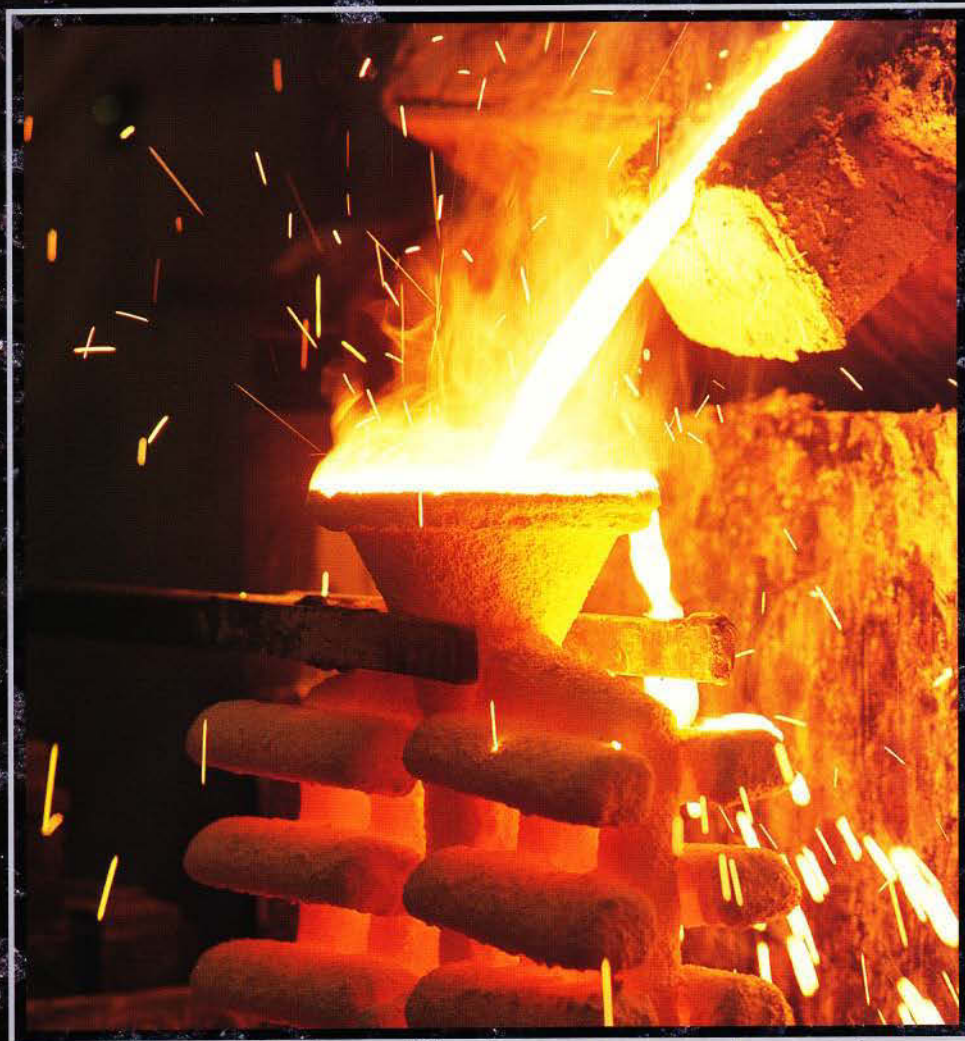


# **HYCAST METALS**

Precision Investment Castings







## The many shapes of success

When you require a special component - for example, one that is difficult to shape or machine; one which would be used in a corrosive atmosphere; one which must have close tolerances, or one which must be extremely hard or tough - then ask about Hycast's state-of-the-art precision investment casting techniques.

The conventional casting processes place severe constraints on a casting's design and surface finish. This often means that the end product frequently requires expensive, and time consuming, additional machining and finishing. Some processes are confined to alloys that melt at relatively low temperatures and high volume production runs.

However, the development of Lost Wax Investment Casting Process, with its inherent "Near Nett Shape", low die cost, and long die life capabilities is responsible for transforming these previous technical constraints into exciting new design opportunities. Opportunities which Hycast has perfected over many years

to give you unprecedented design freedom when compared with other manufacturing methods.

