FORD OTOSAN

Varlık Kılıç

R&D Engineer

Koç

Feel the difference

Ford

AGENDA

- Ford Otosan Overview
- PD and R&D capabilities Overview

FORD OTOSAN
OVERVIEW

COMPANY OVERVIEW

Mfg. & Assy. Facilities	Kocaeli Assembly Inonu Powertrain and Cargo Assembly
Parts Distribution	Kartal
Engineering Facility	Gebze
Blue Collar Employees	8,100+
White Collar Employees	1,450+
Ownership	41% Ford Motor Company 41% Koc Holding 18% Publicly-owned
2007 Net Sales	$ 6.2 Billion
Market Cap (as of Dec 31st, 2007)	$ 3.7 Billion

A BRIEF HISTORY

- ✓ 1928 – Vehbi Koc assigned as Ankara Ford dealer
- ✓ 1959 – **Otosan founded as Ford assembler in Turkey**
- ✓ 1967 – Production of Transit minibus launched
- ✓ 1975 – Transit van and pick-up added to range
- ✓ 1977 – License agreement with Ford signed*
- ✓ 1982 – İnönü plant launched truck and engines
- ✓ 1983 – **Ford assumes 11% ownership in Otosan**
- ✓ 1987 – Ford increases ownership to 30%
- ✓ 1994 – Ford Escort production launch
- ✓ 1997 – **Ford assumes 41% equity in Ford Otosan**
- ✓ 2001 – **Kocaeli plant launched with Transit production**
- ✓ 2002 – Transit Connect production launched
- ✓ 2003 – New Heavy Truck introduced
- ✓ 2004 – Transit export launch
- ✓ 2006 – New Transit launch
- ✓ 2007 – Gebze Engineering Centre opened

ACHIEVEMENTS

- ✓ Export leader of Turkey in 2007
- ✓ 2nd biggest industrial company (ISO-500)
- ✓ One of the highest profit making companies (ISO-500)
- ✓ "Most Valuable Turkish Brand"

  (Capital Research Survey, 2007)
- ✓ "Şehabettin Bilgisu Environment Award"

  (Kocaeli Chamber of Industry, 2007)
- ✓ "Most Admired Automotive Company of Turkey"

  (Capital Research Survey, 2006)

