XCENTRIC
MOLD & ENGINEERING

USE CASE GUIDE

PROTOTYPING:

How 4 Companies Overcame Challenges With The **Right** Expertise

INTRODUCTION:

Doing What's Always Been Done in Manufacturing

The traditional manufacturing mindset of 'doing what's always been done' or 'if it ain't broke, don't fix it' is both appealing and dangerous. Speed-to-market pressures compound this mindset. Rather than innovating, looking at better solutions, or optimizing the product development lifecycle, some companies skip phases in favor of getting their product to market quickly.

Product developers and engineers may bypass the prototyping phase because they feel it is an easy way to shorten the product development process and reduce costs. Or they rely on simulation or 3D Printing as the primary prototyping process instead of exploring all available solutions. At other times, they skip prototype tooling in favor of production tooling. Some attempt to have all the final requirements baked into their design, simulation, or testing from the start and cross their fingers that everything will work out. A few leverage agile principles to work through shorter development, simulation, and testing sprints.

"Product developers and engineers may bypass the prototyping phase because they feel it is an easy way to shorten the product development process and reduce costs."

INTRODUCTION

But moving straight from physical prototyping (3D printing) to pre-production (production mold-making) produces sub-optimal results. Unexpected problems can arise. In the validation or verification stage, you might find that you are unable to scale up to high-volume production or scale down production. There could be changes to design features late in the game, causing project delays and driving costs up.

This begs the question: Instead of spending tens of thousands of dollars and weeks to months on fixing errors, why not prevent them from happening in the first place? Prototype tooling can cost as little as $1500 and can be completed as quickly as five business days from placing an order.

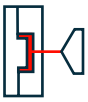
Recognizing the importance of the prototyping phase and choosing the right combination of prototyping options for your project will allow you to proceed more effectively along the product development lifecycle, setting your project up for success.

This Use Case Guide summarizes different prototyping combinations and real-life use cases of how companies have successfully applied them to a range of project objectives and challenges.

CHOOSING THE BEST PROTOTYPING SOLUTION FOR YOUR PROJECTS

3D Printing, Cast Urethane, and Injection Molding

Often, you might find yourself with a project that could fit multiple prototyping or production processes. How do you choose your ideal solution? The following table breaks down some key differences in application between 3D Printing, Cast Urethane, and Injection Molding.

CRITERIA	3D PRINTING 	CAST URETHANE 	INJECTION MOLDING 
Complexity	Initial physical representation—form and fit	Ideal for marketing purposes with some strength testing capability	Ideal for parts with more complexity, e.g. inserts or overmolding
Volume	Low-volume needs only	Low-volume needs only	With direct translation of prototype lessons to production, ability to scale
Cost	Low initial part cost (5 pieces or less) **Note:** 3D Printing is not suitable for production.	Lower-cost option to limited injection molding	Higher upfront cost to create molds but cost-effective option for larger runs (piece part cost)
Build sizes	Limited build requirement	Tool life is 50 pieces or less, breaks down quickly, some material limitations	Engineering or design changes for final fit and function, some size limitations
Testing Capability	Not suitable for post-processes	Strength testing capability (drop tests) that 3D Printing cannot withstand **Note:** While Cast Urethane materials are "like" materials, they are different to actual engineering-grade resins used in Injection Molding.	Suitability for complex parts allowing for fuller testing capability
Timeframe	Early-stage	Early to mid-stage	Mid to long-term

Choosing the best solution involves:

1 | **Understanding how each technique can be used optimally at different points of development**

2 | **Production and engaging a trusted manufacturing partner to help you make those decisions**

HOW 4 COMPANIES SAVED TIME AND MONEY WITH THE RIGHT PROTOTYPING COMBINATIONS

USE CASE 1	Automotive	THE XCENTRIC DIFFERENCE Engineer-Centric

BACKGROUND:
An automotive company had already created a prototype for board approval. They needed to make 50 parts per year but anticipated a reduced quantity over time.

CHALLENGE:
They sought a partner to produce 50 parts each year, and the solution had to have proven longevity (in material and process) over 3D Printing.

