



## Converting Sheet Metal Fabrications to Investment Casting

Larger, thin-walled metal parts yield higher integrity, lower cost

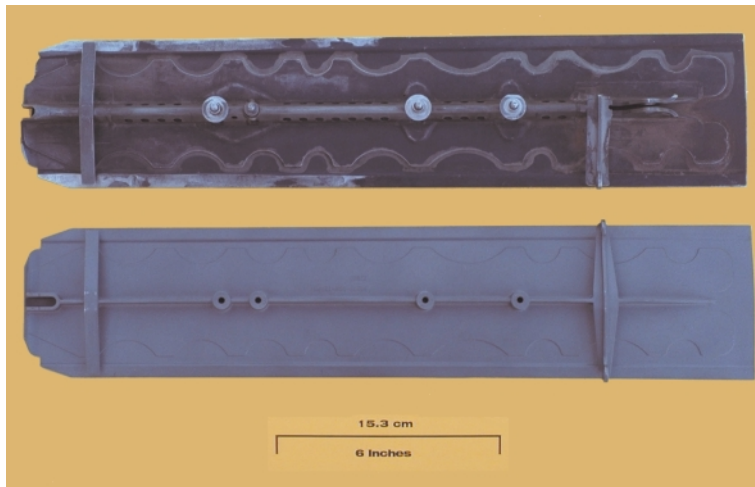
Designers working on fairly good-sized metal parts—ones that would fit, for example, within an 18-inch (457-mm) cube—having walls as thin as 0.015 inch (0.38mm) often think first in terms of sheet metal fabrication. Such designs call for assembling metal sheets by riveting, bolting, soldering, brazing or welding. They are often inherently restrictive, complicated and costly, issues that investment casting can address effectively.

Sheet metal fabrication limits the designer to the relatively small number of alloys that are available as sheets, bolts and filler metal. Lead times to obtain special sheet alloys or dimensions can be long and expensive. The designs normally contain thick sections that have to be incorporated by the assembly method, limiting design freedom still further. If the parts have contours, expensive forming dies are usually required. Parts of a complex shape must be cut or stamped, generating a large amount of waste since the unused portion is discarded. The cosmetic appearance of a welded or bolt assembled part—weld beads or joints featuring a metal overlap for bolting, brazing or riveting—is unappealing. Such joints are often weaker and subject to corrosion due to their differing chemical analyses.

Unlike sheet metal fabrication, Hitchiner's exclusive countergravity investment casting methods can produce thin-walled parts that are not subject to such design compromises, can be designed to almost any shape, are of uniform chemical composition and have no weak joints. Rapid prototyping from CAD files has even

eliminated the need to make casting tooling if only a few parts are required.

Hitchiner has over 25 years of experience using and improving casting processes that are especially capable of making metal castings with walls as thin as 0.015 inch (0.38mm) in production. In fact, Hitchiner can make castings that are as thin, relative to their size, as designers find mechanically useful.