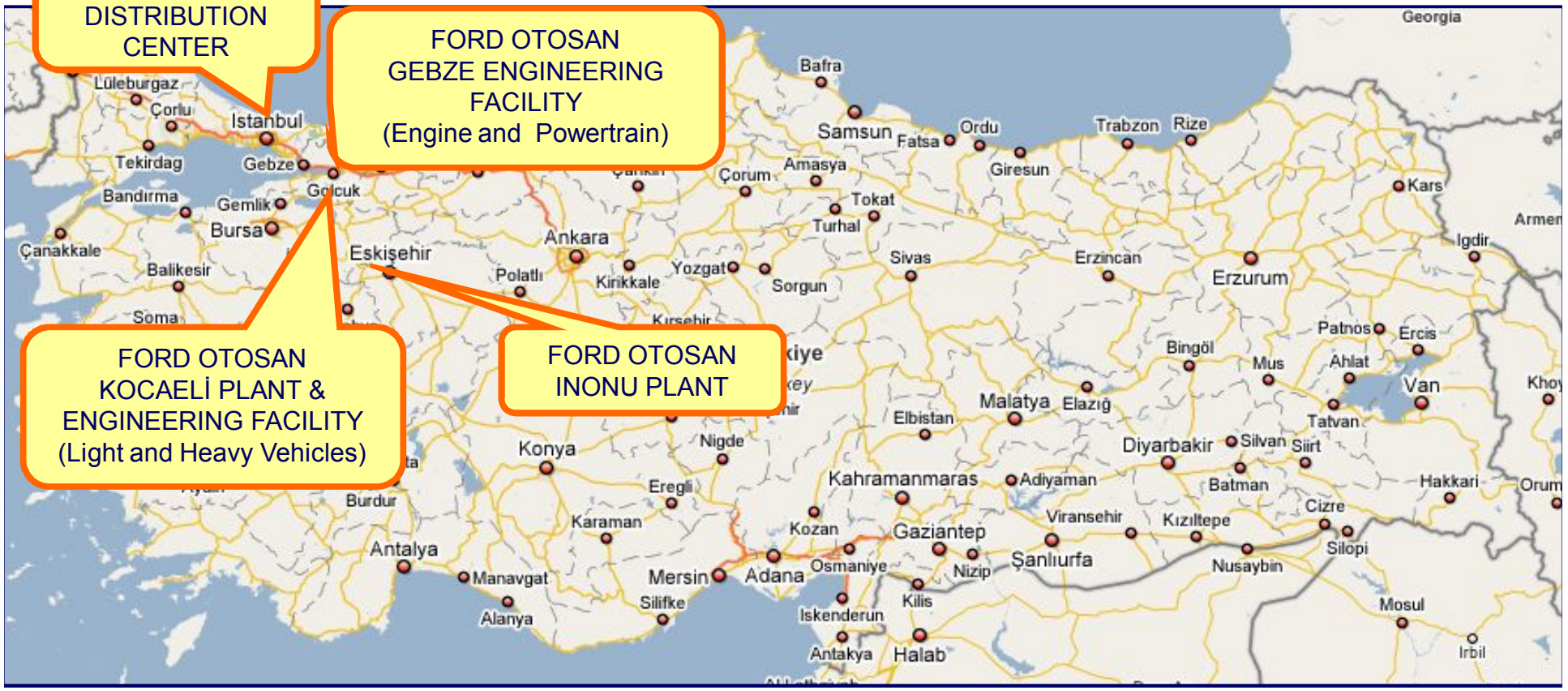
LOCATIONS

FORD OTOSAN
KARTAL PARTS
DISTRIBUTION
CENTER

FORD OTOSAN
GEBZE ENGINEERING
FACILITY
(Engine and Powertrain)

FORD OTOSAN
KOCAELİ PLANT &
ENGINEERING FACILITY
(Light and Heavy Vehicles)

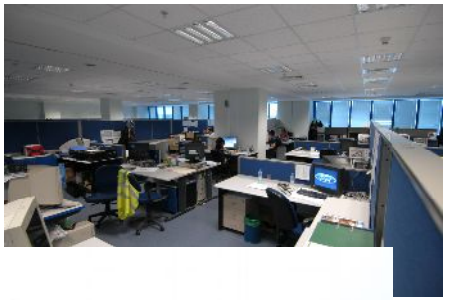
FORD OTOSAN
INONU PLANT

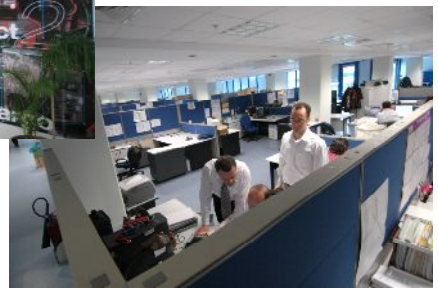


KOCAELİ PLANT

- ✓ Transit & Transit Connect production
- ✓ Sea front location, integrated pier/terminal covering exports & BU imports
- ✓ 320,000 units annual production capacity

KOCAELİ ENGINEERING FACILITY





- ✓ Engineering services for Ford Otosan and Ford of Europe's Product Development Centres
- ✓ 300 Engineers Capacity
- ✓ Located in a Kocaeli Plant

GEBZE ENGINEERING FACILITY

- ✓ Engineering services for Ford Otosan and Ford of Europe's Product Development Centres
- ✓ 200 Engineers Capacity
- ✓ Located in a Technopark Area and Free Zone near İstanbul

İNÖNÜ PLANT

"Best Ford Powertrain Plant in Worldwide"

2006 FPS Audit Results

- ✓ Heavy truck, engine and powertrain production
- ✓ Annual capacity
  - 15,000 trucks
  - 55,000 powertrains

KARTAL PARTS DISTRIBUTION CENTER

- ✓ Parts Operations, Service Engineering, Warranty, Field Operations, Dealer Training and CRC located at this site.

PRODUCTS

TRANSİT

- ✓ International Van of the Year 2007 Award
- ✓ Domestic Market Leader in 2007: 31.9% market share
- ✓ 135K units exported in 2007
- ✓ 36K units sold in domestic market
- ✓ Engineering rights are shared with our partner.
- ✓ Kocaeli Plant is the PVT center

PRODUCTS

Transit Connect

- ✓ Domestic Market Share in 2007: 26.2%
- ✓ 85K units exported in 2007
- ✓ 30K units sold in domestic market
- ✓ International Van of the Year 2003
- ✓ All licence, design and engineering rights are shared in half
- ✓ Kocaeli Plant is the PVT center

PRODUCTS

CARGO

- ✓ Domestic Market Share in 2007: 16.3% market share
- ✓ 2007 units exported to 21 markets in 2007
- ✓ 4.500 units sold in domestic market in 2007
- ✓ All licence, design and engineering rights belong to Otosan
- ✓ Inonu Plant is the PVT center

PRODUCTS

A Full Line of Cars

- ✓ S-MAX: Car of the year 2007
- ✓ 3rd in the Domestic Market in 2007: 9.2% market share

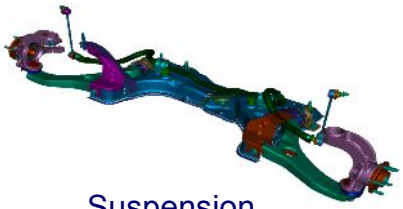
PRODUCTS

Engine & Powertrain

- ✓ Designed in Kocaeli & Gebze Engineering Centre
- ✓ Manufactured in Inonu Plant.

