

Pressure forming, part validation, and a faster time to market



Pressure forming technology holds the potential to revolutionize production processes for manufacturers in essentially every industry. Additionally, with more and more organizations relying on the in-house production of critical parts such as product casings, a deep understanding of pressure forming's industrial advantages becomes increasingly valuable.

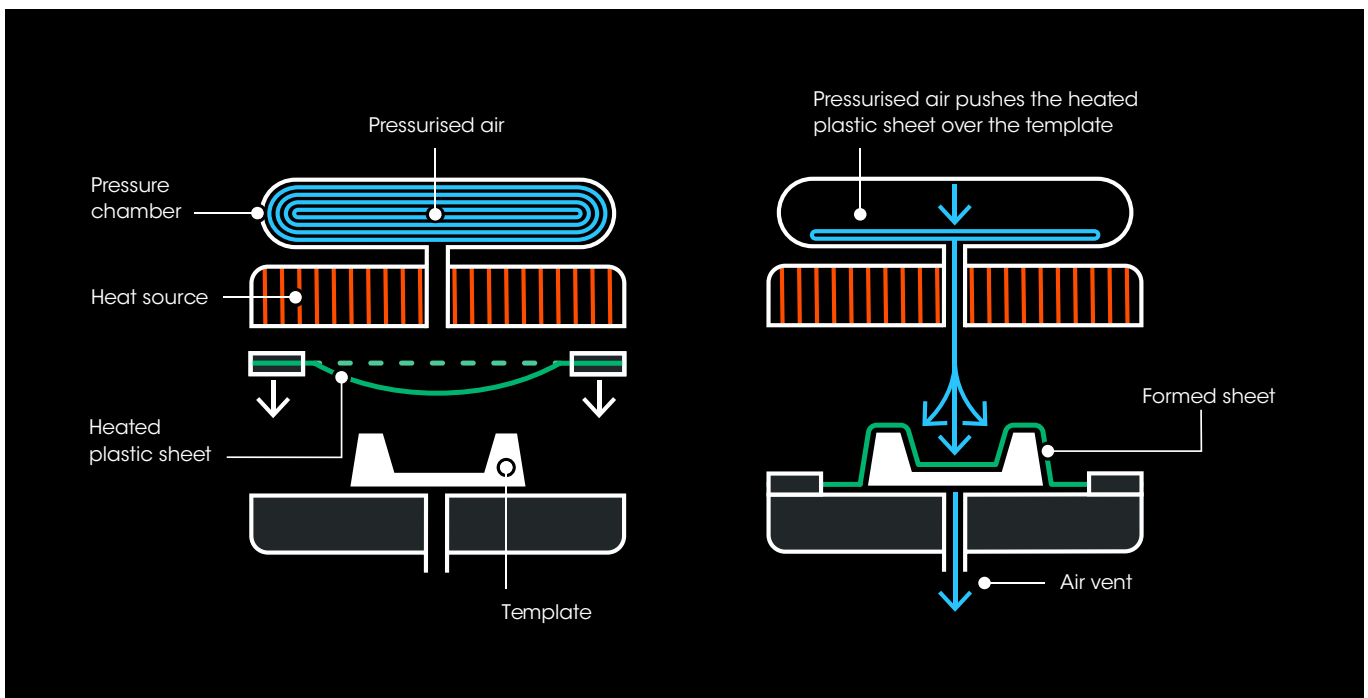
In this guide, we'll take a look at the role of pressure forming in part validation for product casings, highlighting the technology's precision, consistent quality, and ability to rapidly iterate. We'll also take a look at how seamlessly integrating the Mayku Multiplier into your existing operations can reduce delays and result in a faster time to market - keeping your organization effective, efficient, and operational.

Introduction to pressure forming

Pressure forming is a method of shaping heated plastic sheets using air pressure to produce molds or parts with rich detail and texture.

Pressure forming technology is notable among manufacturing methods for its versatility, as it can accommodate a variety of materials used in final products. The technology is relatively easy to master and can quickly produce impressively detailed results. Because the process is completed in minutes, it's an ideal method for mass production.

