

Case study - Naphtha Splitter Column, Kwinana WA

ASI member, United Group Resources (UGL Resources) provided integrated capacities from design onwards to deliver to petroleum company, BP what is believed to be the largest single unit of equipment of its type ever fabricated with steel in Australia.

To achieve this seamlessly, UGL Resources provided engineering design, detailing, supply, fabrication and delivery to site of a new naphtha splitter column to be used by the BP refinery at Kwinana, just south of Perth, to separate hydrocarbons.

For the work won against international competition, over 200 tonnes of 460N grade XLERPLATE® steel from BlueScope Steel was used to fabricate the unit's cylindrical shell and dished ends.



UGL Resources Project Engineer, Glenn Lemerle said the vessel had to be made to tight tolerances.

“Designed to AS1210 – Class 2A pressure standard, the unit has to withstand operating temperatures up to 182 degrees Celsius and pressures up to 500kpa, high for a vessel of that volume to maintain its shape without distortion or rupturing,” he said. “The 460N grade steel has a very high tensile strength so we didn’t have to perform stress tests or heat relief.”

The project was completed on time with zero health and safety recordable injuries and zero quality issues, undertaken in 51 weeks, a lot earlier than the planned 68 - one of the first steel projects of its type in Australia to integrate design, detailing, fabrication and final delivery by one commercial entity.

Over one kilometre of welding was performed without a single defect and over 17,000 bolt holes made without a single misalignment.

UGL Resources constructed the shell of the vessel in 3m by 4.5m diameter sections in its Kwinana workshop due to the immense size and weight of the column. This modular construction method was used to maximise resources and optimise schedule compliance. The different modules were then welded together in the horizontal plane.

Fabrication, hydrotesting, painting, insulation and cladding in multiple work fronts at one plant location also meant that the vessel could be transported to site in one piece. The column fitted into the refinery on the first attempt.

Transportation of the massive column was a logistical exercise in its own right involving a police escort on its three-kilometre journey to BP's refinery. The journey took five hours as it involved lifting and 'de-energising' numerous power lines to allow the truck with the fully assembled vessel to pass underneath. Civil works were also required to remove and replace traffic islands. It took 28 axles to transport the vessel with each axle moving up to 18 tonnes.

The 64m high by 4.5m diameter column unit weighs 312 tonnes and involves a complex interaction of internal process trays, baffles, piping nozzles and external access platforms, ladders and walkways.

Internally, the column has been fitted with perforated process trays in ASTM A240 410S stainless steel at about every 450mm interval.