A DRIVERLESS FUTURE FOR FREIGHT?

DRIVERLESS CARS ARE expected to revolutionize personal transport in the next decade, and driverless trucks and trains may not be far behind. Specialized automated trucks are already in regular use at off-road and remote locations, and over-the-road commercial trucks with partial and fully autonomous systems are being tested in the United States and Europe. On the rail side, mining giant Rio Tinto is currently phasing in the first long-distance driverless freight rail service in Western Australia. (While not freight, nearly 50 city metro rail-based systems worldwide are already automated, as are dozens of airport shuttle and people-mover systems.)

As is the case for driverless cars, the technology for autonomous freight transport is quickly becoming feasible. While plenty of obstacles remain before we see trucks and trains driving themselves, economic and competitive considerations are likely to keep the pressure on for driverless freight transport solutions. Economically, trucking is likely to benefit more than rail from going driverless, but autonomous trucks could so alter the transportation landscape that railroads might have little choice but to follow suit.

THE ECONOMICS OF AUTOMATION

Several options for driverless trucking are currently being tested. One is driverless with backup – that is, an onboard autopilot system handles a portion of the driver's duties, thereby reducing driver fatigue and stress (similar to the autopilot system in an airplane cockpit). Such a system is already legal on Nevada's roads. A second option is "platooning" – whereby a lead truck is operated or overseen by a driver, with one or more driverless trucks following behind. Fully autonomous trucking with no driver on board would be a final step, but likely require the longest timeframe to gain public acceptance.

Driverless trucking could help alleviate a growing shortage of drivers in the United States and Europe, the result of aging populations, increasing regulation, and a younger generation less willing to spend long periods away from home. According to the American Trucking Associations, the US trucking industry will be short 73,500 drivers this year – and that number could rise to 174,500 by 2024. Press reports put the current UK truck driver shortage at 50,000, while Germany could see a shortfall of some 250,000 drivers over the next decade.

Smart trucks with autopilot systems could help keep older, experienced drivers on the road, while fully driverless trucking would free up drivers for more complex local pickup and delivery operations closer to home. Another advantage of automation is that trucks would not need to sit idle during drivers' mandatory rest periods. This change alone could reduce driver costs by up to two-thirds and increase equipment

utilization by a third. Going driverless also could lead to a 70 percent drop in accident rates, meaning lower casualty claims and likely lower insurance rates. Equally, highway capacity could increase by 200 percent or more, since driverless vehicles can operate with closer spacing and at more consistent speeds.

In the case of train automation, many of the technological building blocks already exist (or are being implemented) in the US and Europe: remote control systems, onboard computers that enforce speed limits and regulate movement, and software that optimizes train operation and fuel consumption. And while railroads currently are able to fill most of their train crew jobs (pay is higher in rail than in trucking), projected retirements and the same lifestyle issues as in trucking suggest that a shortage of personnel may not be too far off. Automation would enable operating support jobs to be converted to regular shift assignments at fixed geographic locations, improving the appeal of railroading to employees who want more consistent schedules and to work near home. At the same time, railroads could reduce their labor costs and boost their network capacity. Asset utilization, service levels, and reliability could improve as well, as more frequent, shorter trains could be operated at no cost disadvantage versus current operations.

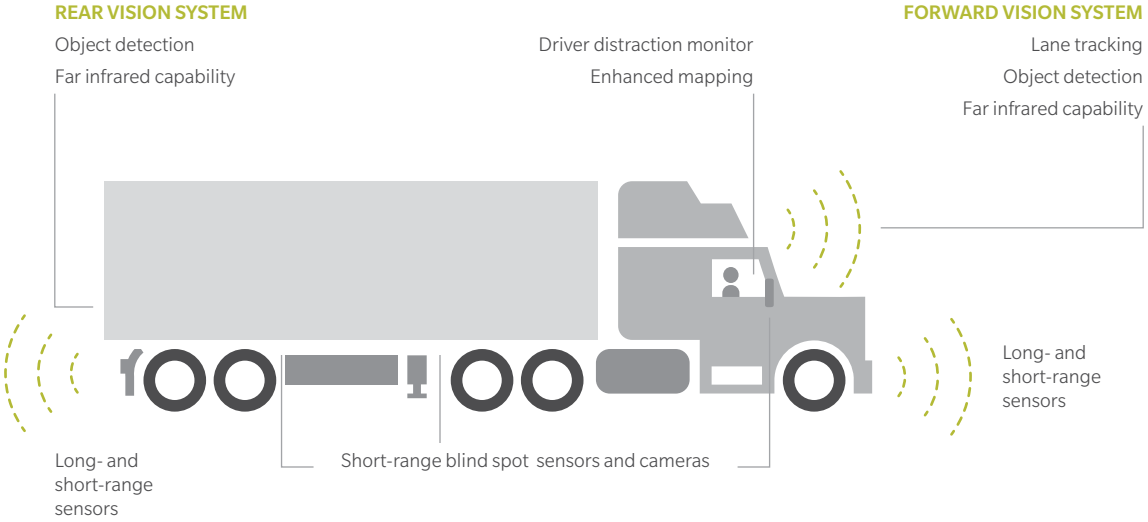
GOING DRIVERLESS: WHAT WILL IT TAKE?

For freight railroads, the critical barrier at present is that trains cannot detect and avoid obstacles in their paths. Several different strategies in tandem will likely be needed to overcome this problem, such as real-time monitoring systems for grade crossings and navigation app-based alerts for car drivers when they are approaching crossings. As real-time train tracking becomes more common as well, it's not hard to envision a future of mobile devices warning drivers and pedestrians of an oncoming train in their vicinity.

Of course, no rail corridor can be completely sealed off, which means trains will need obstacle detection and avoidance systems. Autonomous cars, for example, use light detection and remote sensing technology, linked to the braking and steering systems, to avoid obstacles. The challenge for a train will be determining what an obstacle is and whether to brake for it, since sudden deceleration creates a risk of derailment. Is it a car that can't get out of the way – or a deer that can?

For autonomous trucks, the challenge is somewhat different, and likely greater, given that trucks operate on open roads with full public access. A phased approach may make the most sense: Autopilot systems, once they demonstrate their safety and reliability in testing, could

TECHNOLOGY BUILDING BLOCKS FOR AUTONOMOUS TRUCKS



IN DEVELOPMENT

Vehicle-to-vehicle communications

Algorithms for trailer movement and braking

Handling for adverse conditions

be an entry point for licensing. These systems could then be gradually expanded over time to take on a larger share of tasks or to control trucks as part of a platoon.

Safety concerns might lead to public demand that fully driverless trucks initially operate on dedicated and segregated highway lanes. But while converting some lanes to autonomous-only vehicles would likely add highway capacity (and thus cut congestion), this approach could be a political non-starter unless there are sufficient lanes in each direction to serve conventional drivers as well.

AUTONOMY: THE NEXT COMPETITIVE EDGE

The technology for driverless trucks and trains will largely be in place within the next few years, and the economic imperative will only escalate. Driverless trucking faces more hurdles but has more to gain in terms of solving long-term industry structural problems. Railroads could face regulatory and labor union issues, but automation would be easier to implement from a technology standpoint.

Most critically, automation could reduce motor carrier costs enough to make them competitive with rail over longer distances. If this happens, failure by the railroads to move quickly enough in response could lead to a loss of market share that would be difficult to make up.

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