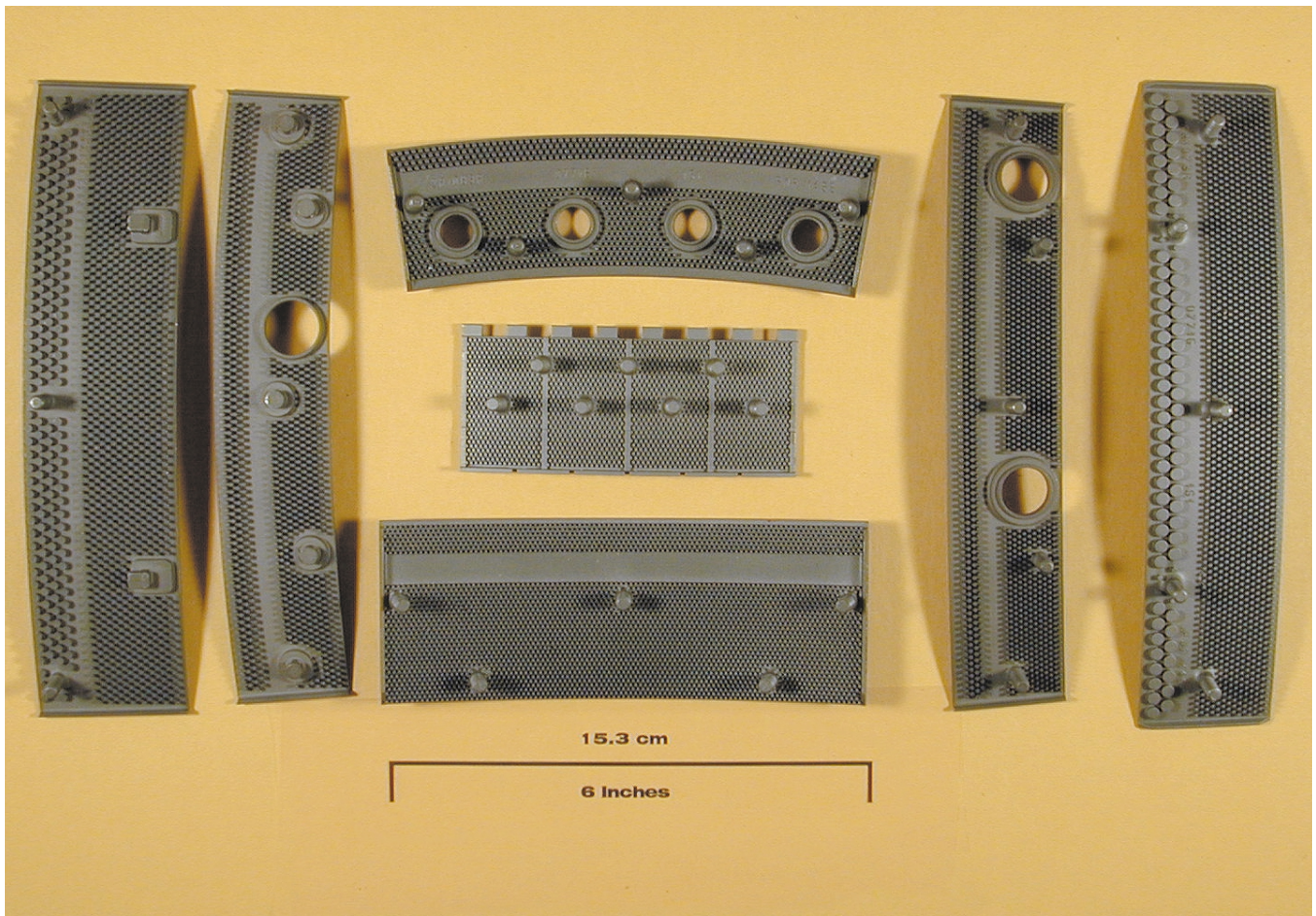


**Figure 1. The original weldment for a jet engine seal (top) compared to its investment cast replacement. The investment cast part features wall thicknesses down to 0.030-0.035 inch (0.762-0.889mm) and offers lower cost, longer service life.**

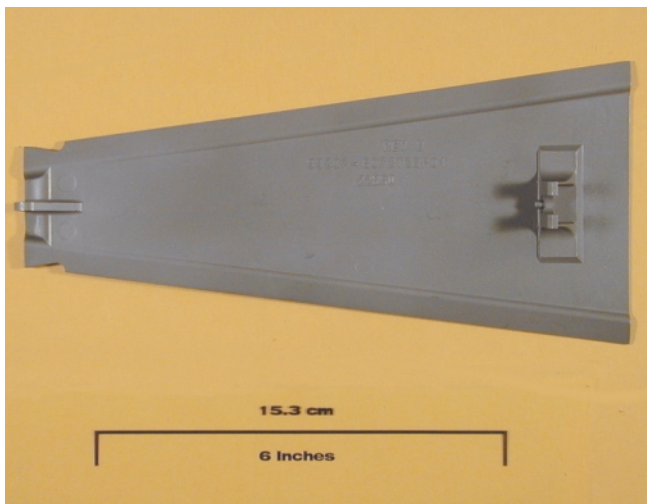
Figure 1 shows an investment cast jet engine seal alongside the original weldment. Figure 2 shows another conversion made by the thousands during the last 20 years. Figure 3 shows a conversion which garnered large cost savings for the customer. Figure 4 shows the wax pattern for a very thin part that was converted to an

investment casting. The new design and process yielded a better, lower cost part with more alloy flexibility. These are but a few of the thousands of casting designs that contain the fine detail, even cutting edges, made possible by Hitchiner's thin-walled capabilities. The company's parts database includes many more.

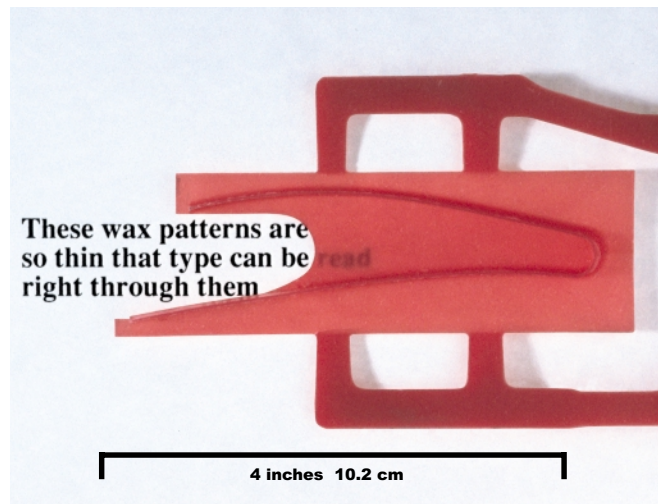
Allow Hitchiner's experienced engineers to review your thin-walled parts to see if our processes can also be of help to you. They will apply their extensive knowledge of metal processing of all kinds, finite element analysis capabilities and can-do approach to objectively evaluating your needs and helping you to optimize your design. You can trust Hitchiner to approach your project with one goal in mind: Helping you get the highest part performance possible at the lowest cost possible when you need it.



**Figure 2.** Jet engine burner can segments feature wall thicknesses down to 0.020 inch (0.51mm). They incorporate fine detail, including cast-to-size bolting threads.



**Figure 3.** Jet engine augments seal features wall thicknesses down to 0.040 inch (1mm).



**Figure 4.** The wax pattern for a jet engine vane shroud with a wall thickness of 0.015 inch (0.38mm).