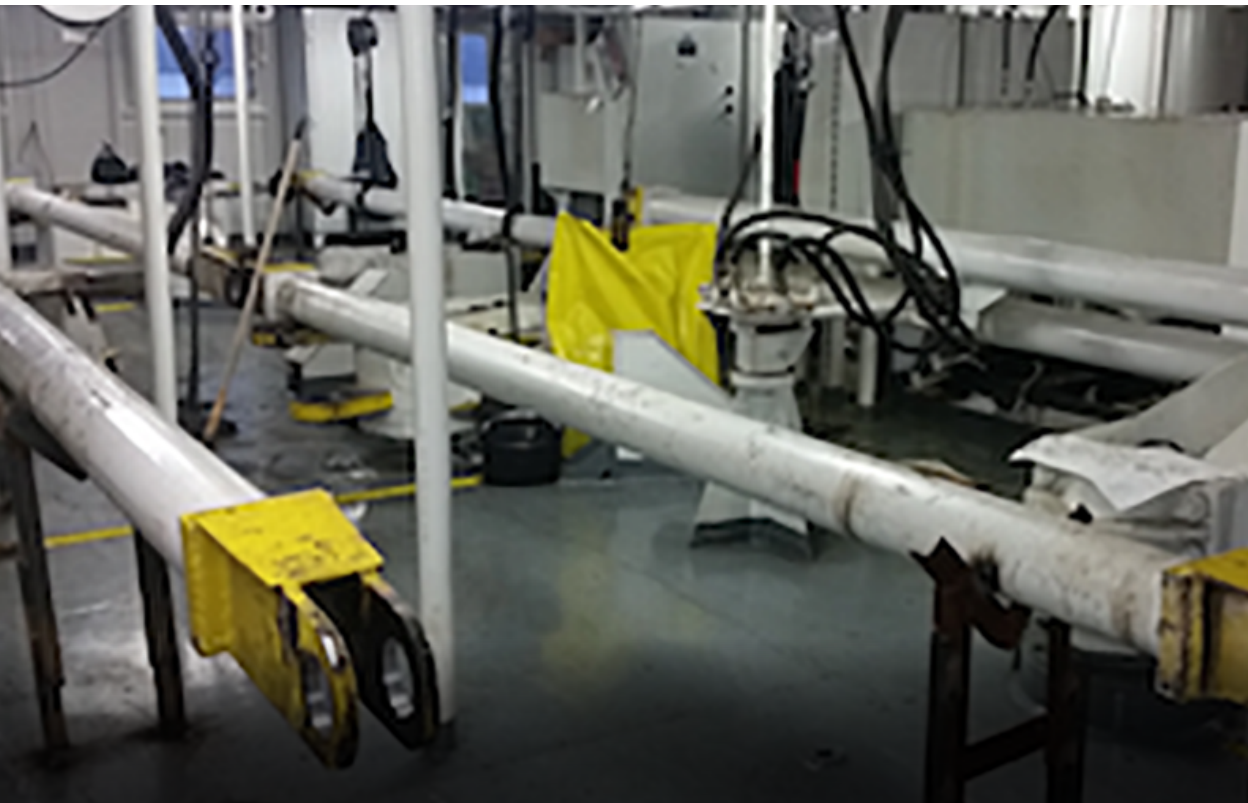


Case Study

INLAND RIVER
TOWING COMPANY

Project Description

..... Complete a steering system overhaul on a lower Mississippi triple screw towboat by totally replacing hydraulic power units, piping, dead ends, hydraulic cylinders, and quadrant modifications, as well as machine all quadrant and jockey bar bushing, bores with pin replacement. The new linkage system will be completely greaseless when the project is completed. The steering system consists of three steering quadrants, six flanking quadrants, two, dummy flanking quadrants and associated jockey bars.



Mactech's Role in the Project

- Line bore all bushing bores for quadrants and jockey bars and machine and install new greaseless bushing material.
- Also, manufacture new wear rings for jockey bars and new pin keepers. Assemble complete steering system and install new pin keepers.