Another valuable benefit is the close dimensional precision which Hycast has developed, using this process. This makes it easier - and cheaper - to produce accurate, complex fine castings. This versatility frequently allows previous sub-assembly components to be translated into a single casting whilst expensive secondary machining operations, such as grinding and drilling, can be either totally avoided or significantly reduced. Components required in "difficult to machine" alloys can frequently only be cost effectively produced by investment casting.

For example, with one customer, we were able to successfully redesign a four-piece fabrication to a superior one-piece "ready to use" investment casting. The final outcome was enhanced integrity, single source responsibility, significant overall cost reduction - and a happy customer!

By constantly seeking to improve upon this exciting technology, we have also increased the level of accuracy and fine detail that can be achieved. It is common practice to reproduce embossing and company logos into investment castings with very little additional once-only die costs being incurred.

At Hycast, we have committed significant resources in combining technology and creativity to perfect the Lost Wax Investment Process. Because Hycast is exclusively dedicated to this unique process we are concentrating all our efforts on being the best. The result, for you, is much more than just an alternative casting

method, but rather a revolutionary manufacturing process. You get enhanced design flexibility and product integrity ... right down to the consistent fine surface finish that this process uniquely offers.

### **Commitment to quality**

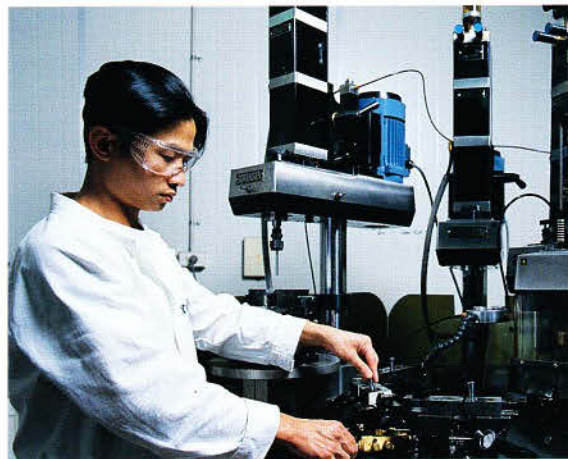
Hycast has adopted a system of quality control procedures which govern every aspect of our company's operation.

This ensures that we:

- Supply products and services which always meet client specifications.
- Add value and quality to products to ensure that customers always receive their goods on time and at the lowest possible cost.



A



C



B

A. Craftsmanship and attention to detail in the manufacture and preparation of the wax patterns are hallmarks of Hycast's dedication to quality and contribute to the near net shape of the final product.

B. Molten metal at temperatures up to 1670°C is poured into the ceramic shell in a closely monitored production process.

C. Constant upgrading of plant and equipment enables Hycast to compete successfully in today's market.



Our state-of-the-art ARL 3460 Spectrometer ensures that the chemical composition of our material conforms to the material specification.



The study of the Metal Micro Structure to determine the conformance of the material.

To us every casting is important





As specialists in the investment casting process, Hycast has the contacts to source the top quality raw materials to ensure our products meet your chemical specification requirements. With our new, state-of-the-art spectrometer, we accurately check the composition of the metal we purchase and supply so you can be assured of specification compliance.

We are renowned for our fine castings and can advise you of the best alloys available to meet your specific application. Our ability to produce quality cost-efficient investment

castings in a broad range of alloys and shapes, means Hycast can effectively handle your requirements. Even small runs can be produced surprisingly economically using this process. Our diverse client list is testimony to our versatility ... from gear box parts for the motor industry to corrosion-resistant valve components for the oil industry, and from delicate lock parts to shower spouts, abrasion-resistant pump parts and North Sea oil and coal drilling components. Import replacement parts occupy much of our production capacity.







## The Lost Wax Precision Investment Casting Process

To produce a casting using the Lost Wax Process a die must first be produced having the final shape of the casting formed in it. This die can either be made from epoxy resin, aluminum or steel depending on the quantity of castings required.

Wax is then injected into this die under pressure, producing a wax pattern for every casting required. These wax patterns are then wax welded onto a standard wax tree.

