Integral Castings
Design to Cost
While Improving Performance

Howmet Castings
an Alcoa business
Integral castings save time and money

Howmet's Integral Casting operation is the leader in the production of integrally cast vane rings, turbine wheels (blades and disk cast as one), compressor stators and structural components. The integral casting approach offers design and manufacturing engineers alternatives to the shortcomings of fabrications, because integral castings successfully overcome a variety of cost, cycle time and metallurgical issues.

La Porte Casting's expertise is the manufacture of superalloy compressor stators, integral turbine vane rings, integral turbine rotors, and thin-walled structural components. The foundry gives customers near-net-shape components that require minimal finishing. In this way, our engineers can help your organization meet objectives that include reducing part count, fabrication, assembly, cycle time and cost, while simultaneously improving quality and product performance.

In fact, a single, integral casting, designed as a replacement for a multipiece fabricated assembly, can have a direct and positive impact on many of your organization's product and process improvement targets.

Advanced Shapes. Thanks to broad advances in pattern technology, project engineers can push design limits, pursuing innovations such as these three-dimensional airfoil shapes, which improve compressor performance while reducing part cost.

Datum Machining. This integrally cast compressor stator ships with machined datum surfaces that allow operators to quickly, easily, and accurately set up subsequent finishing operations.

Available Capacity. Dedicated cells, reducing scrap and accelerating the casting processes, have enabled Howmet to slash cycle times by 50 percent, freeing up capacity for additional production.

Dimensional Accuracy. This Coordinate Measuring Machine (CMM) uses the customer's engineering data to make sure the cast component meets all dimensional requirements. The La Porte operation casts parts up to 34 inches in diameter and 20 inches in axial length.
Designers who want to “design to cost” and secure high profit margins for a new product must make effective project management decisions. One of the most effective decisions they can make is to talk to Howmet right from the outset.

Our engineers think in terms of product functions and total systems. This means your organization works with peers who can move you effectively through material, design, and process evaluations. The result is maximum speed and cost-effective investment. Howmet’s process modeling and rapid prototyping technologies help cut development time in half or more, while creating opportunities for design enhancements before committing to hard tooling.

Creating an integrated product development team speeds all selection and validation processes. Howmet has extensive experience with process modeling that assists project engineers in picking the right production strategy and predicting outcomes accurately. Howmet castings are produced using the most advanced, specialized processes, which is why customers benefit from building a bridge between our expertise and their needs right from the start. Our technicians make the greatest contribution to helping your team achieve its goals when we partner with you in the beginning. In this way your company saves precious developmental time and money, cuts production costs and gets to market faster with new designs.

Quantum Leap. Howmet combined a vane ring with a structural component to reconfigure this PW150 inter-turbine vane support from a multipiece fabrication into an integral casting. The result is reduced part count, weight and, ultimately, engine cost.

Reduced Part Count. This exhaust case for a PW150 engine contains an integrally cast bearing housing. Howmet’s advanced pattern making technology enables this component to feature thin wall struts strong enough to support the bearing loads while reducing weight and part count.

Cooling Innovation. The precise dimensional control maintained in the production of this Tangential On Board Insertion (TOBI) component results in exact metering of air onto the turbine disk, effectively cooling the disk and blade roots, while conserving cooling gases. Weight reduction is an added benefit.

Ultra-thin Walls. This Harpoon Missile engine exhaust duct was converted from a sheet metal fabrication to a structural equiax casting with wall thicknesses of less than one millimeter.
You benefit from Howmet's technological integration

La Porte Casting pours dozens of cobalt- and nickel-based alloys. We offer full engineering and R&D support at the beginning of the design process, as well as a variety of inspection, finishing and certification services.

Howmet's commitment to continuous improvement is highlighted by the high degree to which improvement tools such as synchronous manufacturing, Kaizen, integrated process control, Six Sigma and Quick-Shop Intelligence have become a permanent part of the company's culture. These initiatives are driven by customer demands for faster delivery, reduced costs and enhanced quality. As a result of these efforts, typical manufacturing lead time for a production component is four to six weeks or less.

Howmet is a technologically integrated company. This means that the alloys, cores, pattern and waxes, other specialty materials and wax injection equipment are typically designed and manufactured in-house to our own exacting standards. The casting process itself is supported by the most advanced mold making, vacuum furnace, and automated casting production technology in the world – most of it Howmet made. Howmet has advanced coating and machining capabilities which enable the company to offer a “one-stop-shopping” option for customers who want ready-to-assemble components from a single source. In addition, Howmet maintains the largest R&D facility and holds the greatest number of active patents in the industry.

Only one company in the world offers such a comprehensive range of investment castings and casting support services. Only one company meets the highest and broadest range of customer expectations regarding quality, delivery, and cost.

That company is Howmet.

**Cost Advantages.** La Porte Casting has successfully met the cost and life targets for the locomotive turbocharger wheel market. The integrally bladed disk (wheel) offers true life-cycle cost advantages for the major locomotive manufacturers. The Grainex® process greatly improves the cast disk metallurgical properties over conventional equiaxed castings.

**High Volume.** The radial wheel for AlliedSignal's Model 85 engine shown here has improved durability and reliability thanks to superior metallurgy. These benefits are achieved through the cleanliness of Howmet alloys and advanced ceramic controls, which enable the production of castings with fewer inclusions and reduced porosity.

**Mechanical Properties.** La Porte Casting specializes in meeting stringent mechanical-property requirements with Grainex® investment castings. Grainex® castings, with their fine microstructure, can handle higher load factors than parts made using alternate production techniques, and thus offer improved life-cycle performance for many integrally cast turbine wheels.

**Cast-in Features.** This wheel casting for the Abrams Tank engine comes with tip seals – two, 360-degree near-net-shape “rails” on the outer diameter. This feature has two benefits: reduced machining and enhanced engine performance.