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USING MECANUM WHEEL IN MOVING CARGO

A mover in a certain sense is a device that converts energy, force from an external source or engine into a certain movement. At the same time, it interacts with the environment in such a way that the platform on which the driver and the engine are located moves in space. Thus, the engine is one of the main parts of land transport, because it is a part in the combination of the engine and the mover that leads to the translational movement of the vehicle.

Very often, not only wheels, and not only types of wheels, but also other types can act as a driving force. The main types are wheel; caterpillar; semi-tracked platform, with wheels; semi-tracked platform, with skis; auger.

Due to its design, the wheel consumes much less energy to move on the main types of roads and surfaces. When using a wheel, work occurs against the force of rolling friction, which in artificial road conditions is significantly less than the force of sliding friction.

An ordinary round wheel is the most primitive type of drive, which in its essence is the founder of other types of wheels that are currently used on transport platforms. There are four main types of wheels (Fig. 1):

(а) Standard wheel: two degrees of freedom. It rotates around the wheel axis (motorized) and the point of contact with the surface.

(б) Turning wheel: two degrees of freedom. Rotates around a displaced wheel joint.

(в, г) Swedish wheel: three degrees of freedom. Rotates around the (motorized) wheel axle, around the roller axles and around the point of contact. Rollers can be placed in two different ways. The 90° variant is shown in the figure (Fig. 1, в) and the 45° variant is shown in the figure (Fig. 1, г).

(д) Ball or spherical wheel: technically difficult to implement.

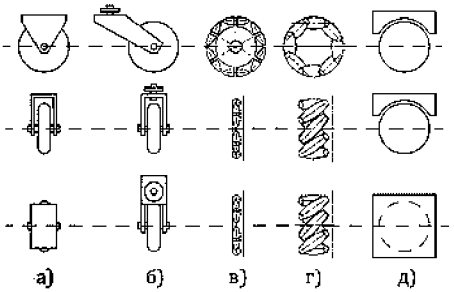

Figure 1 – Scheme of the main types of wheels

Mobility is one of the main problems of robotics and motor vehicles, when the platform has to move in a small and narrow space and avoid obstacles. The omnidirectional drive mechanism is very attractive because it guarantees very good mobility in such cases where conventional wheels are ineffective. This possibility mainly depends on the construction of the wheel and its design.

One type of omnidirectional wheel is the Mecanum wheel, also known as Elon's wheel or, as it is sometimes called, the Swedish wheel. It is a roller bearing wheel with several rollers attached to its circumference, these rollers have an axis of rotation at 45° to the plane of the wheel in a plane parallel to

the axis of rotation of the wheel, and this allows the vehicle to move in any direction. Depending on each individual direction of motion and speed, the resulting combination of all these forces produces a total force vector in any desired direction, allowing the platform to move freely in the direction of the resulting force vector without changing the position of the wheels themselves. Mecanum wheels are widely used in cases where very good platform or robot mobility is required and are ideal for narrow spaces. The advantages are its compact size and high load capacity.

Typical Mecanum wheeled vehicles usually have a square or rectangular platform on which the wheels are mounted (Fig. 2), two wheels on each side of the chassis. Using four of these wheels provides all directionality of movement for the vehicle without using a conventional steering system.

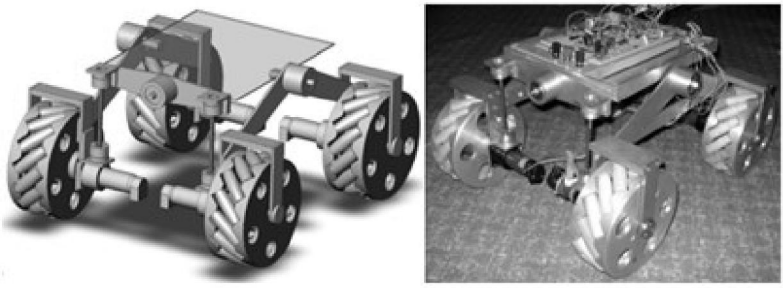

Figure 2 – Mecanum wheeled vehicle

Omni-directional vehicles have great advantages over conventional car-steering platforms for convenient mobility. They can crawl (sideways), turn in place, and follow complex trajectories. These platforms can perform tasks easily in environments with static and dynamic environments, obstacles and narrow passages. Such environments are usually found in factory workshops, offices, warehouses, and hospitals. The omnidirectional vehicle development aims to further prove the effectiveness of this type of architecture and add a capable ground vehicle platform of exceptional maneuverability when moving cargo.