

DAIMLER

OSU / Daimler Truck Research Lab

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Salem, OR

April 29, 2015



Daimler AG

Mercedes Benz Cars



Daimler Trucks &



Daimler Buses



Mercedes Benz Vans



Daimler Financial Services

Daimler Financial Services
(in millions of euros)

	2009	2008	% change
EBIT	7	677	-99
Revenues	11,996	11,944	+0
Expenses	11,989	11,877	+1
New business	25,061	25,014	+15
Total portfolio	18,300	43,363	-8
Europe	20,042	32,719	-9
Americas	22,952	25,429	-11
Africa & Asia/Pacific	2,435	4,995	+6
Portfolio (in units)	2,412,000	2,481,000	-3
Employees (Dec. 31)	6,830	7,316	-4

Services



DAIMLER U.S. Sites, Revenue and Employees

DAIMLER locations across the USA

DTNA brands in the U.S.

OR
Daimler Trucks HQ and
Western Star Plant (4,549)
Portland



MIN
Diesel Reman (100)
Hibbing

MI
MBFS HQ Farmington Hills (350)
Detroit Diesel HQ/Plant/Reman/Purem (2280)
Detroit
MB R&D NA Redford (66)
Ann Arbor (19)

NY
Detroit Diesel-Allison (50)
MBUSA (230)

CT
Detroit Diesel-Allison
(36)

NJ
MBUSA HQ (900)
Detroit Diesel-Allison (159)
Freightliner PDC (90)
MBUSA PDC (97)

NV
Freightliner PDC (40)
Reno

OH
DDC Reman (525)
Cambridge
DDC PDC (170)
Canton

MD
MBUSA VPC (65)
Baltimore



CA
M-B R&D NA (170)
Palo Alto, Long Beach, Carlsbad
M-B Driving Academy – Los Angeles
MBUSA VPC - Los Angeles

TN
Freightliner PDC (175)
Memphis

NC
Freightliner: 4 Plants
(6,465)

SC
DTNA – Ft. Mill (425)
Freightliner – Gaffney (560)
Sprinter – Ladson (100)

GA
Freightliner PDC (76)
Duluth
MBUSA VPC (37)
Brunswick

AL
MBUSI (2,930)

Cleveland (2290)
Mt. Holly (1595)
Gastonia (1270)
High Point (1310)

TX
MBFS (450) - MB PDC (46)
Dallas/Ft. Worth
car2go HQ (20)
Austin

FL
MBUSA/MBFS
Jacksonville (150)
Detroit Diesel-Allison (344)
9 locations

U.S. (2013)

Revenue \$39.4B
Employees 20,993

car2go: Austin – San Diego – Miami – Portland
– Seattle - Washington, DC

Inventor of the Automobile and...

1885 Gottlieb Daimler's invention of an upright single-cylinder four-stroke engine



1886 Carl Benz's invention of a three-wheeled "Motorenwagen"



1959 World's first safety body with robust passenger cell and integrated crumple zones for passenger car



1978 World premiere of anti-lock braking system (ABS) for passenger cars
First ABS for commercial vehicles in



1987 First acceleration skid control (ASR) system for commercial vehicles



2000 First Lane Keeping Assist system for trucks



Daimler Trucks North America ("DTNA") continues to maintain a strong commitment to the safety and fuel efficiency of our vehicles which support both economic productivity and to protect the human and natural environment. This is demonstrated by our history of being first to market with many safety technology systems including antilock brake systems in 1987, obstacle detection systems in 1996, driver airbags in 1998, stability control systems in 2002, lane departure warning systems in 2006, seat belt pre-tensioners and side airbag systems for rollover protection in 2007, and adaptive cruise control and collision avoidance systems in 2007.

Our Core Mission since 1938

June 21, 1954

77

NEW "JIMMY" DIESEL BOOSTS PROFITS!



Jack Cole Company reports new GM "6-71E" engine gets over 7 miles per gallon — engine maintenance costs less than 1/2 cent per mile for parts and labor

Figures coming from key highway haulers prove the new General Motors "71E" Diesel leads all others in economy as well as performance.

