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4 DAY CYCLE FOR CONSTRUCTION OF SEMI PRECAST MULTI-STOREY BUILDINGS

This invention relates to an improved method of construction of multi-storey buildings using the semi precast method of construction. The semi-precast method of construction is disclosed in patent application number GB9626126.8, filed on 17th December 1996.

The present method of construction is particularly applicable to the construction of 2 or more multi storey buildings in high density areas where space is limited.

It is an advantage of the present method of construction that there is a significant reduction in the time taken to complete erection of the superstructure of the building, which in turn results in not only overall costs savings, but also earlier completion and occupation of the building. It is a further advantage of the present invention that there is a reduction in the number of workers required for the construction.

The speed of construction of a multi-storey building is determined by several factors. The most significant of these factors is the availability of materials for use in the construction and the availability of the tower crane to move concrete and materials from ground level to the working floor. The number of tower cranes that can be deployed on site is determined by the number of buildings being constructed at the site and by the radius of the crane.

A considerable amount of the tower crane's time is taken up transporting concrete from ground level to the working floor. Concrete is transported in



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traditional concrete buckets. As the concrete bucket can only hold a certain volume of concrete, a very large number of trips are necessary to transport the volume of concrete required for the work to be carried out. Thus other material can only be transported to the working floor when the crane is not transporting concrete.

In the construction of a typical multi-storey building for example the work schedule of the tower crane rotates between moving materials to the different wings of the building and moving concrete for the construction of the walls and floors of each wing. This requires careful planning to ensure maximal deployment of tower crane during the working day.

With the semi precast method of construction it can take up to 6 days for the completion of a typical floor. Using this method of construction the precast facade is erected first. The facade is lifted into place by a crane and once the facade is in place wall reinforcements are fixed. After the wall reinforcements have been fixed wall forms are erected around the wall reinforcements for the structural cross walls. Once this has been completed concrete is poured to create the structural cross walls. The wall forms are then removed once the structural walls are cast. Precast floor slabs are then lifted and placed on top of the cross walls and floor slab reinforcements are then fixed. The final step of the process is to concrete the floor slab. These steps are repeated for all wings of the floor in accordance with a carefully defined work schedule. A typical construction schedule for the 6 day cycle can be seen in Table 1.

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In general terms the construction cycle for each wing is as follows:

Day 1: placing the precast facade and fixing the wall reinforcement.

Day 2: placing and fixing the wall form for the structural cross walls.

Day 3: concreting the cross walls.

Day 4: stripping wall forms and placing pre cast floor slabs.

Day 5: fixing timber slabs and floor slab reinforcements.

Day 6: concreting the floor slabs.

Thus with the normal 6 day cycle a total of 2 working days are taken up in the construction of each floor with concreting work and thus during this period the tower crane is not available to transport any other material to the working floor. As a result of this some workers at the site are idle.

The present invention relates to a method of construction of multi-storey buildings using the semi precast method of construction wherein the construction of each floor can be completed in 4 working days and wherein the tower crane is only employed to move materials, but not concrete needed in the construction of the walls and floors, to the working floor.

With the present invention the construction of a typical floor can be completed in 4 working days. This is achieved by eliminating the need to

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transport concrete to the working floor by the tower crane. Instead concrete is pumped to the working floor by a high pressure concrete pump from the concrete mixing device, situate at the ground level to the working floor. All operations for the completion of a wing are carried out in one day across the different wings of the building, thus minimizing the time workers are idle.

The concrete pump is connected to the outlet of a concrete mixing device to receive ready mixed concrete and the outlet of the concrete pump is attached to a suitable pipe to enable concrete delivered from the concrete mixing device to be pumped to the working floor.

This then free's the tower crane to transport other material to the working floor.

At the working floor it is necessary to erect a hydraulic jib to enable concrete to be placed for both floor slabs and the structural cross walls. The hydraulic jib is itself placed on a portable steel column fitting which is supported over several floors and can be relocated upwards in accordance with the progress of the construction.

In order to use the concrete pump it is necessary to modify the concrete slump from the standard 75mm to 100mm by introducing a higher cement content into the concrete mix. The concrete thus maintains its strength but is easier to pump to the working floor.

