Embark 2018 Disengagement Report

Embark is the leading developer of driving automation systems specifically designed for interstate trucking. We are focused on developing the software and hardware that will eventually power Level 4 self-driving trucks on long-haul interstate routes.

Today - to support the development of that software and hardware - Embark operates a fleet of conventional, FMVSS-compliant trucks outfitted with Embark systems, in consultation with key OEMs and Tier 1 suppliers. Embark's public testing is limited to Level 2 automation[1], which includes a commercial driver with hands required to be on the wheel, trained to supervise both system performance and driving environment. Embark's trucks cannot currently operate without a driver.

In order to develop systems that can easily integrate into existing interstate freight operations, Embark's trucks move freight for real customers, including multiple Fortune 500 companies. In 2018, Embark continued to expand its fleet of trucks based in our Southern California operations center, drove over 124,000 automated miles, and completed the first ever cross-country trip by an automated truck.

Voluntary Disengagement Reporting

As Embark currently operates driving automation systems limited to Level 2 in agreement with the California Department of Motor Vehicles, at this time Embark is not required to submit an annual report as described in California Code of Regulations Title 13, Article 3.7, §227.50.

However, we strongly believe that transparent, consistent, and public testing data published by each automated vehicle developer is an important first step to building public trust around these systems. Therefore, we have chosen to voluntarily release the following key statistics:

Total miles driven in automated mode (12/1/2017 - 11/30/2018)	**124,062 miles**
Q4 2018 disengagement rate	**1,392 miles per disengagement**

[1] According to SAE J3016 Surface Vehicle Recommended Practice "Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles," June 2018 Update

Methodology

Total miles include all system operation in the U.S. and are not exclusive to California.

To differentiate system disengagements as defined in §227.50 from other events, such as voluntary end of testing, Embark uses a simulator to “replay” each deactivation. Events flagged as safety-relevant were then reviewed manually to confirm each met the disengagement criteria.

To provide a representation of the system’s current abilities, we have published a disengagement rate above that includes all miles traveled divided by all disengagements, during release runs from October 1 - December 31, 2018. This rate of 1,392 miles per disengagement includes all miles traveled and disengagements in the U.S. and is not exclusive to California.

Safety as Primary Focus

In order to ensure safety is the highest priority every time an Embark truck is on the road, we have adopted a range of testing best practices. These protocols seek to eliminate behavior that has contributed to known automated vehicle testing crashes at other companies, and proactively anticipate and address issues that could lead to future unsafe operation.

Embark testing is limited to 2-person teams of trained drivers and operators and includes internal/external video monitoring and audits of driver behavior. We are constantly refining our testing methods to anticipate and address potential future issues that would interfere with the safe operation of the vehicle or driving automation system, including using AI to automatically identify distracted and fatigued driving behavior.

Future Improvements to Disengagement Reporting

While the current reporting system mandated by California provides a consistent baseline for autonomous (Level 3+) light vehicle testing data, we look forward to working with industry partners and the California Department of Motor Vehicles to refine the type of information requested from automated vehicle developers in order to further improve transparency, accountability, and public understanding of how these vehicles are being used.

Additionally, we stand ready to partner with the California Department of Motor Vehicles, California Highway Patrol, the California State Legislature and other relevant stakeholders to develop rules that more fully reflect the state of the automated vehicle industry, including provisions for the testing and deployment of autonomous (Level 3+) vehicles over 10,000 lbs.

Sincerely,

Alex Rodrigues, CEO

Jonny Morris, Head of Public Policy