HYPERTHERM ASSOCIATES®

SHAPING POSSIBILITY®

Transform Shipyard Fabrication

Modernize cutting, gouging, and beveling for better weld prep

To stay competitive, shipyards are replacing outdated methods with advanced technologies that deliver higher precision, faster throughput, and lower operating costs.



Overview

As fabrication grows more complex and global competition intensifies, shipbuilders face labor shortages and aging production methods. Leading shipyards are modernizing cutting, gouging, and beveling with advanced plasma cutting solutions—and increasingly exploring waterjet for new precision-driven applications.





Barriers to Fabrication Transformation

Across the shipyard, work with leading builders shows clear opportunities to transform fabrication by eliminating non-value-added steps and replacing outdated methods such as manual carbon-arc gouging and oxyfuel cutting. Excessive handling and legacy processes slow production, while advanced plasma systems and modern motion platforms boost throughput, improve quality, and reduce costs.

Safety Risks

- Ergonomic strain and eye injuries from vibratory grinding equipment
- Fires and asphyxiation from oxyacetylene cutting
- Fumes generated during cutting and welding

Skilled Labor Availability

- Difficulty finding, training, and retaining employees
- Perception among younger workers that shipyard work is difficult or unsafe
- Long hiring and training cycles increase costs and accelerate the need for automation

Material Handling

- Low utilization of capital equipment due to loading and unloading time
- High coordination demands and investment requirements for overhead cranes
- Challenges positioning, aligning, and fitting subsections

Distortion

- Angular and buckling distortion from welding, gouging, and cutting heat input
- Excessive rework required to correct warped or misaligned components
- Degraded structural integrity and poor aesthetics in finished assemblies

Secondary Operations

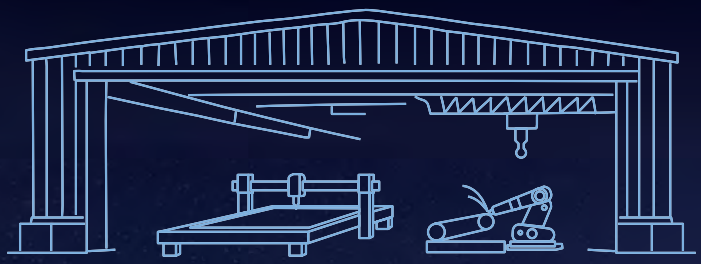
- Labor-intensive bevel cutting, grinding, and rework
- Increased risk of accidents due to manual, repetitive tasks
- Reduced productivity and higher overall fabrication costs

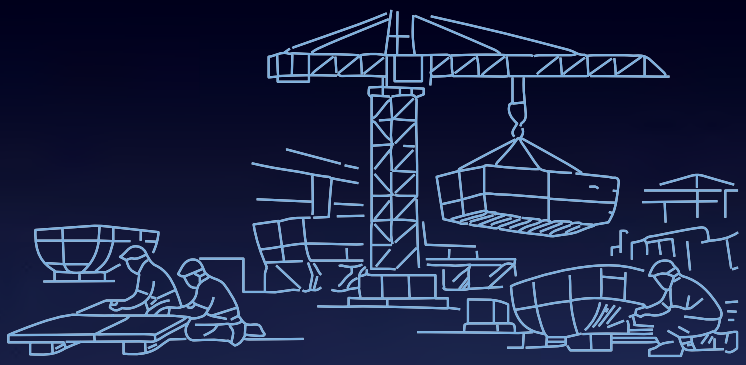
> **Modern shipbuilding demands new tools, new processes, and a commitment to continuous improvement.**





Modernizing Shipyard Fabrication for Better Performance





Cutting and Pipe Shops

CHALLENGES: Cutting flat plate, pipe, and tube can create bottlenecks, waste, and rework when producing accurate bevels and holes is difficult. Work often shifts downstream to less-ideal methods, increasing handling, distortion, and fit-up.

SOLUTIONS: Modern plasma cutting systems and CNC software are proven solutions to improve bevel-cut accuracy and hole quality at high speeds. When it makes production sense to perform off-table bevel cuts using industrial robots, cobots, or tractors, then the versatility of mechanized plasma systems, coupled with offline robotic programming software, reduces the reliance on scarce skilled labor. Waterjet cutting is increasingly used for prototyping and specialty low-volume parts, offering new opportunities for cleaner, distortion-free edges.

