
The Role of Concrete in the Material World

"More concrete is used than any other man-made material in the world.[1] As of 2006, about 7 cubic kilometers of concrete are made each year—more than one cubic meter for every person on Earth.[2] " this briefly shows how concrete greatly affects our lives since it was invented. Concrete is one of the most commonly used construction material in building a different variation of infrastructures. It is composed of the following: cement which is commonly Portland cement, water, aggregates (which is composed of fine and coarse aggregates) and having the usage of admixtures which are added to the mixture immediately before or during the mixing of concrete. Hence, development of new materials in concrete has been widespread and thus, gains a new source of innovation wherein its performance is has a massive effect. The development of these new concrete types improved versions to have an emphasis on the durability, workability, mechanical properties and also the reliability of the concrete structures to be built. Hence, a new development from the new materials means new methods in the process which can be economical and beneficial. There are various types of new methods in concrete, one of which is that it allows building monolithic walls and slabs in one operation on a daily cycle, which is a formwork system called Tunnel Form.

Tunnel Form is an advanced method of construction wherein it is suitable for building apartment blocks, hotels, prisons, commercial developments and condominiums and other typical buildings that are being built with a high degree of repetition. It is a process that usages steel and concrete forms in order to make a shell composed of a series of structural tunnels. It is an operation to cast slabs and walls in one operation in a daily cycle, thus, when the process begins, the flow should be consistent with forms of rotating every 24 hours. Walls and decks are placed each day which also has the framing and plumbing, wherein in just 3 days, can work on the newly formed tunnel bays which then can be removed after it formed. In this method, to make an inverted U-shape floor, wall and ceiling forms to cast a single unit, L-shaped units are locked together to be one.

Other construction in the interior part, the reinforcements are fixed, the doorways and corridors are boxed out, and for lighting which is conduits are installed and such. The casting of concrete is the next step, the strength gain of the concrete due to the raised temperature that accelerates; the forms can be stripped and repositioned the next day. Then the forms are steel-faced that results that can decorate the resulting cast surfaces. To obtain this kind of method, elaborated stages, processes are given in order to have a systematize result. According to theconstructor.org, that validates this stages to the following: The Tunnel formwork forms an "L" shaped that are bolted together at the top to form a tunnel. The steel used in the formwork is reused up to 600 times that it can produce a different variety of sizes, which makes the is

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method economical. A rotation of 24-hour of its construction cycle to be achieved. In the reality, the tunnel form will appear like this when the two halves are bolted together: “

The Casting Process of Tunnel Formwork:

- Stage 1: Prefabricated Wall reinforcement is placed by crane along the entire wing prior to casting the kickers (used to position wall formwork).
- Stage 2: Two and a half tunnel is craned into place, bolted together and ties are added.
- Stage 3: The wall concrete is poured.
- Stage 4: The slab reinforcements are fixed
- Stage 5: The slab concrete is placed. The formwork system provides for a pour to be wrapped in tarpaulins and for the use of butane heaters to maintain a sufficiently high temperature for the concrete to reach its striking strength overnight.
- Stage 6: The tunnel-forms are removed the next day.
- Stage 7: The process is repeated for the next two bays”.

Moreover, this new method provides a solution to the problem of sound transmission of the infrastructures that shreds a sound reduction of 50 decibels. Also, it is an earthquake resistance and a systematize solution and fire resistance. In this new method cuts out various costs in building an infrastructures which are the following: it saves construction time up to 25% over the traditional method of construction; it reduced the cost of the frame of the abovementioned benefitted buildings, typically hotels, condominiums and such, by about 15%; for the low-rise construction, 45% savings in construction time due to brick or block. The tunnel form can produce durable in-situ cellular structures and finishes a good quality.

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