

Reducing machine downtime by manufacturing essential covers in-house



In industries from manufacturing to robotics, professionals are increasingly adopting pressure forming technology as a key component of their processes. With many companies moving towards producing replacement parts in-house, it's important to recognize the many benefits this technology offers to industry.

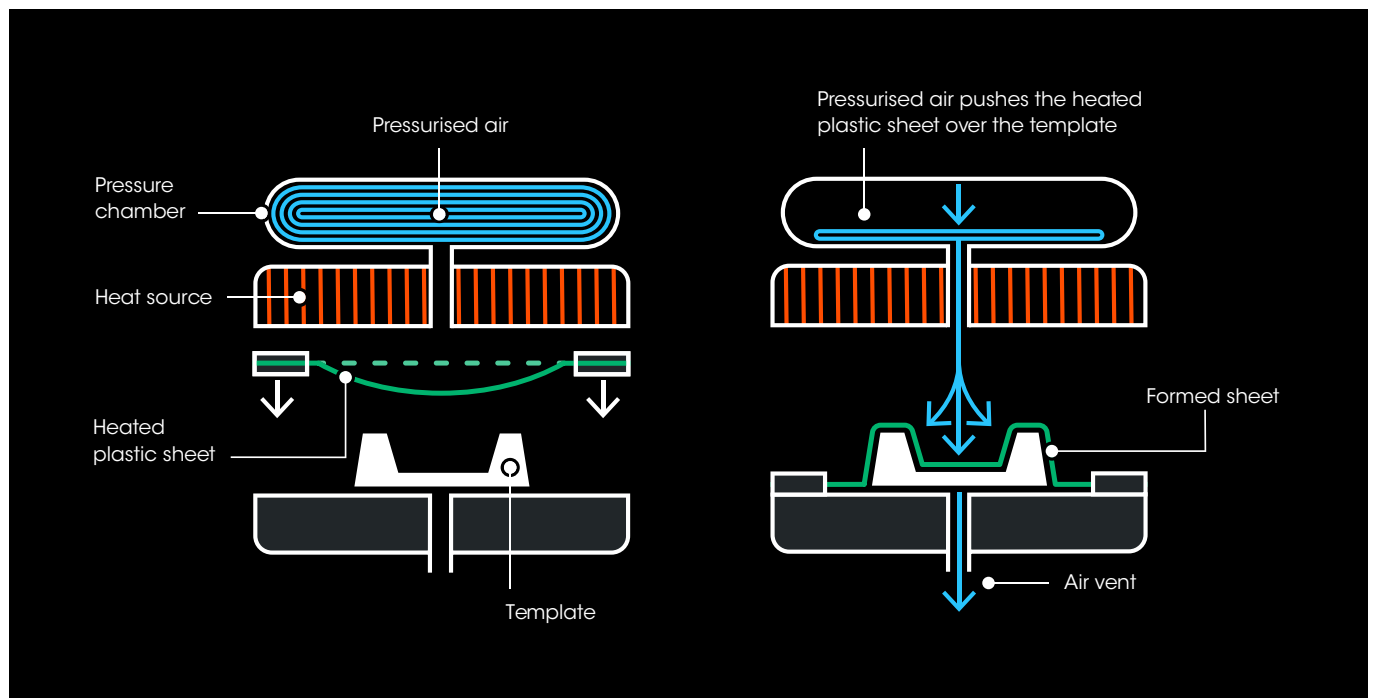
In this guide, we'll discuss the benefits of pressure forming for manufacturing and production environments. We'll highlight its role in improving productivity, saving costs, ensuring reliability, and enhancing in-house skills. We'll also examine how pressure forming with the Mayku Multiplier can outperform the traditional manufacturing methods you might find in a production environment.

Introduction to pressure forming

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

This technology is notable among manufacturing methods for its versatility, as it can accommodate a variety of materials used in final products. Pressure forming is relatively easy to master and can produce impressively detailed results in a short amount of time. Since 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 and vacuum forming fall under the category of 'thermoforming technology'. Though they're both similar techniques, pressure forming exerts much more force onto the heated sheet, enabling higher-quality outcomes and a broader range of materials. Some of the advantages of pressure forming over vacuum forming include:

Detail precision

Pressure forming can replicate finer details, even as intricate as text or textures smaller than $<1\mu\text{m}$, rivaling the precision of injection molding.

