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The influence of automation and robotics on the performance construction

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Abstract

In the decades to come, building production will concentrate in the metropolitan centres of the world due to the migration of the world's population to the major cities.

An improvement of the construction process in densely populated inner cities will be the task of the future. This focuses on performance management, construction engineering and construction management. New developments being discussed in this field are new design strategies, human machine technologies, employee safety, progress monitoring, distributed production information and Personal Digital Assistants (PDAs).

Keywords: Value creation; Performance management; Construction engineering; Construction management; Automation; Metropolis

1. Introduction

1.1. The building industry tomorrow

Changes in building production are essential if the world of construction is to improve. The changes are also necessary because the next few decades will see an enormous migration into the cities. The forecast is that in 2015, 55% of the world's population will live in the urban areas (see Fig. 1). These metropolises (densely populated inner cities with their agglomeration) impose their own requirements on construction management and production systems.

The following developments occur in the Western European construction industry. In Germany, building production has fallen by 35% in 5 years; in the Netherlands, by 15% in 3 years. In other countries on the European continent, the construction industry is hesitant. In Britain, the innovation process 'Rethinking Construction' was the prelude to a change in the system. The development of the 'chip' and the 'chip industry' has completely changed society as a whole. The developments in construction in recent decades can also be attributed to these changes.

1.2. Changes in construction

The developments of the construction process are the result of a set of changing circumstances and

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	1995	2015
Global and total	45%	55%
Developing countries	39%	50%
Industrial countries	75%	80%

Urbanisation

Fig. 1. Quota of urban population.

conditions. These changes encourage developments of technologies to ensure the creation of a process that leads to improved performance for the client. These developments are based on an analysis of the Status Report issued in 2001 by the CIB Task Group TG27 'Human-Machine technologies for Construction Sites' [1] and of the Proceedings of the ISARC2003 Symposium: The Future Site [2].

In this analysis, automation in construction is addressed from the perspective of the performance of building projects serving the client and the environment.

– How can a connection between performance requirements and building production be established and improved through the use of automation in production?
– How can automation in construction engineering change the role of being a responsible partner in a changing world?
– How can construction management systems contribute to the improvement of production by automation?

When all building production is ultimately designed to lead to improved performance and a satisfied client, it is always difficult to keep sight of the overall picture and this final goal. Components develop and result in the required performance improvements. The overview in Fig. 2 shows the relationship between the various aspects of automation in construction. Construction management, construction engineering and performance management help the managers meet the needs of the client.

1.3. Examples of developments by automation

This paper looks at all three of the following aspects:

1. Performance management with a contribution about the development of new design ideas to meet client requirements in a different way.

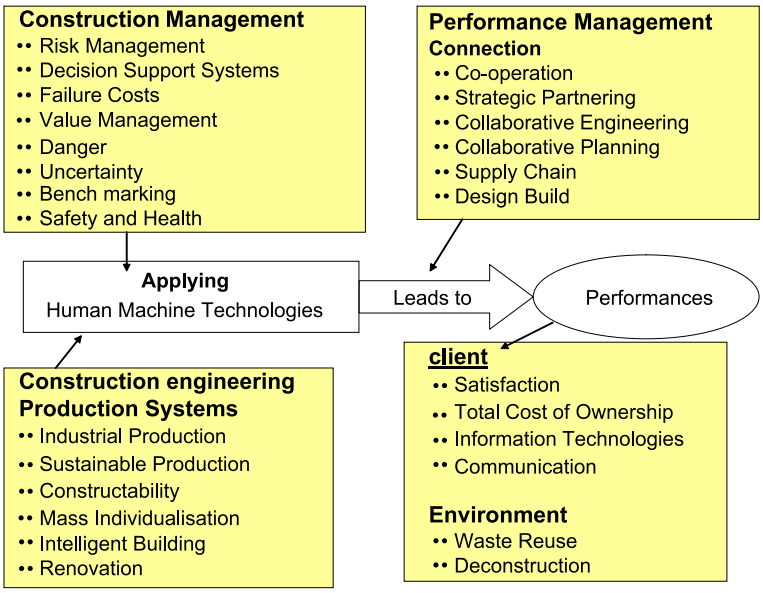

Fig. 2. Relationship between management, engineering and performance.