



## Next-Generation Modular Expansion Joints for Bridges – “Smart” And Easily Replaceable in Order to Minimise Life-Cycle Costs

**Dr. Pascal Savioz, Golden Shen**

*Mageba (Shanghai) Co., Ltd., Shanghai, China*

**Dr. Simon Hoffmann**

*Mageba Group, Bulach, Switzerland*

**Contact:** [psavioz@mageba-group.com](mailto:psavioz@mageba-group.com)

### Abstract

This paper about bridge expansion joints of the modular type includes an introduction to the development of this type of expansion joint since its invention almost six decades ago. It also provides an insight into the current state-of-the-art technology in this field, including such innovations as the option of pre-equipping the joints with sensors for easy integration in a bridge’s automated monitoring system – thereby making the joints “smart” – and the option of designing the joints to be easily replaceable when the need arises – thereby minimising the associated costs and disruption to traffic. Considering the huge contribution of maintenance and replacement works to the life-cycle costs of a bridge’s expansion joints, the use of such options – combined with the design optimisations resulting from these decades of ongoing development work – enables the long-term costs associated with a bridge’s expansion joints to be greatly reduced.

**Keywords:** bridge; expansion joints; modular; installation, replacement; monitoring; life-cycle costs.

### 1 Introduction

The best modular expansion joints available today for use in bridge construction and maintenance bear little resemblance to the original that was invented in 1965, due to an ongoing process of development ever since. In fact, decades of experience with thousands of specimens on bridges all over the world have prompted continuous improvements.

Such improvements are often aimed at maximising long-term performance and minimising life-cycle costs – very importantly, including those associated with replacement at the end of the expansion joint’s service life – considering the increasing

awareness of these issues among bridge engineers. The current state of the inventor’s technology is described, with a focus on recent innovations such as the “smart” option of designing and pre-equipping the joints with sensors of all sorts, enabling them to be optimally integrated in a bridge’s SHM system to optimise inspection and maintenance work. Another innovation that is likely to be increasingly valued in the coming years is the “quick exchange” option of designing the joints to be easily replaceable when they reach the end of their service life.