

# Bricklaying Robots: Revolutionizing Construction through Automation

Prathamesh K. Ware, Mukesh Chawdhary, Rahul V. Khandare,  
Samiksha R. Barve, Surajsingh Shekhawat  
Guru Gobind Singh Polytechnic, Nashik, Maharashtra, India

**Abstract:** *The construction industry is synonymous with respective tasks and labour-intensive processes. Bricklaying robots are revolutionising the construction industry by automating the bricklaying process. It combines a well established building material with new digital design processes and robotic fabrication techniques. Robots can precisely lay bricks at a fast pace, which reduces errors and speeds up construction. Bricklaying robots have emerged as a potential solution for companies looking for enhance productivity and reduces costs. As the demand for quicker, more efficient building methods grows, construction companies are looking for more ways to automate existing processes. Bricklaying robots may become more essential as these pressures grow. It primarily used in large - scale construction projects where speed and efficiency are essential. Their ability to work continuously without fatigue gives them an advantage over human worker in terms of both speed and consistency.*

**Keywords:** automation; industrialization; bricks; construction robot

## I. INTRODUCTION

The construction industry is synonymous with respective tasks and labour-intensive processes. Bricklaying robots are revolutionising the construction industry by automating the bricklaying process. It combines a well established building material with new digital design processes and robotic fabrication techniques. Robots can precisely lay bricks at a fast pace, which reduces errors and speeds up construction. Bricklaying robots have emerged as a potential solution for companies looking for enhance productivity and reduces costs. As the demand for quicker, more efficient building methods grows, construction companies are looking for more ways to automate existing processes. Bricklaying robots may become more essential as these pressures grow. It primarily used in large - scale construction projects where speed and efficiency are essential. Their ability to work continuously without fatigue gives them an advantage over human worker in terms of both speed and consistency. Some notable companies include Australian based construction technology firm FBR ( Formerly Fastbrick Robotics ) has developed Hadrian X, a bricklaying robot. These companies are pushing the boundaries of construction automation, enabling faster and more accurate building processes. Also the first bricklaying robot, known as “SAM” ( Semi Automated Mason), was introduced in the early 2010s. SAM can lay between 200 and 400 bricks per hour, it is adapt to real jobsite conditions. This innovation marked a significant milestone in the automation of construction.

### Types Of Bricklaying Robot

There are several types of bricklaying robot, including Semi-automated and fully automated robots.

#### Semi Automated Robots

These robots work with human operators to lay bricks, while the operator handles tasks like mortar application and brick placement. These robots are ideal for large scale projects where speed is important, but human oversight is still needed.

#### Fully Automated Robots

These robots can handle the entire bricklaying process, including applying mortar, placing bricks, and cutting bricks to fit complex designs. They are best suited for environments where consistency and efficiency are important, such as in the construction of large walls or repetitive structures.

### **Technical Points**

Bricklaying robots are equipped with advanced sensors, software, and other technologies that allow them to perform a variety of tasks.

- **Navigation:** Sophisticated algorithms and computer vision help robots navigate and access construction sites.
- **Brick handling:** Robots can handle different types and sizes of bricks, including asymmetrical designs.
- **Brick placement:** Robots can precisely place bricks, including around corners and on curved walls.
- **Mortar application:** Robots can apply mortar to bond bricks together.
- **Brick cutting:** Robots can cut bricks to fit complex designs.
- **Environmental factors:** Robots can mitigate environmental factors like wind and vibration to precisely position blocks.

### **Adoption and Growth Of The Market**

The market for bricklaying robots is still in its early stages, but it is growing rapidly as construction companies recognise the potential benefits of automation. The adoption of these robots is currently most common in regions with high labour costs and labour shortages, such as North America, Europe, and parts of Asia.

While adoption is increasing, the cost of these robots remains a barrier for many small to mid-sized construction companies. However, as the technology matures and becomes more affordable, it is expected that bricklaying robots will become a more common sight on construction sites around the world.

### **Advantages of Bricklaying robots**

- **Safety:** Robots can perform hazardous tasks, such as bricklaying, demolition, and reward tying, which reduces the risks of injuries to workers. Robots can also be controlled from a safer location.
- **Efficiency:** Robots can complete tasks faster than humans. For example, the Hadrian X robot can lay 1,000 bricks per hour.
- **Cost savings:** Robots can reduce labour costs and material waste. For example, some robots use less mortar than manual bricklayers.
- **Precision:** Robots can precisely position bricks.
- **Sustainability:** Robots can minimise unnecessary bricks overordering and waste.
- **Faster construction:** Robots can help construction projects be completed more quickly.

### **Disadvantages of bricklaying robots**

- Robotic devices are expensive.
- To operate a machine effectively, one must have the necessary training.
- The machine's alignment and on-site instruction take a lot of time.
- Fuel is necessary for the robotic machine to operate, which has an impact on the environment. Since the invention of Mortar Mason and other Automated bricklaying robots, technology has advanced significantly.

## **II. CONCLUSION**

The future of bricklaying, in conjunction robots with bricklaying robots, hinges on a balanced collaboration between human skill and robotic efficiency. By investing in upskilling initiatives and embracing technological advancements, the construction industry can pave the way for a sustainable and innovative future, where bricklaying robots and human workers operate in synergy.