

DESIGN OF FORMWORK

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ABSTRACT- Formwork is an essential part of concrete construction. It is to give FORM to green concrete as per the structural and architectural requirements. For concrete construction at higher elevations, formwork supporting structure called centering (scaffolding) is necessary. Both can be called as enabling facilities to create permanent Members of a Structure. Design of formwork is the theme of this presentation and the same only will be dealt with hereafter. For small and medium size works, provision of formwork is left to the carpenter's contractors hitherto experience at site. Naturally this method is more by experimentation rather than proper structural design. For safe, Even if formwork is only intended to be used temporarily, it is crucial to design it as a structural part to ensure its affordability and soundness. The most crucial step is the assessment of the correct weight s from the point of pouring green concrete to the point at which the concrete member gains selfsupporting strength. Secondary consequences of the aforementioned loads must be properly taken into account and planned for in the design.

Index Terms- Formwork system, Conventional Formwork system, Cost, Quality, Duration, Speed of construction etc.

I. INTRODUCTION

Formwork in construction is the use of support structures and moulds to create structures out of concrete which is poured into the moulds. Formwork can be made using moulds out of steel, wood, aluminium and/or prefabricated forms. Formwork is an ancillary construction, used as a mould for a structure. Into this mould, fresh concrete is placed only to harden subsequently. The construction of formwork takes time and involves expenditure up to 20 to 25% of the cost of the structure or even more. The operation of removing the formwork is known as stripping. Stripped formwork can be reused. Reusable forms are known as panel forms and non-reusable are called stationary forms. Formwork is designed according to The ACI document SP- 4

1.1 Requirements of formwork:

- Strong enough to withstand all types of dead and live loads.
- Rigidly constructed and efficiently propped and braced both horizontally and vertically, so as to retain its shape - The joints in the formwork should be tight against leakage of cement grout.
- Construction of formwork should permit removal of various parts in desired sequences without damage to the concrete Material of the formwork should be cheap, easily available and should be suitable for Reuse.

- The formwork should be set accurately to the desired line and levels should have plane surface.
- As light as possible Material of the formwork should not warp or get distorted when exposed to the elements. Should rest on firm base.
- The following points are to be kept in view to effect economy in the cost of formwork.
- The plan of the building should imply minimum number of variations in the size of rooms, floor area etc. so as to permit reuse of the formwork repeatedly.

1.2 Scope of project

Improving productivity, increasing output for the same inputs, has been a longstanding concern of the Construction Industry. Objective of this project is to identify the build ability factors affecting labour productivity in formwork by collecting the data at both macro and micro level

1.3 Classification of Formwork

Conventional: The formwork is built on site out of timber and plywood or moisture resistant particleboard. It is easy to produce but time-consuming for larger structures, and the plywood facing has a relatively short lifespan. It is still used extensively where the labour costs are lower than the costs for procuring reusable formwork. It is also the most flexible type of formwork

