Daimler Technology – Automation, Electrification, & Connectivity

Ritchie Huang, Manager – Engineering & Safety, Vehicle Compliance and Regulatory Affairs
Daimler is the global leader in mobility which includes the manufacturing of heavy trucks, buses, and luxury vehicles.
Daimler Trucks North America, LLC (DTNA)

Chief Executive Office: Roger M. Nielsen

Main Locations in the U.S. & Employee Count

- Portland, OR (HQ)
- Redford, MI
- High Point, NC
- Cleveland, NC
- Mount Holly, NC
- Gastonia, NC
- Gaffney, SC
- Fort Mill, SC
- Other locations

U.S. Employees = Over 14,000

Notables:
- Market share leader in the United States for Class 6-8 trucks, leader in safety, efficiency, and manufacturing
- 2015: First licensed automated truck to operate on public roads – The Freightliner Inspiration
- 2017: Launched the fuel efficient New Cascadia with the most advanced active safety system in the industry, Detroit Assurance 4.0
- 2017: Launched the industry leading Detroit Connect telematics system with advanced diagnostics, data acquisition, and analytics
- 2018: Detroit Assurance active safety system is made standard in all New Cascadia Class 8 vehicles
- 2018: Active testing in the US for Level 2 coordinated braking platooning technology
- 2018: Established Automated Truck R&D Center and announced e-Cascadia, e-M2, and e-TBB products
LEADING THE CHARGE

Automation  Electrification  Connectivity

Intuitive Mobility
LEADING THE CHARGE

Automation  Electrification  Connectivity

Intuitive Mobility
2015 - First Licensed Operation of an Automated Commercial Truck on an Open U.S. Public Highway
Platooning

Safety
• Increased sensing capability
• Coordinated Braking
• Reduce Driver fatigue
• Active lane assist

Connectivity
• V2V Broadcast & Integration
• Infrastructure Integration
• Additional safety features

Efficiency
• Lower operating cost
• Lower emissions
• Greater range
• Congestion reduction
• 45% of braking distance depends on *human perception and reaction*
• 38% of braking distance reduced by coordinated braking using DSRC
Platooning

Technical Design Challenges for a Safe Implementation

- Vehicle positioning & identification
- Vehicle cut ins - allowing space for merging or overtaking vehicles
- Emergency braking scenarios
- Evasive maneuvers
- Environmental interference
- Single vs Multi-Lane use
- Coordinated Braking Strategy
- Functional safety

Platooning system safety tests being conducted at Daimler’s closed course facility in Madras, OR
Platooning

Regulatory Considerations for testing and deployment:

- Location restrictions (e.g. outside business district, city limits)
- Following distance and caravan laws
- Implications for bridge loading
- Liability
- External Visual indication (e.g. lights, signage)

Align and collaborate with regulatory organizations
Vehicle Connectivity enables opportunities for safety and efficiency improvements. Requires detailed system knowledge & deep system integration. Platooning function leads to highly stringent safety goals and system requirements. ... and don’t forget ... Testing, Testing, Testing.

Safety is our top priority!
Automated Truck Technology

What does it mean?

What is the impact?

How will it evolve?

Daimler believes that by striving towards highly automated driving technology, this will accelerate the evolution of safety technologies that will reduce crashes and save lives.
Autonomous is still ways to go...

- We need a technically **100% reliable solution**, **Safety is our priority**
- We need **acceptance** from public and **confidence** from customers
- We need a **legal and regulatory framework** for operation and liability

Safety will dictate our timeframe of deployment of automated driving systems
We are pioneering automated driving, features from demos end up in product launches - Examples

**Future Truck**
- World premier of automated vehicle on the road

**Inspiration Truck**
- Premier on USA highway

**Highway Pilot**
- Test license for German Autobahn
- World premier of platooning

**Highway Pilot Connect**
- Test operations with Fraport

**Automated snow removal**
- Test operations with Fraport

**Truck Platooning**
- Testing in USA & Japan

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2014 2015 2016 2017 2018
It's a long way from a demo...to a customer viable product

- All regions/streets
- Reliability/Uptime
- Seamless integration into customer process
- Reduction of crashes and fatalities
- All situations incl. the unknown
- All weather conditions
Building a real Autonomous Truck is a tough game!

