

# MANIFA PJ - TANAJIB SEA WATER TREATMENT PLANT EXPANSION PROJECT



PROJECT NAME	MANIFA PJ - TANAJIB SEAWATER TREATMENT PLANT EXPANSION PROJECT
LOCATION	TANAJIB, SAUDI ARABIA
CLIENT	JGC GULF INTERNATIONAL LTD / SAUDI ARAMCO
CONSTRUCTION PERIOD	PHASE I – 24 MONTHS PHASE II – 7 MONTHS



MAC was entrusted by JGC Gulf International Ltd, as its main sub-contractor, to execute the construction works for the Sea Water Treatment Plant Expansion at Saudi Aramco, Tanajib Facilities, involving multi-discipline tasks including civil, buildings, mechanical, piping, electrical, instrumentation, insulation and painting.

The Tanajib Water Treatment Facility was upgraded to increase its capacity in order to supply the water requirements to the new Manifa Central Processing Facilities (MCPF) 900MBCD.

- The project involved over 2.6 million man-hours of direct labor and over 1.5 million man-hours of Indirect labor with a sustained peak load of direct manpower of 885 plus 225 indirect labor & supervision totaling 1,110 men. All personnel were accommodated and catered for in MAC's camp adjacent to the job site where full life support facilities were provided
- The achieved Quality Control Index was 98.69%
- The Safety Record involved over 4 million worked man-hours without any Lost Time Incident. The achieved Project Safety Index was 97.25%





**The PROJECT consisted of Construction and Installation of the following:**

- Two new Electrical Substations and Utility Operation Buildings
- New Sea Water Intake Basin, Pumps, Inlet Drum Screen, Collection Chamber with a 48" RTR interconnecting pipe line and four MOV tie-ins
- New Electro-chlorination & Product Chlorination System
- Twelve Pre-Treatment Filters and demolition of two existing roughing filters
- Three Feedwater Surge Pumps
- Coagulant, Sodium Bisulphite & Sulphuric Acid Systems including six pumps and three tanks
- Four Cartridge Filters
- Six SRO Pumps and eleven SRO Banks including demolition of existing SRO Banks & Pressured Vessels
- New Degasifier Sump pit including installation of three new pumps
- Product Water Shipping facility including installation of three pumps with underground 18" RTR pipeline routed towards Manifa CPF
- Two new Hypochlorite Mix Tanks and ten new Hypochlorite Injection Pumps
- New Caustic Tank and two new pumps
- Instrument Air Compressor
- Simulation of Logic Works: for proper logical control of field instruments synchronized with correct functionality of software via Honeywell DCS system & Windows Based Triconex ESD System at PMCC in PIB



**The Scope of Work Consisted of:**

**Civil & Concrete Works:**

- Construction of a New SWI pit and chamber below sea water level involving installation of 16m sheet piles with a 160m long dewatering system
- 23,000m<sup>3</sup> excavation works, mostly by hand, due to live underground existing services. Work involved trenches for U/G piping, electrical and instrumentation cables; pit and pond, sewer and drainage, open ditch and swale, equipment's main and miscellaneous foundations, duct banks and culverts, retaining wall, oil dike and foundations for two buildings
- 8,000 m<sup>3</sup> concrete works for all structures

**Structural Steel Works:**

- 192t steel structural members and supports for pipe rack, equipment bridges, platforms and access stanchions
- Fabrication and installation of sunshades and shelters for new pumps



## Mechanical Works:

- Installation and pre-commissioning of static and rotary equipment, including 21 vessels, 1 storage tank, 2 tank mixers, 55 pumps, 1 set of heat exchanger & 4 heaters, 1 set of air compressor, 12 sets of module equipment, 11 sets of permeator bank assembly and other miscellaneous equipment, involving hauling, rigging, assembling, aligning, filling of catalyst & chemicals and grouting
- Demolition of various equipment before and after plant operations

## Underground & Aboveground Piping Works:

- Over 100,000 dia. inch of various piping materials such as CS, GCS, Duplex Steel, SS, RTR and CPVC were fabricated and installed as well as 94t of pipe supports
- Works included several Total, Unit, Limited and Critical shutdowns involving execution of about 900 joints in 315 tie-ins that were subjected to special authorizations delivered by SAJGC under strict Quality and Safety regulations
- Preparation and execution of over 1,130 test packages including tie-in and hydro tests
- Two 48 inches RTR outlet pipes for sea water collection box
- New oily water drainage system associated with sewer lines and manholes, connecting to existing wash out sump
- Underground fire water network tied to the existing network including installation of hydrants and hose reels
- New aboveground interconnecting lines (mostly RTR pipes) to carry potable & product water, chemical, utility plant air, etc.
- Demolition of various piping systems before and after plant operations

## Electrical Works:

- 5,000m of main cable trays and RGS/EMT PVC coated conduits
- 1.8 kilometers of 34.5kV cable installation in direct buried trenches between the existing Main Substation and the New Substation
- Electrical termination and splicing involving 1,400 points and 135,000m LV, HV and 34.5kV power and ground cables
- 98 lighting poles up to 10m height and 177 lighting fixtures
- Installation and pre-commissioning of systems involving inspection and testing of transformers, switchgears & MCC's, UPS system, control distribution and miscellaneous panels, lighting and grounding systems for the new plant units including main and branch cable laying, cable tray and conduit piping installations, ferruling, termination, demolition works and others related to modifications inside the existing plant area

## Instrumentation Works:

- Installation, inspection, testing and pre-commissioning of control, marshaling and auxiliary system cabinets, local instrument and analyzer installations, cable way and tray installation, cable laying termination, continuity tests, hook up and tubes for pressure and air piping, fabrication and installation supports, instrument tagging, calibration and loop test
- Loop check for 1,180 of I/O's and calibration of 700 instruments
- 80,000m of instrument main cable laying and 4,000m of main cable trays/ covers & conduit piping including stub-ups

## Insulation Works:

- Hot insulation for the electric heat tracing Caustic Soda lines including metal jacketing

## Painting Works:

- Painting for all equipment, steel structure & supports, carbon steel and CPVC piping including lettering and marking
- Painting of buildings for internal and external coat finishes





MAC Construction