ECOTORQ

MT75



Suspension

Rear Axle

Puma Engine

PD and R&D Capabilities

DEVELOPMENT PROJECTS

Light Duty Vehicle

Transit Maksi Low Line Family Bus
Transit LCY 2.5 DI 100 PS T/C MFI
Transit 97 MY VE83 Exterior Facelift
Transit 99 MY VE83 Interior Changes
Transit LPG Application
Transit Heavy Duty Bus
Transit V184
Transit V184 2002
Transit Connect 2002
Tourneo Connect 2002
Transit Jumbo

Engine Projects

ERK Diesel Engine (1.9 liter IDI)
DOVER Engine Upgrade
2.5 DI Engine T/C Upgrade & MFI
Zetec CFI Application for local Escort
Zetec CFI Application for India
Dover Engine Durability Improvement (500K)
Dover Engine Emission Improvement (Euro1)
Cargo 3227 8x2 272 PS Engine
Transit 99.5 MY DOHC Petrol Engine
Puma MFIP
Ecotorq Euro 3 Engine
Ecotorq Euro 4 Engine
Puma I5 Engine

Heavy Duty Vehicle

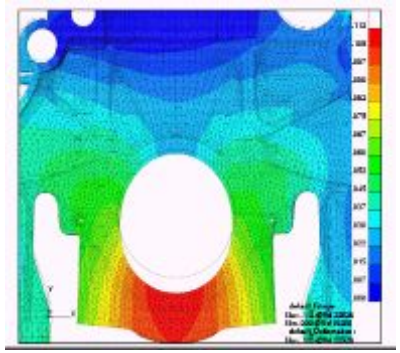
Cargo 2014 Wedge Type Full Air Brake
Cargo 2621 A New Truck for Tipper Use
Cargo 98.5 MY Major F/Lift & Twin Bed S/Cab
Cargo 1826 4x2 Trailer Truck
Cargo 2526 6x2 Draw Bar Truck
Cargo 3226 8x2 Twin Axle Steering
Cargo 1827 4X2 Trailer Truck
All New Cargo Truck

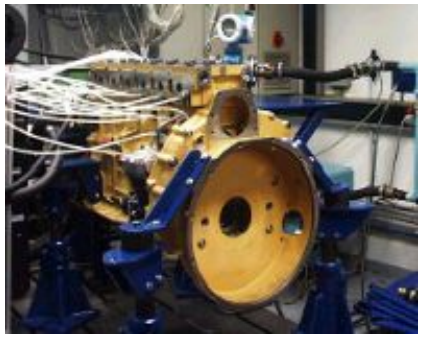
PD AND R&D HUMAN RESOURCES

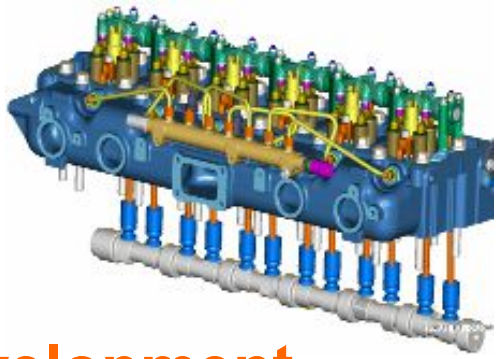
Personnel	
Engineer	
PhD.	25
MSc.	139
BSc.	257
CAD Designer	45
Technician	41
Specialist	**507**
Blue Collar	51
TOTAL	**558**

Departments
PD & Homologation
Powertrain & Engine
Body Engineering
Chassis Engineering
Electrical Engineering
Vehicle Engineering
Cargo Truck Engineering
Design Studio
Special Vehicle Engineering
PPM
TVM
PD Coordination
PVT

PD RESOURCES & CAPABILITIES







Engine Development

Engine Design & Analysis

Mechanical Development

Calibration

Durability Cycles

Development of Engine Control Functionalities

HP System Monitoring Algorithms

EOL and Diagnostics

Software and New Function Development

PD RESOURCES & CAPABILITIES

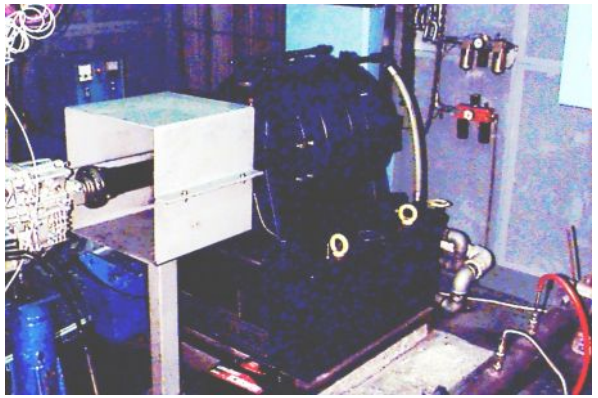
Test Cells

✓ 4 Dynos are available for both Emission Development & Durability Testing in Kocaeli Plant

✓ 7 Dynos are available for Durability Testing in Inonu Plant

✓The following tests / functionalities are supported by the emissions & durability test cells:

- ✓ STG IV and EURO IV Emission Testing
- ✓ ECE R-15/04 (city cycle)
- ✓ MVEG (ECE R-15/05)
- ✓ Modal (undiluted) Analysis / Evaluation
  - ✓ ECU optimisation with CAMEO software
  - ✓ Air flow/swirl measurement
  - ✓ Cylinder Pressure & Need Lift Measurements



✓**Stage IV & V Emission development is being carried out on dynamic test cells with AVL's GEM301L/H software. Chassis rolls are only used for verification.**

