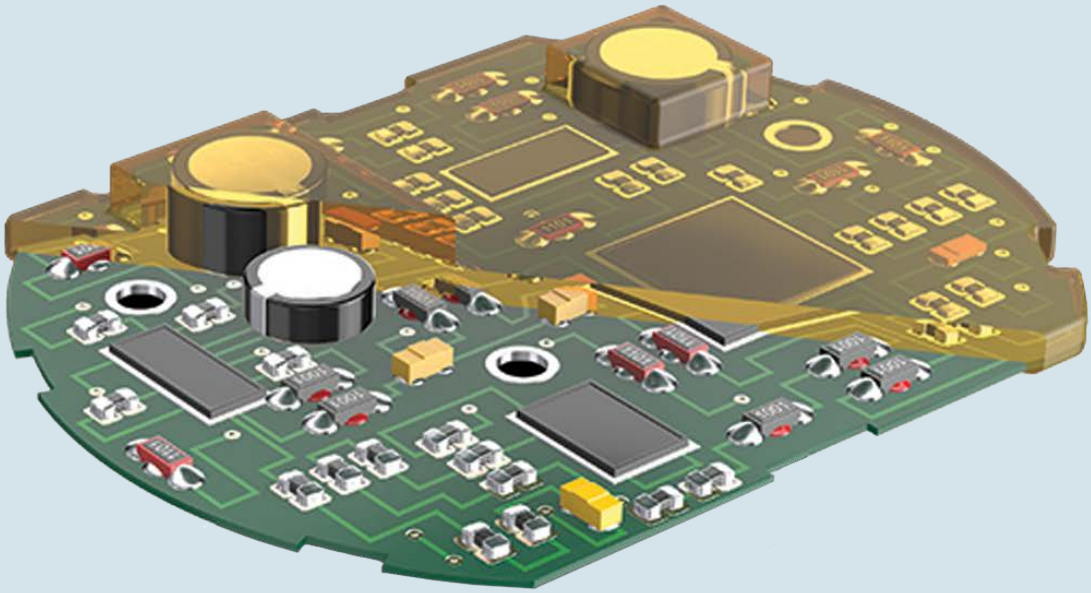
ELECTRONICS PROTECTION, *SIMPLIFIED*

How Low Pressure Molding is Shaping Device Resilience

Jochen Schilling

There are not many things in industrial device manufacturing that are easy. As product complexity increases, so do assembly and post-assembly integration processes. Except when it comes to a novel encapsulation technique which is, quite literally, as easy as 1-2-3.

Low pressure molding is a three-step approach that provides incredibly tough and resilient encapsulation protection for various electronics components within many industrial applications, including automotive, lighting, medical, and cables and connectors. It is simple, fast, and effective.



What is Low Pressure Molding?

The low pressure molding process uses specialized polyamide hot melt materials, custom-made molds, and molding equipment to form a protective shell around electronic components of all shapes and sizes. While the process is similar to plastic injection molding, **low pressure molding achieves encapsulation without high injection pressure**, so it is **ideal for all types of electronics, particularly those with small, delicate features.**

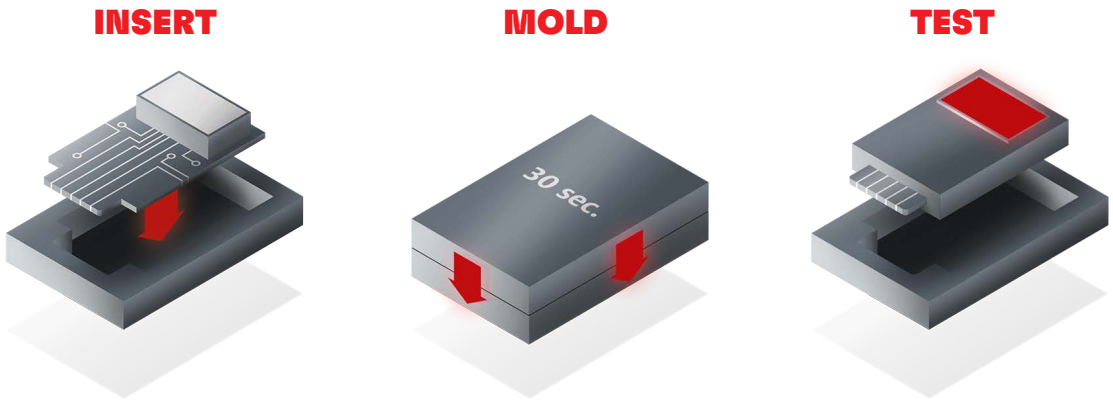
The steps are as follows:

1. Place the part into the customized mold.
2. Melt and inject the hot melt materials.
3. Cool the part in seconds.

Once complete, the fully molded part offers **electrical insulation**, is **waterproof, protected from most chemicals**, in **some cases is UV-resistant**, and can **withstand vibration and impact**. Naturally, there are applications and specific environments where low pressure molding is not the most appropriate option. In cases where the device requires resistance to extreme temperatures or very rugged durability, potting may be a more suitable option.

