



## CASE STUDY

# MARINE LOADING ARMS HYDRAULIC TUBING UPGRADE AND REPLACEMENT

### SITUATION

SS316 tubing and fittings are subject to pitting and corrosion over time in port and marine environments, especially with exposure to iron ore dust due to port and loading operations in the region.

Marine Loading Arms are operated every 3~5 days to load LNG carrier vessels – any delays result in high demurrage costs.

### SOLUTION

Pressure Dynamics designed and manufactured all structural steel trays and 6Mo tubing runs off-site, in easily installable modules.

Early installation was effected on site during 3~5 day shipping windows, then completed during the Shutdown period. 6Mo tubing and fittings increase the pitting and corrosion resistance.

### PROBLEM

The hydraulic tubing and fittings of the Marine Loading Arms required replacement due to pitting and corrosion. A lengthy Shutdown from traditional tubing installation would result in LNG Export Sales losses.

The facility Shutdown was of known, limited duration (3 weeks), and early works needed to be executed during shipping windows.

### BENEFITS

3D modelling enables accurate off-site manufacturing design, and pre-site fabrication. Modular fabrication to suit project delivery efficiency.

Site installation de-risked for efficiencies in manpower resourcing and works schedules, and unplanned costs. Project delivered in 5 weeks, versus previous works durations of up to 11 weeks.

## OVERVIEW

Pressure Dynamics collected *cloud point* data through a 3D survey and created a SolidWorks 3D baseline model of the jetties and loading arms. After designing the structural tubing trays and tubing runs, the modules were manufactured in the Pressure Dynamics workshop and subsequently installed in the Gas plant.

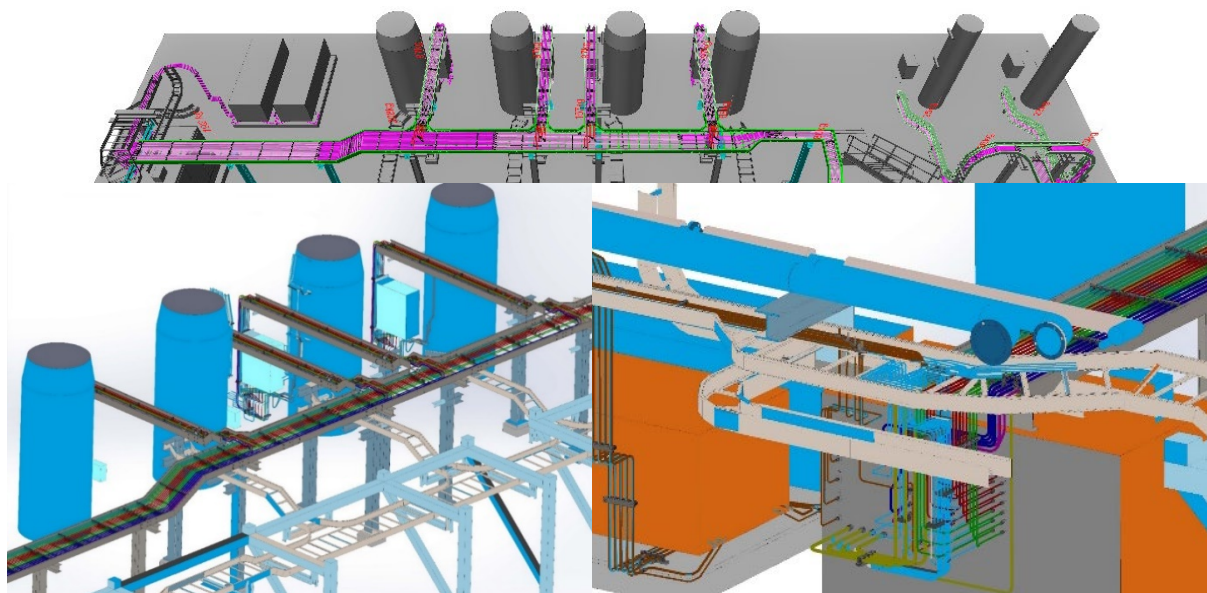
The modules were designed to suit ongoing operations at the jetties (to load LNG carriers) with the trays and tubing to be installed at site between the (3~5 day) shipping windows, with works to be completed in a Shutdown. The shipping windows proved to be a pre-execution and ongoing planning task for our Project Engineers and Project Manager who worked closely with the customer's Maintenance Coordinator to ensure maximum efficiency.

