

## BP Refinery in Perth, Australia

First Cyrax® retrofit project is challenging, successful

Scope	As-built 100m L x 15m W x 8m H area to support design of new piping through complex area
Owner	British Petroleum
Date	2001



*"This project was extremely challenging for our first one due to the complexity of the site. Along with the Cyrax 2500 we used a Leica TPS 1105 total station to accurately measure targets and features used to tie scans to the site grid. The final results not only impressed our client, BP, with the level of detail supplied but also confirmed our company's belief in the future of the Cyrax and Cyclone technology for numerous "as-built" surveys."*

Gerry Nolan  
McMullen Nolan and Partners Pty Ltd, Perth, Australia

### Project Facts

**Field:** 2 ½ days; 2-person crew; 33 scans

**Office:** 3 weeks; 1 person

**Deliverable:** 3D model as .dwg file for export to AutoCAD

### Customer Benefits

- More complete, accurate as-built data enabled better design verification and, ultimately, fewer field fit-ups & interference problems
- Comprehensive capture of a cluttered, complex structure without the need for physical access

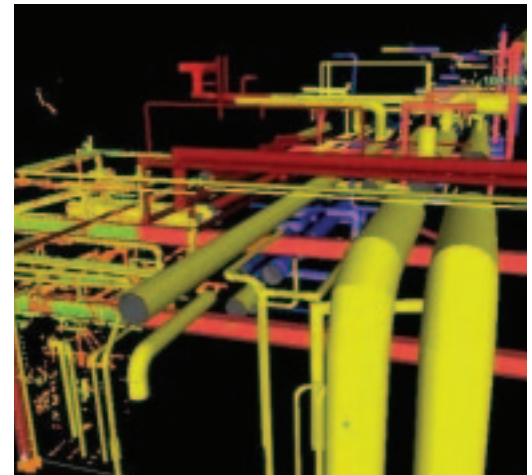
**Background:** Worley Engineering, main engineering contractor at BP's Kwinana, Australia refinery, was charged with the design task of routing a major, new 10" water pipe through a complex, existing structure and supporting the new pipe on existing racks. The refinery was built in 1955 and has had numerous in-situ modifications with no as-constructed drawings for these modifications. Although Worley had completed the initial design for routing the new pipe, they worried about encountering costly construction interferences, as the area in which the pipe was being routed was quite complex. Worley decided to undertake a design verification and hired McMullen Nolan and Partners Surveyors Pty Ltd to provide an accurate as-built survey to ensure the final design would be interference-free. In addition, Worley wanted the as-built output in a format that allowed pipe stress analysis for the new piping, if needed.

The traditional method of re-constructing the existing structure in a CAD environment is to use the original (1955) design drawings and field-measure the additional features. This methodology, however, has a number of drawbacks:

- The original drawings were as-designed and not as-constructed.
- Measuring newer structures is quite time consuming.
- Some areas could not be measured traditionally due to safety constraints as they were mainly out of reach.
- Restricted access to many areas of the structure, in this case 3 and 4-level pipe racks, made it very difficult to trace pipe work routes.
- The complexity of the structure made it difficult to measure traditionally.
- The goal was to achieve relative accuracy of 3-6mm; other external factors, such as heating up, can affect absolute position of the structure.

**Project Workflow:** McMullen Nolan used their newly acquired Cyrax 2500 system with a crew of two to scan the site in two and a half days. To register the scans to the site's plant grid both flat scan targets and a reflectorless Leica total station were used. Targets were coordinated and tied into the plant grid from day one. The crew drew a detailed scanning plan prior to starting the project to ensure completeness.

Following scanning, one surveyor spent three weeks creating a detailed 3D model - his first modeling job using Cyclone™ software. One week of training was provided on-site by Cyra personnel in support of the project. The final deliverable was a 3D model saved as a .dwg file, which was used for design verification in AutoCAD. The fieldwork met budget expectations and the office work was also within expectations, particularly for a first project.



# CYRA

Cyra Technologies is a Leica Geosystems Company

© Cyra Technologies, Inc  
4550 Norris Canyon Road  
San Ramon, CA 94583  
Tel. 1.925.790.2300

▶ [www.cyra.com](http://www.cyra.com)

Cyra and Cyrax are registered trademarks and Cyclone, CloudWorx and SmartScan Technology are trademarks of Cyra Technologies, Inc. All other trademarks in this document are the property of their respective owners.

**Leica**  
Geosystems