THE XCENTRIC SOLUTION:
Cast Urethane was utilized to build soft tooling to make 25+ parts, with more consistency and better longevity than 3D Printing.

RESULTS:

- By choosing Cast Urethane molding over 3D Printing and hard tooling like aluminum and steel, the company was able to save thousands of dollars over the next few years.
- The polyurethane material used achieved better longevity and part consistency.

Note: If the company's production quantities increased to 100 per year, aluminum tooling would have been part of the solution.

USE CASE 2	Consumer Goods	THE XCENTRIC DIFFERENCE Expert Team Engineered To Be Nimble

BACKGROUND:
A consumer goods company needed to quickly get a prototype ready for board approval. They also needed to ensure that they could test the product's strength early on before proceeding to make thousands of parts every year.

CHALLENGE:
They needed a partner to build the prototype and test the part for drop from height. They also expected a production of 50,000 parts per year, in the long-term.

THE XCENTRIC SOLUTION:
3D Printing (SLA) was utilized with the closest approximation to the actual molding material. Then prototypes were created in Cast Urethane for drop-testing, this time approximating the end-material closely. Finally, Injection Molding was used to build the mold for both prototype and low-volume production.

RESULTS:

- 3D Printing enabled the company to produce a low-cost, quick-turn representation of the product for board approval and socialization.
- Cast Urethane allowed for the development of a lower-cost prototype with enough strength to withstand the drop test.
- Injection Molding tooling served both prototype and production of the 50,000 parts per year.

USE CASE 3	Defense/Military	THE XCENTRIC DIFFERENCE Expert Team Engineered To Be Nimble

BACKGROUND:

A defense/military company had already created a prototype ready for board approval. They needed to produce 50 parts, gradually increasing to 25,000 parts per year.

CHALLENGE:

The company sought a partner for both their short-term and long-term quantity requirements. The parts were intended for rugged outdoor environments and therefore needed to be subjected to intense temperature fluctuations, UV conditions, and various other tests.

THE XCENTRIC SOLUTION:

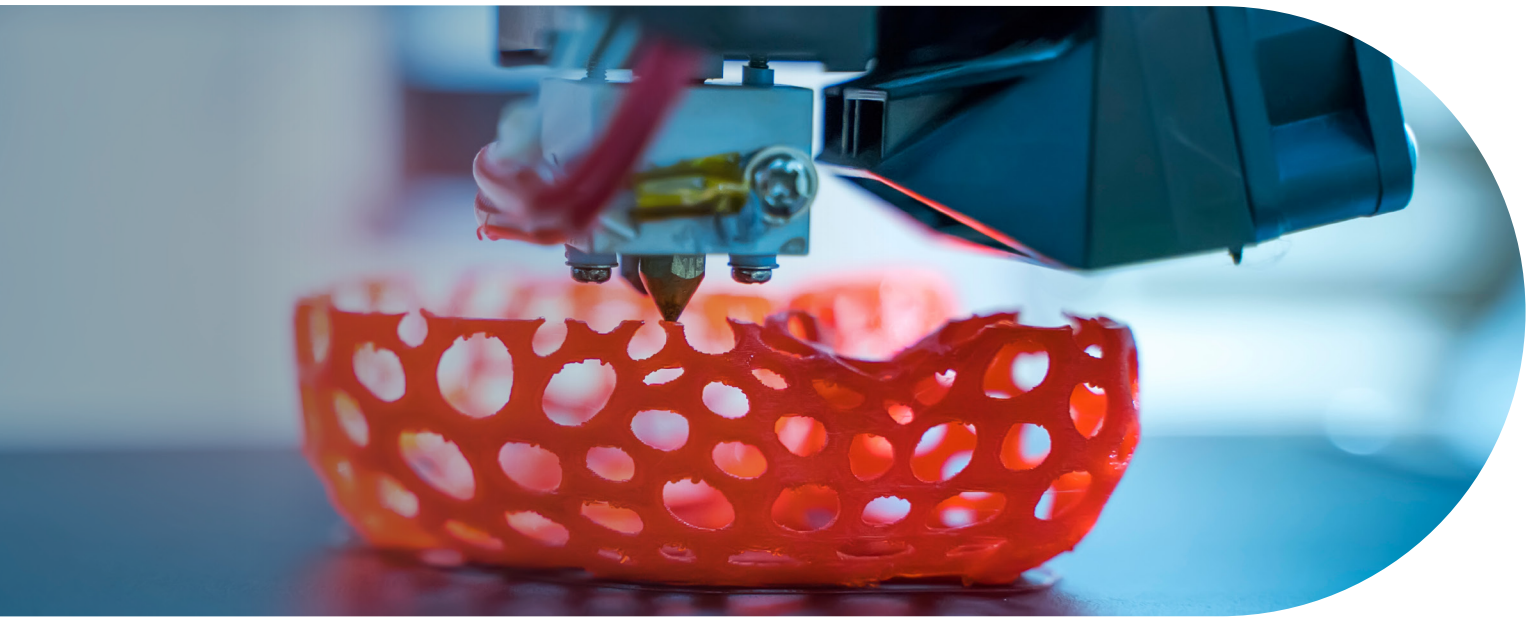
Because of the environmental loading that the part would need to withstand and the production scale required, Injection Molding was identified as a better solution over 3D Printing and Cast Urethane. Aluminum tooling was built for Injection Molding using materials and processes that would translate easily to production.