Birmingham, Alabama's Jack Cole Company — operating a fleet of 76 GM Diesel-powered truck-tractors nearly a million miles a month — reports that the new GM "6-71E" engines are delivering fuel mileage from 7.2 to 7.4 per gallon hauling payloads up to 40,000 lbs. Seventeen of these units have been in service almost a year — ten more have recently been added.

Other "Jimmy" Diesels in this fleet have accumulated 250,000 to 270,000 miles without

overhaul and with total engine maintenance cost of less than one-half cent per mile. Fleet Supervisor O. B. Johns expects at least 300,000 miles before overhaul. He prefers GM Diesels because "overhaul cost less than other Diesels, ease of maintenance eliminates road failures and clean burning of fuel eliminates smudging of trailers."

Compare features and specifications — check horsepower and torque curves at the same altitude and temperature. You'll find the 2-cycle "Jimmy" Diesel gives you more power with less weight — greater torque output across the entire driving range — less fuel input per equivalent horsepower. It means a

profit-boosting increase in revenues and lower costs per mile!

Call your GM Diesel distributor about repowering present equipment. And when you're in the market for new trucks, be sure to ask for this great new GM "71E" Diesel — it's available for any make, 26,000 GVW and up!

Truck and bus engines: "4-71E"—160 h.p.; "6-71E"—210 h.p. New Turbopower models harness the energy of exhaust gases to deliver even higher power: "4-71T"—171 h.p.; "6-71T"—226 h.p.

Write for brochure on new lightweight aluminum version of the "6-71E" "Jimmy" Diesel engine. It weighs up to 600 lbs., less than competitors in 210-h.p. range.



DETROIT DIESEL Engine Division of General Motors, Detroit 28, Michigan

Regional Offices: NEW YORK, ATLANTA, DETROIT, CHICAGO, DALLAS, SAN FRANCISCO • In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario • Single Engines: ... 34 to 354 H. P. Multiple Units: ... up to 892 H. P.



Why has Milwaukee bought 32 new tractors since Mar. Listen to Maister Rabalais: "We get every 6-71 Diesel. He breaks that fig. of \$2,700 per annual maintenance. At that rate, this general freight will off the new equip. their way to a re-

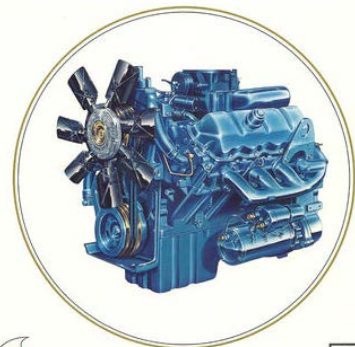
FUEL SQUEEZER PLUS 307

FUEL EFFICIENT HORSEPOWER

Detroit Diesel Engines

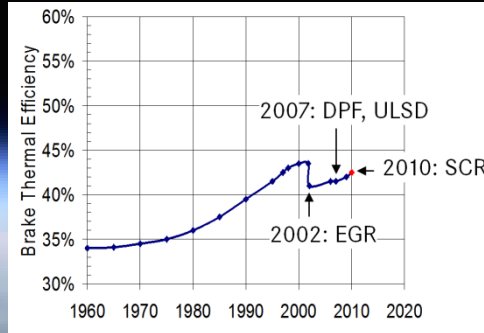
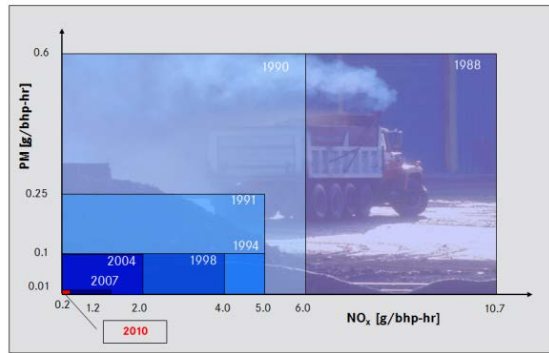
intende
TRUCK
PURPO
RIES S3
1,100 H.P.

