Pile Wrapping Gantry

Introduction

Dalrymple Bay Coal Terminal – DBCT were looking to extend the lifespan of the piles supporting the jetty structure. John Holland Group (JHG) partnered with DBCT and developed a procedure of wrapping the piles with tape to protect the existing paint from wave damage rather than repainting. The existing method of accessing the piles involved building scaffolding over the conveyor houses and underneath the roadway, a process that would take a week to wrap two piles. With more than 120 bents, the name for the piles and headstock, to be wrapped the process was going to take several years.

JHG proposed the concept of a gantry that travels along the existing roadway with a structure wrapping over the conveyor tunnels and supporting davits that swing underneath the jetty, with swing-stages that access the piles.

JHG approached CMP Engineers to design and supply, through Loadquip, the mechanical systems required to make the design work.

General Description

To clear the headstocks between the conveyor houses, a mast that can be raised for transport and lowered for use of the swing stages was designed. A wire rope reeving system with redundant ropes and a load-sharing mechanism supports the mast. Nylon rollers specifically designed for rigidity and low friction, guide the mast while it's being moved. A hydraulic cylinder raises the mast and integrated valves prevent any uncontrolled movement.

The hydraulics is powered by a marinised hydraulic power unit, purposefully built inside a stainless steel enclosure that provides a double bunded reservoir as insurance for leaks. Hydraulic cylinders were supplied with corrosion resistant ceramic densified hard-chrome rods that provide enhanced mechanical and salt spray protection.

The use of traditional tyres and wheel drives was not possible in order to allow vehicle access along the jetty even when the gantry is in use. A specifically designed geared wheel hub, that met the required drive and braking loads while also fitting into the narrow envelope allowed, was sourced from Italy. The high wheel loads prevented the use of inflated or solid rubber tyres so a nylon tyre and integrated wheel were designed and fabricated.

A steering mechanism was designed to guide the gantry as it travelled down the roadway. Jacks were incorporated to provide a stable support for the structure and prevent uncontrolled motion when the gantry was not moving.

A simple solution of a small hydraulic cylinder provides motion to the davits supporting the swing stages. Hand pumps, located at the base of each mast, move the davits into position even in high wind.

Safety was paramount in the design with the addition of wind speed monitoring via an anemometer and the use of a trapped key interlock system to restrict access and limit motion when the structure is in use.

Before - Extensive scaffolding

After - Mobile platforms