This assembled tree is then dipped into a ceramic slurry, followed by a coating of fine zircon sand applied using a rain machine. The coating then air dries before additional coats are applied until the mould thickness builds up to approximately 5-6 mm. The finished mould is now placed in an autoclave to remove the wax by steaming.

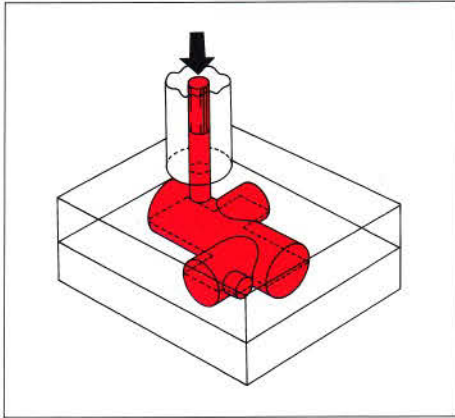
The mould is then pre-heated before receiving liquid metal. When the metal has solidified, the mould material is removed using a vibration technique.

Castings are now removed from the tree, finished, sand blasted and inspected under quality control supervision.

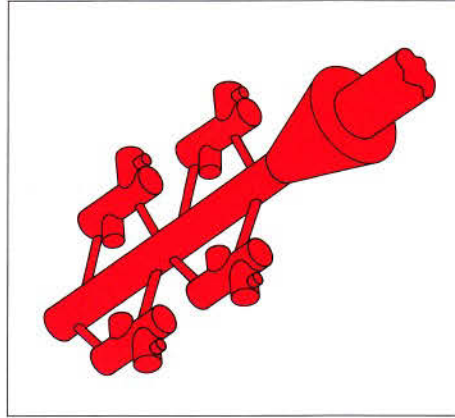
This method of casting is ideal for producing quality components ranging in weight from less than one gram up to 25 kilograms in any metal. In fact, it offers more design freedom and imposes less engineering restrictions than most other manufacturing methods for complex shapes.

At Hycast, we can achieve a consistent surface finish in the order of N8, as well as dimensional tolerances which are generally  $\pm 0.13$  mm per 25mm. As a result, sub-assemblies can be converted into single components thus eliminating expensive and wasteful machining operations.

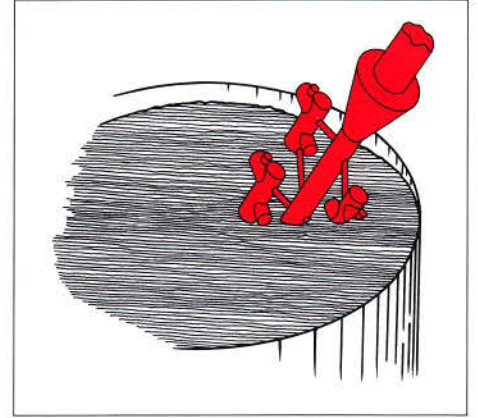
Externally, Investment Castings can reproduce fine detail whilst adhering to metal specifications. The choice of metals includes all plain carbon and low alloy steels, all stainless and heat-resisting steels, nickel and cobalt alloys, aluminum and all copper base alloys.



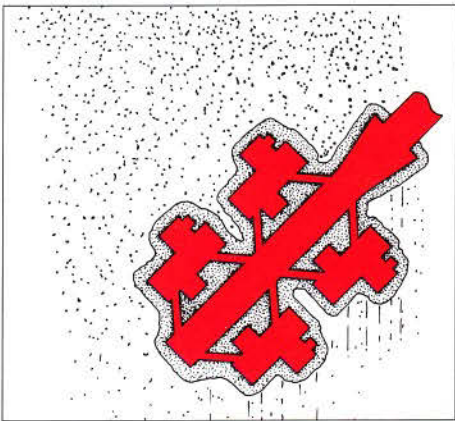
**1 Wax Injection**  
Wax is injected into a die to produce a pattern.



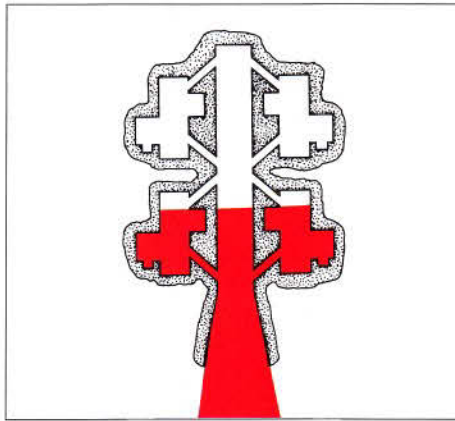
**2 Pattern Assembly**  
Individual patterns are wax-welded onto an appropriate runner system.