→ Learn more: [Introduction to pressure forming](#)



Pressure forming technology: A visual explanation

Pressure forming is similar to vacuum forming, but is able to apply significantly more pressure, making it a stronger manufacturing technique. Both pressure forming and vacuum forming are types of 'thermoforming technology'.

The benefits of pressure forming over vacuum forming include:

Level of detail

Parts and molds are able to capture small details such as text or textures (less than $<1 \mu\text{m}$), offering injection mold-like precision.

Precise part tolerances

Parts offer precise tolerances when using female molds.

Surface finish

Parts and molds capture the template's exact surface finish.

Material thickness

Up to 5 mm material thickness.

Introducing the Mayku Multiplier

Industrial pressure forming on your workbench

The **Mayku Multiplier** is a desktop pressure former that can achieve resolution of less than 1 μm in sheet thicknesses of up to 5 mm. Combined with high-resolution 3D printing, the Multiplier can achieve injection mold-like quality parts from your workbench in a matter of minutes.

60 PSI

Generate pressure up to 60 psi – equivalent to 5 tonnes of force

380mm x 160mm

400 mm circular forming bed, 380 mm usable space, and 160 mm maximum draw height

225°C (440°F)

Heat materials up to 225 °C (440 °F)

0.5mm-5mm

Work with factory materials between 0.5 mm and 5 mm

<1 μm

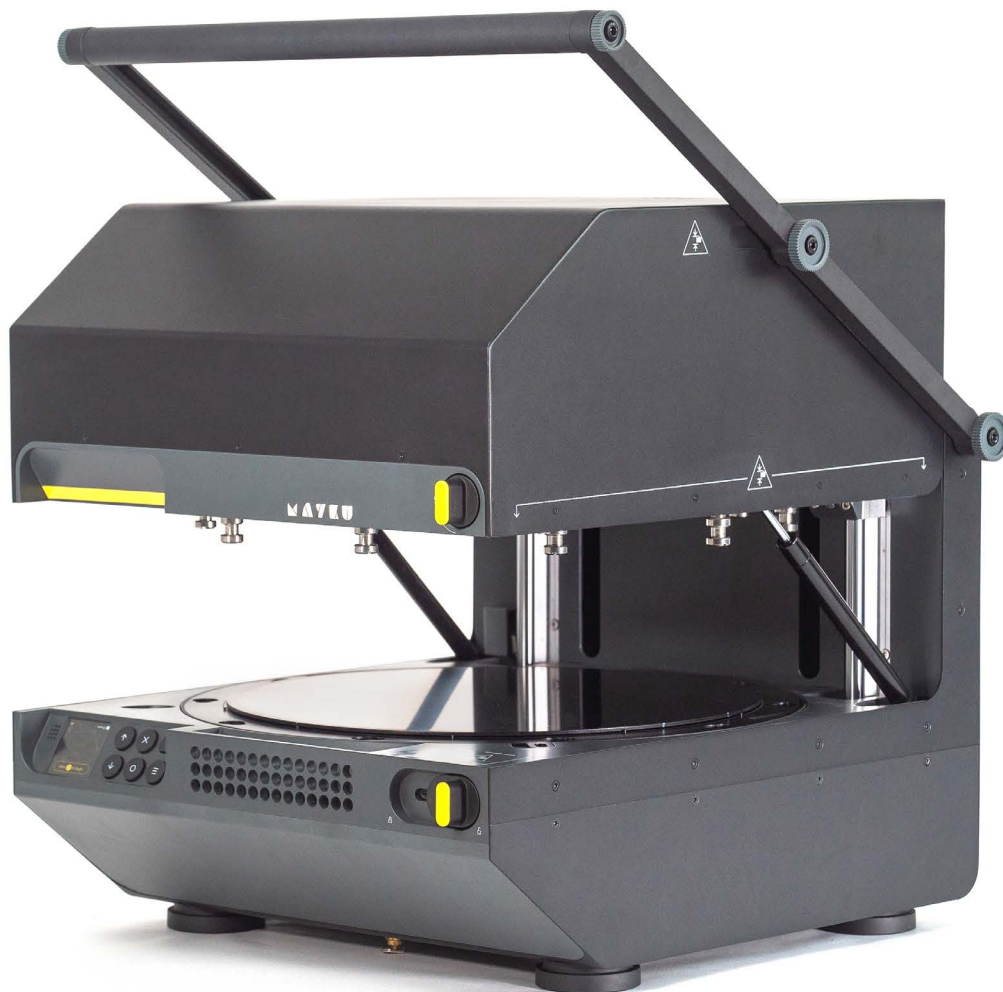
Create parts with precise tolerances and capture details of less than <1 μm