The Fuel Pincher Diesel

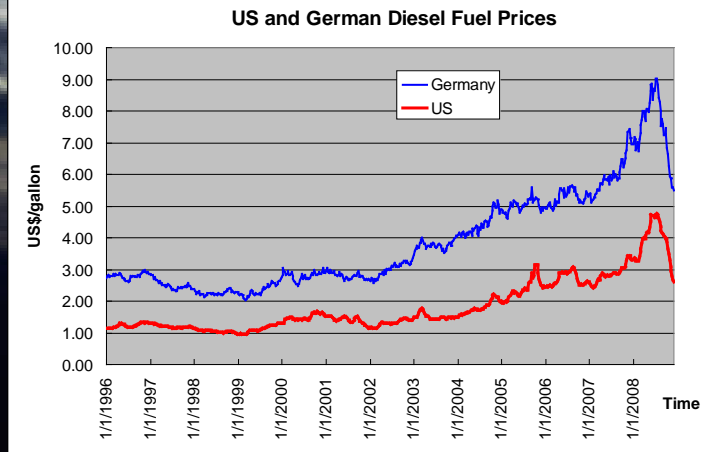
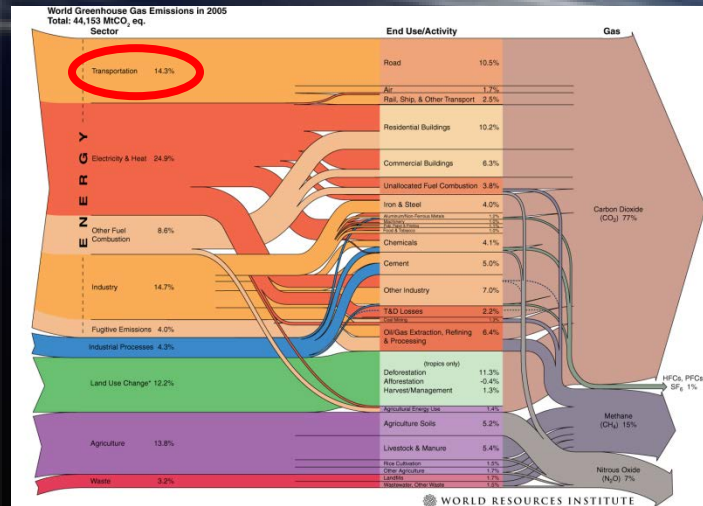
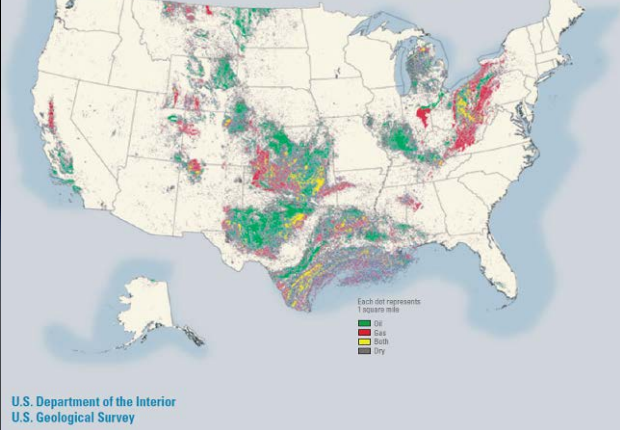


Progress made in Emissions Reduction and CO₂

EPA Emission standards 1988 to 2010



Oil and Gas Exploration in the United States



Department of Energy SuperTruck Project Goals



Project Target

Develop and demonstrate vehicle and advanced engine technology for Heavy-Duty Class 8 Trucks as follows:

- 50% improvement in “freight efficiency” (measured in ton-miles per gallon for a Class 8 vehicle weighing 65,000 lbs)
- 20% improvement in “engine brake thermal efficiency” (50% BTE)
- Modeling and analysis for pathway to 55% Brake Thermal Efficiency

Funding

- Federal awards: \$39.6M (with \$40M DT matching) over 5 years (2010-2015)
- Stimulus money awards based in part on number of jobs created or retained
- Pairing with partners or subcontractors encouraged

SuperTruck Video



Daimler Trucks has the Leading SuperTruck Results

115%

Freight efficiency
improvement

12.2
mpg

50.2%

Brake thermal
efficiency



Road to 50% Improvement

A-Sample (Performance Test, April 2014)

