A SYSTEM FOR CONNECTING BEAMS & COLUMNS IN PRECAST CONCRETE STRUCTURES

Applications
The hybrid system allows the structures to be rapidly constructed compared to the conventional construction method.

Advantages
- Enhanced the capacity of the joint system to resist moments and shear between the precast frame members.
- Economical, easy and fast to fabricate and assemble, especially the steel components of the beam-to-column connection
- The new connection system can be used for all joints in a building
- Possible to replace the damaged beams easily dismantle the colt connections within the joints
- Can be used in steel and composite construction

Intellectual Property
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- Patent status: Patent Filed in 2018
- Patent Title: A system for connecting beams & columns in present concrete structures

Problem
A new connection system for connecting precast concrete members such as beam-to-column, column-to-foundation, beam-to-beam and column-to-column is proposed. The invention is a hybrid connection system using steel and concrete, where the beam is connected to the connection through protruding steel plate embedded in reinforced concrete beam. The hybrid system allows the structures to be rapidly constructed compared to the conventional construction method. From a series of full-scale testing of exterior beam-to-column connections, it was found that the proposed hybrid connection system has performed better than the conventional monolithic connection under cyclic and static loads. Also, an improvement was achieved in the performance of the connection in terms of load-displacement behaviour, connection strength, plastic hinge, ductility, energy dissipation and failure modes. In conclusion, this innovative connection system is suitable to be used in the precast concrete systems.

Our Solution & Technology
Precast reinforced concrete system is one of the Industrialised Building Systems (IBS), which allow for various building components to be prefabricated prior to the construction. This allows structures to be rapidly constructed compared to the conventional construction methods using reinforced concrete structures. It is vital that the components to be used in this system is easily prefabricated and require simple assembly process to ensure shorter duration for construction completion, thereby saving cost. This is possible by minimising cast-in-place concrete volume and excluding pre-stressing, welding and formwork requirements. The precast frame system using the proposed hybrid connection system has sufficient strength to withstand structural and seismic loads. Accordingly, it offers an improvement for connection strength to be at least similar to the performance of the conventional monolithic connection system.