RMB PRODUCTS

White Paper

From Design to Assembly: How Full-Service Vessel Fabrication Enables Enhanced Corrosion Resistance for Chemical Applications

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Chemical applications are hard on process equipment. Vessels and piping are constantly battling corrosion, abrasion and different forms of operational wear, all of which can lead to damage and premature structural failure.

Vessel liners are one method of providing corrosion resistance. Once engineers decide that they need a new process vessel with a protective lining, often they request two proposals, one for fabrication and one for lining. They may not be aware that some suppliers can both fabricate and line. Giving the project to one full-service supplier instead of multiple vendors has many advantages.

REDUCED RISK OF A COMMUNICATIONS ERROR

As with design engineering, the goal of vessel fabrication should be to reduce the points of potential failure. Perhaps the poster child of miscommunication and finger pointing happened in 1999 with the Mars Climate Orbiter. The navigation team at the Jet Propulsion Laboratory used the metric system in its calculations, while the spacecraft builder provided data in the English system. The spacecraft accelerated into the Martian surface. The more parties involved, the greater the chance that something will get lost in translation.

When a single vendor has visibility into the entire chain of manufacturing, there are fewer opportunities for miscommunication. For example, RMB assigns a team to each project led by a single project manager. The project manager knows the details of each step of the process from start to finish, covering design, approvals, raw material, fabrication, inspection, lining, testing, coating, and shipping. If any step is delayed (or accelerated), then immediately the manager can adjust the rest of the schedule, get needed information and approvals, and communicate to everyone. This approach stands in contrast to having multiple emails and calls between multiple suppliers and the purchaser, each one an opportunity for misunderstanding—if the communication happens at all. In addition, the purchaser benefits from having one point of contact, spending less time getting information and status updates, and having one party be accountable for the entire project.

LOWER FREIGHT AND HANDLING COSTS

A single-vendor solution usually means there is only one shipment: from the fabricator to the customer site. When different vendors handle different steps of equipment fabrication, lining, and coating, then the vessel must travel by truck multiple times. According to DAT Trendlines, the average cost of flatbed shipping per mile was $3.11 in July of 2021. The miles add up with each trip. On top of cost comes shipping time, which adds days to a delivery schedule. In the meantime, processes may stay down, or new systems may not start until a properly lined vessel is in place. Finally, each time the vessel is handled presents a risk of damage by scratching and dropping.

PROPER DESIGN

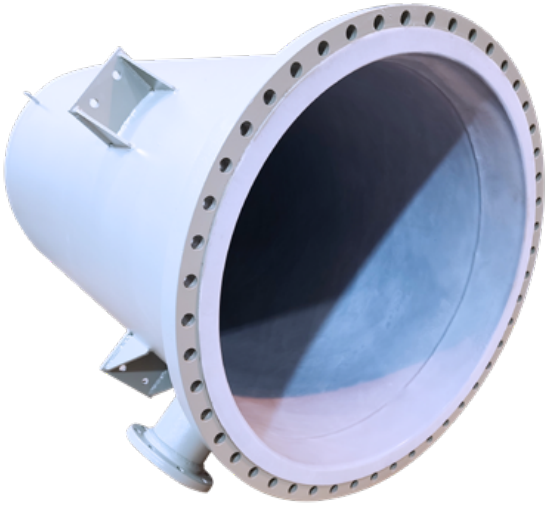
The fabricator must understand how to design the vessel so that it will be compatible with the lining process. The tolerances required are more stringent than those required in typical fabrication. Root welds must be ground, and sharp corners must be curved off. If the fabricator also specializes in lining, then managers should have confidence that the design will be correct.

A good example is an RMB project for a pollution control scrubber. The vessel was made of an FRP (Fiberglass reinforced) epoxy and a 150-mil corrosion barrier-liner.

Engineers at RMB knew that the new design could not simply follow the drawings of the existing vessel. The internal dimensions of FRP vessels are usually at the nominal dimension or larger, and rotolining reduces the internal dimension by the thickness of the lining. Rather than use a standard 18-inch pipe as the substrate, RMB custom-rolled and welded carbon steel into a pipe with an internal dimension of 18.375 inches yielding a post-lining ID of 18.0 inches. Then, to match the inherent corrosion-resistance of FRP, RMB coated the exterior with primer, epoxy, and polyurethane.

Tanks with glass linings also require rethinking. A silicon manufacturer asked RMB for a quote on replacing their glass lined tanks. The engineers estimated that the weight of each tank was about 8,000 pounds. Glass linings require thick metal walls to support the lining. Switching from glass to an ETFE rotolining enabled engineers to reduce the weight by 2000 pounds. Also, they replaced the clamped flanges required by glass lined vessels with ANSI flanges.

