

Industrial Robots for Investment Casting (Lost Wax Casting) Tasks

IRB 7600



How Manufacturers Use Robots for Investment Casting (Lost Wax Casting) Tasks

Manufacturers use robots in investment casting, also known as lost wax casting, to enhance efficiency, precision, and safety throughout the casting process. This method involves creating a wax pattern that is coated with a ceramic shell, which is then heated to remove the wax and pour molten metal into the cavity. Here's how robots are integrated into various stages of investment casting:

Wax Pattern Production

- **Automated Wax Injection:** Robots can control the injection of wax into Molds to create precise patterns, ensuring uniformity and reducing waste.
- **Pattern Handling:** Robots are used for transporting and organizing wax patterns, minimizing the risk of damage and improving workflow efficiency.

Shell Building

- **Shell Coating:** Robots can automate the dipping or spraying process to apply ceramic slurry to the wax patterns, ensuring consistent coating thickness and quality.

- **Temperature Control:** Some robotic systems can monitor and control the temperature of the shell during the hardening process, ensuring optimal conditions for strength.

Wax Removal

- **Automated Wax Extraction:** After the shell has hardened, robots are used to assist in the removal of wax, often by heating or mechanically extracting it, reducing labour and safety risks for workers.
- **Cleaning and Preparation:** Robots can clean and prepare the shells for metal pouring, ensuring they are free of any wax residues.

Cooling and Solidification

- **Automated Cooling:** Robots can transport castings to cooling stations and apply controlled cooling methods, ensuring uniform solidification and preventing defects.
- **Cycle Time Optimization:** By managing cooling processes, robots help optimize cycle times, reducing overall production time.

The Types of Robots Used for Investment Casting Applications

In investment casting (lost wax casting) applications, various types of robots are utilized to enhance precision, efficiency, and safety throughout the process. Here are the main types of robots commonly used in investment casting:

- Articulated robots
- Vision-Integrated robots
- Robotic Welding System
- Grinding and Finishing robots

Articulated Robots

- **Description:** These robots feature multiple rotary joints, allowing for a wide range of motion like a human arm.
- **Applications:**
 - **Wax Injection:** Used to inject wax into Molds for creating patterns.
 - **Pattern Handling:** Efficiently transport and organize wax patterns and ceramic shells.
 - **Part Extraction:** Remove solidified castings from Molds.

Vision-Integrated Robots

- **Description:** Robots equipped with cameras and vision systems for enhanced accuracy and quality control.
- **Applications:**
 - **Quality Control Inspections:** Identify defects in cast parts and ensure they meet specifications.



- **Guided Picking:** Use visual systems to locate and handle components accurately.

Robotic Welding Systems

- **Description:** Specialized robots designed for automated welding processes.
- **Applications:**
 - **Joining Components:** Weld non-ferrous castings or other components together, ensuring strong connections.
 - **Repair Work:** Perform welding repairs on defective cast parts.

Grinding and Finishing Robots

- **Description:** Robots equipped with grinding and finishing tools to process cast components.
- **Applications:**
 - **Surface Finishing:** Grind, polish, or deburr cast parts to improve surface quality.
 - **Trimming Operations:** Efficiently remove excess material from castings to meet specifications.

Specification	Details
Payload	150 kg - 500 kg (varies by model)
Reach	2.3 m - 3.5 m (varies by model)
Axes	6
Repeatability	± 0.06 mm
Maximum Speed	2 m/s (depending on payload and reach)
Mounting	Floor, inverted, tilted
Controller	IRC5
Protection Rating	IP67 for the wrist, IP54 for the body
Power Consumption	5 kW
Weight	1,700 kg - 2,400 kg
Environment	0°C to +45°C (standard operation)
Application Fields	Material handling, machine tending, welding, assembly, foundry operations