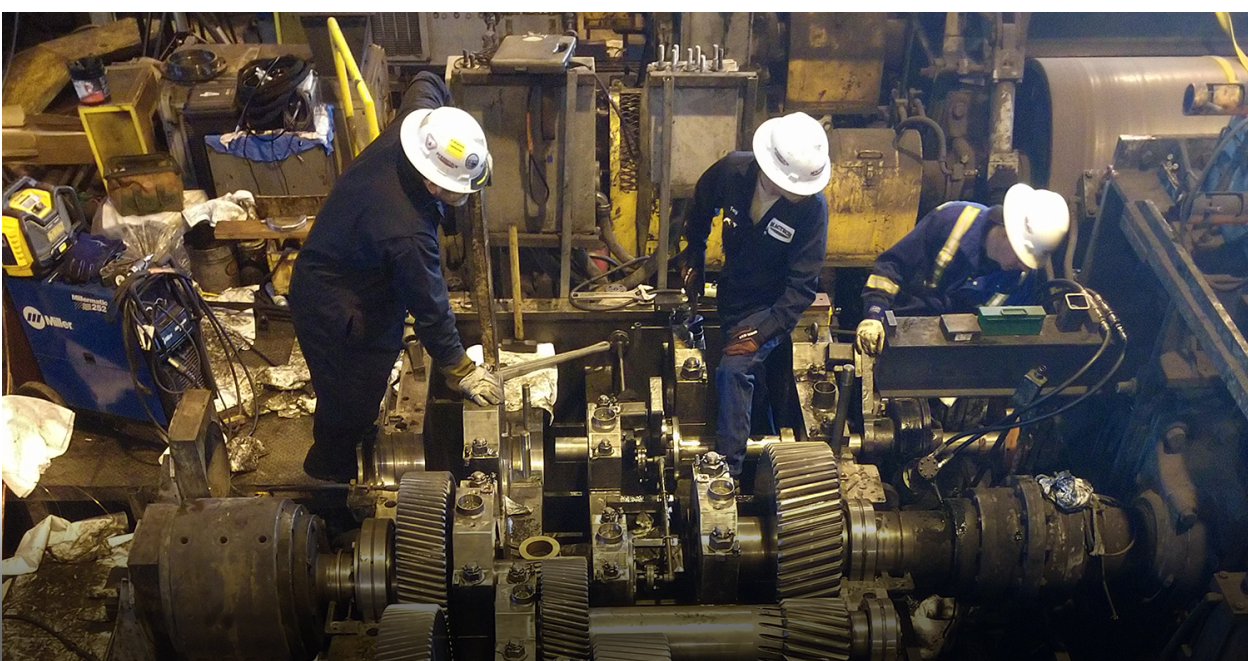
Mactech's Value Added to the Project

- Mactech has the proper tools, experience, and processes to complete the job in place without removing all the steering components from the boat. Mactech had a complete understanding of how this steering system works and what the customer was trying to accomplish.

Alternative Methods Considered

Remove all the steering components from the boat and transport to a shop for the machining. The steering components would then have to be transported and loaded back onto the boat for reassembly. This would require much more man hours and assets than completing the machine work in place.

Performing the machine work in place also allows you the ability to machine the components in operating position and maintain tighter clearances between bushings and pins.



Steps to Job Completion

1. Measure and record all as found bushing data and provide to the customer
2. Mock up steering linkage in operating position
3. Line bore all bushing bores to a common size
4. Manufacture new bushings to proper sizes and clearances
5. Install new bushing into quadrants and jockey bars
6. Manufactured new wear plates for each pin joint
7. Assembled the steering system complete
8. Manufactured and installed new pin keepers on each pin
9. Provide end user with report of bushing sizes and clearances



Challenges & Advantages



Flanking quadrants were very close to the floor and allowed for a limited space for machining all with welding, electrical, and machining work happening simultaneously in a small area.

Every bore in system had to be machined to a nominal size $+.002/-0.002$.

Mactech equipment is very flexible and works well in difficult spaces with innovative fixturing.

The company's unique processes of controlling bore sizing were essential over the duration of the project.

Good planning, staging, and communication to accommodate other craft working in the same area added to the success of the project.

Equipment Used



- BB2250 line boring package with 48.00" bar
- BB1750 line boring package with 60.00" bar
- Flexible modular fixtures to overcome tight clearance areas
- Custom dummy pins for system mock up
- Tooling kits specific for steering system
- Portable welding machine

Important Job Statistics



- Line bored (52) holes to nominal sizes $+.002/-0.002$
- Manufactured (52) new bushing
- Manufactured (28) new wear plates
- Manufactured (15) new pin keepers
- Maintained average .004" bushing to pin clearances in the entire system

Number of Bores and Sleeves Installed



- 52 bores
- 52 sleeves
- 18 spacers
- 12 pin keepers

Results



The repairs were completed on time and without using any costly dry dock time.

