



The Modern PU-Based Flexible Plug Expansion Joint for Bridges – The Ideal Solution For City Expressways With Recent Innovations Making Installation Even Faster and More Reliable than Before

Golden Shen, Dr. Pascal Savioz

mageba (Shanghai) Co., Ltd., Shanghai, China

Dominik Ortmann

mageba Gesellschaft m.b.H., Wels, Austria

Contact: psavioz@mageba-group.com

Abstract

The modern polyurethane-based flexible plug expansion joint is vastly superior to the traditional asphaltic-type flexible plug joint, as has been shown by extensive laboratory testing and years of experience under traffic on many bridges. The advantages offered by the PU-based version include its great strength and elasticity (with the material allowing 650% elongation before failure), its resistance to both very low and very high temperatures, and the special advantages it offers when used to replace old small-movement joints in existing structures. These advantages relating to installation on existing, heavily trafficked structures have now been enhanced by recent prefabrication innovations that make installation even quicker and easier, thereby further reducing the impact on traffic. The expansion joint type and these recent innovations are described, with reference to their first applications on some of Shanghai's busiest city expressways.

Keywords: expansion joint; polyurethane; flexible plug; fast installation; city applications.

1 Introduction

When a bridge's expansion joints require to be replaced – as they inevitably will, considering the constant loading and stresses/movements to which they are subjected from vehicle wheels and superstructure movements – the selection of the expansion joint solution that will be used to replace the existing joints is worthy of careful consideration. Of course, such a project comes at a significant direct financial cost (typically at least several times higher than the cost of supply and installation of the bridge's original expansion joints), and the indirect costs relating to traffic

disruption etc. can be even higher than the direct costs [1]. Such expansion joint replacement work can additionally have a negative impact on the bridge's structural integrity, where concrete, steel or waterproofing membrane also requires to be broken out and replaced.

Various expansion joint solutions have been developed to minimise the impacts on the bridge structure, and on traffic, by minimising the amount of the existing structure that needs to be removed and replaced [2]. Such solutions typically also reduce the direct financial costs of the project, and the environment impact, by reducing the materials,