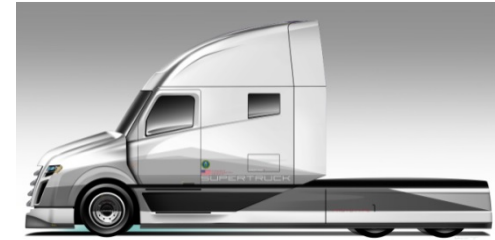
- Aero hood, bumper, active grille
- Stock DD11 Engine, DT12 DD Trans. + eCoast
- Waste Heat Recovery (electrical expander & vehicle cooling)
- 6x2 Axle Config, 2.28:1 RAR + oil baffle
- GHC Hybrid B-sample (120kw eMotor, 360v, 2.4 kw-hr Li-Ion Bat)
- eHVAC (HV compressor, remote condensor, electrical fan)
- eMotor engine start
- Cab insulation package
- Clutched air compressor / electronic air control
- AccuSteer (closed center steering gear + a
- Low rolling resistance wide based single tir
- Thermal mgt. (variable speed fan, water pu
- Trailer aero., lightweighting and solar



A-Sample



Tinker Trucks



Final Demonstrator

Final Demonstrator (FE Test, Oct 2014 – Jan 15)

A-Sample Technologies, plus...

- Full Tractor Aero
 - cab/sleeper, underbody, drive wheel fairing, mirror cam, steer wheel, full side extender
- 50% BTE DD11 Engine + WHR
- Predictive hybrid controller
- Predictive engine controller
- New final drive active oil management with FE gear oil
- Lightweight Aluminum Frame and cross members
- Ultra Lightweight Air Suspension
- Advanced Loadshift 6x2
- Solar reflective paint
- Enhanced Trailer aerodynamics

Energy Losses in Engine/Vehicle

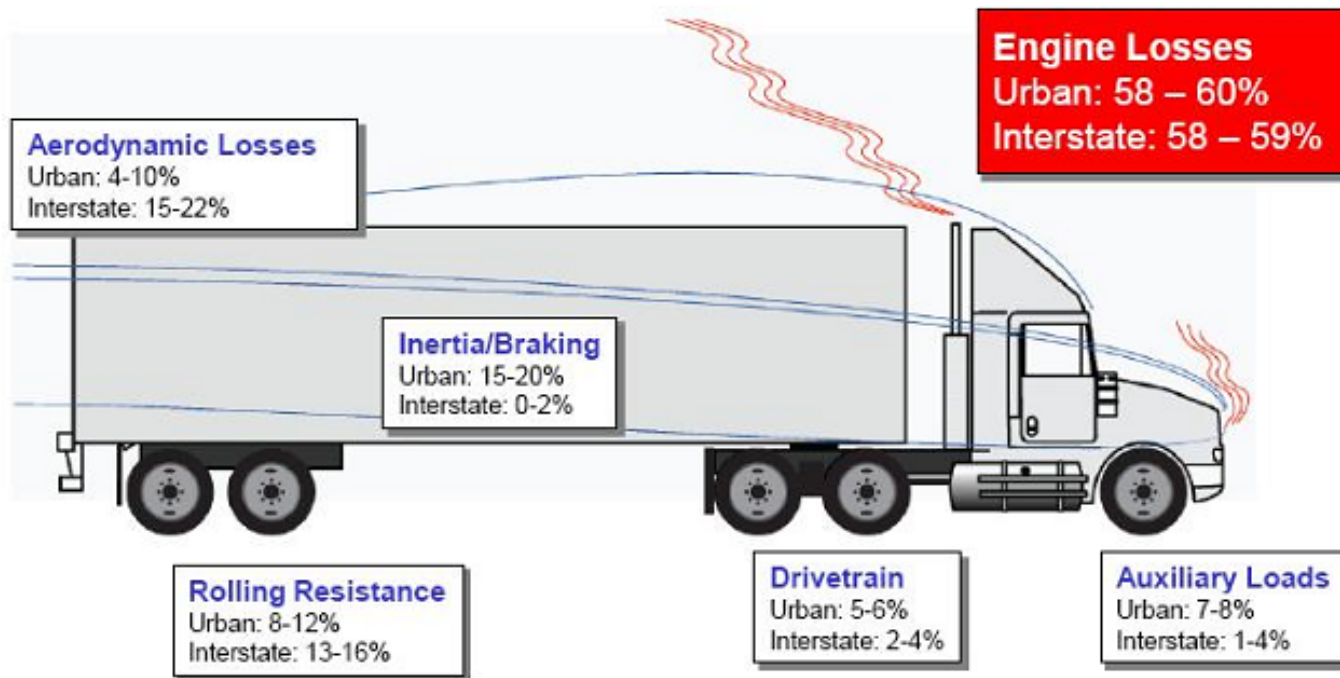


FIGURE 2-7. Energy “loss” range of vehicle attributes as impacted by duty cycle, on a level road.

