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27 July 1995

For the attention of Mr E M Leonardi

Dear Mr Leonardi,

EU PARTICIPATION IN THE "DIVINE" PROJECT

Following recent conversations between us, and between yourselves and Mr Christensen, I am now writing on behalf of FEHRL members to request EC participation in the DIVINE project. As we agreed, this is an important project that will have a number of outputs of particular relevance to Europe. The FEHRL Executive Committee have prepared the attached statement and request for 200,000 ECU funding; the statement provides more details of the expected benefits to Europe, and of the technical content of the project.

I do hope you will now be able to give this matter your early consideration; as you know, there is a risk that the project will have to be stopped this summer through lack of funding, and this is clearly something that FEHRL and its members wish to avoid.

To complete this submission, I enclose copies of the DIVINE brochure, and the most recent Newsletter of the project. If there is any further discussion that you need, or any further information, I shall, as ever, be pleased to hear from you.

Yours sincerely,

I Schacke
Chairman
FEHRL Executive Committee

INTRODUCTION

It has been known for many years that the loads applied by moving trucks to road surfaces differ from the static loads. It is also believed that these "dynamic pavement loads" can accelerate the deterioration of a road pavement, and it is known that they lead to increased loading on bridges. Dynamic loading may be reduced by the use of some types of suspension, and by air suspension in particular, as has already been partly recognised in some European countries. The possibility therefore arises that if dynamic loading can be reduced substantially by the use of so-called "road friendly" suspensions, then it may be possible to make savings in the sums devoted to road and bridge maintenance, while simultaneously increasing truck productivity.

Theoretical estimates have been made of the possible benefits of road-friendly suspension, and these suggest savings of perhaps 115 MECU per year in a country with a road network and vehicle fleet similar to that of the United Kingdom. Road friendly suspensions may also bring about very large savings by improved efficiency in the road freight industry. However, these estimates have yet to be confirmed experimentally.

In 1994 the member countries of FEHRL joined with the USA, Canada, Australia, New Zealand and Japan to implement an international co-operative research programme with the aim of seeking such confirmation, and to explore the most effective ways of improving transport productivity by affecting dynamic loads. This programme, called the DIVINE project - **D**ynamic **I**nteraction **V**ehicle-**I**nfrastructure **E**xperiment - is carried out under the OECD Road Transport Research Programme and is based on proposals made in an OECD review report "Dynamic loading of pavements" written in 1992 by a scientific expert group chaired by Dr Peter Sweatman. The scientific expert group which is now responsible for coordinating the many elements of the DIVINE programme, as well as for final reporting, is also chaired by Dr Sweatman.

BENEFITS TO EUROPE

Although the DIVINE project is being conducted on a world-wide basis, much of the work, and a great deal of the funding, comes from European countries. In particular, Austria, Denmark, Finland, France, Netherlands, Norway, Sweden and UK are all making technical and/or financial contributions. The technical issues being considered in the project have a particular relevance to the European context, and to the Common Transport Policy, and the widespread support from European countries is evidence of this.

Three types of benefit could arise from the DIVINE Project:

- reduced road wear (and hence reduced road maintenance costs)
- improved productivity while avoiding increased road costs
- reduced road costs and increased productivity

The European Commission has already recognised the potential for some of these benefits, and has referred to them in Directive 85/3, parts of which have been

implemented in some countries of the Union. However, the outputs from DIVINE may assist in strengthening the Directive, and bringing about further consideration of EU policy objectives in the Transport field.

The DIVINE project will contribute to the possibility of reduced road maintenance costs by improving understanding of the effects of dynamic loading on road pavements. The development of the "road-friendly" freight vehicle will then make it possible to take the benefits of the work as a reduction in the costs of road construction and maintenance. However, even greater benefits may be possible from improved productivity of road freight operations. The annual costs of operating freight vehicles far exceeds the costs of building and maintaining roads (vehicle operating costs have been estimated to be approximately 30 times road costs).

Objectives designed to increase the competitivity of European industry will rely heavily, in this sector, on increases in productivity. Improvements in road freight productivity - through potentially higher payloads - have a large potential pay-off in reducing total vehicle operating costs and reducing transport costs.

The implementation of such productivity improvements clearly depends on national policies with regard to road funding, road user charges, size and-weight limits and vehicle regulations, and the EU is central to these questions.

The outputs of the DIVINE project will therefore provide the EU with important information that will enable further consideration of policy issues in the field of vehicle weights and dimensions, and will allow technical developments to assess the "road-friendliness" of vehicles to be exploited in Europe. Increased payloads and productivity could be brought about by a mix of transport policy options selected to best suit the regulatory and economic environment. Components of these policy options could include:

- higher gross weights for road-friendly vehicles, brought about by additional axles rather than higher individual axle weights.

- increased axle group weight on "road-friendly" tandem and tridem axle groups

- scientifically-based means for measuring and assessing the road-friendliness of heavy vehicle suspensions (including the dynamic and load-sharing performance of suspensions).

- Such vehicle-related options could be supported by new strategies for pavement design, reconstruction and maintenance which is less likely to produce, and is less sensitive to, dynamic loading and perhaps stronger, more even pavements on designated freight routes.