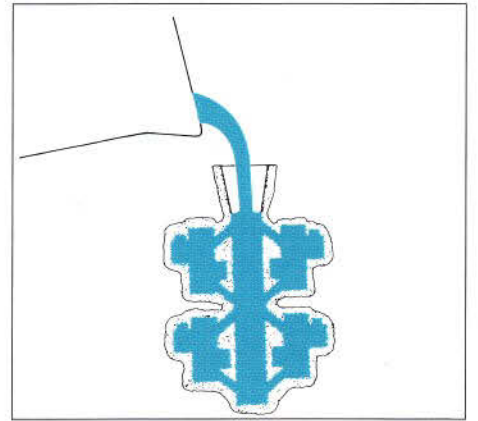
**3 Shell Making**  
The pattern assemblies are dipped into a ceramic slurry.



**4 Mould Build up**  
The slurry on the pattern is consolidated by the application of dry ceramic. This is repeated several times in a controlled fashion to obtain the desired thickness.



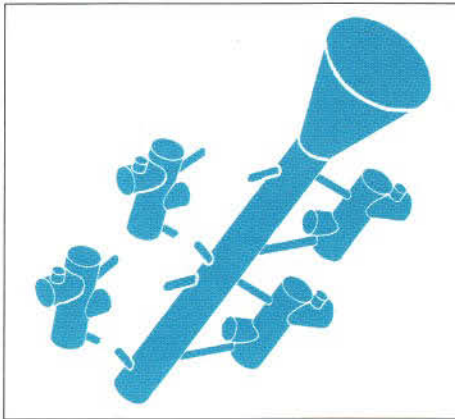
**5 Dewaxing**  
When the build-up is completed, the wax is melted out of the shell.



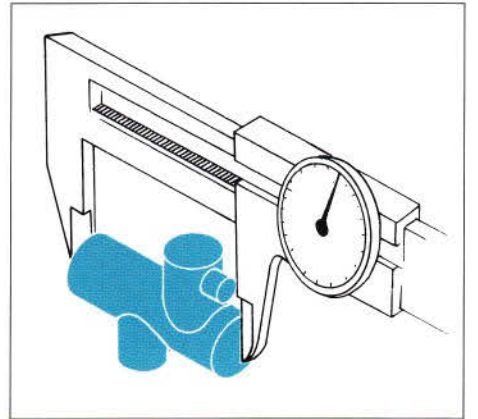
**6 Pouring**  
The shells are heated and filled with molten metal.



**7 Mould Removal**  
The "spent" shell is removed from the casting assembly or 'tree'.



**8 Finishing**  
The castings are separated from the sprue and then the gates are dressed off.



**9 Inspection**  
Castings are checked for dimensional tolerances in the Quality Control Department.



# One cast that won't change

At Hycast, we strongly believe in the value of employing the best, highly specialised individuals with "hands on" experience in the investment casting industry.

You can be sure that we have the expertise to totally understand your specific requirements, before putting forward our technical recommendations. Recommendations based on our experience which, together with your practical knowledge, will result in an end product tailored to your unique needs. In this role we can assist you with alloy selection and advise you how converting an individual component, or several subcomponents, to an investment casting could greatly reduce your overall cost.

Whilst other companies are still using conventional production methods, we are

constantly seeking new state-of-the-art production techniques which can be utilised to produce a superior product and most important, to speed up the production process, so we can reliably continue to meet delivery deadlines.

At Hycast, we take the challenge to stay one step ahead very seriously and that keeps us at the forefront of investment casting technology. So it is probably no surprise to you that Hycast is the largest Australian Investment Casting producer.

Even though the industry is growing more technically demanding every year, our goal remains a simple one - to maintain our position as a reliable, highly innovative company that is bringing you the best in Australian quality and proud to be Australian.



## HYCAST

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*Investment Casting Institute Member*