Integrated sensors for reliable performance and



Evolving functionality through firmware updates



The benefits of pressure forming in new product development

The Mayku Multiplier brings the benefits of pressure forming to new product development workflows, providing increased flexibility in prototyping and tooling validation. This ultimately leads to a faster time to market. Let's explore some of the major advantages that the Multiplier offers to manufacturing organizations.

Increased flexibility

In-house pressure forming gives you the flexibility to create, test, and iterate during the product development cycle. This increasing operational agility by:

- Encouraging an iterative design approach can increase the success rates of validation
- Enabling you to quickly move from a digital to a physical product
- Ensuring your final product meets your specific requirements and objectives
- Eliminating the need for outsourcing, which requires weeks of planning

Fast iteration cycles

Produce high-fidelity prototypes of product enclosures rapidly and on-demand, reducing lead times and accelerating the product development process.

Iteration cycles can be as short as 24 hours, including design, template manufacturing, small batch production with the Mayku Multiplier, and part review and testing.

Faster decision-making

In-house manufacturing enables faster decision-making during the prototyping process, as there is no need to wait for external parties to provide feedback or make adjustments.

Enhanced confidentiality

Keeping prototyping in-house reduces the risk of sensitive design and product information being shared with external parties during outsourcing.

Reduced costs

Adopting desktop pressure forming in your factory not only decreases the cost of each high-fidelity prototype, it also speeds up your time to market – leading to a potential increase in revenue and a competitive advantage.



*Batch of 4mm
ABS parts made
with the Mayku
Multiplier*



*4mm ABS part
made with the
Mayku Multiplier*

Production-ready material choice

The Mayku Multiplier can heat materials up to 225 °C and exert pressure up to 60 psi (4.1 bar), making it compatible with a variety of production-ready materials, including ABS, UHMW, and PMMA. These materials can range in thickness from 0.5 mm to 5 mm, and can possess flexible, impact-resistant, transparent, or rigid properties.

Seamless integration with existing workflows

The compact size and ease-of-use of the Mayku Multiplier make it suitable for existing workspaces and digital fabrication workshops. When used in conjunction with high-resolution 3D printing technologies like SLA, it can create injection mold-quality parts in just a few minutes from a desktop.

Furthermore, parts can be post-processed using various methods, ranging from quick manual trimming with commonly found workshop tools to precise and automated processes such as laser or CNC cutting.



*Formlabs Form 3
SLA 3D printer and
Mayku Multiplier*

Application spotlight: Pressure forming for product casings

Customer profile

A consumer tech manufacturer validating product casings. It currently uses large-scale pressure forming equipment to make prototypes of product casings. However, this method is inefficient, as it disrupts regular manufacturing operations and results in long iteration cycles.

The challenge

The consumer tech manufacturer faces a problem with validating parts and tooling. Currently, it must activate its entire production line to create one prototype, disrupting normal manufacturing operations. This leads to longer iteration cycles and makes planning more difficult, as trials must be scheduled well in advance. Very few design iterations are allowed, as they have a significant impact on production schedules.



