk of making the control loop unstable when trying to maximize performance of the system. In a Pick & Place application this will allow for faster motion profiles and therefore higher throughput in each module.

Multi-motor type support

Prodigy supports multiple motor types, DC brush, Brushless DC, and stepper, and also pulse & direction amplifiers. Each axis on a card can be a different motor type, e.g., Brushless DC with lead screw or linear motor. This allows for optimized motor selection in the system for both cost and performance. Because of this, the system could be simplified using linear motors doing away with the need for a dual encoder configuration. The configurations below show three brushless DC motors and one with a step motor controlled from one Prodigy Motion Control card.

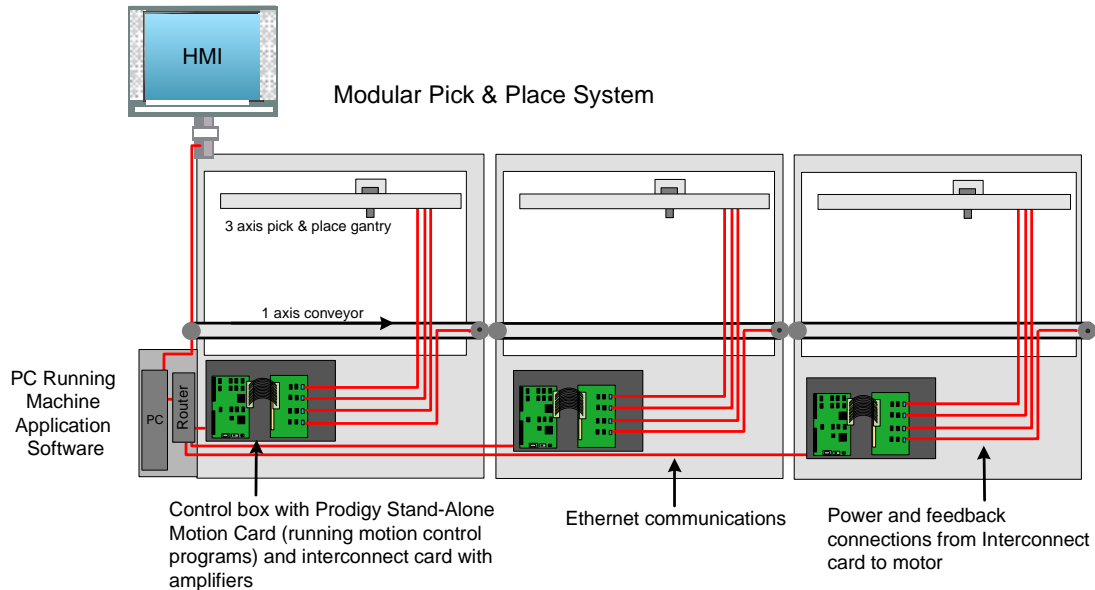


Figure 1 illustrates the connections from the PC to the Prodigy stand-alone motion card, interconnect card, amplifiers and motors. Each motion card is connected to the Ethernet router independently.

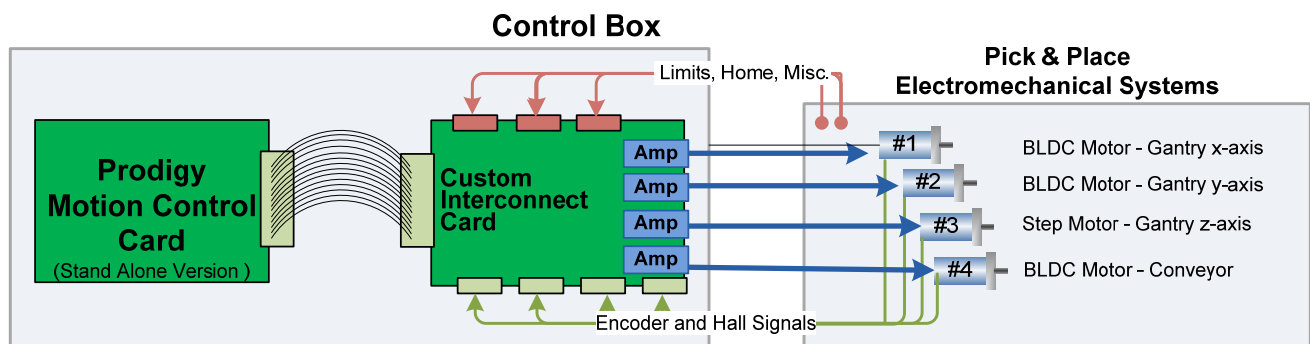


Figure 2 shows the motion card and the interconnect card controlling four axes.

All **Prodigy Motion Cards** provide high performance motion control supporting multiple motor types including DC brush, brushless DC, step, and microstepping motors, and are based on PMD's Magellan® Motion Processor, which provides user-selectable profile modes including S-curve, trapezoidal, velocity contouring, and electronic gearing. Formats include PCI, PC/104 and Stand-alone versions, all with downloadable programming options.



Contact our customer support team at +1 781 674 9860 for more information including details on Developer's Kits and application support. We would like to assist you in improving your motion system.