PD RESOURCES & CAPABILITIES

- ✓ **Material Lab:** To support material characterisation and failure root cause analysis
- ✓ **Engineering hardware:** 209 Unix CAD/CAE workstations, 30 NT workstations
- ✓ **Vehicle Performance Measuring Equipments:** To measure speed, accelaration, brake performance, fuel consumption and noise & vibration
- ✓ **Fatigue Test Rigs:** With programmable 6 hydraulic cylinders (INSTRON) and SINCOTEC Resonance Frequency Fatigue Rig Test Rig
- ✓ **Durability Rig Test Laboratory:** To support key life tests

PD RESOURCES & CAPABILITIES

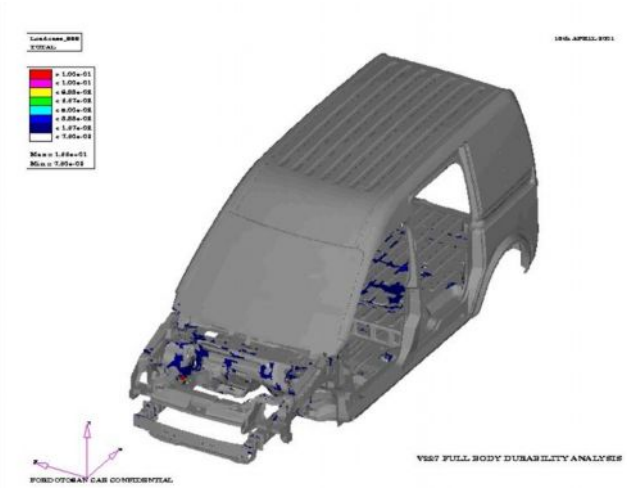
CAE Infrastructure

- ✓ 6 seats Pro/E
- ✓ 114 seats C3P
- ✓ online connection to FORD cray computer.
- ✓ access to FORD CLS server
- ✓ C3P and digital buck access
- ✓ local computing server – SGI Origin 2000
- ✓ Up-to-date h/w & s/w (209 Unix CAD/CAE w/s, 30 NT w/s)
- ✓ examples of s/w used: V-ENDURE, V-SIGN, FLAP, HyperMesh, NASTRAN, LS-DYNA, ABAQUS,TecWARE, RADIOSS, AKUSMOD, ADAMS.

PD RESOURCES & CAPABILITIES

PD RESOURCES & CAPABILITIES

Package & PIM

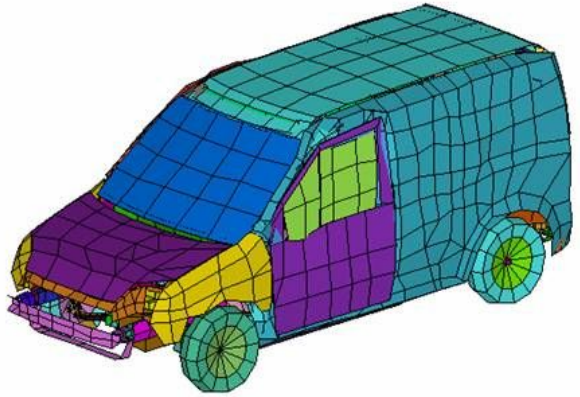


- ✓ **Vehicle Architecture**
  - ✓ Vehicle Proportions
  - ✓ Vehicle System Architecture
  - ✓ Vehicle Attitude
  - ✓ Ground Clearance
  - ✓ Tire Package
  - ✓ Powertrain Compartment Package
  - ✓ Vehicle Transportation & Recovery
- ✓ **Occupant Environment/Package**
  - ✓ Occupant Accommodation & Roominess
  - ✓ Ingress / Egress
  - ✓ Visibility
  - ✓ Interior Stowage
  - ✓ Luggage & Cargo
- ✓ **Vehicle Compatibility**
  - ✓ Digital Compatibility
  - ✓ Physical Buck Compatibility
- ✓ **Physical Vehicle Verification / Benchmarking**
  - ✓ Vehicle Level 3D Scanning

PD RESOURCES & CAPABILITIES

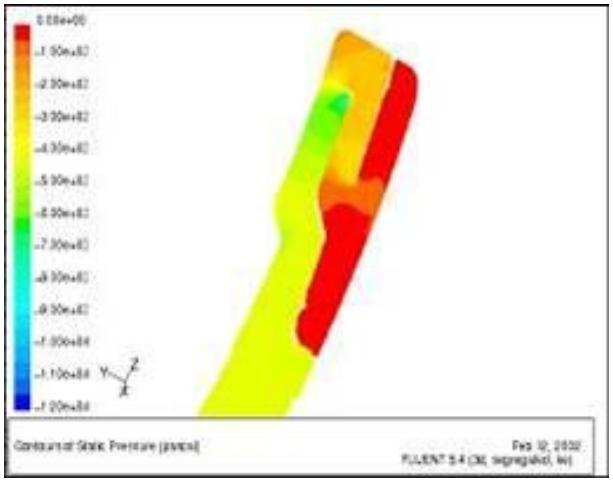
NVH

- ✓ full vehicle nvh
- ✓ BIP and trimmed body modal analysis
- ✓ NTF, VTF and point mobilities
- ✓ subsystem level analysis
- ✓ correlation testing