II. METHODOLOGY

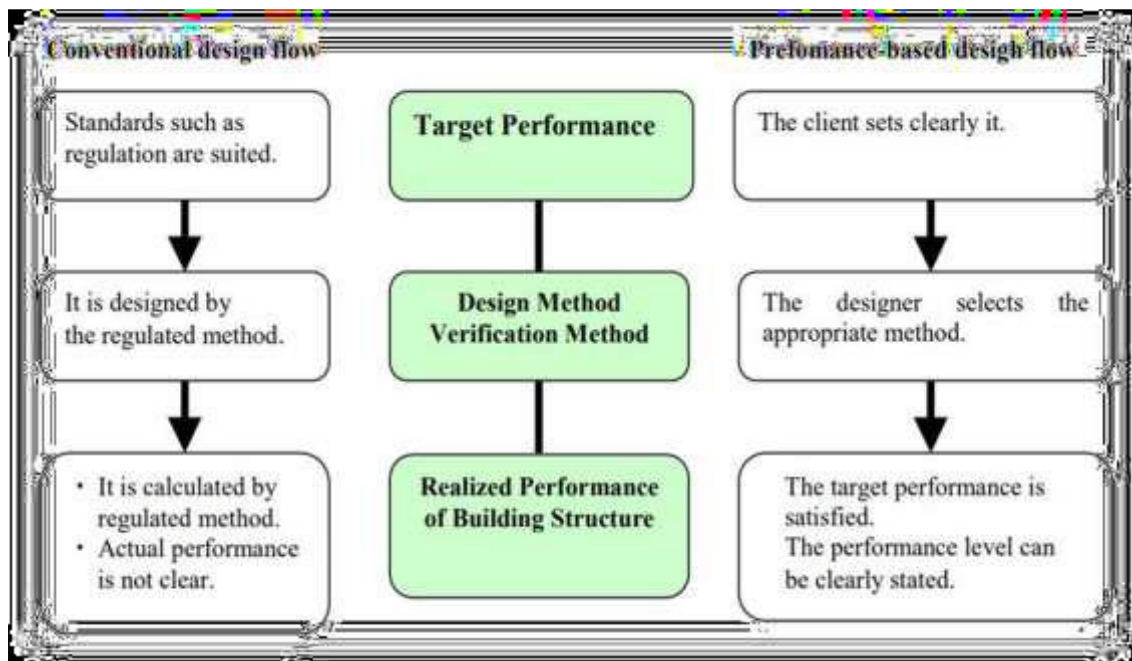


Fig 1.- The comparison between conventional process and new process of building structural design

2.1 Loads and Pressures on Formwork

The possible loads acting on formwork are many. Vertical loads are usually associated with the dead load of the placed concrete and formwork and the live load of workers and their equipment. Internal pressures on vertical formwork result from the liquid or semi-liquid behaviour of the fresh concrete. External forces such as wind exert horizontal loads on the forms, requiring bracing systems for lateral form stability.

2.2 Materials Used

Formwork is mainly of two types

- Wooden formwork
- Steel formwork

2.2.1 Wooden formwork:

Most common material used for bracing the member, hence called as the traditional formwork. Can easily be cut to size on site, Joist are replaced with engineered wood beams and supports are replaced with metal props. This makes this method more systematic and reusable various sizes of members of timber

Sheeting for slabs, beam, column side and beam bottom	25 mm to 40mm thick
Joints, ledges	50 x 70 mm to 50 x 150 mm
Posts	75 100mm to 100 x 100 mm

1 Plywood

This is by far the most common material used for the facing panel. It is easily cut to shape on site, and if handled and stored carefully, it can be used many times. A standard plywood thickness on site is 18mm. This is usually sufficient for most pours. However, if the formwork is curved, thinner plywood is used to facilitate bending. Thicker plywood may be used when the weight of concrete causes standard thickness plywood to bow out, distorting the concrete face.

2 Steel formwork

Steel forms are stronger, durable and have longer life than timber formwork and their reuses are more in number. Steel forms can be installed and dismantled with greater ease and speed. The quality of exposed concrete surface by using steel forms is good and such surfaces need no further treatment. Steel formwork does not absorb moisture from concrete. Steel formwork does not shrink or warp.

3 Aluminium formwork

Often used in pre-fabricated formwork, that is put together on site. Aluminium is strong and light, and consequently fewer supports and ties are required. The lighter sections will deflect more, but this can be avoided by simply following the manufacturer's recommendations.



Fig.2- Aluminium formwork

III. RESULT

A firefighting robot called QRob has been created to locate and put out fires. QRob has the capacity to locate a target utilising an ultrasonic and flame sensor. While the ultrasonic sensor is working to detect the presence of objects near the QRob, the flame sensor is detecting the location of the fire. The Arduino Uno, which managed the movement of the DC motor, connected to both sensors. The DC motor will come to a complete halt 40 cm from the fire when the flame sensor detects it. From a distance, the operator will use a remote control to put out the fire. The QRob can also be watched over by the operator via a smartphone-connected camera.

IV. CONCLUSIONS

Based on a review of the literature and references to relevant publications, can be said that the design of the formwork demonstrates our superior understanding of timber formwork compared to other types of formwork. The Conventional formwork can be used for 8 to 9 times whereas present formwork can be used more than 250 to 300 times as compared to conventional formwork.

Thus it can be summarized that formwork system can be economical for projects of repetitive and massive in nature or else conventional formwork system would be economical

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