

## **The Design and Fabrication of Hastelloy® Tanks and Vessels**

In chemical and pharmaceutical processes the working environments experienced by the tanks, vessels, piping and auxiliary equipment is often aggressive (strongly acidic, strongly alkaline, elevated temperatures, presence of halogens or halide ions) and the choices for materials of construction become limited. A&B Process Systems, although renowned for the design and fabrication of stainless steel process equipment, recognized that the stainless steels had limitations and that other alloys and metals, in particular the Hastelloys®, provided more reliable, extended performance in the demanding conditions of many chemical and pharmaceutical processes. A&B therefore has developed the capability to fabricate equipment from these materials, to provide the required corrosion characteristics and mechanical properties. This capability includes the fabrication and installation of storage tanks, mixing tanks, pressure vessels and reactors, which, if necessary, can be custom designed in terms of heat transfer, agitation, CIP integration and accessibility.

The Hastelloys® are a series of nickel-based alloys, incorporating varying amounts of chromium, molybdenum and tungsten. The alloys have been shown to exhibit excellent long-term performance in a variety of chemical processes, e.g., the production or use of acetic acid, sulfuric acid, phosphoric acid and hydrochloric acid. Of particular interest is their corrosion resistance in strongly alkaline solutions. The alloys offer resistance to both localized corrosion (weld zones for example) and stress corrosion cracking, as well as to the general chemical corrosion processes. The Hastelloys® can be used over a wide range of temperature, from ambient to 1500 F, depending upon the chemical environment. The alloys can be fusion welded using gas shielded processes such as TIG and MIG and may be machined, cut or formed by conventional practices. The importance of the design phase of a project should not be minimized. If the design of the Hastelloy® tanks or vessels is required, A&B Process Systems can make available a highly qualified group of engineers. Finite element analysis, a computer-based numerical technique for examining the behavior of engineering structures in terms of stress, vibration and buckling, is routinely used in designing the tanks and vessels.

Should the specifications for the Hastelloy® tank already be defined, A&B Process Systems will provide the fabrication services. The company has four plants with approximately 80,000 square feet of manufacturing capacity. Welder-fabricators and welder-fitters are always available, providing high quality work to meet demanding schedules. A&B's facilities include the necessary ceiling height and crane capacity to allow the fabrication of very large Hastelloy® tanks if required. All the work is completed in accordance with any one of several guidelines, for example FDA, USDA, cGMP, ASME or BPE. A&B specialize in GTAW, GMAW and orbital welding techniques and are ASME certified in each of these procedures. The finished product is extensively visually inspected and hydrotested to ensure the required quality. Interior and exterior weld areas are ground and polished to the specified finish and buffed to remove any discoloration.

A&B Process Systems offers the capability to design and fabricate Hastelloy® storage tanks, mixing tanks, pressure vessels and reactors to meet the particular requirements of the customer. Options such as clean-in-place (CIP) sprayball assemblies, sweep and scrape surface agitators, fixed or

removable baffles, manways and access platforms can be included in the design, together with fully automated control systems. The thermal characteristics of the chemical or pharmaceutical process may require the use of a jacketed tank or the addition of insulation, modifications that are readily completed at A&B's facilities. Efficient heat transfer can be obtained using either dimpled surfaces or "half pipe" designs, again fabricated from the Hastelloys® as necessary.

For 30 years A&B Process Systems has been designing, fabricating and maintaining process equipment, working with stainless steels and specialty alloys. The company has plants that are ASME certified and renowned for the quality of workmanship. It can be stated without fear of contradiction that "A&B has dedicated resources for testing equipment and a team of trained QA/QC professionals to ensure that standardized processes and procedures are followed and all documentation completed.