Material thickness

Pressure forming is capable of handling materials up to 5mm thick, which is significantly thicker than what vacuum forming can typically manage.

Authentic surface finish

Parts and molds faithfully reproduce the original template's surface finish.

Exact tolerances

When using female molds, the parts produced adhere to strict tolerances.

Introducing the Mayku Multiplier

Industrial pressure forming on your workbench

The **Mayku Multiplier** is a desktop pressure former that can achieve sub-one-micron resolution in sheet thicknesses of up to 5mm. Using high-resolution 3D printing alongside the Multiplier makes it possible to produce parts at your desktop that rival the quality of injection-molded parts.

60 PSI

Produces up to 60 PSI (around 4.1 bar) pressure, equating to 5 tonnes of force

380mm x 160mm

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

225°C (440°F)

Capable of heating materials up to 225°C (440°F)

0.5mm-5mm

Compatible with materials between 0.5 mm and 5 mm thick

<1µm

Produces parts with exceptional precision, capturing details finer than <1µm



Integrated sensors ensure reliability and safety



Firmware updates introduce new features to enhance performance



The Reducing Plate accessory can make it work with third-party materials



V O L V O



GE Aerospace

Benefits of pressure forming in production environments

The Mayku Multiplier offers advanced pressure forming capabilities to a range of fabrication industries. It can produce high-quality parts directly on the production floor, plus it's capable of producing robust parts that can be used on-site if needed.

Using the Multiplier for machine repairs, especially for replacement machine covers, has been proven effective. This approach not only reduces extended downtime and its associated costs, but also cuts down on additional repair expenses.

Increased flexibility

Using pressure forming in-house lets you easily design, test, and validate new ideas, making it simpler to adjust and improve your operations.

- Pressure forming in-house gives you the flexibility to continuously improve parts. Using 3D printed forms means you can switch from physical inventories to digital ones.
- It allows for the on-demand production of replacement parts, thereby decreasing machine downtime, as well as reducing the stock of replacement parts.
- It provides the flexibility to adapt quickly to any changes on the production line.
- It fully integrates into digital fabrication workflows including 3D scanning and 3D printing.

Production speed

Pressure forming allows for rapid on-demand production of tools and spare parts. This reduces lead times to days, instead of the weeks often required when ordering from suppliers, consequently decreasing machine downtime.

Supply chain resilience

Supply chain issues can delay products and increase machine downtime. With desktop pressure forming technology, production environments can swiftly and affordably create short runs of replacement protective covers in-house, reducing reliance on suppliers and responding to production changes faster.

Reduced costs

Adopting pressure forming in a production environment lowers part replacement costs, reduces downtime-related revenue loss, and minimizes unused inventory, freeing up capital and space.

In the table below, you can see the cost difference between sourcing replacement parts from a supplier compared to in-house manufacturing with the Mayku Multiplier. Each Multiplier-made part costs around €22. This offers a 92% cost reduction compared to purchasing from a supplier.

	Sourcing replacement from supplier	In-house manufacturing with the Mayku Multiplier
Estimated time	2-4 weeks	1 hour, including post processing
Cost per part	€250	€22



4mm ABS part
made with the
Mayku Multiplier

Production-ready materials

The Mayku Multiplier can heat materials up to 225 °C and exert pressure up to 60 PSI (around 4.1 bar), making it compatible with a variety of industrial-grade materials such as ABS, UHMW, and PMMA. These materials range in thickness from 0.5 mm to 5 mm and have a range of useful properties, including flexibility, impact resistance, transparency, and rigidity.

Seamless integration with existing workflows

The compact size and ease-of-use of the Multiplier makes it easy to fit into existing workspaces. Combined with the high-resolution capabilities of SLA 3D printing, it can produce injection mold-quality parts on the desktop within minutes.