RESULTS:

- With Injection Molding, the initial part run of 50 per year was easily increased to 25,000 per year with the same tool.

Note: If the customer's long-term quantity was only 50 per year, Injection Molding with aluminum or steel tooling would still have been the only choice due to the part's environmental requirements.

USE CASE 4	Industrial	THE XCENTRIC DIFFERENCE Engineer-Centric Engineered To Be Nimble



BACKGROUND:

An industrial company needed to quickly get a prototype ready for board approval and then produce thousands of parts annually. However, it was also imperative that they were alert to changes in their industry that would impact the design of those parts.

CHALLENGE:

The company sought a partner to produce the 10,000 parts they required each year and a tooling solution that would be flexible in accommodating design changes.

THE XCENTRIC SOLUTION:

3D Printing (SLA) was utilized with the closest approximation to the actual molding material. The prototype tooling created was steel safe with planned contingencies into certain parts features to allow for quick and inexpensive project changes when required.

RESULTS:

- 3D Printing enabled the company to produce a low-cost, quick-turn representation of the product for board approval and socialization.
- As the product did not require intensive testing, Cast Urethane did not need to be considered as an additional solution, eliminating potential tooling costs.
- Minor design changes were able to be made at a very low cost in under two weeks, enabling the customer to iterate without delays in market launch.

These use cases illustrate the hybrid techniques that combine multiple technologies to reach a desired outcome in the shortest possible time. A true rapid manufacturing partner that understands quality and delivers repeatability of results to the stringent requirements of production applications, can help you achieve this.

XCENTRIC'S PROTOTYPING SERVICES

Prototyping can reduce total project time, cost, and risk in your projects.

TALK TO AN XCENTRIC EXPERT ABOUT

- Budget
- Speed of Delivery
- Demonstration
- Testing
- End-Use
- Expected Design Changes In The Future
- Material Requirements
- Production Volume

We work closely with you to provide options that meet all these criteria.

THE XCENTRIC DIFFERENCE

1 | Engineered To Be Nimble

Xcentric can deliver simple or complex parts from prototype to production, on time and on budget. Our on-demand digital manufacturing capabilities in Michigan allow us to be quick, flexible, and responsive to your design needs.

2 | Expert Team

With 25 years of industry experience, we have a robust team of experts in injection molding and rapid prototyping. Our (recently tripled) design, engineer, and customer experience teams are with you every step of the way from concept to production.

