

## Ricardo was responsible for a 13% fuel-economy improvement on a commercial vehicle.

### Situation and Objectives

Desire to improve fuel-consumption competitiveness of the highway bus product.

System approach with combined development of engine, transmission and vehicle systems required.

Targeting fuel-consumption improvement over real-world customer drive cycle.

### Ricardo Responsibilities

On-site support for vehicle data acquisition.

Engine test bed development of calibration maps and turbocharger matching.

Simulation of vehicle over selected drive cycles.

Sensitivity analysis to define fuel-consumption critical components/systems. Areas included:

- Transmission Matching
- Aerodynamics
- Ancillary Losses
- Tire and Driveline Friction
- HVAC System
- Turbocharger Matching
- Engine Cooling System
- Engine Calibration

Confirm effect of system developments.

Engineering of development specifications.

Implementation support of developed systems and vehicle confirmation testing.

### Results and Benefits

13% fuel-consumption improvement identified:

- 2.0% from engine recalibration
- 2.5% from transmission and driveline
- 8.5% from cooling system and thermal management strategy

Cost/benefit analysis completed to enable the OEM to make an informed decision on what changes to implement in production.