Formlabs Form 3
SLA 3D printer and
Mayku Multiplier

Application spotlight: Rapidly producing protective covers in-house to minimize machine downtime

Increasing manufacturing efficiency often hinges on automation, one of the fastest-evolving fields in today's production landscape. Highly automated production lines, with arrays of machines, sensors, and robots, operate on ever-tightening cycles.

Leading automotive companies have effectively combined pressure forming and 3D printing to minimize equipment damage risks with protective covers.

Frequent component failures cause expensive downtime. In industries like automotive, a single minute of downtime can lead to losses of up to \$50,000. Additionally, legal safety requirements underline the need to prevent damage, avoid shutdowns and maintain efficiency.

One effective approach to minimize this risk is to shield equipment from potential harm. For instance, each robot is equipped with thermoplastic covers that protect sensitive parts from impacts, debris, and splashes.

This inventory approach is not just expensive, but it also lacks flexibility, limiting opportunities to enhance the covers or refine the workflow.

Production line



→ Challenge

Shielding sensitive equipment from harm is essential, but it presents its own set of challenges. Maintaining a sizable inventory of spare parts is a must, as no maintenance engineer would want to run out of crucial components. This means having an excess of daily-needed parts on hand, as it can take 2-4 weeks to replenish part inventory.

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→ Solution

A fast method to produce these covers locally is crucial to reduce costs, save space, and prevent expensive production delays.

Recognizing its potential for quick and cost-effective production of replacement covers automotive manufacturers have turned to the Multiplier, integrating it into their maintenance workflow. They can now produce durable replacement covers on-site as needed, conserving inventory space and cutting maintenance expenses.

→ Results

Comparing the old method with the new, the traditional approach required approximately 3 weeks of lead time. However, by integrating the Multiplier workflow, this duration shrinks drastically to an estimated 48 hours, which includes design, printing, and post-processing. This represents a remarkable 95% reduction in lead time.

In terms of costs, the new method offers substantial savings, with an estimated 88% reduction for a batch of 20 pieces when accounting for the tooling resin costs. The shift to the Multiplier workflow presents significant time and cost advantages for manufacturers.

✓ Downtime reduction.

The Multiplier enables customers to rapidly produce replacement covers, reducing downtime associated with robot breakdowns

✓ Cost savings.

By developing the capacity to fabricate covers in house, original manufacturer markups can be avoided.

✓ Enhanced robot reliability.

The new covers produced with the Multiplier are durable and reliable, significantly reducing the risk of future breakdowns

✓ Streamlined maintenance.

The simplified workflow for producing replacement covers improved the efficiency of maintenance operations.



