

GEMCAR: “Guidelines for ElectroMagnetic Compatibility modelling for Automotive Requirements”

A three year collaborative research project supported by the EU under the Framework V programme “Competitive and Sustainable Growth” (Contract no. G3RD-CT-1999-00024)

EXECUTIVE SUMMARY

Background

Future vehicle electronic systems will provide many more safety related functions to aid the driver, as well as advanced telematics facilities to support activities such as traffic management. In addition, more sophisticated control systems will be used to optimise vehicle performance and emissions. Thus, electromagnetic compatibility (EMC) represents an increasingly significant issue for the function, safety and reliability of modern vehicles.

The success of future vehicle technologies which aim to improve transport and to minimise its environmental impact will therefore be critically dependent on the efficient and successful handling of automotive EMC issues. This is recognised by the automotive industry’s *CO₂PERATE* Programme, which has provided a letter of support for this proposal.

Automotive EMC engineering has traditionally been a experimental activity. However, the advent of electric and hybrid-electric vehicles, and the increasingly wide range of systems and frequencies which are used in vehicles, are expected to make automotive EMC an increasingly onerous burden to vehicle manufacturers in future. It is considered that the adoption of numerical modelling techniques will provide the most cost effective approach for future automotive EMC engineering.

Objectives and expected results

Although tools and techniques have been developed which are suitable for this purpose, further research is now required to establish practical modelling issues such as:

- the requirements for EMC modelling in automotive applications
- the level of model detail that is required
- the uses and potential benefits of automotive EMC modelling
- how to maximise the efficiency of vehicle scale simulations

This project aims to develop a comprehensive set of guidelines for practical electromagnetic modelling in automotive applications, based on detailed validation of models of real vehicles.

This will be achieved by critical comparison of model results and measurements. A range of modelling techniques and vehicle test cases will be used for this purpose. The test cases will be derived from production vehicles, and will be staged at three levels of complexity. The wiring harness and vehicle structure will also be considered both individually and in combination.

The guidelines will be widely disseminated and will speed the adoption of EMC modelling techniques within the European automotive industry, thus improving competitiveness. The guidelines will also be of value in other transport sectors, most notably the rail and aerospace industries.

Consortium

As EMC modelling techniques are most mature in the aerospace industry, the consortium includes aerospace organisations in order to exploit this existing expertise and to further develop practical vehicle modelling in collaboration with automotive companies. The project consortium comprises nine organisations drawn from five different European countries, as detailed below.

Partner	Role	Country
MIRA	Co-ordinator	UK
Ford	Assistant contractor (to MIRA)	UK
Aerospatiale	Principal contractor (industry)	France
CETIM	Principal contractor (industry)	France
DERA	Principal contractor (industry)	UK
EPFL	Principal contractor (academic)	Switzerland
Hevrox	Principal contractor (industry)	Belgium
ONERA	Principal contractor (industry)	France
Volvo TDC	Principal contractor (industry)	Sweden

Project schedule

The project started in January 2000, and is due to complete in December 2002.