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Matrix Brake Ideal for Compact Multi-Directional Forklifts

Matrix®
Altra Industrial Motion

Matrix Brake Ideal for Compact Multi-Directional Forklifts

Specialized forklift trucks enable modern warehouses to maximize space and product flow efficiency, ultimately increasing profitability of the operator. The continuous design and development of these trucks is key to unlocking new advantages, a philosophy that also applies to critical sub-assemblies such as brakes. New technically advanced electromagnetic brakes, such as Matrix's 4PMB, are providing OEMs with a compact, reliable and safe solution, perfect for state-of-the-art forklift truck designs.

For a new model multi-directional forklift designed to promote storage capacity, a leading OEM approached Matrix International to provide a brake that combined variable torque and power-off emergency braking in a single package.

Compact Matrix Model 4PMB070 operator-controlled, variable torque permanent magnet brakes have a 190 Nm (140 lb.ft.) static torque rating and 150 Nm (110 lb.ft.) dynamic torque rating.

Optimizing warehouse space

The principal factor that has allowed warehouse operators to maximize storage capacity is the forklift truck. These vehicles allow the movement of large loads from the rack, loading dock or trailer with relative ease. Forklift trucks are therefore vital for modern logistics, as illustrated by global sales of 1,583,000 units in 2018[1]. With advanced forklift trucks, warehouse operators can hold and access the maximum amount of stock, which consequently, boosts profitability.

By offering highly maneuverable, compact forklift trucks, OEMs can provide additional storage capacity improvement opportunities to warehouse operators. A forklift that operates efficiently within a reduced aisle space, can allow the racks to move closer together, further maximizing storage capacity within the warehouse. The result is increased cost-effectiveness.

Multi-directional forklift trucks

A design that is indicative of this philosophy is the multi-directional forklift truck. Optimized to provide increased maneuverability in tight spaces, some trucks allow sideways movement to further reduce footprint. With these features, multi-directional forklift trucks have allowed storage racks to move closer together, which has made them popular with warehouse operators.

For multi-directional forklift OEMs, optimizing the compactness, maneuverability and reliability of the vehicle is key. New designs rely on innovative, compact components and assemblies that perform reliably. This can enable space saving on the vehicle design, which in turn, creates storage capacity benefits. Reliability allows operators to properly capitalize on the increased cost-effectiveness of improved storage capacity.

[1] [https://www.fortunebusinessinsights.com/industry-reports/forklift-trucks-market-101541]

Choosing trusted Tier 1 suppliers to provide key components is all-important to achieve this outcome. This is especially true of forklift truck brakes.

Improving braking performance

A global forklift OEM approached Matrix, a leading brand of Altra Industrial Motion Corp., to provide a braking solution for their updated multi-direction forklift truck. Matrix is a premier designer of industrial electromagnetic/hydraulic clutches and brakes, and a key provider to the forklift truck market.

The forklift featured a steering system that allowed the truck to move sideways while transporting heavy, oversized loads. The truck could therefore travel in narrow aisles, providing the storage capacity advantage.

The original vehicle utilized mechanical load wheel brakes, but the OEM wanted to update the system to one of Matrix's technically-advanced electric brake solutions.

The 4PMB electrically-released, variable torque load wheel brake was chosen, which provides the following benefits:

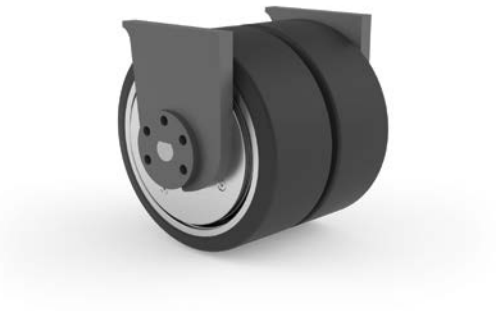
- Power-off engagement enables the brake to be used as a parking brake and for emergency stopping during power-loss conditions.
- Variable braking torque, through current control, allows controlled and efficient braking depending on the load condition.
- Compact size and a load-wheel integrated design enables reduced truck size.
- Optimized design and reduced component count ensure long-life, reduced maintenance and improved reliability.

Assessing the torque requirements, space restrictions, chassis mounting configuration and onboard power supply, Matrix engineers developed a custom 4PMB series brake specifically for the application.

A compact solution

The compact 4PMB brake was positioned within the front load wheels, providing parking and variable torque service braking. The forklift operator could easily adjust the dynamic brake torque by varying the amount of current delivered to the brakes. Variable torque control allows the driver to enable extra holding and stopping power when carrying heavy loads, while maintaining controlled stopping under lighter load conditions.

A key advantage of the 4PMB is an inherently high torque-to-size ratio. The Model 4PMB070 permanent magnet brakes fitted to the forklift have a 190 Nm static torque rating and a 150 Nm dynamic torque rating. The power-off design ensures that 100% torque is generated when no power is applied, so the unit can function as a



Positioned inside the front load wheels, compact 4PMB units provide parking and variable torque service braking.

parking and emergency stop brake. The design also features an auto-adjuster spring return mechanism which enables long wear life and ensures zero drag torque while disengaged.

After successful testing conducted by both Matrix engineers and the OEM, a production order was placed for the 4PMB070 brakes. Having proven its reliability and performance in the field, the brakes contributed to a highly compact and maneuverable design, enabling increased space efficiency for warehouse operators using the forklift.

The compactness and reliability of the 4PMB also makes it well-suited to the future of forklift trucks autonomy. Autonomous forklifts that are connected to warehouse management software can provide additional efficiency improvements by further reducing vehicle size and increasing storage capacity. Due to its installation within the wheels, the 4PMB can easily integrate within the design of the autonomous guided vehicles (AGV) that are defining the modern approach to warehouse logistics.

As a global designer and manufacturer of braking solutions, Matrix provides forklift OEMs with a highly dynamic product range that can be adapted and specialized to meet specific forklift designs. Working closely with OEMs during the initial prototyping and development process, Matrix can integrate innovative braking solutions seamlessly to achieve compact designs and operational reliability.

Matrix®
Altra Industrial Motion

US (Application Assistance)
800-825-9050
www.matrix-international.com

Europe
+44 (0) 1356 602000

Asia Pacific
For a list of our AP sales offices:
www.altramotion.com/contactus

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