

INTRODUCTION OF ABS PLASTIC FORMWORK AS AN ALTERNATIVE OPTION TO TRADITIONAL FORMWORK SYSTEM

Rahul Shinde¹, Tanay Kulkarni², Niranjan Mahamuni³, Abhishek Mhetre⁴, Rohit Mehendale⁵,
Rohit More⁶

¹Assistant Professor, Department of Civil, RMD Sinhgad School of Engineering, Maharashtra, India.

²Student, Department of Civil, RMD Sinhgad School of Engineering, Maharashtra, India.

³Student, Department of Civil, RMD Sinhgad School of Engineering, Maharashtra, India.

⁴Student, Department of Civil, RMD Sinhgad School of Engineering, Maharashtra, India.

⁵Student, Department of Civil, RMD Sinhgad School of Engineering, Maharashtra, India.

⁶Student, Department of Civil, RMD Sinhgad School of Engineering, Maharashtra, India.

Abstract

In this paper, we are introducing an ABS plastic formwork system and talking about all the aspects of ABS plastic formwork. The large amount of deforestation has occurred in recent past causing environmental imbalance to our ecosystem. As a preventive measure to stop deforestation we should find alternative to wood formwork. In this point of view 'ABS PLASTIC FORMWORK' is only possible solution to this problem as it is recyclable, reusable and eco-friendly alternative. That's why we are introducing the plastic formwork to replace the traditional formwork. ABS Plastic formwork is a new innovation in formwork industry, it is famous for its light weight, speedy construction and accuracy in work. Today almost over 350000 sq m of formwork is being used for construction purpose all over the world. In our country ABS plastic formwork has been used on many construction projects and it has been proved to be economical. ABS plastic formwork has been widely used in gulf countries, Europe, Asia as well as all other parts of the world. This technology is mostly suitable for huge housing projects to be completed in short period of time, where columns, beams, slab sizes are standard. This technology gives more accurate results and good quality of construction in optimum cost and minimum time.

Keywords: ABS Plastic formwork, Recyclable Material, Sustainable Material, Temperature Tolerance.

1 INTRODUCTION TO FORMWORK

Formwork is a support structure in which concrete is poured. There are many types of formwork systems used in construction industry. The selection of type of formwork mainly depends on requirements of particular project. Traditionally formwork systems are made up of wood and steel, now a day's aluminium and is also used as a formwork material. Once the concrete is poured in formwork, it is allowed to settle and then formwork is dismantled.

For many years reinforced concrete construction is predominantly followed in India, thus the formwork plays a vital role in construction industry. The most commonly used type of formwork systems are the conventional system made up of lumber, and formed at site during construction as known as built-in formwork. Currently even for construction of wide variety of structures from small to large size projects the conventional formwork is used. The main objectives of formwork systems are quality, safety and economy. The conventional formwork systems could account only for an economical aspect of construction.



Fig no. 1

Fig. no. 2

Today, with rapidly growing construction industry the needs of industry are also changing. The project should be completed in estimated time, with good quality of construction as well as with utmost safety precautions during the construction phase. As all these needs cannot be fully filled by conventional formwork system. An alternative formwork system like ABS plastic formwork system can be a plausible effective solution to conventional formwork system.

The two major advantages of plastic formwork are

1. speedy construction
2. maximum number of reuses

Though the plastic formwork system has lot of advantages over conventional formwork their usage in the indian construction is very minimum.

2. PLASTIC FORMWORK

The panels of plastic formwork are made up of ABS (Acrylonitrile Butadiene Styrene).The panel of this formwork has thickness 80mm. These panels fits perfectly to each other.for the purpose of interlocking the panels, nylon handles are used and this is only locking assembly for this system. While for construction of slab and beams, panels are inter connected in same manner and supported by regular props which are used in construction industry.

As the formwork material is made up of ABS plastic, they are light in weight but still possesses high load bearing capacity. As the material is light in weight, handling and on site transportation process becomes much easier. Hence, there is no need of heavy lifting equipments. The panels are in fixed sizes and when connected adjacently, they are exactly in plumb and when connected perpendicularly then they make exactly 90 degree angle giving exact dimensions of required column sizes. Hence, skilled labour is not required. Therefore work can be done with unskilled labour only.

The panels are available in different sizes, that are 1200mm*600mm, 400mm*600mm, 350mm*600mm, 300mm*600mm, 250mm*600mm, 200mm*600mm. Adjustable panel are also available. With the help of adjustable panel different sizes of column can be achieved. All these panels are made with high accuracy which provides ease in construction work.



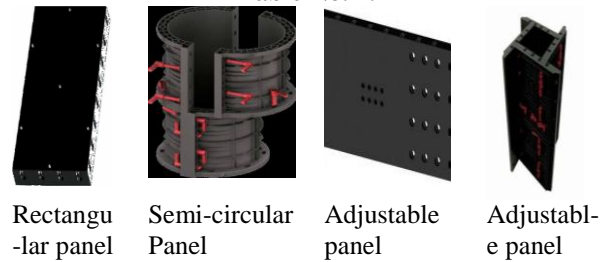
Fig no. 3

Fig no. 4

2.1 Components of Plastic Formwork

The basic element of the formwork is the panel , which is made up of ABS . These panels have various shapes and sizes , sizes of these panels are fixed . Rectangular shaped and semi-circular shaped panels with different dimensions and different diameters are available .Load carrying capacity of these panels is 72Kn/m² .For locking purpose Handles are used , these are Nylon handles. Average tensile strength (rupture) of each handle is 1178.2 kg.

