

Levels of Autonomy, Heavy-Duty Trucking

According to National Highway Traffic Safety Administration (NHTSA), driver error is cited as a factor in over 94% of road incidents. Prototypes of autonomous shuttles, autonomous delivery vehicles, and taxis are being tested. Autonomous large haul trucks are revolutionizing mining: enhancing safety, boosting productivity and lowering costs through 24/7 operations. How close are we to self-driving heavy-duty trucks?

Worldwide there are over 40 companies who are actively advancing autonomous truck solutions with at least 10 major players focused on driverless semi-truck technologies.

Advanced driver assistance system (ADAS) is a Level 2 autonomy feature that is a steppingstone to full autonomy. ADAS now supports over two thirds of new light-duty vehicles sold today. As automatic emergency braking (AEB) is included in ADAS functionality, vehicles will complete the requirements of Level 2 autonomy.

Heavy-duty truck autonomy is being used for private road and yard applications. Mining and resource extraction are the first autonomous technology adopters. Port and terminal operations are also using autonomous technology to move containers and goods. Specialized industries like forestry and agriculture are being supported by autonomous convoys. Middle-mile and long-haul freight delivery are being advanced.

Canadian manufacturers Gatik, Waabi, and NuPort Robotics are engaged in heavy-duty vehicle autonomous trials and advancing Level 3 and Level 4 vehicle autonomy for heavy-duty trucking. Each organization has a unique identifier associated with their vehicle automation.

Gatik:

Gatik is a market leader, focusing on short haul middle mile deliveries. Gatik became the first company worldwide to conduct fully driverless commercial deliveries in the middle mile. Working

Levels of Driving Automation

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| 0 | No Automation
Human performs all driving |
| 1 | Driver Assistance
Single automated system
(i.e. cruise control) |
| 2 | Partial Automation
Vehicle can steer and
accelerate with human
monitoring all tasks. |
| 3 | Conditional Automation
Vehicle can perform
driving. Human override
required. |
| 4 | High Automation
Vehicle can perform
driving. Geofencing is
required, human override
is an option. |
| 5 | Full Automation
Vehicle can steer and
accelerate with no human
monitoring. |

with organizations that include Loblaw and Walmart, Gatik has successfully introduced light and medium-duty trucks at Level 4 vehicle autonomy.

Waabi:

Waabi is another industry leader focusing on vehicle autonomy with Class 8 long-haul operations. In 2024, Waabi partnered with Volvo to develop autonomous solutions that prioritize safety, efficiency and sustainability to advance Volvo's Autonomous Solutions. Waabi has safely operated driverless trucks in controlled environments and on complex real world closed course conditions. Heavy-duty trucks are proceeding to public roads with level 4 autonomy, where a driver is "in the loop" monitoring and supervising the autonomous system.

NuPort Robotics:

NuPort Robotics is also advancing autonomy to transform trucking. Nuport provides a retrofit technology that can transform existing technology into a self-driving truck. NuPort has partnered with companies that include Canadian Tire for both private sites and distribution centers. NuPort offers a low-cost investment that provides safer sites for vehicles with routine movements and repetitive routes.

Challenges for Self-Driving Trucks

Technical, legal and social challenges will all shape how fast and far self-driving trucks advance. Safety and reliability must be proven. Public perception and trust must be attained. Regulations and insurance must be secured. Cybersecurity risks must not become a realized threat, and drivers must be able to partake in new roles that involve remote monitoring and managing autonomous operations.

Arguments for Autonomy

Autonomous trucks are designed to solve industry challenges associated with safety and rising costs. While most road accidents are caused by human error, autonomous vehicles do succumb to human distraction and do not experience fatigue. Autonomous vehicles remain within the route speed limits and are programmed to follow at a specified distance. Optimized speed, acceleration and braking assist with reduced fuel costs. Autonomous vehicles operate for longer stretches without resting and adjust routes in real time to avoid traffic.

The future of transportation is moving fast. While many hurdles still exist for the autonomous market, consumers must stay informed of market advancements.