



# CATALYTIC REACTOR

SHELL CLYDE REFINERY  
NSW, AUSTRALIA





## The Opportunity

In 2006 Fitzroy were awarded the contract by Shell Refining Australia to design, procure, fabricate and deliver a new catalytic cracking unit, including reactor and stripper vessels, cyclone crossover and refractory, site supervision and erection of columns for the Clyde Refinery in Parramatta Sydney. Detailed design was completed by local company ITL. The Clyde Refinery supplied about 40 percent of Sydney's petroleum requirements and about 50 per cent of New South Wales' needs.

## The Project

This is the largest and most detailed pressure vessel ever fabricated in New Zealand. The catalytic reactor is made up of several interconnected vessels to a total project weight of over 455 tonnes and was fabricated from chrome molybdenum steel up to 60mm thick. All internal items were lined using either erosion resistant refractory or 410 stainless cladding to protect the steel pressure retaining parts from erosion.

A major component of the overall project was the installation of the refractory anchors which were designed by Fitzroy and their subcontractors. This was a time consuming but essential element as any failures of the refractory lining puts the pressure shell at serious risk. All of the refractory material – a high aluminium, low cement and chemically bonded compound – was applied by hand by a team of specialists, a process that took four months in total.

The reactor operating temperature is 550°C and all weld areas had to be completed with preheats to 150°C. Once complete each weld was heat soaked for three hours at 350°C before being cooled and X-rayed or ultrasonically tested to ensure weld integrity. Final heat treatment was at 700°C in Fitzroy's onsite heat treatment facility.

The main reactor column was fabricated from nine sub-assemblies to form a single transportable component over 46m long, 5.5m in diameter and weighing in excess of 360 tonnes.

The vessel was delivered fully dressed out with ladders, platforms and access ways in place to ensure minimum work was required on site. All components were transported by specialist heavy duty trailers to Port Taranaki then loaded onto a heavy lift barge, towed to Sydney Harbour and up the Parramatta River to the Clyde Refinery.

## Key Features

- Project Value approx \$NZ17m
- Total project fabrication duration 15 months
- Fabricated from chrome moly to design code AS1210
- Refractory lining weighed 60t with 40t in the main vessel
- Four major components - primary reactor vessel, stripper column, cyclone arrangement, crossover



*Cyclone Installation*



*Loaded on the Barge*

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