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Recycled Aluminum Formwork in Column Construction: A Sustainable Game Changer for the Industry

Mohammed Al-Qahtani[1]; Khalid H. Alwayli[2]

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Abstract: As the construction industry is evolving rapidly, it needs faster, safer, sustainable, and more efficient building solutions. One of the biggest innovation ideas is the use of recycled aluminum formwork for casting reinforced concrete columns and other structural foundations. This solution is the best alternative to the traditional wooden formwork since it provides precision, strength, and cost-effectiveness. This paper explores how the recycled aluminum formwork is transforming column construction and why it's becoming the best option for many construction companies.

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I. INTRODUCTION

Erecting a temporary formwork to hold the wet concrete in place until it sets is critical activity in concrete construction and consumes a significant time of projects schedule. Traditionally, wood is the used material for formwork, but it comes with some limitations such as deformation, exposure to moisture, and limited reusability. Hence, the industry has to overcome these limitations with more sustainable solution as construction industry is growing fast.

Recycled aluminum formwork is one of the most efficient solutions due to its lightweight, strength, and reusability, which makes it the best option for the construction of projects as it reduces construction schedule, improves finishing quality, reduces waste, reduces cost, and increases sustainability.

II. ALUMINUM FORMWORK ADVANTAGES

- *Lightweight and Strength*

The high strength to weight ratio of aluminum is one of the main advantages. The lightweight makes aluminum easy to handle at construction site as it weighs one-third of steel. Even with its lightweight, it can bear significant concrete pressure which makes it a reliable alternative for column construction.

- *Precision and Consistency*

Aluminum panels are made with high precision with respect to size and quality. This ensures consistency in construction and produces smooth surfaces which will minimize the time and cost for finishing.

- *Faster Construction Cycles*

Time is essential in modern construction, and aluminum formwork helps to accelerate the construction because it is easy to assemble and disassemble, and it also reduces the finishing time. Using aluminum formwork can reduce construction schedule by 30 to 40% compared to wooden formwork.

III. COST-EFFECTIVENESS AND SUSTAINABILITY

- *Reusability and Long-Term Savings*

Aluminum formwork is more expensive than wooden formwork; however, its lifecycle makes more cost-effective option in the long-term. With proper maintenance, aluminum formwork can be reused more than 300 times, whereas wooden formwork can be reused up to 15 times. This makes aluminum formwork an economical option for repetitive or mega construction projects.

- *Environmentally Friendly*

The use of recycled aluminum in formwork for columns decreases the carbon footprint by reducing deforestation and increasing sustainability, that makes recycled aluminum formwork an eco-friendly solution. This is in line with green building initiatives and minimizes the environmental impact.

IV. APPLICATION IN COLUMN CONSTRUCTION

- *Adjustable Column Formwork*

Aluminum formwork for columns is designed to be adjustable, making it suitable for different column sizes and shapes. This flexibility ensures precise alignment, reduces errors, and allows for quick modifications when needed. Moreover, the lightweight of aluminum makes handling and

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installation easier which results in reducing labor costs and improving efficiency.

- *Structural Benefits*

During casting concrete columns, it is critical to distribute the pressure evenly to avoid weaknesses or deficiencies. Aluminum formwork distributes the pressure uniformly which results in producing stronger columns. The rigid design of the aluminum formwork prevents deformations leading to more reliable final structure.

V. CONCLUSION

Recycled aluminum formwork is redefining the way columns and other concrete structures are built as it provides a perfect balance of schedule, strength, precision, quality, and cost-effectiveness. Even though the initial investment is higher in aluminum formwork, the reusability and efficiency will payback. Since the construction industry is evolving rapidly, aluminum formwork is the best solution where efficiency and quality are top priorities.

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