CFD

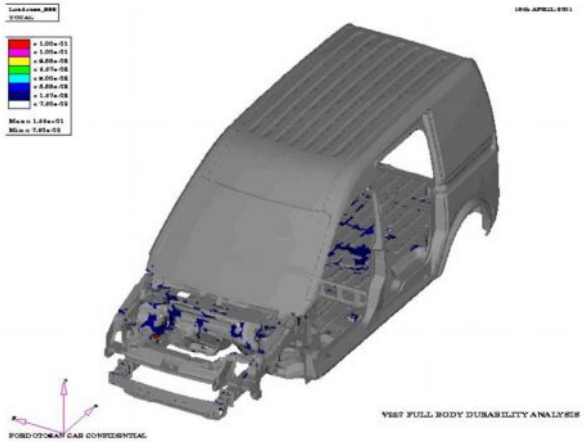
- ✓ exterior air flow analysis
- ✓ cooling performance
- ✓ interior heating and cooling performance

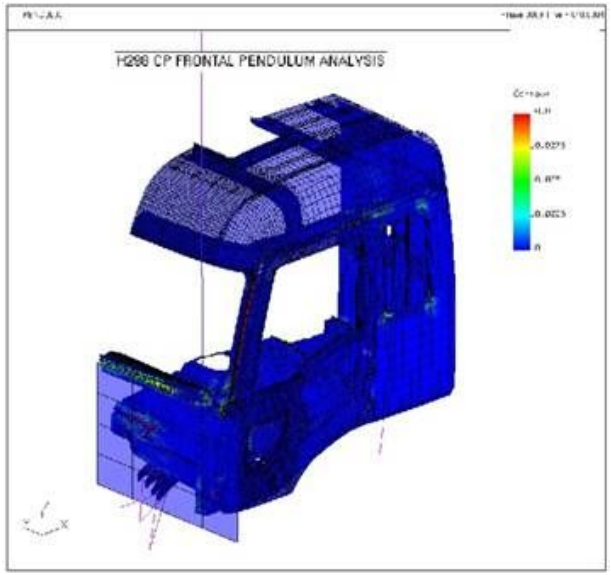


PD RESOURCES & CAPABILITIES

Durability

- ✓ full body durability (FLAP)
  - ✓ subsystem level
  - ✓ fatigue analysis (FLAP)
- ✓ closure durability (Linear Analysis MSC Nastran, Nonlinear Anaysis Abaqus)
- ✓ chassis durability (FLAP & Linear Analysis MSC Nastran, Nonlinear Anaysis Abaqus)
- ✓ correlation testing (Test values & CAE values are compared)





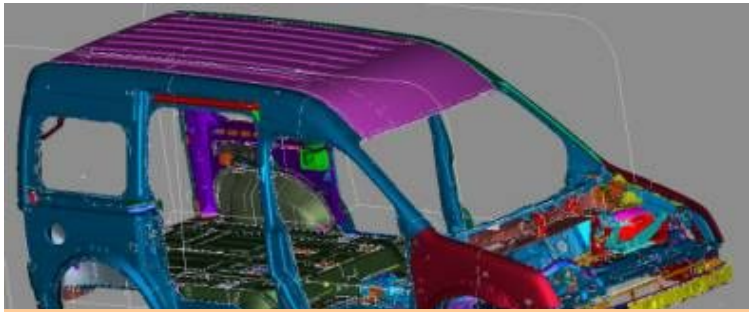
Safety

- ✓ structural crash analysis
- ✓ quasi-static nonlinear analysis, e.g.ECE 29
- ✓ impact analysis
- ✓ high g test simulation

