



**ULSAB-AVC Program**

**Technical Transfer Dispatch #1**

**May 14, 1999**

**Description of ULSAB-AVC**

**Benchmarking and Target Setting Approach**

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## Introduction

### *Background Concerning ULSAB-AVC Technology Transfer Dispatch (TTD)*

TTD is a generic term for an external communication to external automotive technical audiences. TTDs are periodic communication to key contacts at automakers to maintain a dialogue and to keep key automotive people informed about the project. TTDs are expected to be distributed approximately every 2-4 months, however, frequency will be driven by technical content that is available at appropriate times.

This Technical Transfer Dispatch describes in brief the ULSAB-AVC Program benchmarking and target setting approach. These are the program's first steps, building the foundation and giving direction for the work to follow.

The ULSAB-AVC Program is focused on the development of steel applications for vehicles to be produced from the year 2004 and beyond. A "holistic" total vehicle development approach will be applied, including styling, package, closures, suspension, etc.

The understanding of the interactions of all vehicle subsystems, their optimization in respect to size, mass, and performance, will lead the program to an optimized vehicle concept. Benchmarking will provide the data for building the basis of the target setting, after which the program target will be established and guidelines for the design will be created.

The ULSAB-AVC Program concentrates on the design of two (2) lightweight vehicles: One in the most popular European C-class (so-called Golf class); and the second, in the North American PNGV class (Partnership for a New Generation of Vehicles\*). Both will share as many components and structural members as possible with the goal to reduce total vehicle mass and subsequent energy consumption.

\* PNGV: described as a 5/6 passenger sedan; 3.115 cu-m interior volume including passenger and luggage space; curb weight of 907 kg; capable of achieving a fuel efficiency of up to 80 miles per gallon; with a production prototype available by 2004.

## **1. Benchmarking Approach**

Benchmarking from current production C-class and PNGV-type vehicles as well as vehicles with a curb mass in the 900 kg range, will be collected.

Additionally, to gather the newest and most accurate data for the purpose, two (2) vehicles will be purchased, evaluated and dismantled.

The selected vehicles are:

- a) Ford Focus – C-class type vehicle (see attachment 1)
- b) Peugeot 206 – 900 kg class vehicle (see attachment 2)

The Ford Focus was chosen as a recent example that meets current safety standards and is a C Class size vehicle. The Peugeot 206 was chosen because it is approximately a 909kg (2000lb) vehicle and will provide a good example for detailed component mass benchmarking.

For the PNGV-type vehicle, the targets have been set by PNGV and will be applied where possible. In respect to structural and crash performance, the targets for PNGV-type vehicle will be updated to comply with future requirements. Porsche Engineering Services, Inc. (PES) will use benchmarking data for the PNGV class vehicle (e.g., Chrysler Cirrus – see Attachment 3) received from PNGV and from existing data from similar size vehicles.

## **2. Target Setting Approach**

The overall ULSAB-AVC Program objective is to demonstrate that steel offers solutions for future vehicle developments and to communicate those solutions to OEMs, their customers, and the general public.

Essential targets will be set to meet this objective that demonstrate the innovative use of steel in automotive applications, which can provide a wide range of functional and societal benefits:

- Environmental responsibility through energy and resource efficiency
- 100% recyclability

- Safety through design and material selection
- High volume production through established and innovative manufacturing techniques
- Inherent affordability through modern manufacturing technologies
- Low cost of ownership including ease of repair

Based on the results of the benchmarking and the adaptable PNGV requirements, the targets for the C-class vehicle and the PNGV type vehicle will be set and mutually agreed upon with the ULSAB-AVC Consortium.

There will be two (2) sets of targets, one (1) for the C-class vehicle, and one (1) for the PNGV-type vehicle, because of differences in size and performance requirements.

The following targets will be set:

- Mass of complete vehicle
- Subsystems and component mass
- Vehicle dimensions
- Vehicle performance (U.S. standard and European standard)
  - Acceleration
  - Fuel consumption and related CO<sub>2</sub> emissions
- Vehicle features
  - Safety equipment
  - Comfort features (e.g. air conditioning, audio system, electronic seats)
- Crash worthiness
- Structural performance of body structure only
  - Torsional rigidity
  - Bending rigidity
  - Normal mode frequencies

- Aerodynamics drag
- Affordability (total vehicle cost, or cost penalty)

**Attachment 1**  
**Purchased Vehicle for Benchmarking**



Engine:     Layout 4 cylinder in line, 1388 ccm  
              Maximum power: 55 kW (75 PS) at 5000 rpm

Dimensions:     Length: 4178 mm  
                      Width: 1702 mm  
                      Heights: 1481 mm  
                      Wheelbase: 2615 mm

Weight: 1068 kg

Top speed: 171 km/h

Acceleration: (0-100 km/h): 14.1 seconds

ECE-Consumption: Combined: 6.4 ltr / 100 km

**Attachment 2**  
**Purchased Vehicle for Benchmarking**

Peugeot 206

Engine:     Layout 4 cylinder in line, 1124 ccm  
              Maximum power: 44 kW (60 PS) at 5250 rpm

Dimensions:     Length: 3822 mm  
                  Width: 1673 mm  
                  Heights: 1435 mm  
                  Wheelbase: 2442 mm

Weight: 915 kg

Top speed: 158 km/h

Acceleration:(0-100 km/h):15.2 seconds

ECE-Consumption: Combined: 6.2 ltr / 100 km



**Attachment 3**  
**PNGV Reference Vehicle**



Engine: Layout 4 cylinder in line, 1996 ccm

Maximum power: 98 kW (133 PS) at 4550 rpm

Dimensions:       Length: 4750 mm  
                          Width: 1820 mm  
                          Heights: 1370 mm  
                          Wheelbase: 2740 mm

Weight: 1350 kg

Top speed: 205 km/h

Acceleration (0-100 km/h): 10.9 seconds

EU Consumption: 7/12.6 ltr/100 km