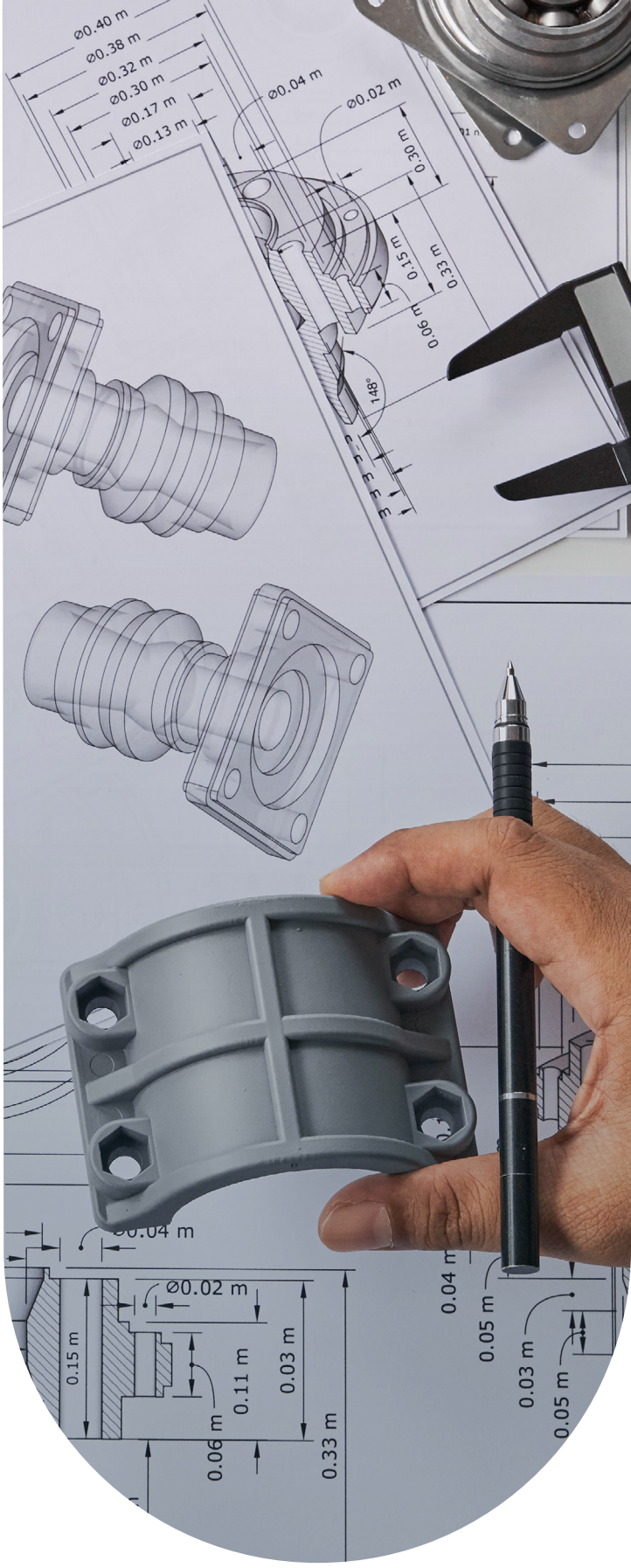
3 | Engineer-Centric

We understand the day-to-day challenges engineers face, and we help alleviate those struggles. We apply an engineer-first mindset to everything we do—addressing prototype design and manufacturing complexities while ensuring projects are delivered on time and on budget.

ENGAGE AN EXPERT FOR PROTOTYPING SUCCESS

To be successful, a collaborative process with a rapid manufacturing expert experienced in full spectrum prototyping processes is essential. Whether it's short, medium, or long-term objectives, having an expert on hand to advise on prototyping options will help you move away from 'doing what's always been done' and focus instead on 'doing the best' for your prototyping projects. The results? You insure yourself against unexpected problems, implement the best-fit solution, and achieve your quickest route to market.

To find out more about how we can help you make prototyping decisions, contact us at **info@xcentricmold.com** or **(586) 598-4636**. If you'd like to request a quote, please submit your project **here**.



ABOUT XCENTRIC MOLD & ENGINEERING

Founded in 1996, Xcentric Mold & Engineering is an innovator of on-demand digital manufacturing and continues to lead advances in injection molding and rapid prototyping. We know what it takes to deliver a high-quality product on time and on budget. Xcentric is engineered to be nimble, employs a team of experts in injection molding, and takes an engineer-centric approach to everything we do. Tens of thousands of product developers and engineers across North America trust Xcentric to bring their products to life.

XCENTRICMOLD.COM | (586) 598-4636

XCENTRIC
MOLD & ENGINEERING