Using this present method of construction the precast facade is lifted into place by a crane. Once the facade is in place wall reinforcements are fixed

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and the wall forms are erected around the wall reinforcements for the structural cross walls. Once this has been completed concrete is poured to create the structural cross walls. This can all be achieved in one day as the tower crane is available to transport material to the working floor and the concrete needed is pumped to the floor by the concrete pump.

After the structural cross walls are cast the wall forms are removed and the precast floor slabs are laid on the cross walls. This can be achieved during the second day of the construction cycle. Floor slab reinforcements are then laid for the floor and the floor slabs can be concreted on the final day.

The cycle is repeated for each wing of the floor and the entire floor can be completed in 4 days. These steps are repeated for all wings of the floor in accordance with a carefully defined work schedule. A typical construction schedule for the 4 day cycle can be seen in Table 2.

The operation of the 4 day cycle construction plan can be illustrated by the following timetable:

Day 1: place and fix precast facade, fix wall forms and concrete the walls.

Day 2: strip wall forms and place precast slabs and fix timber slabs.

Day 3: fix slab reinforcements.

Day 4: concrete floor slabs.

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The actual sequence of construction of the 4 day cycle can be varied without any impact on the overall time to complete each floor. Thus for example it is possible for the different wings to reach different heights e.g wing A is completed to floor 10, while wing B is still at floor 8 and wings C & D are at floor 7.

In the 4 day cycle it is vital to ensure a constant supply of concrete.

Traditionally concrete has been transported to the site by concrete mixing trucks from remote concrete batching plants. The problem with this method is that there are often delays in getting the concrete to the construction site, especially in built up areas, which in turn results in delays in the construction.

This problem is overcome by using a mobile batching plant of the type disclosed in patent application number GB 9622397.9, filed on 28th October 1996.

An onsite batching plant ensures adequate supplies of concrete are available when needed. The concrete produced by the batching plant is poured directly into the high pressure pump and is pumped by the high pressure concrete pump directly to the working floor.

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TABLE 1

Description \ Day	1	2	3	4	5	6
Fix Wall Reinforcement	////////					
Concealed Conduit	////////				////////	
Place Wall Form						
Concrete Wall			■			
Strip Wall Form						
Place Precast Slab				■		
Fix Timber Slab Form				////////		
Fix Slab Reinforcement					————	
Concrete Slab						■
Place Precast Facade						



TABLE 2

Description \ Day	1	2	3	4
Fix Wall Reinforcement				
Place Precast Facade				
Concealed Conduit				
Place Wall Form				
Concrete Wall				
Strip Wall Form				
Place Precast Slab				
Fix Aluminium Slab Form				
Fix Slab Reinforcement				
Concrete Slab				

CLAIMS

1. A method of construction of multi-storey buildings using the semi precast method of construction wherein the construction of each floor can be completed in 4 working days and wherein a tower crane is only employed to move materials, but not concrete needed in the construction of walls and floors, to a working floor.
2. A method of construction as claimed above wherein the construction of a wing is carried out in 4 operations and wherein one operation is the placement and fixing of a precast facade and fixing of wall forms and concreting of the walls and wherein another operation is to strip the wall forms and place precast slabs and fix timber slabs and wherein another operation is to fix slab reinforcements and wherein another operation is to concrete floor and wherein all 4 operations can be carried out in one day across the different wings of the building such that all wings on one floor are completed in 4 days.
3. A method of construction as claimed in claim 2 above wherein the concrete required in the construction of the walls and the floor is delivered to the working floor by means of a high pressure pump via a suitable pipe means and wherein one end of the said pipe means is connected to a concrete mixing device to receive concrete and the other end of the said pipe means is connected to a hydraulic jib to facilitate the placement of concrete throughout the working floor and wherein the hydraulic jib is mounted on a detachable and portable column to facilitate the placement of the hydraulic jib on the working floor and relocation from the

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working floor.

4. A method of construction as claimed in claim 3 above wherein the concrete for use in the construction of the walls and the floors of the building is prepared on site by means of a batching plant and wherein concrete from the batching plant is poured directly into the said high pressure pump such that concrete from the batching plant can be pumped to the working floor.