- In-vehicle computing power
- Deep Learning/Artificial Intelligence Learning from examples
- HD Localization/Interactive Connected Maps (online)
- Environment Perception Sensor Fusion
- Driving Dynamic Modelling
- Vehicle Control Center
- Connectivity & IT Backend
- Validation/Testing Technology
- Legal & Homologation
- Sensors Vehicle & Trailer Radar, Camera, LIDAR, Ultra Sonic
- Fail Operational Design/Redundancy Powernet, Steering, Braking, Sensors
Global Automated Truck Research & Development Center opening in Portland

- Center for automated driving pioneers
- Global R&D network US, Germany, India, ...
- Global modular technology platform across brands
- Synergies with Daimler car technology
- Defining the future of transportation
- Automation and workforce

Automated Truck Research & Development Center
The Road to Autonomous Vehicles

- As the level of automation in trucks increases, the role of the driver will change to reflect the improved capabilities of the vehicle.

- Application of automation to use cases will happen incrementally – designated routes or tasks.

- Testing and Validation need to be highest priority!

- Societal and Regulatory factors must be considered along the way.

The Goal: Getting from Point A to Point B as Safe, Efficient and Reliable as possible.
LEADING THE CHARGE

Automation

Electrification

Connectivity

Intuitive Mobility
Daimler has an extensive electric vehicle history – we are experienced

Daimler Commercial Trucks on the road
Leveraging global EV engineering expertise
Daimler is delivering production level commercial electric vehicles today with more in process

Daimler Commercial Trucks on the road
Leveraging global EV engineering expertise

POWERED BY DAIMLER THROUGH HISTORY

2017

2017

2017

2018

2018

2019

2021

2021

STUDY E-FLUGG VISION ONE

THOMAS BALT BUS

MERCEDES-BENZ eVITO

MERCEDES-BENZ eSPRINTER

FREIGHTLINER eCASCADIA

FREIGHTLINER eM2

FREIGHTLINER eCASCADIA

FREIGHTLINER eM2

MERCEDES-BENZ CONCEPT EQA

FUSO eCANTER

MERCEDES-BENZ eACTROS

MERCEDES-BENZ electric Citaro (SERIES PRODUCTION)

#ACTROS GENERATION 2

FUSO eCANTER
Meet DTNA’s electric vehicle line up

Presenting the DTNA electrified commercial vehicle family: Class 6-8 + TBB Jouley
Customer use cases: Dedicated, repeatable routes are practical for eTrucks

**PORT TO STAGING LOT**
PORT TO INTERMODAL TRANSFER

- Dedicated route, consistent charger location, heavy-haul, predictable environment
- Daily use: 2-3 round trips to/from port
- Daily mileage <150 miles

**PICK UP AND DELIVERY**

- Dedicated route, consistent charger location
- Daily use: 1 round trips from warehouse to multiple drop off points
- Daily mileage <150 miles
LEADING THE CHARGE

Automation  Electrification  Connectivity

Intuitive Mobility
Detroit Connect is DTNA’s suite of connected vehicle services

Uptime:
Virtual Technician
Expanded Faults – GHG17, Transmission and Safety System
Flash Over The Air
Remote Engine Parameter Change

Fuel Economy and Performance:
Connect Fuel Performance Analytics
Fleet and Trip Fuel Analytics
Fuel Efficiency Driver Scoring
Trip Reporting

Safety:
Connect Safety Event Reporting
Vehicle and Fleet Scoring
Safety Event Detail Viewer

Detroit Connect Web Portal and Mobile App
One Stop Shop for ALL DTNA Connected Vehicle Services
Detroit Connect Analytics

**Fuel Performance Analytics**
- Single Vehicle Trip Reporting
- Fleet Level Analytics
- Fuel Efficiency Driver Scoring

**Safety Event Reporting**
- Vehicle and Fleet Scoring
- Safety Event Detail Viewer
Thank You