A full-service provider, one with experience in both fabrication and lining, has the expertise to design vessels that can be successfully lined, and in some cases, improve the design as well.



TRANSACTION COST CONTROL

Each transaction with a vendor takes time… setting up a vendor in an accounting system, completing transactions, managing the relationship. The Institute of Finance and Management estimates that processing an invoice can cost up to $21 in labor. Having one supplier both fabricate and line your process vessel will reduce the number of transactions and lower costs.

Vendor reduction is a common strategy used to control costs. By giving a supplier a larger dollar order, it gives the purchaser more leverage on price and delivery.

By the way, vendor reduction leads to stronger vendor relationships, because vendors get to know the purchaser's systems and preferences, and because the parties build trust with each other.

RMB'S FULL-SERVICE APPROACH TO CHEMICAL VESSEL FABRICATION

No matter what your lining and coating needs are, taking a systematic approach to chemical vessel fabrication can help you get better parts, faster. Rather than have one manufacturer create the vessel and then another one line it, having a single manufacturer handle the full process of vessel fabrication and lining leads to longer-lasting process equipment.

That is why RMB offers a full-service approach to chemical vessel fabrication. More than just the liner, the RMB team offers a total product solution for rotolined tanks, handling everything you need for full-service fabrication. Here is a look into RMB's 10-Step Vessel Fabrication process:

1. Selection and Design
Starting with the overall design of a part, RMB creates equipment tailored to the requirements of a system. This begins by better understanding the application and what temperatures, chemicals and other process conditions the design must work under.

RMB is a qualified ASME Section VIII fabricator and will guarantee that all designs are up to date on regulations and applicable codes. With detailed experience across all chemical applications, RMB is a trusted consultant for addressing specific design issues related to the chemical industry.

2. Revisions and Customer Feedback
After selecting an initial design, RMB works with customers to ensure that all of their desired features and design components are incorporated into the design. As a single provider for full vessel fabrication, RMB offers the flexibility to make design changes before moving on to production.

3. Fabrication and Manufacturing
RMB has the manufacturing expertise and the right tools and machines to create whatever design you need. RMB's fabrication process is supported by CAM (computer aided manufacturing) development. Since everything is being done under one roof, parts are designed both for manufacturing viability and lining/paint convenience.

4. Inspection and testing
Non-destructive inspection using radiography is the only way to see inside of welds. RMB can also perform dye penetration tests on vessels. As a standard, RMB will perform Holiday spark testing on linings to verify there are no gaps in coverage.

5. Certification
RMB offers both ASME vessels and non-stamped equipment, ensuring that products are properly specified for their application. If any certifications are required, RMB will design and fabricate the vessel for compliance. For ASME Section VIII certification and National Board registration, an ASME Authorized Inspector will ensure all requirements of the code are met.

6. Lining
As the original manufacturer of the vessel, RMB can seamlessly line your equipment. Our rotational lining technology offers several operation benefits, including:

- Seamless bonding
- Leak-free designs
- Higher structural integrity
- Easy maintenance
- Improved operating temperatures
- Enhanced corrosion and abrasion resistance
- Thicknesses of up to 0.500”

7. Quality Control
Once the vessel is properly lined and fabricated, RMB makes certain to put the part through a thorough quality control process. This includes checking the lining for impurities such as bubbles and performing Holiday spark tests.

8. Painting and Anodizing
When dealing with a full-service provider, you will not have to go to another manufacturer to finish your part. RMB provides tailored painting and epoxy coating of vessel exteriors to fit your specifications.

9. Post-Production Assembly
Since RMB designed and created everything that went into your vessel, it is a seamless process for RMB technicians to handle post-production assembly. Additional accessories, fittings and brackets are available on request.

10. Shipping
While shipping is often not top of mind for many manufacturers, it is a critical step to getting your equipment. When not prepped correctly for shipping, tanks and vessels can get damaged in transit, pushing back timelines even further. RMB provides saddles and support constraints so that the equipment does not move around on the truck, ensuring that it ships in a safe and reliable manner.

RMB OFFERS FULL-SERVICE VESSEL FABRICATION FOR ANY APPLICATION

As a custom fabricator, liner, and topcoater, RMB can help ensure your equipment meets the demanding requirements of even the toughest chemical applications. From the initial design to the final assembly, RMB can deliver a fully lined vessel, without all the back and forth of dealing with multiple manufacturers. That way, not only can you get corrosion-resistant equipment quickly, but also with a quality that a single, full-service provider can offer. Visit our website today at rmbproducts.com.