

Howmet Castings, An Alcoa Business

Hampton, Virginia



McKinney and Company provided full service design, construction management and project management for plant expansions and improvements to the Howmet Castings facilities, a division of Alcoa, Inc. The entire casting plant area exceeds 700,000 SF including manufacturing space and offices. The plant employed more than 1,200 people at maximum capacity.

Howmet manufactures lost wax castings using titanium and superalloys that are used to produce metal blades for airplanes, fighter aircraft assemblies, space shuttle components and industrial gas turbine blades and vanes. Howmet is the leading producer of complex investment cast turbine airfoils for the industrial gas turbine industry, specializing in the investment casting of equiaxed, MX[®] ultra-fine grain, directional solidification (DS), single crystal (SC) blades, and single and multi-vane segments for Industrial Gas Turbine applications. The company supplies a prestigious list of customers who include ABB, Fiat, Hitachi, Siemens, General Electric, and Pratt & Whitney.

The following projects challenged McKinney engineers to design and develop highly sophisticated systems to support the intricate processes at Howmet.

The design of the **HSC Monoshell 7000 pound Robot** required structural, mechanical and electrical engineering designers to work closely with Howmet project managers and equipment vendors to meet an aggressive construction schedule. The project required the demolition of an existing mezzanine, development of new foundations for the Robot, Stucco Tower and Dip Pot, the design and development of a 20 ft. high insulated panel system, and the design of automatic doorways for the Drying Tunnel portion of the molding process. Critical coordination of all equipment and construction locations was required of the McKinney team to ensure non-interference with the dynamic range of motion of the automated equipment.



Howmet Castings *(continued)*

Additionally, the project involved the relocation and reconditioning of two rooftop Cargocaire units to provide the desiccant conditions (72 deg.F at less than 15% RH) required to dry the molds and the arrangement of (46) 10,000 cfm panel fans in restricted space conditions and in close proximity to the Mold Rack system, which uses an automated, robotic index and retrieval process for mold handling.

The **Chilled Water and Heating Water Capacity and Load Study** involved the survey of more than 80 load points, for comfort and process cooling and direct process equipment cooling applications. The study included the collection and analysis of load and flow data, documentation of existing distribution piping, recommendations and solutions to accommodate future expansions as well as redundancy of service to assure continuous support of critical process conditions. The chiller plant serving this loop includes three 800-ton Trane centrifugal chillers, three cooling towers and a primary/secondary pumping system for loop flows in excess of 5000 gpm.

McKinney on-site projects include:

- ◆ 15,000 SF Chemical Milling building including process design
- ◆ 30,000 SF Direct Solidification Casting addition including process design
- ◆ 15,000 SF Structural Casting Office building
- ◆ 20,000 SF Industrial Gas Turbine Monoshell warehouse
- ◆ 50,000 SF Industrial Gas Turbine Monoshell Addition including process design
- ◆ 25,000 SF Shared Resources building
- ◆ 20,000 SF Wax Room addition
- ◆ 65,000 SF Shell/Gate Removal building including process design
- ◆ 20,000 SF Administration office building
- ◆ 10,000 SF Post Cast Finishing building and numerous other additions and building improvements totaling more than 284,000 SF

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