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Mobile Bricklaying Robot

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MOBILE BRICKLAYING ROBOT

THE NEED

Bricklaying is a highly repetitive and physically exhaustive task. For these reasons, it is logical to consider automatization for this process. Also, industrialized countries are confronting the problem of a lack of skilled workers. With the predicted building boom and the decreasing availability of a skilled workforce, the construction industry can profit from the automatization of the bricklaying process.

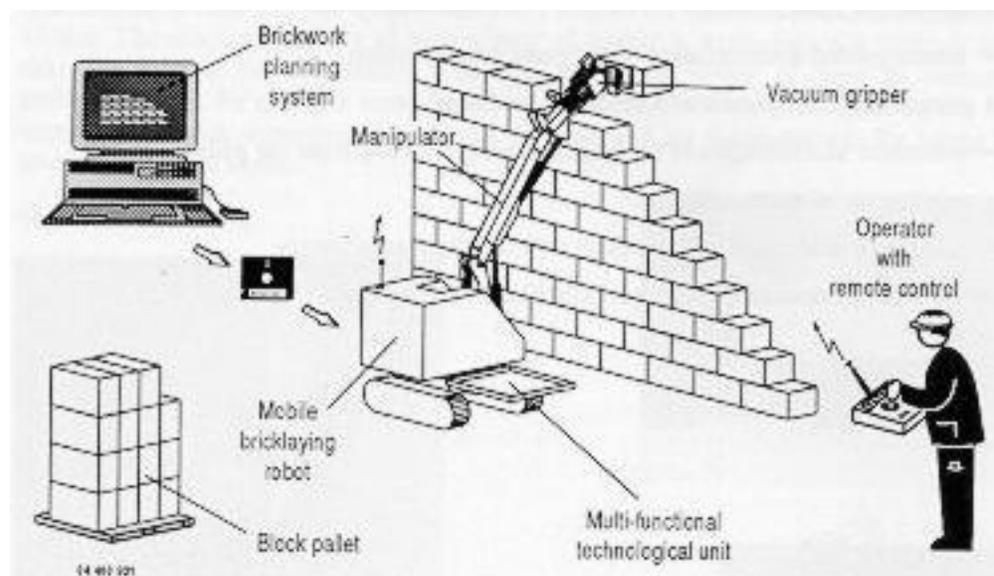


FIGURE 1 SCENARIO OF A MAN-MACHINE-SYSTEM FOR AUTOMATED BRICKLAYING ON THE JOB SITE

THE TECHNOLOGY

The tasks of the construction site bricklaying robot include removing bricks or blocks from prepared pallets, the application of bonding material and the erection of brickwork at a high level of accuracy and quality. Prototype realization of the bricklaying robot, which is based on a commercial construction machine, has been done by two research institutes in close cooperation with ten industrial partners.

The design of the robot is strongly influenced by technological aspects such as the types of bricks or blocks and the mortar technology used. Proper function of the robot requires:

1. handling different kinds and sizes of bricks and blocks,



2. detection of and compensation for material tolerances,
3. calibration of the brick or block position with respect to the TCP (Tool Center Point),
4. automated dispensing of bonding material,
5. robust, site-specific and cost-effective solutions.

To meet the above requirements, a number of solutions have been presented during the last few years but each of them covers only part of the requirements.

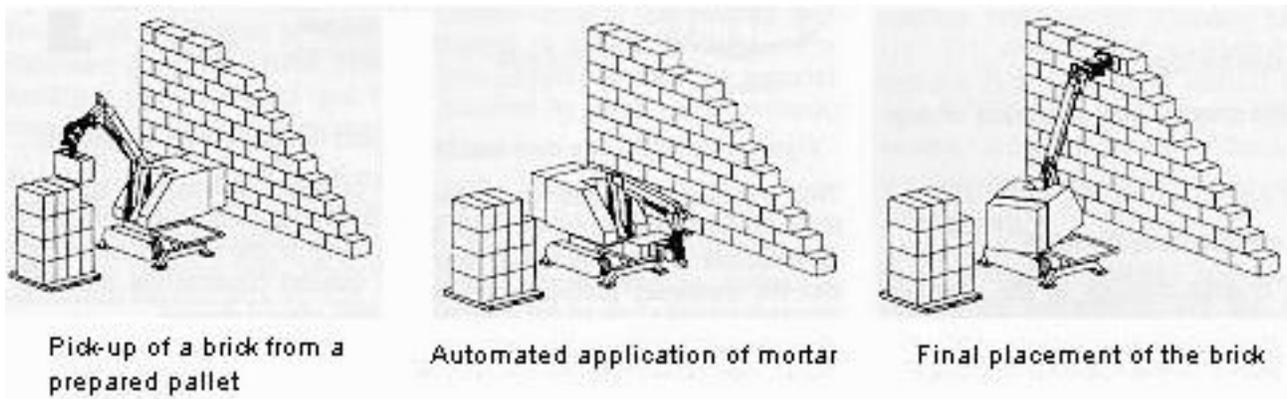


FIGURE 2 OPERATION SEQUENCE OF AUTOMATED BRICKLAYING

THE BENEFITS

The bricklaying robot could reduce costs, improve quality, and reduce need for skilled labor.

STATUS

The automatic application of thin-bed mortar using the dipping method has been verified by trials with an experimental robot. A standard industrial vacuum handling system, which has been slightly modified, turned out to cover all relevant types and formats of bricks and blocks.

A unit has been developed which integrates technological functions such as TCP calibration, measurement of the block tolerances and application of bonding material. Future research will include the integration of the described subsystems in the prototype of the bricklaying robot and extensive experimental investigation.

BARRIERS

As a prototypical technology, it is still under development and improvement. In most of the countries around the world the implementation of this robot would be more expensive than to hire labor. This is a technology that is responding to a need of the German construction market.



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REVIEWERS

Peer reviewed as an emerging construction technology

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