Production line. Source: https://commons.wikimedia.org/wiki/File:Manufacturing_equipment_101.jpg

The solution

With the Mayku Multiplier, the customer saves time and resources by quickly producing a single part without activating the entire production line. The Multiplier uses the same tooling process as the customer's production line, enabling faster validation and exploration. It also enables the testing of different materials and adjusting forming parameters – giving the customer increased control.

Results with the Mayku Multiplier

These are some of the results achieved by integrating the Multiplier in the product design workflow.

- ✓ **Faster time to market.**
Reducing manufacturing delays and shortening time to market by pressure forming product components for part validation
- ✓ **High-fidelity prototyping.**
Rapid creation of production-grade product casings for consumer electronics. Made prototypes exhibit properties of the final product, as the manufacturing method is the same as the final technology, providing a more accurate representation of the final product.
- ✓ **Faster iteration cycles.**
Faster validation and exploration of the manufacturing process
- ✓ **Material testing**
Quick testing and iteration of different material types and forming parameters.
- ✓ **Reduced production line disruption**
Tooling verification and optimization without interfering with the main production line. This in turn allows more iterations and increases success rate.



Multiplier-made product casing prototype and 3D printed template

Costs and time

The Mayku Multiplier enables the entire prototype manufacturing process, including post-processing, to be completed within 24-48 hours, as long as the template is ready. In contrast, the traditional workflow takes 23 days and disrupts regular manufacturing operations.

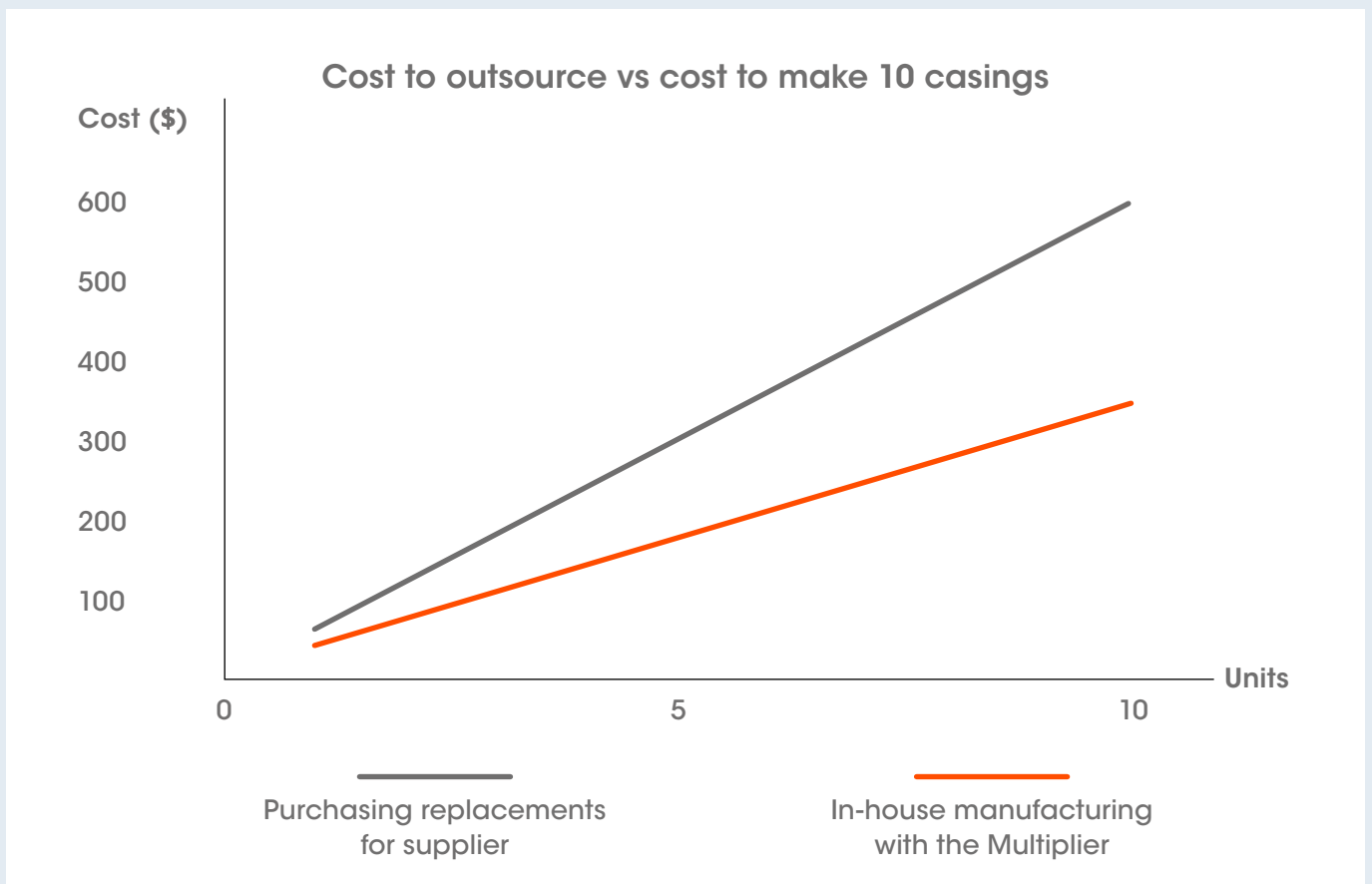
In this application, small batches of 8-10 parts are formed with each tooling iteration. This allows the design team to run multiple tests simultaneously, including processing trials, assembly mock-ups, and visual finish considerations.