The customer is very happy with new greaseless steering linkage.



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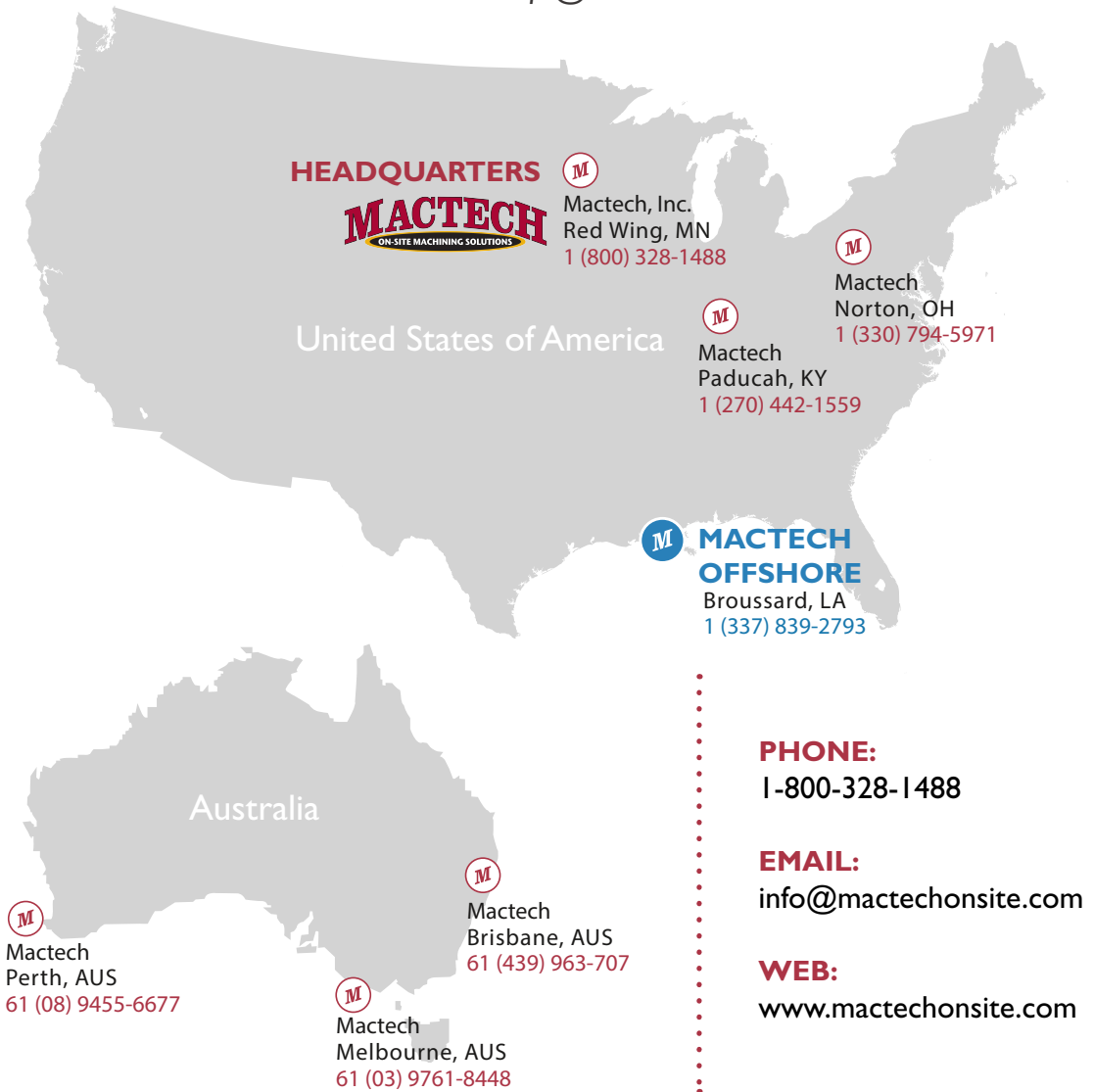


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