In the case of the Trans-European Road Network, the possible outputs from DIVINE will not only enable more accurate estimates to be made of the costs of initial construction and continued maintenance of those roads, but will again improve the productivity of those European operators using the Network, without increasing road wear costs. *European subventions to the Network may therefore be optimised.*

While the DIVINE project will contribute to a reduction in road maintenance costs, even greater benefits may be available through improved productivity of road freight operations. This will *clearly contribute strongly to the competitivity of European industry, both within and outside Europe*. The potential improvements may be brought about by increased vehicle payloads at no additional road maintenance costs. However, the implementation of such policy options will of course depend on the national and international regulatory environment in Europe.

Sustainable Mobility is greatly affected by questions of traffic congestion and growth; congestion itself is exacerbated by frequent and sometimes lengthy road works brought about by the need for maintenance. The outputs from DIVINE are expected to minimise the need for road maintenance, and *will therefore contribute in the medium term to improved prospects for sustainable mobility*. These prospects will be further improved if those outputs can be translated into increased productivity of national and international truck fleets. This will lead to fewer trucks in those fleets, with consequent improvements to congestion and mobility.

Finally, it is anticipated that the potential reduction in numbers of heavy goods vehicles will lead to *significant environmental improvements, and to overall energy savings*.

TECHNICAL ISSUES

The project consists of 6 interdependent research elements that are led by nominated experts in their particular field. Their responsibility is to ensure the correct conduct of the appropriate research element, (leading to integration of the results with those from other elements, and the reporting of these results.

Research elements 1,2,3 and 5 form a package that together attempt to answer four basic questions:

i. Under controlled conditions, by how much do dynamic loads reduce the life of road pavements?

ii How can the results obtained under controlled conditions be transferred to real road conditions with mixed traffic?

iii. How should we specify and test heavy vehicles for road friendliness?

iv. How much increase in pavement life should we expect from road-friendly heavy vehicles in practice?

Research element 6 addresses the specific effect of dynamic loading on bridge life and maintenance, while the more general question of how the observed effects of dynamic loading can be realistically modelled is considered in element 4. Brief descriptions of each of the elements are given below.

Research Element 1 - Accelerated dynamic pavement testing, is being carried out at the CAPTIF testing facility at the University of Canterbury in Christchurch, New Zealand. It

involves New Zealand test personnel, the Research Leader from VTT in Finland and the pavement designer from the FHWA of the United States. Dr Peter Sweatman from Australia is acting as coordinator at the local level. Its purpose is to establish measured pavement lives under air and steel suspensions.

Research Element 2 - Pavement primary response testing, it involves test sections in Finland and the United States which have been trafficked by instrumented vehicles from United Kingdom, Canada and the United States. The research leader is from the United States, and the purpose is to measure strains generated by dynamic loads so that the results of other elements may be transferred to other conditions.

Research Element 3 - Road simulator testing, is carried out using the National Research Council of Canada shaker facility and instrumented test vehicles from Untied Kingdom, Canada and the United States. The Canadian research leader supervises the planning, co-ordination and conduct of the research, the team from Hungary and personnel from the University of Hanover, Germany, are involved in the data analysis. The objective of the work is to ascertain to what extent road simulators can reproduce the dynamic effects in a vehicle caused by a real road. This element will also assist in defining the parameters of a test for "road-friendly" suspensions and this will provide useful information to European institutions who may be concerned with this aspect.

Research Element 4 - Testing of computer simulations of road/vehicle interaction, is conducted by the TNO, Netherlands, using a range of computer simulation model packages from around the world.

Research Element 5 - Spatial repeatability tests, are being carried out on two instrumented test sections under real traffic. The work is conducted by LCPC in France and TRL in the United Kingdom under the leadership of the two road research laboratories. The instrumented vehicles from United Kingdom, Canada and United States are also being used in these tests to enable cross-references to be made. The work will assist in defining whether particular projects on a road are particularly susceptible to dynamic loading.

Research Element 6 - Dynamic bridge load testing, was conducted on three different road bridges in Switzerland using the 5-axle tractor-semi-trailer instrumented test vehicle from Canada. Coordinated with these tests, a programme of research on the effects of dynamic wheel loads on short span bridges is being carried out in Australia.

FUNDING ISSUES

The original direct budget of DIVINE was $US 1.5 million (approximately 1.125 MECU), to be funded by participating and non-participating countries and industrial organisations. Cash contributions to date have resulted in commitments of 0.675 MECU from 13 countries and 3 major truck manufacturing companies. These funds have now been consumed, and the project's executive committee, chaired by Mr Jørgen Christensen (the current chairman of the Steering Committee of the OECD RTR programme) is calling for further cash contributions from countries and industry to ensure the orderly completion of the project. At present, these seem likely to reach a total of 100 000 ECU. Through careful management, the required budget is now 0.975 MECU, leaving a shortfall of about 200 000 ECU.

SUMMARY

It is against this background that FEHRL is now applying for support from the European Commission. Such support will give added strength to the European DIVINE partners by enhancing the funding that they have already contributed. It is suggested that the EC might contribute 200,000 ECU, to be channelled into the project through FEHRL. It has been proposed by the DIVINE Executive Committee that a European reference group is formed to provide for the easy flow of information between the research project, its European sponsors and industry and potential users of the outputs of the project. A similar reference group has been established for the Australasian sponsors, and this has proved to be very successful. A further group is also planned for North America. The Commission would of course be welcome to join the European Reference Group should they wish to do so.

The members of FEHRL therefore request the participation of the EC in the DIVINE project, and hope for their participation in the proposed European Reference Group.