



# MUSTANG'S VESSEL ENGINEERING AND DESIGN DEPARTMENT – CREATORS OF VIPs

**T**here are VIPs, and there are VIPs. Mustang's Vessel Engineering and Design Department has both! It has been operating within the company for almost 15 years, starting as one person needed to support certain project requirements, growing to a current staff of 30. Its need to expand became increasingly evident with the formation of the Process Plants Group in 1996.

While the Vessel Department's experience covers the full range of upstream, downstream, and midstream projects, one of its strengths is its engineering and design of Fluid Catalytic Cracking Units (FCCU). Within the past nine years, they have completed 10 FCCU projects with three ongoing jobs, establishing itself as one of the industry's most significant players. Mustang's Vessel team, led by 15-year Mustanger Frank Traina, has become renowned and has gained the confidence of both clients and process technology licensors for their technique and results.

The processing of hydrocarbon fluids and petrochemicals

requires multiple vessels of assorted types, sizes, configurations, design complexity, and metallurgical makeup. In addition to being called vessels, they are also known by different names – tanks, reactors, towers, and columns, just to mention a few. Vessels operate in either onshore or offshore applications and are integral to processes that often run under extreme temperatures and high pressures. Whether a process involves reaction, regeneration, treating, distillation, separating, filtering, coalescing, drying, extracting, storing, or a multitude of other functions, Vessel Engineering & Design will play a significant role.

## Using Sophisticated Software

The group has developed its own proprietary integration program – VIP (Vessel Integrator Package) – taking output data directly from the ASME code calculations to create automatic scaled engineering drawings. The VIP program provides an opportunity for schedule improvement. Its consistent format presents design data in an easily recognized pattern, for use by designers of



all Mustang disciplines. To be effective, the Vessel Department must be proficient in the latest and most effective industry software. The team utilizes cutting edge techniques provided by the most powerful software packages available.

### **Early Design is a Key – Making Our Vessel Group Different**

The Vessel group operates differently than most vessel departments within competitive engineering companies. Rather than relinquishing the vessel design to vendors, Mustang's vessel engineers are adroit at pre-designing vessels based on initial process engineering parameters, outlining the needed capacities, sizes, and required metallurgy. Design principles are used to develop wall thickness, support, nozzle, and internal details, as well as stiffening and reinforcement. Appendages, including ladders and platforms, are additionally incorporated into the design scope. In preparing the engineering drawings, the department's efforts enable Mustang's piping, civil, and structural designers to proceed with project design without waiting for vendor drawings. Mustang's engineering drawings allow multiple vendors to accurately bid on the same work which results in expedited major material procurement. On the majority of projects, the Mustang-issued vessel engineering drawing, rather than vendor data, acts as the controlling document for the project.

Value-added benefits emerge with this unique early design approach. There are fewer changes, risk of rework is minimized, less coordination is needed, manpower is reduced, and redundancy is all but eliminated. Most importantly, the procedure has been proven to improve the overall project schedule and speed up construction by months.



As a project progresses, the

team follows the work in the vendor's shops and continues its interaction with all the other design disciplines. There is a close interface with purchasing, making certain that all specifications are considered and that the most capable vendors accurately bid the project. Similarly, as the work unfolds, Mustang's Project Vessel Lead Engineer works closely with shop inspectors to assure that the vessel is fabricated and tested according to industry codes, as well as client and Mustang specifications.

### **Handling Complex Projects Is Strength**

While much of their work is revamp-oriented, with clients attempting to boost plant capacity, the Vessel Department also tackles grassroots projects of varying complexities. A recent delayed coker project is an excellent example. In this hydrocarbon thermal cracking process fuels are fractionated in a furnace, with heavier liquids converted to coke in a special 20+ foot diameter drum standing more than 100 feet high. This unique vessel had to be intricately designed. Special engineering criteria had to account for an uneven temperature profile, severe expansion and contraction, and varying stresses. It is just the kind of project that allows Mustang to fully demonstrate its capabilities.

Upstream projects also have complex and unique challenges. Vessels for deepwater offshore floating production facilities must be



designed for varying motions. The department has the needed expertise to design vessels and their supports to withstand topside movements.

### **Consultants for Providing Solutions**

The department is often called upon to be the technical solutions provider for other Mustang disciplines. Its experience with FCCU temperature profiles and stress analysis has positioned them as Mustang's "go-to guys" for finite element analysis projects and for addressing weld compatibility issues.

Its assessments are based on vast knowledge, fabrication experience and application of ASME and other industry codes and are compiled in detailed reports for use by the client or other Mustang design disciplines. They are also developing the detailed design for Mustang's Midstream Business Unit's proprietary LNG Smart® Tanks for liquefied natural gas re-gasification.

### **Building for the Future**

Vessel Engineering and Design believes in the Mustang philosophy of teambuilding and keeping an eye toward its future. It has built strong project teams with a mix of highly experienced designers and engineers coupled with talented young Mustangers. The department has fully supported the Young Guns effort at Mustang and is actively mentoring to provide a unity of purpose and



solid results.

Several of its members speak at ASME meetings, sharing their knowledge with peers and promoting its capabilities. The results of its successful projects have further provided a positive exposure for the department. Many clients use the team repeatedly and, with a growing reputation for quality and ingenuity, the innovative group is also attracting project work independently of other Mustang projects. In a tight job market, the Vessel Department continues to grow with the addition of experienced personnel who are eager to work with the best team in the industry. The employment of top technical resources, an extensive knowledge base, an empowering work environment, a solid project execution plan, and a reputation for consistent quality and performance have all proven to be the keys to success for Mustang's Vessel Department.

