



World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium 2016,
WMCAUS 2016

Impact of Delays during Concreting of Reinforced High- Performance Concrete Beams

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Abstract

Increasing application of HPC commit to analysis its concreting process - the article raises the issue of impact of delays during concreting of reinforced high-performance concrete beams. It is difficult to cast the whole structure monolithically if the concrete elements are large size; there are some limitations to the availability of formwork, concrete workers or supply of the fresh concrete. In such cases, it becomes necessary to perform structure elements in two or more stages, which leads to formation joints - plane of weakness or discontinuity formed when a batch of concrete hardens before the next batch is placed. Correctly located and properly executed construction joints provide limits for successive concrete placements, without adversely affecting on structure. There is many available guidance as to the location and performance of joints in case of ordinary concretes – some special requirements for HPC have not been found. The main purpose of the research was detailed analysis of the Ultimate Limit State as well as Serviceability Limit State (deflection and cracks) on full-size HPC beams, with different positioning of joints. Both the network of cracks as well as deflection, shaped differently for beams made of HPC in relation to pattern made of ordinary concrete. The obtained results allowed to determine best technology of shaping joints in the beam elements made of HPC, providing obtain an element comparable to the beams which was cast the whole.

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Peer-review under responsibility of the organizing committee of WMCAUS 2016

Keywords: construction joints, high-performance concrete;

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1. Introduction

The current construction site is a very dynamic and volatile environment. There is often a need to adapt to unforeseen circumstances that are likely to occur during the construction works. Such challenges are an integral part of concrete works. Although it is usually recommended to construct members in one concrete work cycle, the contractor is often limited by:

- human resources, e.g. the lack of a sufficient number of concrete placer brigades,
- time limitations,
- technical limitation, such as: the amount of available formwork, the ability to supply an appropriate concrete mix, etc.

Therefore, a need often occurs to construct concrete members in two or more stages. While in the case of conventional concretes one can find numerous guidelines about where to locate and how to construct construction joints (fig. 1-2) [1,3,4,5,6,7,8], no such information is available for HPC concrete.

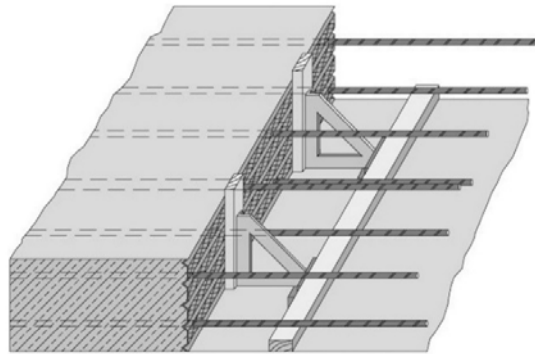


Fig. 1. Working joint using streckmax shuttering [9].

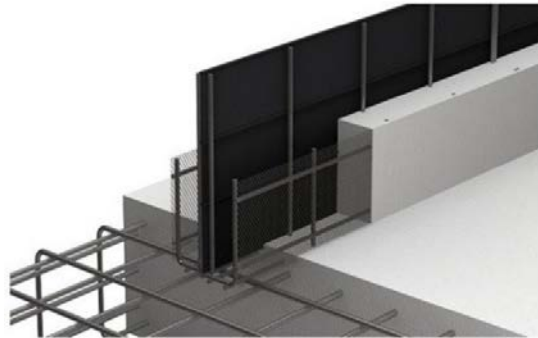


Fig. 2. Installation of the internal sealing tape together with construction of the foundation threshold [9].

The aim of this paper was therefore to determine the impact that construction joints have on the properties of HPC beam members. The work includes a detailed analysis of the ultimate limit and serviceability limit states (deflection and cracking) for the tested beams.

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