IMPACT:

- Less distortion and rework
- Reduced dependency on skilled labor
- Products that are intuitive and easy to train/operate
- Faster throughput and operational versatility

Yard Area

CHALLENGES: Traditional cutting and gouging methods, such as oxyfuel and carbon arc gouging, are slower and require more heat input, contributing to distortion and significantly affecting downstream operations. They are typically slower and leave a rough surface finish requiring more grinding to prep for welding.

SOLUTIONS: Replace oxyfuel and carbon arc with modern plasma cutting systems for handheld or mechanized cutting and gouging. Designed for application versatility, plasma systems can be conveniently integrated into a variety of motion platforms (e.g., tractors, robots, and cobots) to deliver higher-quality, near-weld-ready surfaces.

IMPACT:

- Higher speeds resulting in less distortion and rework
- Improved safety – less noise and fume emissions, and use of oxyacetylene
- Ability to automate distances operators further from related hazards

Across the value stream, outdated methods—manual carbon-arc gouging, oxyfuel cutting, and excessive material handling—slow fabrication and add unnecessary labor. Through on-site work with leading shipyards worldwide, we've identified clear opportunities to modernize these applications, streamline production, boost productivity, cut costs, and improve safety.



Drydock Area

CHALLENGES: Manual layout, cutting for fit-up, ports, doors, access holes, and edge prep are time-consuming. Removing temporary attachments (lifting lugs/eyes, studs) requires heavy grinding and skill to avoid damaging base metal. Carbon arc backgouging creates noise, fumes, debris, and carbon contamination—adding cleanup and grind time before welding.

SOLUTIONS: Plasma systems offer application versatility for marking, cutting, and gouging with one system. These systems can be operated effectively with handheld torches, machine, or robotic torches for additional productivity gains through automation.

IMPACT:

- Faster time to weld from fewer secondary operations
- Less risk of base metal damage during attachment removal
- Technology that is safer and more ergonomic to use



Dock Area

CHALLENGES: Returning ships with damaged metal and fatigued welds require quick cutting or gouging without damaging the surrounding area or equipment. Access holes need to be cut cleanly so hull inspections can be performed, then the hull restored.

SOLUTIONS: Plasma system portability and versatility allow the equipment to be located where the work needs to be performed with precision. Cutting and gouging can be performed manually or semi-automatically using a tractor or a cobot.

IMPACT:

- Faster repairs with less distortion
- Ability to semi-automate for more accurate results
- Cleaner results with less slag, minimizing secondary operations

Solutions for Transforming Shipyard Fabrication

Hypertherm® plasma and OMAX waterjet systems are increasing productivity and profitability in shipyards and marine construction plants worldwide. From the largest cargo vessels to submarines to recreational craft, our technologies support every phase of fabrication and repair—delivering safer, higher quality cuts and gouges for more efficient welding, tighter fit ups, and more predictable performance.

Cutting and Pipe Shops

Flat Plate XY Cutting & Beveling

Hypertherm XPR® plasma delivers high definition cut quality and faster cutting speeds, driving major productivity gains and lower operating costs. With EDGE® Connect CNC and Phoenix® software, operators get a consistent, streamlined workflow across plasma, oxyfuel, bevel, and laser processes. ProNest® nesting software adds automation that boosts efficiency and profitability.

Off Table Bevel Cutting

Producing accurate bevels on an XY table is slow and often inefficient, creating bottlenecks, scrap, and rework. Shipyards are accelerating production by bevel cutting off the table with Hypertherm Powermax®, MAXPRO200®, and XPR plasma systems. Booms, manipulators, carriages, and tracks handle long bevels. At the same time, robots and cobots excel on shorter cuts—adding flexibility and enabling part loading, marking, grinding, layout, and welding within a single cell.

Switching from oxyfuel to plasma for off table beveling delivers major time savings. Plasma cuts 12 mm (½") parts up to four times faster. It's cleaner, higher quality edges reduce grinding, rework, and material handling—resulting in higher throughput and a more productive workflow.

