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 KOCAELİ PLANT & ENGINEERING FACILITY (Light and Heavy Vehicles)
- FORD OTOSAN GEBZE ENGINEERING FACILITY (Engine and Powertrain)
- FORD OTOSAN INONU PLANT
KOCAELİ PLANT

“Best Ford Brand Assembly Plant in Europe Since 2002”

✓ 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
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
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

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

### 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

### Personnel

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<th>Role</th>
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<td>Engineer</td>
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<td>BSc.</td>
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<td>CAD Designer</td>
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<td>Technician</td>
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<td>Specialist</td>
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<td>Blue Collar</td>
<td>51</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>558</strong></td>
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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
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, acceleration, 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 Analysis Abaqus)
- ✓ chassis durability (FLAP & Linear Analysis MSC Nastran, Nonlinear Analysis 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
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.
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

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
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.
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.

**HYBRID CARGO**
COLLABORATION PROJECT EXAMPLES

Electric Motor, ECU & Battery Development for Hybrid Electric Vehicles

- **Battery Development**
  - Partners: Ford, TÜBİTAK, İNÇI AKÜ
  - Battery Design and Development to be used in Hybrid Electric Vehicles

- **Electric Motor Development**
  - Partners: Ford, TÜBİTAK, arçelik
  - Electric Motor Design and Development to be used in Hybrid Electric Vehicles

- **Hybrid ECU Development**
  - Partners: Ford, TÜBİTAK, Koc
  - Electrical Control Unit Design and Development to be used in Hybrid Electric Vehicles
Development and prototype production of a Fuel Cell Stack by using domestic resources.

This agreement was to be the first initiation of “Pre-competition Level Strategic Collaboration”
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.
GREEN (IP) Green Heavy Duty Engine

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.
ICAT 2008 “Alternative Technologies for the Reduction of CO₂ 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 COMMERCIAL VEHICLE OF THE YEAR 2003” award – Transit

“VAN OF THE YEAR” award

Designers (Europe)
“EURPE AUTOMOTIVE DESIGN” award

U.K. ‘What Van’ Journal
“VAN OF THE YEAR” award

“INTERNATIONAL COMMERCIAL VEHICLE OF THE YEAR 2007” award – Transit Connect

KOÇ GROUP “Shining Stars” Category
FIRST PLACE award

TUBİTAK – TTGV – TUSIAD TECHNOLOGY AWARDS
“Jury Special” award
Thank you...

Please visit our website:

www.ford.com.tr