

ECO-SERVE

Cluster 4 Pavements

1 Problems to be solved

In most countries increasing traffic, in number of trucks as well as in magnitude of axle loads, asks for more and wider roads. This results in a large consumption of high quality building materials.

Production and transport of those materials produces lots of CO₂ with an adverse effect on the environment. Therefore a new type of pavement is wanted which, against competitive costs, reduces the impact on the environment.

2 Strategic objectives

Cluster 4 Pavements must result in the possibility to develop an 'Eco-Serve type pavement', compared to a 'local conventional pavement' it realises the following goals:

- transportation of materials for pavements will be reduced by 20%;
- CO₂-emission related to construction of pavements will be reduced by 20%;
- consumption of bitumen, which is an energy exchangeable resource (cracking process) may be reduced by more than 50%;
- overall costs of pavement construction may be reduced by 30% average.

In every country it should be possible to develop such an 'Eco-Serve type pavement'. Environmental indicators will be used during the development, they also will be used to judge whether these goals are achieved. In this way the work in Cluster 4 will support the EU policies; particularly its environmental goals through the contribution to a sustainable construction industry but also through its contribution to cost effective construction methods.

3 Scope of work

Cluster 4 wants to address the issue of possible new types of unbound or hydraulically bound base courses and the correlated design models, which will allow for the introduction of:

- local materials, possibly of marginal quality compared with standard materials, to reduce transport;
- pozzolanic binders with low CO₂-emission during production;
- design of pavements based on present needs (load) with future strengthening options built-in (stepwise design and construct principle);
- reduction of the bituminous or concrete pavement layers to reduce costs.

It is the objective based on assessment of available research and design methods to select the most suitable approach for design (performance based) of unbound or hydraulically bound base course layers (as part of an integrated pavement design). Such base course layers may be produced using materials (sand, gravel), which are available at the location of construction instead of applying

standardised high quality components with proven performance. The technical challenges in the exploitation of these observations are:

- to control the intrinsic cracking through a controlled low strength level, i.e. introduce max. requirements to strength;
- to assure the durability of the base course even at low strength level, which probably means that also minimum requirements to the strength shall be defined, as a result the pavement should be maintenance free;
- to develop a generic design methodology for these low strength base course materials taking into account the absence of discrete cracking together with the consequence that a large number of finely distributed cracks will be present (and influencing the elasticity of the material, i.e. low modulus elasticity materials);
- to verify that asphalt layers are only required to establish a desired wearing course quality and not as part of the structural layer.

In this network project collation and dissemination of data is important:

- all available information regarding pavement design methodologies (focussed on bound base courses) should be collected;
- mapping of stakeholders (road directorates, design consultants and contractors) will take place;
- data of interesting projects should be collected.

Different tasks have been set up, the first activity is to make an inventory of existing design methodologies regarding unbound or hydraulically bound base courses; a questionnaire has been sent world-wide. Consequently a performance based design method will be developed. Emphasis is on the performance of the pavement structure in total, not on the level of mix composition or components. A full-scale test section of the new type of base course will be tested with an accelerated loading facility. Finally a test section will be constructed to demonstrate its performance.

Summarising, everywhere a lot of unbound and hydraulically bound bases are applied but each country has its own design method. At the end of the project a better understanding of the behaviour of these base courses may be expected so that suitable local materials can be selected and a design method based on performance criteria is developed. This must be stated in provisional guidelines for material production and design of pavements. It must result in the possibility to develop an 'Eco-Serve type pavement': a pavement with a base of unbound or hydraulically bound local material which does not result in discrete cracking, consequently the wearing course can be relatively thin.

