

# WHAT IS PLASTIC INJECTION MOULDING?

Plastic injection moulding, a process pivotal to modern manufacturing, offers a fusion of efficiency and precision in producing diverse plastic parts and components.

With its roots traced back to the late 19th century, this technique has become an indispensable tool across various industries.

From intricate medical devices to robust automotive parts, plastic injection moulding is integral in crafting items that shape our daily lives.

This blog delves into the essence of this process, exploring its history, functionality, applications, and the continuous advancements shaping its future.

## A Brief History Of Plastic Injection Moulding

The journey of plastic injection moulding began in the late 19th century, evolving from humble beginnings to becoming a pivotal force in industrial production.

The birth of this process can be traced back to the invention of the Hyatt brothers in 1872, who initially sought a substitute for ivory in billiard balls.

Their invention laid the groundwork for what would become the first plastic injection moulding machine. This concept underwent significant advancements in the 1940s to cater to mass production demands during World War II.

This era marked a turning point, heralding the widespread adoption of this technology across various industries.

# How Does Plastic Injection Moulding Work?

Plastic injection moulding is a meticulous, highly controlled process that transforms raw plastic materials into precise, complex shapes.

At its core, the method involves several key steps, each orchestrated with precision to ensure the production of high-quality plastic components.

The process begins with clamping the mould, a two-part cavity into which the molten plastic will be injected.

Once securely closed, plastic material, usually small pellets, is heated to a molten state.

The injection phase follows, where the molten plastic is forced into the mould cavity through a nozzle by a reciprocating screw. This step demands careful attention to temperature, pressure, and timing to guarantee the correct material flow and distribution within the mould.

Subsequently, the cooling phase commences, allowing the molten plastic to solidify and take the shape of the mould. This stage is critical to determine the final product's structural integrity and dimensional accuracy.

The last step involves ejecting the newly formed plastic component from the mould, ready for further processing or assembly.

You can read more about the injection moulding process.

## When Is Plastic Injection Moulding Used?

Plastic injection moulding is used in many scenarios, primarily due to its versatility, efficiency, and capability to produce high-quality parts consistently.

This process is particularly beneficial in situations where:

- **Mass Production of Parts is Needed:** When large volumes of the same part or component are required, plastic injection moulding is often the most cost-effective and efficient manufacturing process. It is ideal for mass production due to its high throughput rates.
- **Complex Part Designs:** This method can produce parts with complex geometries and intricate details that might be challenging or impossible to achieve with other manufacturing processes. The high pressure of injection moulding ensures that the plastic fills even the most complex moulds, accurately replicating fine details.
- **Tight Tolerances and Consistent Quality:** Industries that require parts with tight tolerances and high consistency, such as the automotive, aerospace, and medical industries, often rely on plastic injection moulding. The process offers excellent repeatability, ensuring each part meets stringent quality standards.
- **Use of Different Materials:** Plastic injection moulding allows for the use of a wide range of materials, including various types of plastics and additives, to achieve desired properties like strength, flexibility, or heat resistance. This flexibility makes it a preferred choice for diverse applications.
- **Cost-Effectiveness in Long Runs:** While the initial cost for moulds can be high, the cost per part is very low, making plastic injection moulding economically viable for long production runs. The efficiency and speed of the process also contribute to its cost-effectiveness.
- **Aesthetic and Functional Finishes:** The process allows for parts to be manufactured with a high-quality surface finish, which can be both aesthetic and functional. Textures, glosses, or matte finishes can be achieved directly from the mould without the need for additional processing.

# Advantages of Plastic Injection Moulding

Plastic injection moulding offers many advantages, making it a preferred manufacturing method across industries.

Key benefits include:

- **Precision and Complexity:** Achieve intricate designs and precise details, allowing for the production of complex components with high accuracy.
- **High Efficiency:** Rapid production cycles and the ability to produce large quantities make it an efficient choice for mass production.
- **Cost-Effectiveness:** While initial tooling costs may be higher, the per-unit cost decreases significantly for large production runs, ensuring cost-effectiveness over time.
- **Material Variety:** Utilise a wide range of thermoplastics and thermosetting plastics, tailoring material choices to meet specific product requirements.
- **Consistent Quality:** Ensure uniformity and reliability with each part produced, maintaining a high-quality standard throughout the production run.

For a more detailed exploration of these advantages and how they can benefit your manufacturing processes, refer to our comprehensive blog on the advantages of plastic injection moulding.

## Is Plastic Injection Moulding Environmentally Friendly?

The environmental aspect of plastic injection moulding is multifaceted.

On one hand, the process is efficient, generating minimal waste due to its precision and repeatability.

On the other, the use of plastics and their impact on the environment is a subject of ongoing debate.

However, strides in recycling technologies and the development of biodegradable plastics are paving the way for more sustainable practices in the industry.

At Nordell, we take proactive measures to minimise our environmental footprint.

For example, we prioritise using recyclable materials in our injection moulding processes, contributing to the circular economy by reducing waste and promoting the reuse of plastics.

Additionally, we explore and incorporate biodegradable and bio-based plastics into our processes whenever feasible, aligning our practices with the industry's evolving environmental standards.

You can read more about our sustainability efforts [here](#).

## **What Plastics are used in Injection Moulding?**

Plastic injection moulding employs various materials, each selected for specific properties and applications.

Common plastics include polyethene, polystyrene, polypropylene, and ABS.

Each plastic type possesses unique properties, from flexibility to strength, allowing us to tailor material choices to specific product requirements.

For an in-depth discussion of these materials, refer to our detailed blog post on the subject.

## Summary

In conclusion, plastic injection moulding stands as a testament to the innovation and adaptability of modern manufacturing.

Its rich history, evolving from a rudimentary process to a sophisticated method, showcases its integral role in producing a vast range of plastic parts.

This process caters to diverse needs across industries, from simple everyday items to complex components integral to advanced technologies.

Its ability to efficiently produce high volumes of parts with precision, consistency, and diverse material options while pushing the boundaries of design and sustainability underscores its enduring relevance and future potential.

As the manufacturing landscape continues to evolve, plastic injection moulding remains a key player, driving forward the possibilities of what can be achieved in the world of production and design.

If you want to learn more about our plastic injection moulding services, contact our team in Worthing today.

You can email [enquiries@nordell.co.uk](mailto:enquiries@nordell.co.uk) or call 01903 235 765.