Industrial Robots for Ferrous Casting Tasks

How Manufacturers Use Robots for Ferrous Casting Tasks

Ferrous Casting operations to automate tasks that involve high temperatures, heavy lifting, repetitive actions, and dangerous environments. Robots improve precision, efficiency, and safety while reducing costs and human exposure to hazardous conditions. Here's how manufacturers use robots in various ferrous casting tasks:

Molten Metal Handling and Pouring

Automated Ladle Handling: Robots handle ladles filled with molten iron or steel, controlling the pouring process into Molds with precision. This reduces spillage, ensures consistency, and eliminates the need for humans to handle dangerous, high-temperature liquids.

Pouring Automation: Robots perform controlled pouring of molten metal into Molds at precise speeds and volumes, minimizing defects like air pockets or improper fill rates.

Mold Preparation

Core and Mold Handling: Robots transport and place heavy sand cores or Molds with high precision. This reduces human effort in handling large or intricate cores used to form internal cavities in the casting process.

Mold Spraying: Robots spray release agents, coolants, or coatings inside Molds to prevent sticking and ensure even cooling, improving product quality and prolonging Mold life.

Casting Extraction

Part Removal: After the casting solidifies, robots remove the ferrous cast parts from the Molds, handling extremely hot and heavy castings that would be dangerous for workers.

Demoulding Automation: Robots automate the demoulding process by extracting castings and separating them from sand or other moulding materials with high precision.

Machining Operations

Robotic Machining and Finishing: Robots equipped with CNC tools perform machining operations such as drilling, milling, or threading on ferrous castings, ensuring high precision and reducing cycle times.

Tooling and Trimming: Robots perform high-speed trimming of edges and holes in ferrous castings, improving accuracy and reducing material waste.

Advantages of Using Robots in Ferrous Casting

- **Increased Safety:** Robots protect workers from dangerous environments, such as exposure to molten metal, high temperatures, and harmful fumes.
- **Improved Efficiency:** Robots operate continuously, handling multiple tasks at high speeds and improving production throughput.
- **Enhanced Precision:** Robots ensure consistent and precise handling, machining, and inspection, reducing defects and waste.
- **Cost Savings:** Automating repetitive and hazardous tasks leads to lower labour costs, reduced downtime, and fewer workplace injuries.
- **Better Quality Control:** Robotic systems provide accurate quality control checks, ensuring that castings meet strict dimensional and structural specifications.

The Types of Robots Used for Ferrous-Casting Applications

Ferrous casting applications often utilize various types of robots to enhance productivity, precision, and safety. Here are some of the main types of robots commonly used in ferrous casting:

- Articulated robots
- SCARA Robots (Selective Compliance Assembly Robot Arm)
- Delta robots
- Cartesian Robots (Linear Robots)

Articulated Robots

Articulated robots These robots have rotary joints and can have multiple axes of movement, like a human arm.

Applications:

- **Mold Handling:** Used for loading and unloading Molds, ensuring safe handling of heavy components.
- **Part Extraction:** Efficiently removes solidified cast parts from Molds.
- **Machining:** Can perform trimming, grinding, and other machining tasks on cast components.

SCARA Robots (Selective Compliance Assembly Robot Arm)

SCARA robots SCARA robots are designed for horizontal movements and are known for their speed and precision.

Applications:

- **Part Loading and Unloading:** Ideal for quickly transferring materials and components in the casting process.
- **Assembly Tasks:** Suitable for assembling components post-casting.

Delta Robots

Delta robots These robots have a parallel link design that allows for rapid and precise movements.

Applications:

- **High-Speed Handling:** Perfect for quickly picking and placing multiple small parts, enhancing production speed.
- **Packaging:** Used for efficiently packaging finished cast parts.

Cartesian Robots (Linear Robots)

Delta robots These robots operate along three linear axes (X, Y, Z) and are typically used for pick-and-place tasks.

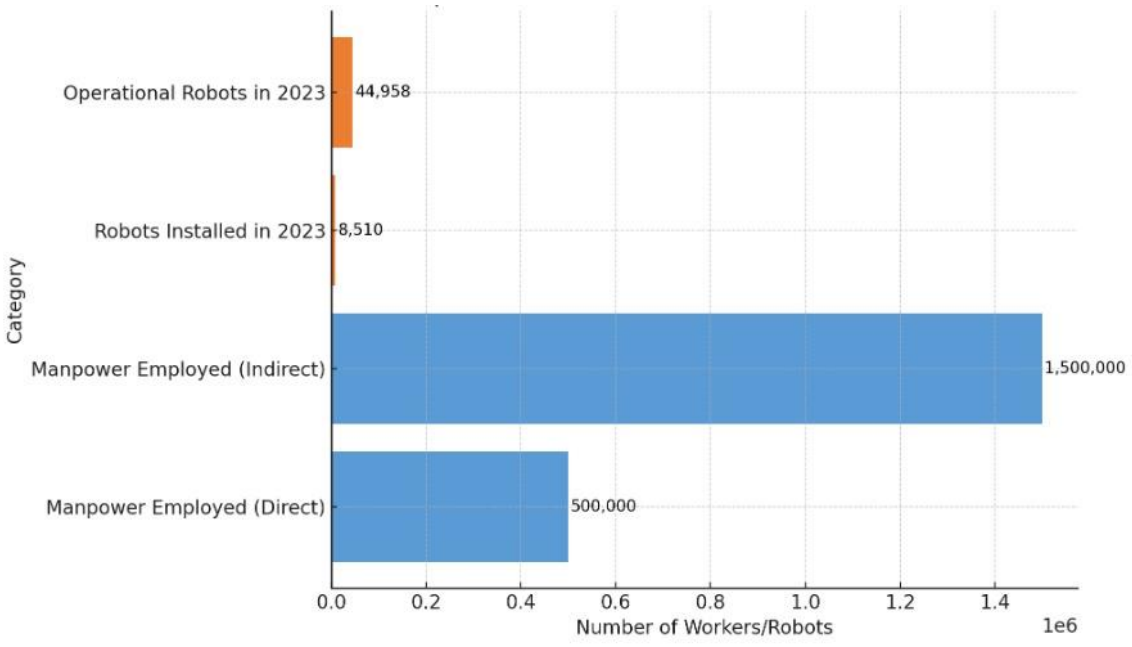
Applications:

- **Material Transport: Efficiently move raw materials and finished castings within the facility.**
- **Simple Assembly:** Can automate straightforward assembly tasks with high precision.

Technical Specifications

Product Specification

Weight	200 Kg
Application	Tractor Castings, Farm Equipment Casting
Model No.	ROBOFINISH RCF Series Gen 3
Components	Heavy Duty Robots with Fitting Tools
Features	Multiple Part Variants Possible, Quick ROI
Transmission Housing Weight	120 Kg
Transmission Housing Cycle Time	7 Min
Hydraulic Housing Weight	60 kg
Hydraulic Housing Cycle Time	6 Min
Differential Cover Weight	25 Kg
Differential Cover Cycle Time	1 Min


Operational Robots in 2023
44,958
Robots Installed in 2023
8,510
Manpower Employed (Indirect)
1,500,000
Manpower Employed (Direct)
500,000
Category
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1e6
Number of Workers/Robots