

## MCDERMOTT AUSTRALIA ICHTHYS LNG PROJECT

### Subsea Pig Launcher/Receiver Levelling System, Timor Sea

ICON Engineering was engaged by McDermott Australia Pty Ltd, to design and fabricate a Subsea Pig Launcher/Receiver Levelling System for operator, INPEX, of the Ichthys Development, in the Timor Sea. The levelling system is a dual purpose device. It can both dissipate landing energy as the PLR is lowered into position and then also provide hydraulic adjustment of the PLR level for precise alignment of a 42" subsea pipe connector.

#### PLRLS Design

The functional specifications dictated that the PLRLS incorporate Soft Landing Cylinders [SLCs]. These serve to dissipate energy of the PLR landing onto the subsea Gas Export Riser Base. Their dynamic performance had to be tuned to be similar to that of a third party SLC which was located at the front end of the Pig Launcher.

The PLRLS also includes a pair of hydraulic levelling cylinders. These are ROV operable and allow the rear end of the PLR unit to be raised or lowered in order to facilitate precise alignment of a 42" subsea pipe connector which joins the PLR to the main gas export pipeline for the Ichthys Facilities.

A pair of ROV operable screw jacks was also incorporated into the design. These provide a reliable locking mechanism, to transfer load from the hydraulic cylinders and to carry the PLR load for periods of up to three years while the PLR may be in position. To provide further redundancy and higher system reliability, the screw jacks were fitted with Class 6 ROV Torque buckets, so that they could actually be used to raise or lower the PLR in lieu of using the hydraulic cylinders.



ROV Operable Jacking Screw Assembly

#### Structural Framing

The design of the structural frame for the PLRLS had to accommodate several challenging criteria. It is essential to afford tailored articulation, to allow the frame and jacking cylinders to self-align during pivoting of the main pig launcher body as it is raised or lowered to achieve connector

alignment. The frame also has to provide sufficient lateral rigidity in order to transmit significant loads during skidding of the entire PLR assembly as the main connector system is stroked in and out during deployment and mating operations. The final design incorporated a "floating" load beam housed within a rigid skeletal skid frame.

Selection of materials, surface coatings and cathodic protection systems were also important considerations to ensure that the unit could survive seabed deployments of up to three years between maintenance and refurbishment programs.



Hydraulic Jacking Cylinder

Soft Landing Cylinder

#### Key System criteria;

PLR Weight in Air	300 Tonnes
PLR Submerged Weight	250 Tonnes
Levelling System Load Capacity	350 Tonnes
Required Velocity Reduction	0.5 m/sec to 0.1 m/sec
Soft landing System stroke	475 mm
Operating Depth	250 m below sea level
Maximum Unit Weight [In Air]	12 Tonnes



Completed PLRLS Unit: Soft Landing Cylinders Extended