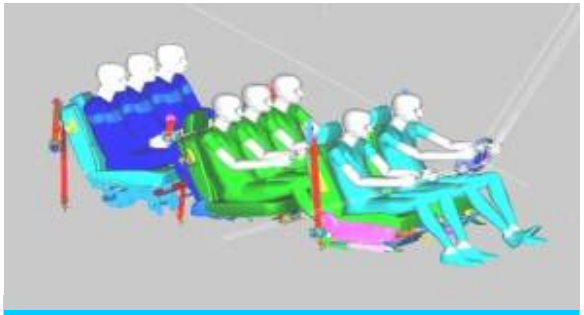
PD RESOURCES & CAPABILITIES

Body Engineering

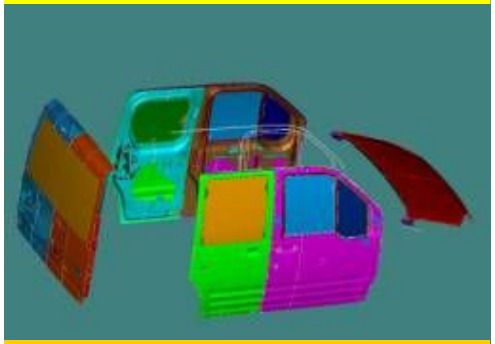
Exterior Trim



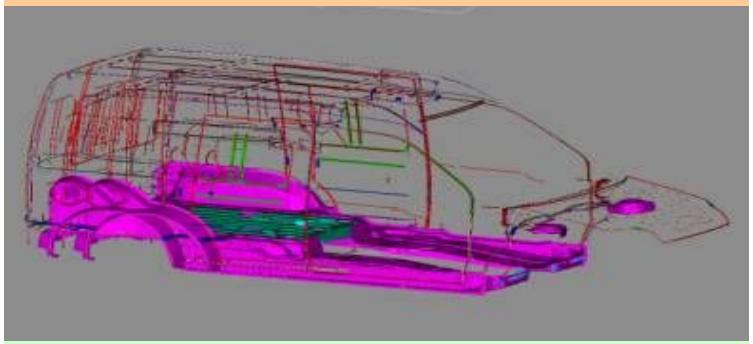
Body Structure



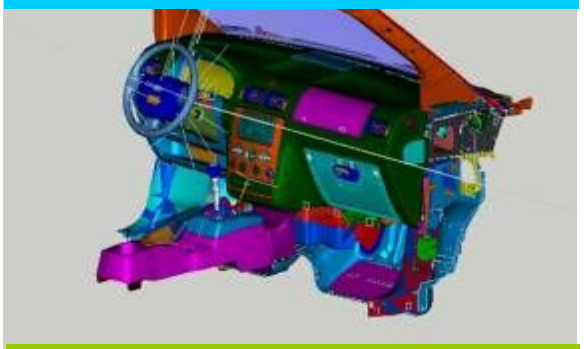
Seats & Restraints



Closures



Seals



Interior Trim

Body Engineering consists of 1 Manager, 4 supervisors, 24 engineers, 12 CAD designers and 1 technician.

Body Engineering Capabilities:

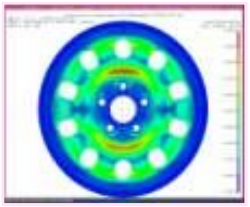
All designers are IDEAS user and have access to metaphase and capable of completing full production release. Engineers are experienced on FPDS and now being trained for GPDS.

PD RESOURCES & CAPABILITIES

Chassis Engineering

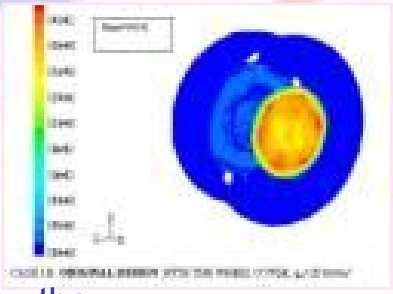
Team consisting of 1 assistant manager, 4 supervisors, 14 engineers and 3 CAD designers. Chassis Engineering subgroups focus on:

- **SUSPENSION SYSTEM**
- **FUEL SYSTEM**
- **BRAKE SYSTEM**
- **STEERING SYSTEM**



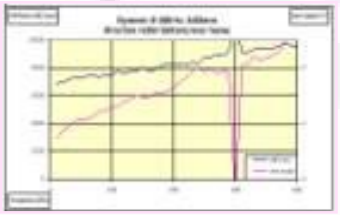
Having responsibility for Transit & Transit Connect Programs, also providing full engineering service on new Cargo brakes

Experienced to work through all stages of a GPDS program.



Collaborating with Turkish Universities on various suspension & fuel system-related projects.

Team includes 1 MBB-candidate, 8 6-sigma projects are currently handled by the team.



PD RESOURCES & CAPABILITIES

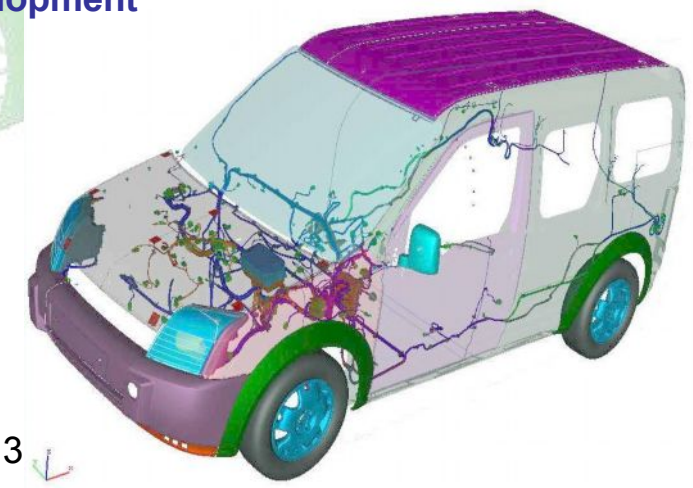
Electrical Engineering

EESE team consists of 1 assistant manager, 2 supervisors, 9 engineers and 1 technician supporting 3 Vehicle Lines:

- Transit Connect (Lead for European and Local Programs)
- Transit (Lead for Local Programs, Support for European Programs)
- Cargo Truck

- Engineering Capabilities
  - Systems and Subsystem Engineering and Verification
    - Electrical Distribution Systems Engineering and Verification
    - Component Engineering and Verification
    - PMT Coordination and Control

- Major Activities
  - Cost Reduction and Localisation Development
  - Support Studies for New Program Development
  - 6 OPD Programs in progress