## APPROACH

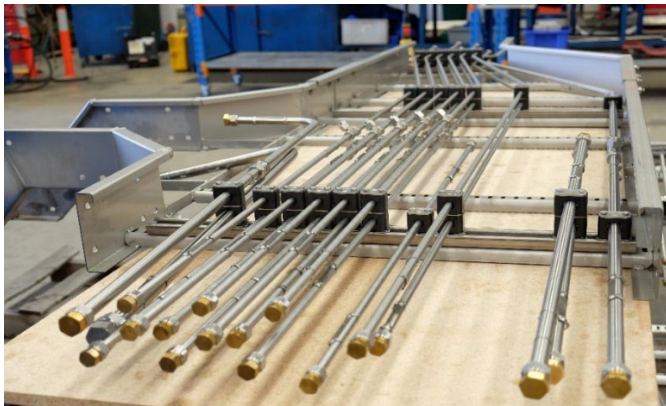
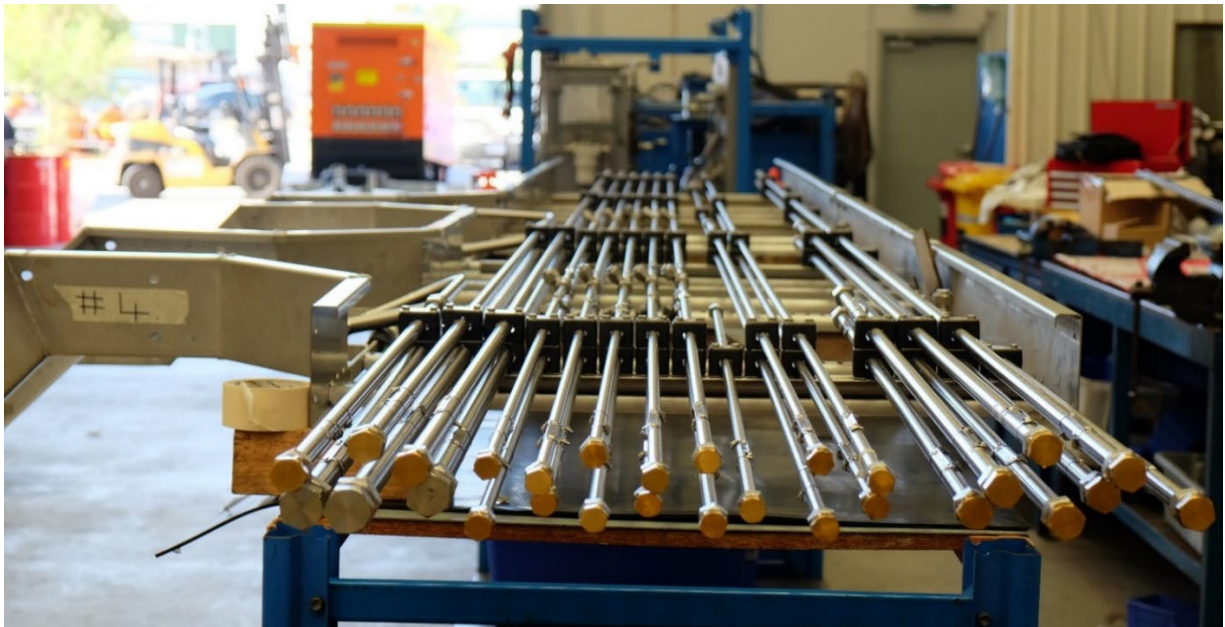
A 3D survey was carried out to collect *cloud point* data for the jetties and loading arms. PDs cleansed the data for application and produced a SolidWorks 3D baseline model of the jetties and loading arms.

The structural steel trays and tubing runs were designed in SolidWorks 3D to suit parallel-run installation of new lines for the jetties and loading arms, and off-site modular manufacturing.

