

# OTTO ROBOT

## A SELF-DRIVING VEHICLE

In partnership with Clearpath Robotics, Shell-O-Matic presents the Otto robot, a self-driving vehicle that combines the flexibility of a labour force with the efficiency of conveyors and the safety of automated guided vehicles (AGVs).

The Otto is available in a range of weight-bearing capacities and can be fitted with various load-carrying implements, adapted for the material it will transport, making it ideal for a variety of tasks in the factory, including:

- » Carrying wax trees or shells with standard Shell-O-Matic couplings
- » Moving items from the wax room to the shell room
- » De-waxing equipment automatically
- » Loading wax patterns/molds in the proper orientation
- » Manipulating molds/patterns to control quality or clean them

### GUIDANCE

The Otto robot has a laser vision system that allows it to “see” its environment, enabling it to guide itself through the factory.

During commissioning, one Otto robot is manually “walked” through the factory and fed, via Wi-Fi, the factory geometry that it “sees.” This allows the Otto to create a factory map, which is then used to configure the system and teach the Otto fleet various navigational constraints, including:

- » Low-speed zones
- » One-way traffic areas
- » Stop signs
- » Any other traffic considerations present in the factory



The Otto robots’ central management system uses the factory map to decide on the Ottos’ best delivery paths. Should the Ottos encounter obstacles, they will “see” them and automatically find new paths to achieve their goals. The Otto robot is robust, and its active suspension system means it can adapt to imperfect floors and even cross over small objects (up to 22 mm high).

## EFFICIENCY

In operation, the Ottos are assigned pick-up and drop-off jobs from a central Wi-Fi-controlled fleet management system, which is connected to the facility's MES to control material handling. The central system also automatically manages the battery charging of the Ottos to maintain and optimize the fleet's operational efficiency.

## SAFETY

Once assigned a task, the Otto automatically finds the best path across the factory to perform material delivery. In operation, the Otto interacts perfectly with any humans or other Ottos moving around it. The Otto slows down when it detects nearby movement and creates real-time avoidance trajectories that allow it to interact safely with its environment.

## VERSATILITY

Shell-O-Matic can install an articulated robot or manipulator on the Otto, which shares the Otto's battery to power its implements. An advantage of this pairing is that it allows the Otto to facilitate the exchange of material between two separate stations.

This flexibility gives further versatility to the system and enhances its adaptability to the evolving material handling needs the factory may experience, including:

- » Raw material package change
- » Produced-part geometry change
- » Addition of new cells in the factory

