



## CASE STUDY

### BRIDGE PRODUCTION: MEDICAL X-RAY DEVICES

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**January 2016, Formula Prototypes**

Without the volumes needed to justify injection molding tools, a medical device manufacturer needed a solution to manufacture parts for their line of mobile x-ray equipment. By using our bridge production method, they were able to save tens of thousands of dollars on tooling and bring the product to market months ahead of schedule.



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Production-grade 3D printing from Stratasys creates functional housings, made from real thermoplastic that are ideal for functional testing.

### PROVING DESIGNS WITH 3D PRINTING

With an in-house production-grade FDM printer from Stratasys, the teams were able to quickly print and test the x-ray housings - ensuring the best models went to production. By printing parts overnight, the new prototypes would be ready the next morning for assembly and evaluation.

This type of iterative design process accelerated the early development cycle, and allowed our client to go to market with a more functional design, quicker than ever.

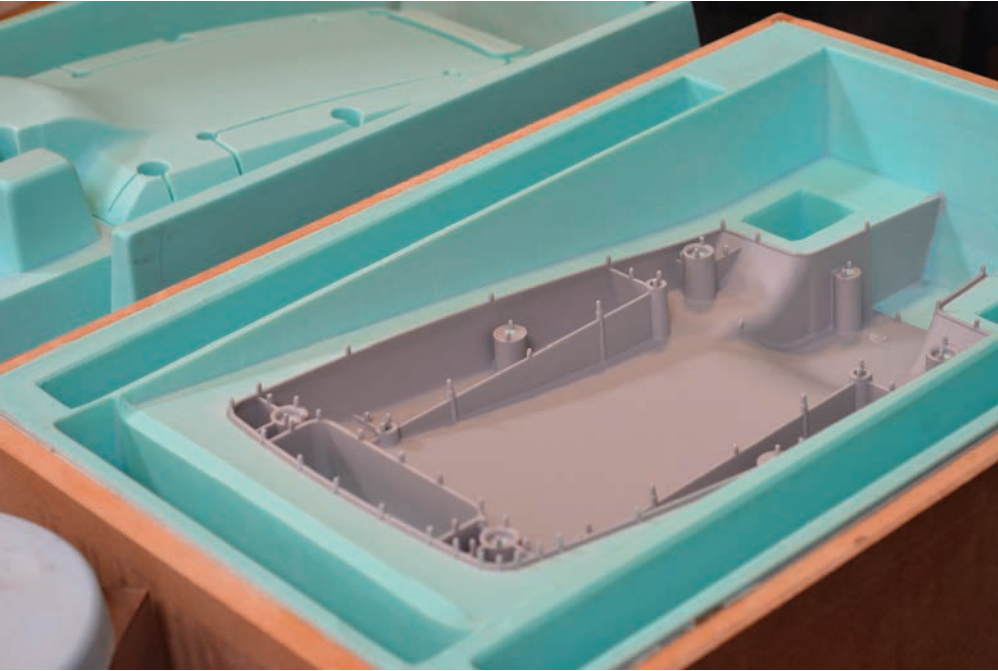
### THE BEST PATTERNS ARE PRECISION-MACHINED

Every mold is made from one master part, called “the pattern.” The quality of the finished production parts is only as good as it’s original pattern. These patterns can either be 3D printed (the faster choice), or machined from solid plastic (which yields a higher-quality pattern).



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Housing molds are precisely supported and keyed together. Resin flow, air vents and strength are strategically accounted for in the mold.



Air bubbles are removed with a vacuum chamber and the resin is poured by hand.

### SILICONE IS A BRILLIANT MOLD MATERIAL

We captured the precise geometry of the many component parts using RTV (or “Room Temperature Vulcanization”) molding. This technique uses high-grade silicone that is poured around a model, capturing the finest of details and producing consistent and repeatable parts.

Soft tooling allowed for greater design freedom and features that were impossible with rigid steel molds, such as: undercuts, zero-draft surfaces, and trapped geometry. Due to the flexible nature of

the silicone, these types of features pulled right-out of the mold.

Best of all, RTV molds work seamlessly with a multitude of polyurethane resins.

### URETHANE RESINS FOR ANY APPLICATION

From medically-certified to aerospace flammability ratings, there’s a Poly Urethane to suit any project. The resins come in a variety of colors, and hardness values - from rubber-like to very rigid.



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Short-run manufacturing of many parts in the assembly, to the required specifications.

Products used in many settings.



### REAL PARTS WITH LOW VOLUME PRODUCTION

Formula Prototypes supports the manufacturing of professional medical x-ray devices, and produces many parts for each of the product assemblies. New parts are continually produced based upon demand, allowing our client to avoid unnecessary inventory.