Source: [Technologies and Approached to Reducing the Fuel Consumption of Medium and Heavy Duty Vehicles, National Research Council of the National Academies, 2010](#)

Truck Research Lab

Oregon State University / Daimler Trucks North America

3-year pilot program proposed (*Sept 2015 - June 2018*)

- 2 Graduate fellowships
- Multiple undergraduate capstone programs (senior projects)

Research focus on fuel efficiency of Class 8 Trucks

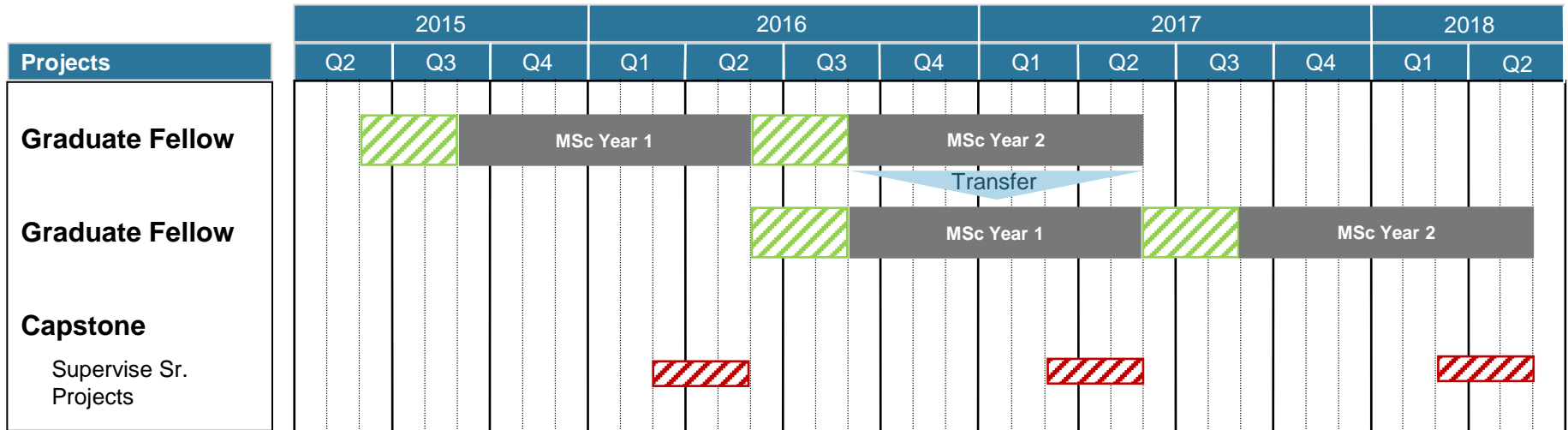
Daimler Commitments

- Definition research topics
- Gift of class 8 tractor (*incl. title transfer*)
- Access to relevant engineering data
CAD
- Summer internships to graduate student

OSU Commitments

- Provision of facilities for tractor and CAD systems (e.g. NX)
- Provision of tools and materials for parts fabrication
- Faculty oversees graduate students and facilities
- Coordinate and oversee undergraduate capstone programs

Three Year Daimler Oregon State University Proposal



Legend

- Truck Lab Setup and Research (Location: OSU)
- Summer Internship (Location: Daimler)
- Undergraduate senior project supervision (Location: OSU)

Projected Budget

Fellowship Program (2 Graduate Fellowships)

Calendar Year			Pilot Program Total
2015	2016	2017	
\$125,000	\$250,000	\$125,000	\$500,000

Truck Research Laboratory

Category	Description	Requested Funds
Distributed TRL Equipment	Outfit existing labs for TRL to include: Fabrication, facilities test and equipment power	\$750,000
TRL Director	Manage Lab Space and Research, educational projects	\$250,000
TRL Matching Funds	1:1 match for research and education programs	\$500,000

Total: \$2,000,000