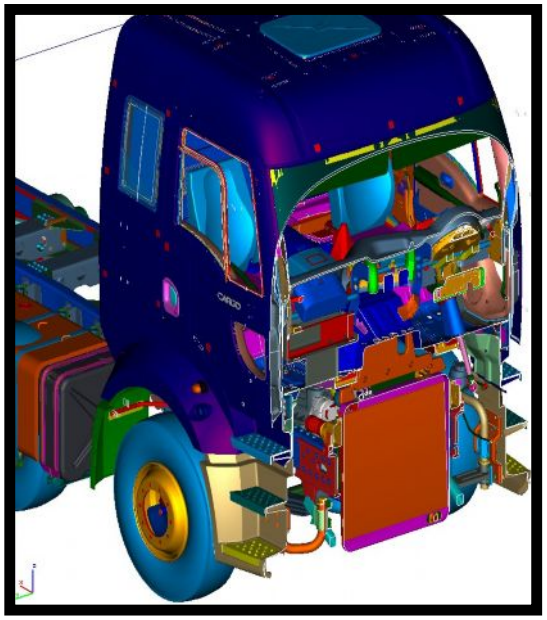


PD RESOURCES & CAPABILITIES

Heavy Truck Engineering

Design Capabilities for;

- Heavy Trucks & Tractors
- Construction vehicles
- Light Trucks
- SVO applications



Design Studio

C3P Engineering

Product Chassis Systems

in C3P environment according to;
FPDS Milestones
Local Markets & Global Markets
customer requirements and regulations
(Turkey, EU, Brasil, China etc)

Research and Development
&
Pre-competition Level Collaborations

UNIVERSITY – INDUSTRY COLLABORATIONS

Collaboration contracts with:

- Boğaziçi University
- İstanbul Technical University
- Middle East Technical Univ.
- Kocaeli University
- Sabancı University
- Koç University...

44 projects, working with 74 graduate students, 43 professors

Boğaziçi, Koç, Sabancı University

Automotive Division Graduate Education Programme

COLLABORATION PROJECT EXAMPLES

HYBRID TRANSİT PROTOTYPE DEVELOPMENT

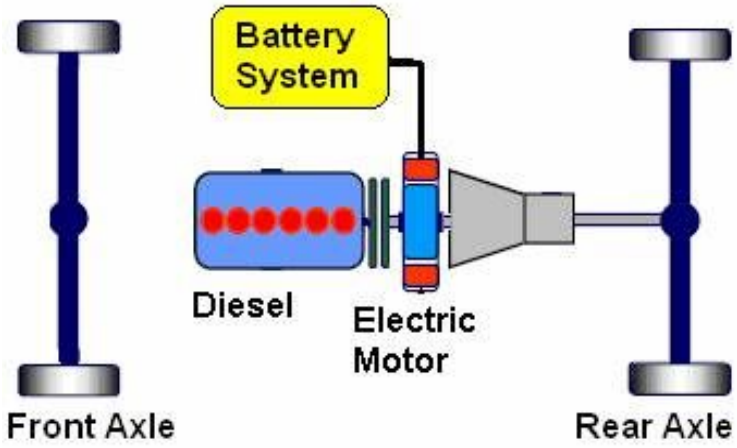
Phase-I of the project is a prototyping stage before commercialization, while the know-how gained will be the starting point of Phase-II. The second prototype will be designed and built by assembly techniques suitable to mass production.

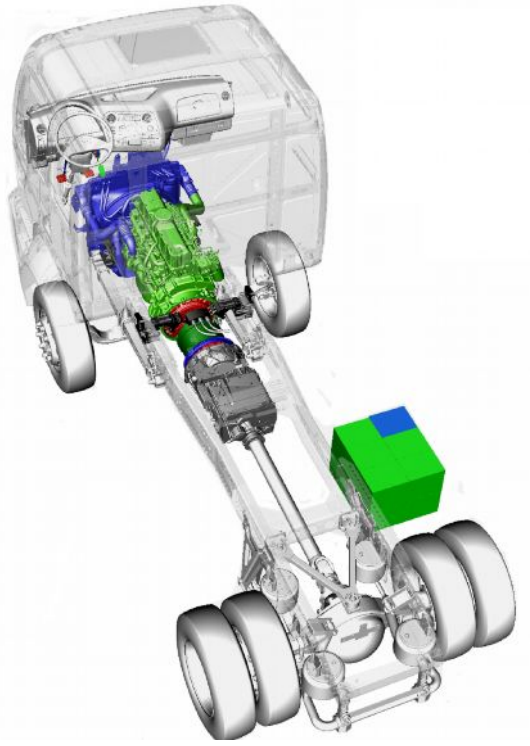
Partners

COLLABORATION PROJECT EXAMPLES

HYBRID CARGO

Four different hybrid vehicle systems in a 9 liter 8x4 truck will be examined with a detailed simulation work. Detailed design and prototype production will be carried out.





