

Addressing society's various needs in the selection and use of key bridge components

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Abstract

Key bridge components – taken here to include bearings, expansion joints, dampers, shock transmission units, seismic isolators and structural health monitoring (SHM) systems, in particular – play a key role in addressing one of society's greatest needs: facilitating transportation where obstacles exist, by enabling bridges to function safely and efficiently. But society has further needs that must not be neglected in the selection and use of such components – most significantly in relation to their maintenance throughout their service lives and their replacement when this becomes necessary (from traffic disruption and environmental perspectives in particular), but also with respect to issues such as noise and comfort. This topic, and a number of examples indicating the wide range of possible solutions to the challenges presented, are discussed.

Keywords: Bridge maintenance; expansion joint; bearing; societal needs; traffic disruption.

1 Introduction

While it is widely recognised that bridges – and by extension the bridge construction and maintenance industry – have enormous value for society in general, it must also be recognised that the construction, maintenance and replacement of bridges also comes at a cost to society. Of course, the purely financial costs of such work on publicly owned bridges must generally be largely paid by taxpayers and users, but the further negative consequences of this work can be far more significant. In the case of key bridge components such as bearings and expansion joints, the potential negative impacts on society – for example, associated with disruption to traffic – depend to a large degree on the suitability and quality of the components selected for use and how they are used [1]. A poorly selected/used component will require more maintenance throughout its life and will need to be replaced much earlier than a more suitable solution. In the case of expansion joints,

for example, the resulting disruption to traffic can result in driver frustration, lost productivity, late deliveries and more accidents. The environmental impact of maintenance and replacement works can also be significant – including, for example, exhaust fumes from delayed or diverted traffic, noise, vehicle wear, and use (or perhaps wastage) of natural resources and energy.

Such negative impacts on society are not easy to quantify, and this paper does not seek to do so, but it may be readily accepted that the impacts are indeed significant and that they can be minimised by the use of high-quality, carefully selected and designed solutions, which can be relied on to achieve a long service life with minimal maintenance – and which can be renovated, or used to replace an existing component, with a minimum of impact on the bridge structure and on traffic. The potential for such benefits to society, resulting from the proper selection and use of key bridge components, are discussed below, with