



The role of key structural components such as bearings, expansion joints, dampers and STUs in addressing the challenges faced by railway bridges

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Abstract

In the field of bridge construction and maintenance, the demands on key structural components such as bearings, expansion joints, dampers and shock transmission units are typically considerably more demanding in the case of railway bridges than of road bridges. Loading from rail traffic is generally much higher, including not only vertical loads but also horizontal forces due to braking, acceleration and track curvature, and can give rise to stronger vibrations. Bearings must be designed to resist all such forces and accommodate required movements, expansion joints must be designed to prevent the ingress of ballast stones where appropriate or alternatively to allow railway/tram tracks to pass through at grade, and the need for dampers (shock absorbers) and shock transmission units (lock-up devices) to control the flow of forces through the structure is typically much greater. This subject is explored with examples of suitable technical solutions and of their application.

Keywords: Railway; bridge; movements; loads; control; bearings; expansion joints; dampers; STUs.

1 Introduction

While key structural components such as bearings, expansion joints, dampers and shock transmission units (STUs) can typically be used for both road and rail bridges, the needs of railway bridges with respect to such devices can differ substantially from those of road bridges. The loading conditions to which these devices will be subjected is typically much more demanding in the case of railway structures in terms of magnitude and vibrations,

and often the greater superstructure rotations that can arise due to the higher superimposed loads from trains. Indeed, the need for devices such as dampers and STUs is typically far greater in the case of railway bridges, considering the high forces that often require to be damped or transferred during acceleration and braking of trains. Examples of suitable technical solutions and their application are presented below.