

## Custom 2K Injection-Molded Enclosure for a Medical Patient Wristband How a Custom Solution Saved More Than €180,000



### Initial Situation

A medical device manufacturer planned the development of a patient wristband with an integrated emergency call button for clinical use. The objective was to create a robust, hygienic, and cost-effective solution suitable for medium-volume production.

Key requirements included a high level of patient comfort, reliable emergency call functionality, and seamless integration of electronics, enclosure, user interface, and wristband.

### Standard Enclosure as the Initial Approach

At the beginning of the project, the customer evaluated the use of a standard enclosure combined with a separate wristband and an additional membrane keypad.

At first glance, this solution appeared attractive because no tooling investment was required and standard components were readily available.

However, a detailed analysis quickly revealed the limitations of this approach.

## Cost Breakdown of the Standard Solution

Component	Cost per Unit
Standard enclosure including wristband	€8.00
Membrane keypad	€2.50
Assembly	€1.00
<b>Total Cost</b>	<b>€11.50</b>

Despite the relatively high unit cost, the solution offered neither ergonomic nor functional advantages.

## Challenge

The goal was to develop a solution that fulfilled multiple requirements simultaneously:

- Integration of enclosure, wristband, and emergency call button into a single assembly
- Reduction of total lifecycle costs
- Improved tactile feedback through a clearly defined actuation point
- High hygiene and sealing performance for clinical environments
- Robust construction for everyday use
- Possibility of color customization for different product variants

## Solution: Custom 2K Injection-Molded Enclosure

Together with N&H Technology, the customer developed a fully customized enclosure solution based on a two-component (2K) injection molding process.

By integrating multiple functions into a single molded part, the enclosure, wristband, and emergency call button were combined into one assembly. This significantly reduced the number of individual components and assembly steps.

## Design Implementation

The final solution consisted of:

- A 2K injection-molded enclosure with integrated wristband
- Two transparent LED windows for status indication

- A separate cover featuring a perimeter elastomer seal
- Additional fastening components for the wristband

The integrated LED windows allow direct visualization of operating and status information. At the same time, the elastomer seal provides reliable protection against moisture and contamination.

### Five-Year Cost Analysis

#### Planned Production Volumes

Year	Quantity
Year 1	1,000
Year 2	3,000
Year 3	5,000
Year 4	10,000
Year 5	10,000
<b>Total</b>	<b>29,000</b>

#### Total Cost Comparison

Solution	Total Cost
Standard solution	€333,500
Custom solution	€152,360
<b>Savings</b>	<b>€181,140</b>

The custom solution became more economical than the originally planned standard approach as early as the third year of production.

#### Benefits of the Custom Solution

- **Lower Total Cost of Ownership**  
The investment in tooling and development was offset within a few years, resulting in significant savings throughout the product lifecycle.

- **Improved Ergonomics**  
The integrated emergency call button provides a clearly defined tactile feedback and improves usability in clinical environments.
- **Enhanced Hygiene**  
The low-gap 2K injection-molded design simplifies cleaning and disinfection procedures.
- **Reduced Assembly Effort**  
By integrating multiple functions into a single assembly, manufacturing complexity and potential sources of error were significantly reduced.
- **Flexible Color Customization**  
Different product variants can be realized without additional painting or printing processes.
- **Unique Product Design**  
The custom enclosure provides a distinctive appearance and strengthens brand recognition.

## Conclusion

This case study demonstrates that a custom plastic enclosure in medical technology is often not only the technically superior solution but also the more economical one.

By developing an individual 2K injection-molded enclosure, the enclosure, wristband, and emergency call button were combined into a single functional unit. The result was lower manufacturing costs, improved usability, and significantly increased product value.

Particularly noteworthy is that the product has now been in serial production for eight years. Its long-term success confirms the quality, durability, and economic advantages of the developed solution.

## Your Development Partner for Custom Enclosure Solutions

N&H Technology supports customers from the initial concept through to series production. Our services include feasibility studies, product development, plastic part design, tooling concepts, material consulting, cost optimization, and manufacturing.

The result is custom enclosure solutions that not only meet technical requirements but also deliver measurable economic benefits throughout the entire product lifecycle.