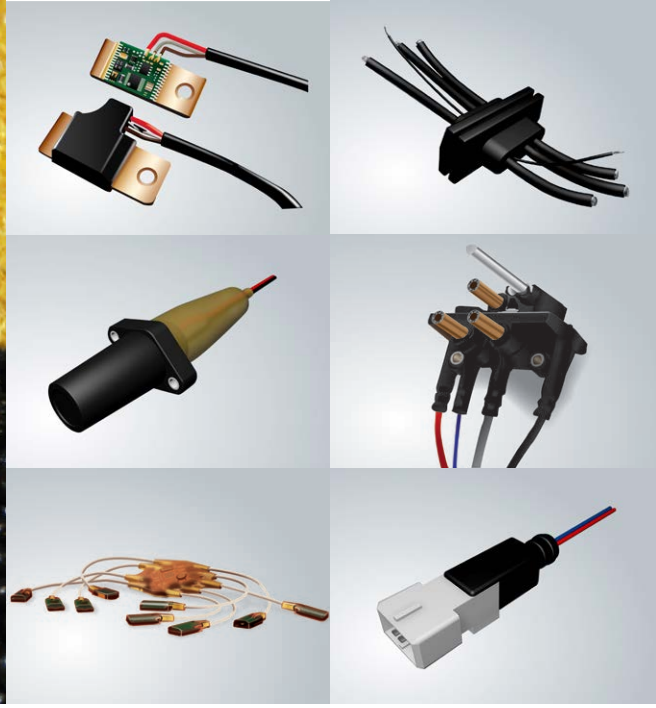
When an application lends itself to various encapsulation methods, however, low pressure molding provides advantages. For example, potting **can require as many as eight steps**, and a housing or a shell must be employed to contain the material. Potting's casting, curing, and cooling steps combined can take as long as **24 hours** to complete.

Low Pressure Molding



Traditional Potting Process

Low pressure molding, on the other hand, may see cycle times as short as 30 seconds and requires no housing. Often, low pressure molding can also result in a thinner, more streamlined product, making the encapsulated part more dimensionally conducive to sophisticated product designs. By following the shape of the electronic components – known as 'sky lining' – less material is used compared to the potting process, which requires filling the entire housing.



Many Formulas, Even More Applications, *Sustainable by Nature*

Henkel's hot melt polyamide materials, marketed under the TECHNOMELT® and LOCTITE® brands, have been engineered to address a wide range of performance and environmental requirements. Formulation-specific characteristics include the softening point, application and environmental temperature, material viscosity, required UV resistance, cold flexibility, substrate compatibility, and hydrolysis (hot temperature and steam) resistance, to name a few.

In fact, Henkel low pressure molding materials are so versatile and the formulation options so vast that they have been used on products as diverse as *e-bike components*, *electronic parts on a robotic dive mission*, *medical devices*, and even over *LED lighting on one of the world's most famous bridges*. In industrial and power electronics, Henkel hot melt polyamides are used to overmold printed circuit boards (PCBs), HDMI and USB ports, all types of cables and connectors, sensors, micro switches and high-power EV charging devices.

Not only are LOCTITE and TECHNOMELT low pressure molding materials **easy to use**, but they are also **sustainably produced** and **designed in compliance with human health and safety standards.** The polyamide-based products are manufactured using predominantly **renewable raw materials** (approximately 60% to 80% content is biobased), **do not produce any harmful fumes in-process**, are **solvent-free, REACH and RoHS-compliant**, and have a remarkably **long room-temperature storage shelf-life** of over two years.

What's Next for Low Pressure Molding Product Innovation?

Henkel's TECHNOMELT® and LOCTITE® low pressure molding materials have enabled many thousands of applications over their more than 30-year history. Still, design evolution is a constant, and so is the continuous innovation of hot melt formulations.

Next-generation LOCTITE® and TECHNOMELT® hot melts are tackling emerging requirements for medical-grade compliance, thermal conductivity, hydrolysis resistance, stabilized flammability behavior, higher UL RTI ratings, color transparency, and electrical conductivity.

Regardless of the dynamics of electronic component design complexity, robust and sustainable protection and durability can remain as easy as 1-2-3.

Jochen Schilling

The Author

Jochen brings over two decades of invaluable experience working as project engineer and technical customer service. For more than 10 years in the automotive industry, he supported development of materials for acoustical and structural parts, where he focused on enhancing product quality and performance.

Currently serving as an application engineer for hotmelt technology and low-pressure molding applications within the Industrials business unit of Henkel Adhesive Technologies, Jochen is dedicated to supporting global and regional key accounts. In his role, he oversees segments such as cable & components and general manufacturing, where his deep understanding of materials and processes allows him to provide innovative solutions tailored to each client's unique needs.

Passionate about customer satisfaction, Jochen is committed to engaging early in the design phase to ensure maximum value from material solutions and processes. His proactive approach and dedication to excellence make him a trusted partner for clients seeking optimal performance and efficiency in industrial and electronics manufacturing.

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