Learning from incidents during bridge erection

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Abstract

Bridge building is a highly uncertain endeavour that entails considerable risk, as attested to by the succession of construction-related incidents and accidents recently reported in Spain and elsewhere. While efforts are being made to improve on-site safety, many issues are still outstanding, such as the establishment of reliability requirements for the ancillary systems used. The problems that must be dealt with in everyday practice, however, are more elementary and often attributable to human error. The overall organisation of the use of bridge construction equipment is in need of improvement. Close cooperation between the bridge engineers responsible for construction planning and ancillary element suppliers is imperative, for flawed interaction between building equipment and the bridge under construction may generate structural vulnerability. External quality assurance should likewise be mandatory.

Keywords: temporary structures, bridge construction, accident, risk, human error, construction equipment, auxiliary elements, structure-equipment interaction, quality assurance.

1. Introduction

One of the most prominent trends in modern bridge construction is the deployment of automated solutions to shorten construction times and lower the associated costs. The wide variety of ancillary elements used for this purpose is being continually upgraded, in parallel with construction techniques. Standardised elements, designed to be re-used after adaptation to the specific characteristics of each new structure, are often the facilities of choice. The use of increasingly sophisticated facilities and in particular their interaction with the bridge structure under construction entails considerable risk. Several task groups working under the aegis of international organisations are presently discussing ways to improve structural safety in connection with temporary structures and activities such as bridge construction. That notwithstanding, many issues, including the establishment of reliability requirements for the ancillary systems used in construction, are outstanding.

Many of the problems that must be dealt with in everyday practice are more elementary, however [1]. An analysis of a number of incidents and accidents occurring over a fairly short period of time in recent Spanish bridge construction history, for instance [2], shows that they are often related to human error, which, on closer analysis, can be traced back to flawed organisation. On many an occasion, the origin of such flaws lies in the singularities inherent in the auxiliary elements used in construction. The design and application of these elements are governed by certain conditioning factors that differ from the factors normally applicable to permanent structures. Consequently, they cannot be analysed or dimensioned to the rules in place for normal structures. Such rules need to be supplemented with information on the behaviour of the ancillary elements, which is usually available only to the supplier, since these systems are often patented.

This situation has significant adverse implications for daily practice. One is that a detailed analysis of bridge structure - ancillary equipment interaction is often neglected. Moreover, such

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