Robotic Cutting

For 3D cutting on domes, beams, and pipe, Hypertherm XPR, MAXPRO200, and Powermax systems give robots and cobots a clear edge. Purpose built lead sets and torches provide flexibility, heat protection, and seamless cell integration. Powermax SYNC® adds single piece cartridges with RFID intelligence for automatic setup and reduced downtime. Robotmaster® software embeds Hypertherm cutting expertise to program complex workflows faster and run them more efficiently.

Prototyping & Specialty Cutting

OMAX waterjets are a strong fit for shipbuilding because they deliver precise, heat free cutting across a wide range of materials without slowing production. Waterjets use cold cutting to eliminate the heat affected zone, which keeps parts accurate from prototype through full production, including specialty work across nearly any material such as composites, armor plate, and non-conductive and layered structures. Built for real shop use, OMAX systems are easy to run, fit cleanly into shipyard workflows, and allow quick changeovers without slowing production or adding extra setup steps.





Yard Area

Backgouging for Weld Prep

For full penetration welds, plasma backgouging is a faster, cleaner way to remove the root pass. High amperage XPR mechanized solutions produce superior gouge profiles, reducing weld prep time and improving consistency. With specialized consumables and application specific torches, plasma backgouging is easier to automate than CAG—whether on carriages, tracks, robots, column and boom systems, or an XY table with a bevel head.

A shipyard in Asia replaced manual CAG with a Hypertherm plasma system on its panel line, producing cleaner gouges that required far less grinding. Automating the process improved weld quality, increased throughput, and significantly enhanced operator safety.

Weld Repair and Removal

When welds fail inspection, handheld plasma gouging with MAXPRO200 and Powermax makes removal faster, cleaner, and safer than carbon arc, oxyfuel, or grinding. Specialty consumables and ergonomic torches help operators quickly remove poor welds and return to production.

Drydock Area

Attachment Removal & Skeleton Cutting

Shipyards rely on MAXPRO200 and Powermax systems—along with FlushCut™ consumables—to quickly remove lugs, pad eyes, and studs without damaging the base metal. Operators cut close to the surface, slash grinding time, reduce distortion, and enable reuse of attachments. For skeleton removal from XY tables, long reach torches keep operators clear of hazards while improving ergonomics and safety.

With oxyfuel, CAG, and grinding, operators often leave extra material to avoid damaging the base metal—then grind it off. Using Hypertherm plasma with FlushCut consumables, one shipyard reduced grinding time by 40% when removing lugs, thereby boosting productivity and reducing grinding related injuries.

Bulb Flat & Stiffener Cutting

Cutting bulb flats for hulls, decks, and bulkheads is faster and more consistent with handheld or cobot assisted plasma. A magnetic base cobot dramatically reduces cut time and improves cut quality—setting up cleaner fits and enabling automated welding downstream.

Trimming in Final Structural Assembly

Final assembly demands constant cutting, marking, and gouging across the ship. Powermax plasma systems eliminate the need for flammable gases—and the fire watch labor that comes with them—while improving safety and mobility. With multiple torch and consumable options, operators can cut any conductive metal faster, more safely, and with better results than legacy methods.

Dock Area

Hull Access Cutting

For repair and refurbishment, Powermax plasma is the go to tool for hull breaching thanks to its portability and flexibility. Whether handheld or robotic, it delivers fast, clean access cuts. Paired with a cobot, operators get consistent, high quality openings—and can use the same setup to weld the plate back on when the job is done.







Leading the Industry

Hypertherm Associates is embedded across the world's most demanding industries — from aerospace and agriculture to energy and infrastructure. Hundreds of thousands of businesses rely on our people, brands, and technologies for the performance, reliability, and productivity gains that keep advanced manufacturing moving. That's why companies trust us to build ships, airplanes, railcars, steel structures, heavy equipment, wind turbines, and more.

Innovation That Moves Shipyards Forward

Hypertherm Associates delivers industry-first solutions that raise cut quality, productivity, and total cost performance, including:

- **High-amperage mixed-gas gouging** for fast, clean metal removal
- **Single-piece cartridges** deliver higher output and cut quality, while reducing costs
- **Proven cut settings** across tables, pipe/tube machines, robots, and cobots
- **Arc-bending FlushCut™ technology** cuts lifting lugs up to 90% faster and reduces grinding time by up to 40% compared to oxyfuel

HYPERTHERM®
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OMAX®
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Explore Advanced Cutting Solutions for Shipyards

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