Changes between iterations have minimal impact on the price of the pressure forming tool. Each tool costs \$142 and takes approximately

23 hours to print using high-temperature resin. The project uses 4mm ABS as the final material, at \$25 per sheet. For a run of ten parts, the cost is \$39 per part, with a forming time of 30 minutes per part.

The traditional alternative method is CNC milling and pressure forming. However, this method is costly and time-consuming for tooling. For example, the tool made from aluminum using CNC milling costs \$407 and takes 23 days to be delivered. When producing 10 parts with material costing \$25 per sheet, the cost per part increases to \$66. Additionally, the long lead time for machined tooling makes the iterative approach inefficient.

	Outsourced manufacturing	In-house manufacturing with the Mayku Multiplier
Estimated time	23 days	24-48 hours
Cost per part	\$66	\$39



How to create product casings with pressure forming

Here's a quick look at how the Multiplier and our tailored support can ensure your success in each stage of your workflow in manufacturing high-accuracy product casings.

1. Application audit.

Our expert team provides tailored onboarding to desktop pressure forming that addresses the specific challenges your company faces.



2. CAD design.

Guided by our educational resources on thermoforming design and team support, you'll design a thermoforming template that is aligned with thermoforming design principles.



3. Template manufacturing.

Create templates with different technologies, including 3D printing and CNC machining. We recommend manufacturing templates using a high-resolution 3D printing process like SLA. [Learn more about template design and manufacturing here.](#)

4. Material selection.

The Multiplier is compatible with hundreds of thermoformable materials.



5. Pressure forming process.

Use **Custom Mode** on the Multiplier to fine-tune your machine to your desired material, ensuring repeatable, consistent forming.



6. Part finishing.

Perform quality checks and remove excess material to prepare the part for installation.



7. Repeat and reproduce.

Repeat the pressure forming cycle for each part to achieve a consistent run. Check the template after each cycle to ensure it is in optimal condition.



Multiplier-made product casing prototype and 3D printed template

Start manufacturing product casings in-house

The future of manufacturing hinges upon innovative technology that enhances factories' capabilities – ensuring they are able to quickly and flexibly adapt to fluctuating market and production demands.

By integrating desktop pressure forming into their production lines to create product casings, these factories are equipping themselves with an industry-shaping, in-house technology they can use to significantly reduce production line disruption, as they quickly test materials and rapidly create high-fidelity prototypes – ultimately achieving a faster time to market.

Ready to learn more about how you can integrate the Mayku Multiplier into your factory for the in-house manufacturing of product casings? Get in touch with a Mayku Expert today!



Talk to a Mayku Expert