4mm ABS Multiplier-made product casing prototype and 3D printed template

Costs and time

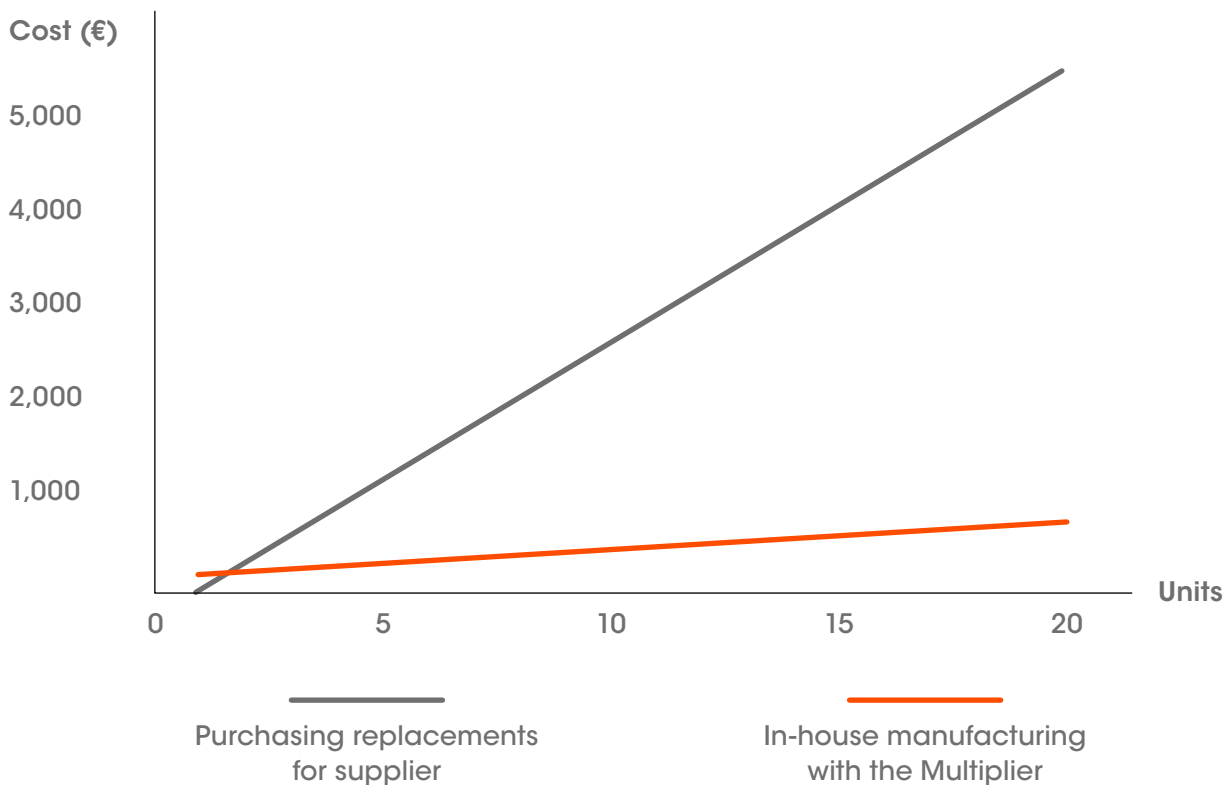
Using pressure forming to produce protective covers in-house offers several advantages: reduced costs and time, greater ROI, tailored parts, and minimized machine downtime.

With the Multiplier, the entire production process can be finished in about an hour if the template is ready, a sharp contrast to the weeks-long wait when ordering from suppliers.

Using the Multiplier, the cost to produce each part is approximately €22, marking a 92% savings compared to buying from a supplier. In contrast to the traditional workflow that incurs linear costs, the Multiplier delivers a more economical cost-per-part. After setting up the thermoforming template, the only subsequent expenses are for the material and any necessary post-processing.

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Cost to purchase vs cost to make 20 covers



How replacement cover manufacturing with pressure forming works

Here's a streamlined overview of how the Multiplier, combined with our specialized support, guarantees successful production of high-accuracy protective coverings:

1. Application audit.

Our expert team provides tailored onboarding to desktop pressure forming, evaluating the best way to implement it to address specific company challenges.



2. CAD design.

A thermoforming template is designed guided by our educational resources on design for thermoforming and team support, to ensure the proposed design aligns with thermoforming design principles.



3. Template manufacturing.

Templates can be made with different technologies, including 3D printing and CNC machining. We recommend manufacturing the template 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. For this application, 4 mm ABS is used for its high impact strength, rigidity, and electrical insulation properties.



5. Pressure forming process.

Use [Custom Mode](#) on the Multiplier to perfectly tune the machine for 4 mm ABS, ensuring repeatable, consistent forms.



6. Part finishing.

Perform quality checks and remove excess materials 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 has not been damaged.



4mm ABS Multiplier-made product casing prototype and 3D printed template

Start producing replacement parts in-house

Stepping into the future of manufacturing involves more than just maintaining existing processes. It's about equipping factories with innovative technologies, enhancing their capabilities, and ensuring they can adapt to changes and production demands.

Companies that integrate desktop pressure forming into their production lines equip themselves with a technology that is shaping the manufacturing world. This method of in-house production reduces machine downtime significantly, while increasing operational efficiency.

If you'd like to explore more about integrating the Mayku Multiplier in your production environment for in-house manufacturing of replacement protective covers, get in touch with a Mayku Expert today.



Talk to a Mayku Expert