Table No. 1.

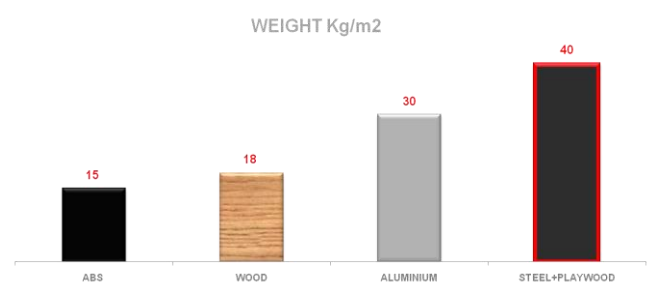


3. FEATURES AND LIMITATIONS

Features :

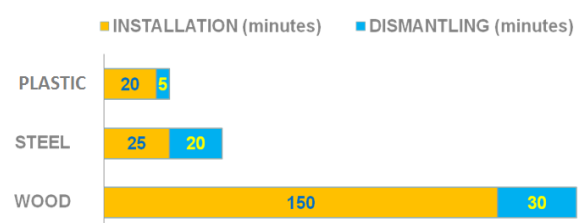
1. The System is extremely light in weight as compared to wood and steel formwork system which requires heavy lifting equipments.
2. Fast construction is achieved, and mainly suitable for large construction projects .
3. Locking system is very easy having nylon handles that lock with simple 90degree turn.
4. System components are durable and can be used several times without sacrificing the quality or correctness of dimensions and surface.
5. Installation and dismantling is very easy and fast saving much more time.
6. System is extremely flexible as more number of combinations are possible.
7. Concrete does not stick to plastic which makes dismantling easy and less timing consuming.
8. System has extreme temperature tolerance of -30°C to 70°C.
9. System is fungus and termite resistance unlike traditional formworks hence improving life of formwork.
10. Cleaning is extremely easy. Just water is enough no requirement of any oil or lubricant.

Table No. 2.



- Light but mechanically resistant(72 kn/m²)
- Fast to install and dismantling :

Table No. 3.



Limitations:

1. Initial investment is high.
2. Scrap value is almost zero.
3. Due to fixed panel sizes it is not suitable for every construction work.

3.1 FEATURES COMPARISON**Table No. 4.**

	Wood	Metal	Plastic
Modularity	Non-Modular	Modular	Modular & Compatible With System
Weight	Fairly Light	Heavy	Light
Plumbing	Long, Result Not Perfect	Fast, Requires Specific Props	Fast, Does Not Require Any Props
Concrete Finish	Irregular Surface	Smooth Surface	Smooth Surface
Storage	Dry Environment		No Special Storage
Number of Uses	Low	Moderate	High
Adherence To Concrete	Yes		No

4. CONCLUSION

In traditional formwork system mainly wood and steel are being used as a material for formwork system. In wooden formwork system, time delay and less accuracy are main constrained. Installation and dismantling period is very high in wooden system. In steel formwork system accuracy is in work can be achieved but due to its heavy weight it requires crane for lifting purpose as a result it proves to be time consuming. Also the repetitions for wood and steel formwork have 10 and 60 repetitions respectively, while ABS plastic can be used over 100 times. Due to its light weight ABS plastic formwork is easy to handle and easy to transport on site, which increases labour productivity.

As deforestation is a major issue worldwide, these days use of ABS plastic as an alternative material for formwork purpose might be a possible solution against deforestation.

Thus it can be concluded that the ABS plastic formwork technology is economical when used on large projects. It increases the speed of construction. It enhances labour productivity. Repetitions are much more than traditional formwork techniques giving more than 100 repetitions and also an ecofriendly alternative to wooden formwork system as it is recyclable.

REFERENCES

- [1]. Formwork method selection model based on boosted decision trees in tall building construction. Yoonseok Shin, Taehoon Kim, Hunhee Cho. Automation in Construction, Vol. 23, 01.05.2012.
- [2]. Constructability Assessment of Climbing Formwork Systems Using Building Information Modelling. Ramesh Kannan. M, Helen Santhi. M. International Conference On DESIGN AND MANUFACTURING, IConDM 2013
- [3]. Sparkonix(India) Pvt. Ltd., Pune. - www.sparkonix.com
- [4]. Geoplast S.p.A.- www.geoplast.it

BIOGRAPHIES

Asst. Prof. Rahul D. Shinde, Department of Civil Engineering, RMD Sinhgad School of Engineering, Warje, Pune 58. is M. Tech. (Construction and Management from COEP), Has 4 years of experience in Construction Industry and 7 Years of Teaching Experience.



Final year student, department of civil, RMD Sinhgad School of Engineering, Warje, Pune 58



Final year student, department of civil, RMD Sinhgad School of Engineering, Warje, Pune 58



Final year student, department of civil, RMD Sinhgad School of Engineering, Warje, Pune 5



Final year student, department of civil, RMD Sinhgad School of Engineering, Warje, Pune 58



Final year student, department of civil, RMD Sinhgad School of Engineering, Warje, Pune 58