

Project title: Asphalt Surfacing on Orthotropic Steel Deck Bridges

Projectnummer: IQ2011-02 also IQ-2012-79 'Experimental and Numerical characterization of membrane bonding strength on orthotropic steel deck bridges', IQ-2013-41 'FEM simulations of membrane layers on steel bridges (Jinlong Li)', IQ-2013-45 'Experimental exploration of multi-layer asphalt adhesive bonding and failure properties (George Tzimiris)

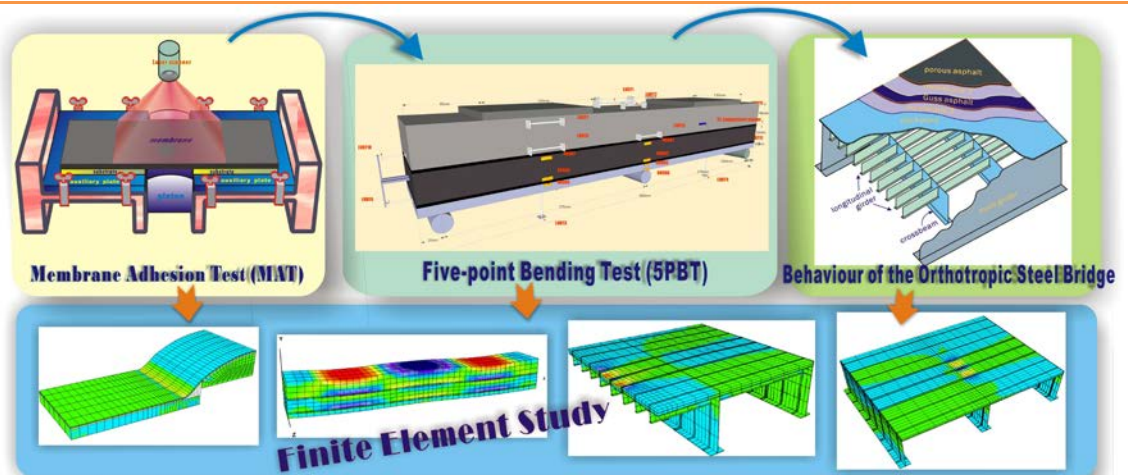
Start date: 1 Januari 2011 **End date:** 31 December 2012

Project team: Tom Scarpas (TU Delft), Xueyan Liu (TU Delft), Jinlong Li (TU Delft), George Tzimiris (TU Delft), Yan Yang (TU Delft), Jan Voskuilen (RWS-DVS), Piet van Dijk (RWS-DVS), Dave van Vliet (TNO), Toon Ansems (TNO), Mario de Rooij (TNO), Elisabeth Kijzer (TNO)

Embedding in IQ-programme: The PhD-project relates to the 'Wegenbouwmaterialen & constructies' Further the project relates to the IQ-project 'Asfalt op stalen bruggen' (IQ-2011-2)

Type of Project: Fundamental concept Integration & development Validation of results Product-in-context / valorisation

Graphical abstract:



Research questions:

- What are the physical quantities that can be used to quantify the membrane bonding characteristics ?
- How can a specially developed Membrane Adhesion Testing (MAT) device be utilized for evaluation of the energy required for membrane debonding
- How can MAT be utilized for membrane product ranking
- How to predict accurately the fatigue life of the steel deck bridge surfacings?
- How to obtain material parameters for 3D Finite Element modeling of steel deck bridge by means of the MAT results?

Conclusions:

The methodology developed in this project is capable of characterizing the adhesive bonding strength of the various membranes with the surrounding materials. Critical energy release rate G is a fundamental physical quantity that can be utilized to quantify the membrane adhesive bonding strength with different substrates.

Other results:

The mechanical response of a membrane is influenced not only by the surrounding substrate but also by the environment temperature.

Dissemination:

The research has resulted already in an MSc thesis and will lead to two PhD-theses, a project report, several publications in peer reviewed scientific journals, conference presentations, professional publications and an international workshop. Development of new characterization techniques may lead to IP or other technical developments that may help to startup new business ventures.