Partners

COLLABORATION PROJECT EXAMPLES

Electric Motor, ECU & Battery Development for Hybrid Electric Vehicles

Battery Development

Partners

Battery Design and Development to be used in Hybrid Electric Vehicles

Electric Motor Development

Partners

Electric Motor Design and Development to be used in Hybrid Electric Vehicles

Hybrid ECU Development

Partners

Electrical Control Unit Design and Development to be used in Hybrid Electric Vehicles

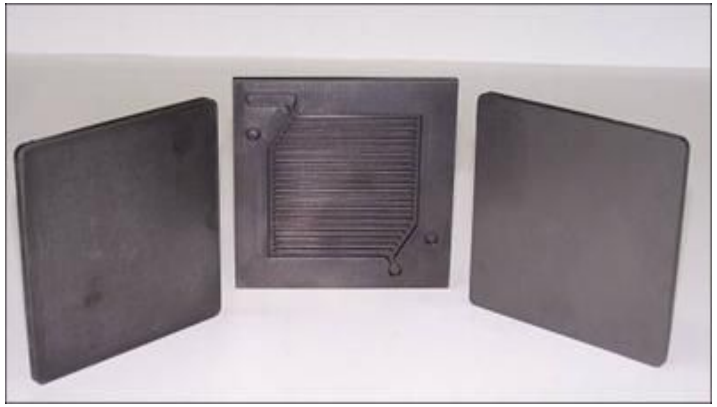
COLLABORATION PROJECT EXAMPLES

Fuel Cell – Consortium Project

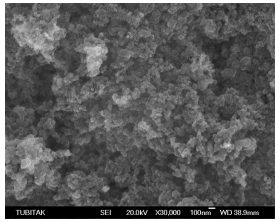
Partners

Ford
arçelik
TOFAŞ Türk Otomobil Fabrikası A.Ş.
TTGV Türkiye Teknoloji Geliştirme Vakfı
TÜBİTAK

Development and
prototype production
of a Fuel Cell Stack
by using domestic resources



This agreement was to be the first initation of
"Pre-competition Level Strategic Collaboration"



Partners

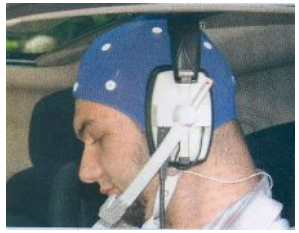
Ford
arçelik
TOFAŞ Türk Otomobil Fabrikası A.Ş.
TTGV Türkiye Teknoloji Geliştirme Vakfı
TÜBİTAK
BOS Bimetal Otomotiv Sanayi A.Ş.
AYGAZ
DemirDöküm

COLLABORATION PROJECT EXAMPLES

"DRIVE SAFE" PROJECT

eSafety - Co-operative Systems for Road Transport

A multinational, multi partner research environment in Turkey



Using signal processing and communications technologies, create conditions for prudent driving on highways and roadways with the purposes of reducing accidents caused by driver behavior

Partners

Ford

RENAULT

TOFAŞ TÜRK OTOMOBİL FABRİKASI A.S.

İSTANBUL TECHNICAL UNIVERSITY 1773

OTAM OTOMOTİV TEKNOLOJİLERİ AR-GE MERKEZİ

Sabancı Üniversitesi

KOÇ UNIVERSITY

FP6 – PROJECTS

GREEN (IP)
Green Heavy Duty Engine

"Euro 6 diesel engine concept for 2012"

Coordinator	: Volvo
Other partners	: AVL, Ricardo, FEV, DC, IVECO, Delphi, Johnson Matthey, Ricardo, Universidad Politécnica de Valencia, Bosch, Chalmers University, Daimler Chrysler AG
Ford Otosan's task	: Performance comparison tests with different alternative fuels

Ford Otosan, by being a partner to this project, has become the first and the only automotive company that participates to an IP project under EC - FP6 programme.

INTERNATIONAL CONFERENCES

ICAT 2008 *"Alternative Technologies for the Reduction of CO_2 Emissions"*

ICAT 2006 "*EU – R&D Entegration Opportunities for Turkey*"

ICAT 2004 "*Future Engine and Vehicle Technologies*"

ICAT 2000 "*Developments on Internal Combustion Engines*"

http://www.icatconf.org/

TECHNICAL PUBLICATIONS

2003 2 International papers
6 National papers

2004 5 International papers
12 National papers

2005 13 International papers
2 National papers

2006 8 International papers
3 National papers

2007 19 International papers
6 National papers

2008 50 International papers
22 National papers

OUR SUCCESS: AWARDS

"Customer Friendly Gold Quality" award

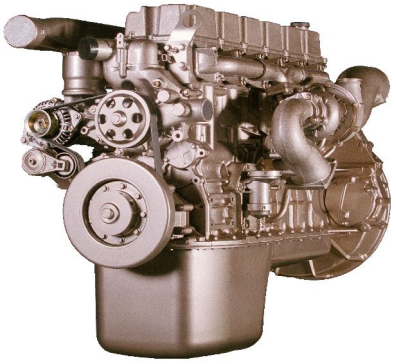
"INTERNATIONAL COMMERCAL VEHICLE of THE YEAR 2007" award - *Transit*

Designers (Europe)
"EURPE AUTOMOTIVE DESIGN" award

U.K. 'What Van' Journal
"VAN OF THE YEAR" award

"INTERNATIONAL COMMERCAL VEHICLE of THE YEAR 2003" award – *Transit Connect*

ECOTORQ



KOÇ GROUP "Shining Stars" Category

FIRST PLACE award

TUBİTAK – TTGV – TUSIAD
TECHNOLOGY AWARDS
"Jury Special" award

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