Replacing the Vacuum Heater in Australia's Biggest Refinery, BP Kwinana

For modern grassroots refinery projects, modularization of equipment is nowadays commonplace, particularly where access to site is limited, and time, as usual, is the most expensive commodity. However, it also can play a significant role in plant revamps. Preassembly off-site reduces site erection costs and manpower requirements dramatically, and, as much of the precommissioning can be done at the fabrication yards, final commissioning and startup are kept to a minimum. Shop fabrication ensures that the highest quality control is attained.

Nowadays, large-purpose built barges and ships are available to transport even the most colossal modules around the world. Multi-wheeled, self-steering, self-powered, hydraulic trailers are used to lift and move modules of several hundred metric tons to and from vessels and onto pre-prepared foundations at their permanent location.

Where an existing heater is to be replaced with a new heater located on the same plot, other considerations often lead to novel approaches and techniques. A case in point is the revamp project of Australia's biggest refinery, BP Kwinana, built at Perth in the 1950s involving an FW-designed and supplied vacuum heater, H-101. After 35 years service, FW designed and engineered a replacement—this time with twice the original capacity.

Because the new heater was to occupy the same plot and utilize the same foundations as the original, and also, because downtime was to be minimized, a novel design approach was needed. The heater, complete with ladders, stairs, platforms, instruments, electrics and lighting, was built on site, adjacent the existing heater plot and moved into place during the shutdown. The existing heater was required to operate right up to the time when the new heater

Back to Contents

When Asbestos Refractories Are Involved....

Although asbestos is no longer used in heater refractories, it is recommended that specialist contractors undertake the disinvestment of older heaters wherever the presence of asbestos is suspected or known. Removal of the old heater can, in itself, be a major exercise on a live plant, particularly when asbestos refractories are involved. Sometimes, the existing heater can be isolated and disinvested by removal in one or more pieces for later off-site dismantling in controlled conditions. However, great care must be exercised when removing such structures, as corrosion or modifications during the life of the heater may require that the steelwork be reinforced prior to lifting, moving or dismantling. This is particularly important for heaters originally built "piece small" at site, as they were never designed to be moved as complete structures. Such disinvestment can considerably extend the time and costs of plant shutdowns as safety rather than expediency are the governing criteria. Having successfully completed over sixty major revamp projects worldwide over the past forty years, FW's Fired Heater Division can offer expert assistance in the detailed engineering and project management for this type of procedure.

was completely built, tested, and ready to install.

The route from the temporary build plot to its permanent plot entailed crossing a live pipe trench. The final weight of the heater at 650 tons meant that jackable-type trailers, as commonly used to move such large structures, were unsuitable due to ground loadings over the live pipe-bridge. By working smarter and thinking creatively, the design team adapted a system previously used in bridge building, whereby the heater—specially designed to take the stresses of the move, would slide on lubricated Teflon® pads along stainless steel rails. The Teflon pads were designed so that the pre-installed lubricant would not migrate from the pads under the weight of the heater during the construction period.

While the construction of the new heater was underway, the construction of the civil reinforced rampart and rail system was completed. The design gave additional temporary protection to the live pipelines under the pipe-bridge and the concrete foundations for the rails. Meanwhile, the heater construction progressed, and it was decided to complete the refractory dry out before the move to reduce weight and save time during tie-in and commissioning.

The permanent foundations for the heater had been designed and built into the rail system. The new heater, measuring in at 22 meters long, 5 meters wide, and 40 meters high, was now slowly pushed along the tracks, one meter at a time, by twin 50 ton hydraulic rams at the rear of the heater – every inch of progress carefully monitored. The heater passed smoothly and safely over the pipe bridge. After the heater reached the allocated plot, the connection to the main transfer line and other tie-ins took place. Finally, the top 22-meter section of stack was installed and commissioning completed. The changeover from old to new heater took just 20 days! ❑

By Tony Tindall, business development manager for the Fired Heater Division of Foster Wheeler Energy Limited

Teflon is a registered trademark of E.I. du Pont de Nemours and Company.

Back to Contents