Additionally, each new set of molds is another opportunity to iterate or refine the design. Engineering issues can be continually addressed and improved-upon. In this way, our client can ensure that only it's best products end-up in operating rooms and healthcare facilities.

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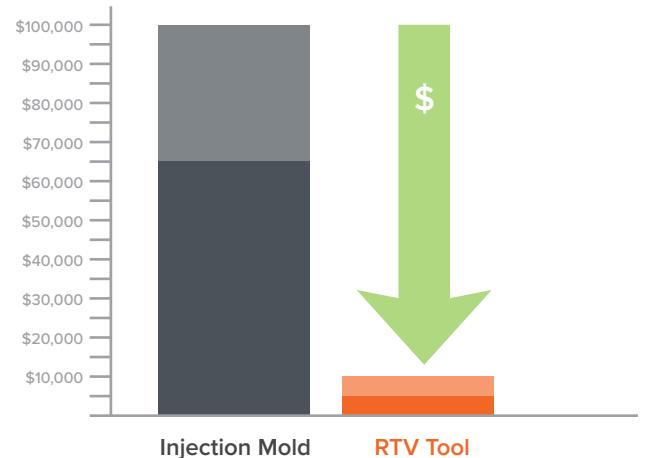
## BRIDGE PRODUCTION: MEDICAL X-RAY DEVICES

### SAVING TONS OF CAPITAL EXPENSE

Injection molding, and other traditional manufacturing techniques, require a huge up-front investment. In this case, our client required lower part volumes, and couldn't justify the expense.

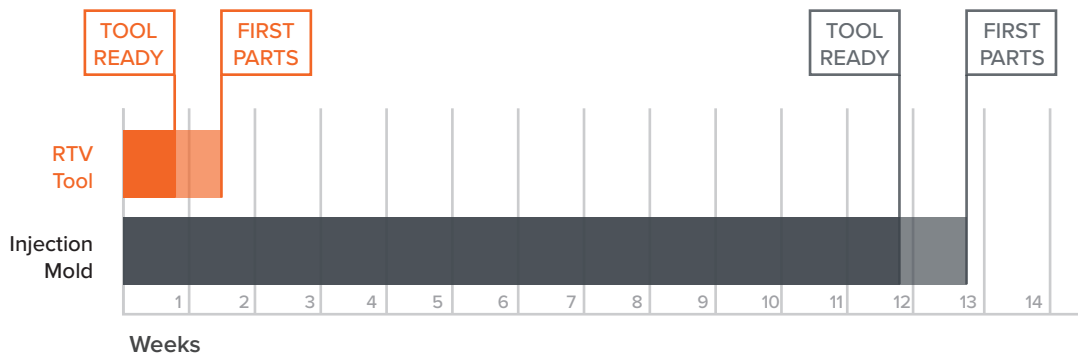
RTV tooling, while producing a significantly lower volume of multiples than injection molding, was an affordable way to jump-start production.

#### TOOLING EXPENSE



Up to 20 times less expensive.  
Capital expense of injection-molding parts versus RTV technique.

#### TIME TO TOOLING



Parts within days, instead of months.

Typical timeline from release of production model to tooling completion and first samples.

### FAST PARTS, QUICK TO MARKET

The typical lead time to make steel injection molds is between 10 and 14 weeks, and this doesn't include transit time, setup, and pre-production. This means that it can take up to 4 months before the first parts are made.

Molds made from RTV silicone can be ready to start production in as little as 3-5 days. Allowing for assembly validation, functional testing, even marketing focus groups.

Our client harnessed this time-savings to start selling and shipping product months ahead of schedule, and below budget.

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### INTEGRATED COMPONENT ASSEMBLY

Each medical device in the product line requires a complex assembly of parts, including: standard electrical components, proprietary technology, as well as mechanical features.

At Formula Prototypes, we insert all sorts of custom components and off-the-shelf parts, integrating them seamlessly into the final assembly.

### CUSTOMIZATION

Our client required a variety of external components and customization of their parts.



#### COLOR & TEXTURE

Custom colors with painted finishes and specific texture application.

#### STANDARD PORTS & COMPONENTS

From charging to communication ports, fitted and integrated.

#### RUBBER STOPS & FEET

Custom made or off-the-shelf rubber-like components for protection and vibration dampening.

#### BRASS INSERTS

For superior mechanical strength and repeated disassembly.

#### TRACKING ID

Integrated part numbers and timestamp.

#### LENSES AND OPTICS

Specialized technology and parts.

#### CARBON FIBER PLATE

Advanced materials used for a specific engineering function.



We are proud to make parts that are used in the operating room, launched into space, and contribute to scientific research.

Contact our development team to discuss how we can support your prototyping and manufacturing:  
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