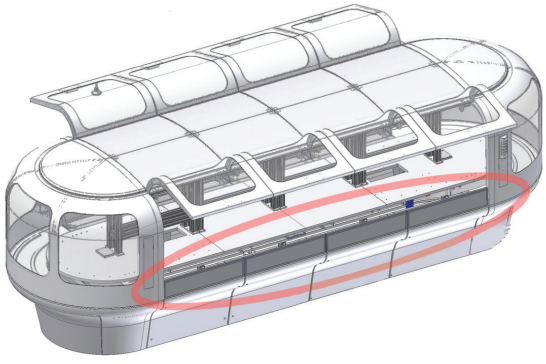
MSD
MOTION SYSTEM DESIGN

Ride this train



AGR Automation (Arbroath, Scotland) manufactures SmartPod modular assembly automation platforms that incorporate MagneMotion's QuickStick linear synchronous motors for pallet transfer and positioning. The flexible system allows lines of up to 12 m long and integrates with other production lines.

For more information on QuickStick modules, contact MagneMotion, Inc. at (978) 461-5090 or info@magnemotion.com, or e-mail the editor at eeitel@penton.com.

Conveyor belts and power transmission equipment are often employed to move materials around production facilities and warehouses. However, their belts, hydraulic elevators, and cranes must be adjusted, tightened, and lubricated, and their wear items can need replacing. Now an alternative conveying system based on *long stator* linear motors both transports and positions material without contact.

Developed by MagneMotion Inc., Acton, Mass., magnetic units based on linear synchronous motors (LSMs) can be used in conveyors to transport items over long distances. The control software and modular design allows sections to be placed end-to-end within a guideway to form a transport system of any length; curves and switches are handled by turntables or double-bogey vehicles.

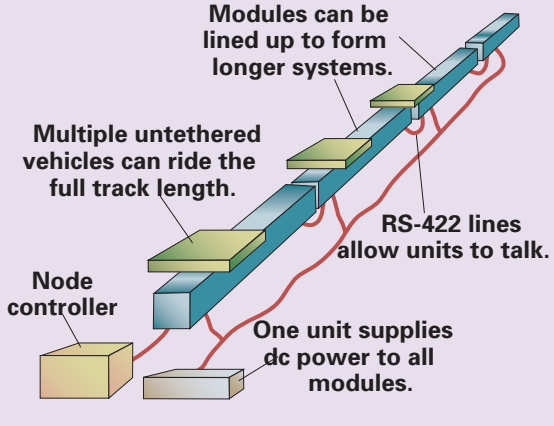
Each section in the MagneMotion system is a standalone intelligent module, combining the motor primary, drive amplifier, servo controller, position sensors, and serial communications. Modules can report vehicle position and other data to supervisory control systems, aiding in security, validation, and work-in-process tracking. Another advantage with the new system is that the pallet is magnetically coupled to the motor, so vehicles can't slip on a belt, causing unwanted delays. Initial cost is somewhat higher but cost of ownership is lower than that of conventional systems. **MSD**

How it works

Each vehicle has a magnet array attached to its underside. The magnets form the motor secondary. The motor primary, as well as the amplifier, are positioned into the base module. There is a physical gap of about 3 mm between the primary and secondary, maintained by vehicle wheels or rollers if the vehicle is a pallet. Each module is divided into one or more motor blocks, and only one vehicle is allowed in a block at a time.

At the start of each session, each vehicle on the track is assigned an ID and the system thereafter knows where each vehicle is at all times. Each vehicle is also given any number of sequential move profiles. Suppose the plan is for vehicle *Number One* to move to station *C* in zone *Y* at a velocity not to exceed 2 m/sec. If a base module senses a magnet array above the motor block, it can tell which vehicle it is by its ID, and what its current move profile should be. The windings are then excited based on the desire profile, creating the necessary electromagnetic field.

The vehicle then rides the field over the motor block, much like a surfer rides a wave, and readies itself to enter the next block. But, to move into a new block, the vehicle must seek permission. If the next block in the move profile is occupied, no permission is granted and the vehicle is halted. Once it enters the new block, the entire process is repeated. Permission requests and responses are executed in msec.



Magnetically conveyed vehicles can move bidirectionally at speeds to 5 m/sec, stop anywhere with a repeatability of ±0.5 mm, and carry loads in excess of 1,000 lb, depending on the incline, drag coefficient, acceleration, and velocity requirements.

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