First cable-driven robot that prints large-sized components in 3-D

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The developed robot working. Credit: Elhuyar Fundazioa

Together with the Institute for Advanced Architecture of Catalonia (IAAC), Tecnalia has developed the first cable-driven robot that allows large parts and even small buildings to be created in situ. The innovative technology includes the latest advances in the field of robotics, digital

manufacturing and 3-D printing.

This new cable-driven robot, known as Cogiro, makes it possible to produce customised parts and also to obtain information in real time about the status of a construction. Among other improvements, it is possible to perfect the foundations using thermal data on the drying status of the structure, thus avoid superimposing layers of material on bases that are still fresh and unstable.

The innovative system is based on a 15 x 11 x 6 m robot that has a built-in 3-D printing machine with a work area of 13.6 x 9.4 x 3.3 m. It contains an extruder for clay material and will shortly have one for cement-based material available, as well. The robot is capable of accessing large work areas, and its rigidity ensures the precision of the resulting construction through the control of three displacements and three turns.

Offering straightforward installation and low maintenance costs, cable-driven robotics can be applied in other construction work, such as the assembly and automatic maintenance of curtain walls. And in the logistics, aeronautical, renewable energies, shipbuilding and nuclear sectors, it can handle and automatically assemble large and small parts as well as automate processes such as painting, inspection and monitoring. The possibility of printing any part that has been modelled via computer beforehand constitutes a real change in the way production is conceived and also in the capabilities for customising the final product.

The prototype of the cable-based robot is located on the TECNALIA premises in Montpellier (France) and is due to be presented at the BBConstrumat fair this coming May.

Provided by Elhuyar Fundazioa