Pressure Dynamics sourced and supplied the tubing, fittings, valves and cable trays materials, which were assembled into modules in the Bibra Lake workshop. Once the modules were assembled, flushed and tested, they were mobilised to the Gas plant. Installation required a team of up to 17 hydraulic and tubing Technicians.



The Modules were fabricated and flushed at our workshop.



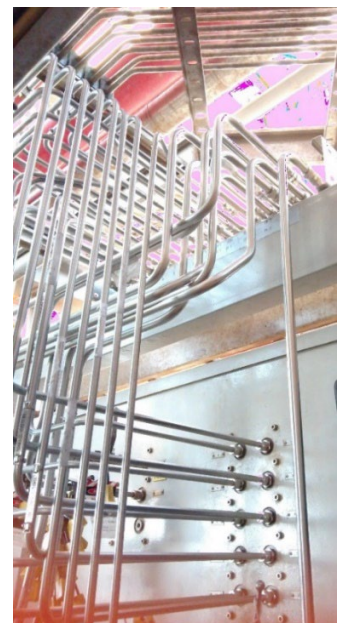
Then were preserved and packed for mobilisation to site.



The modules were progressively installed and interconnected at site.

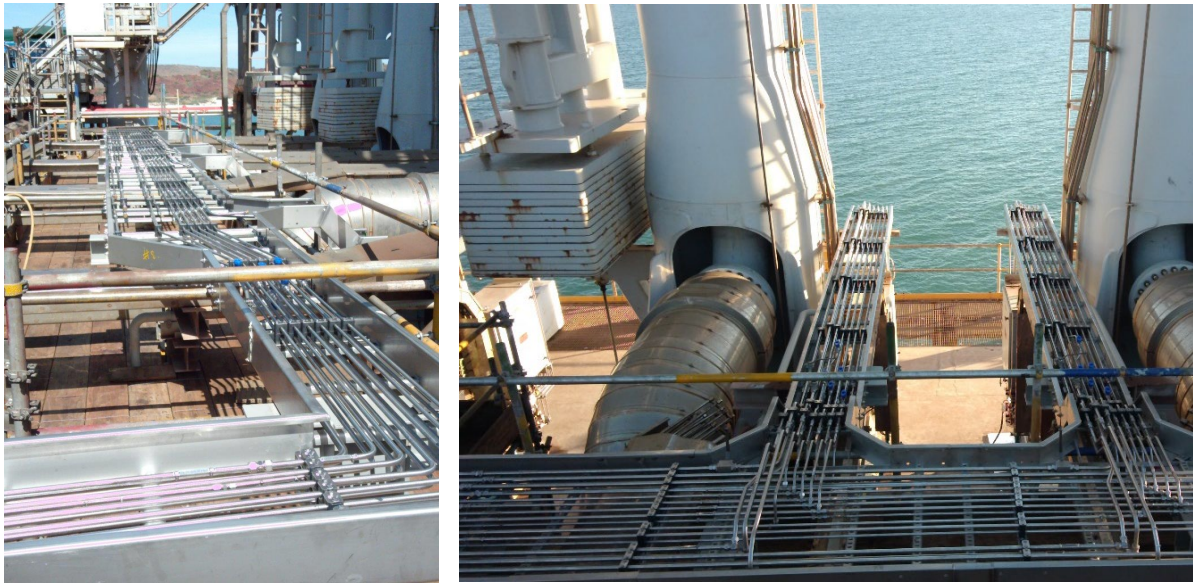


Complex, interconnecting tubing installation was installed and completed at site.



## RESULTS/BENEFITS

Installation, majority complete an in preparation for final flushing, then final interconnection and commissioning.



Pressure Dynamics subsequently dismantled and demolished all the previous horizontal and vertical hydraulic tubing for the Marine Loading Arms in completion of the project scope.

## CONCLUSION

This case study demonstrates Pressure Dynamics' proficiency in:

- 3D surveys and *cloud point* data
- 3D design
- Modular and fabrication design and engineering of structures, and hydraulic and lubrication tubing
- Installation and commissioning
- Project management, especially through challenging work success schedules
- Integration and Commissioning of hydraulic systems
- Commissioning and subject matter expertise for Marine Loading Arms – Pressure Dynamics have executed the hydraulics inspection, maintenance, repairs and commission services for these Marine Loading Arms for more than 30 years

