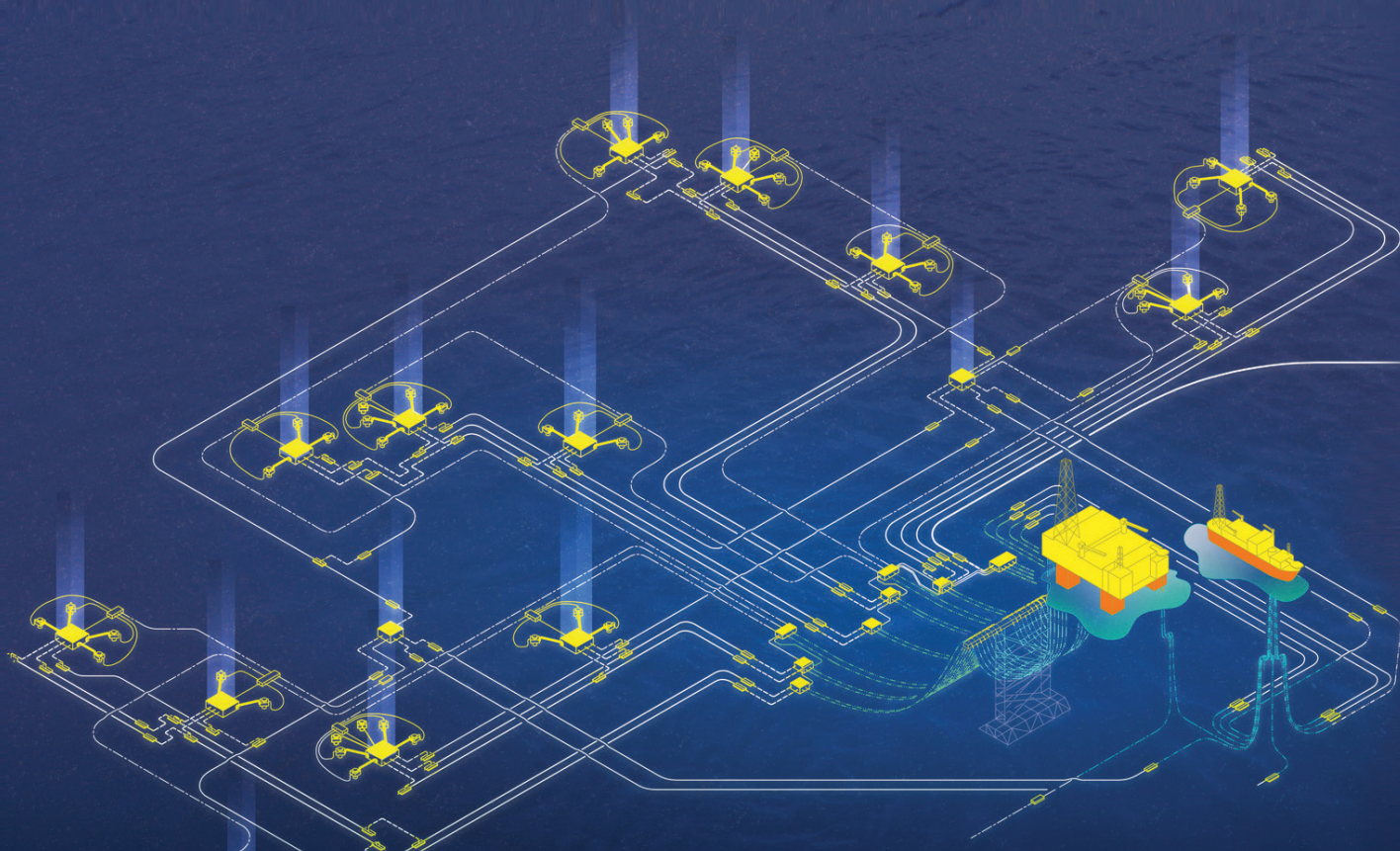




INPEX Ichthys LNG Project

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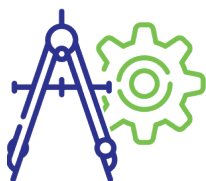
INPEX Ichthys LNG Project

Located about 220 km offshore Western Australia, in an average water depth of 250 m, lies the INPEX Ichthys field. This development required the execution of one of the world's largest SURF EPCI contracts awarded to date.

Gas from five drill centers spread across the 800 km² field is routed through 140 km of infield pipeline and directed towards one of the world's largest and most complex flexible riser systems.

The Ichthys LNG Project required a solution developed around unique and challenging soils in seismically active zones, a 40-year design life and 10,000-year cyclone survival criteria. The Sour Service, High Pressure (371 bar), High Temperature (150 °C) conditions and hook-up to the world's largest semi-submersible required a number of firsts in engineering, procurement, construction and installation.

VERTICALLY INTEGRATED SOLUTIONS



ENGINEERING

More than 500,000 work hours from engineering offices across the globe



PROCUREMENT

Procurement in excess of \$600 million USD of in-field equipment



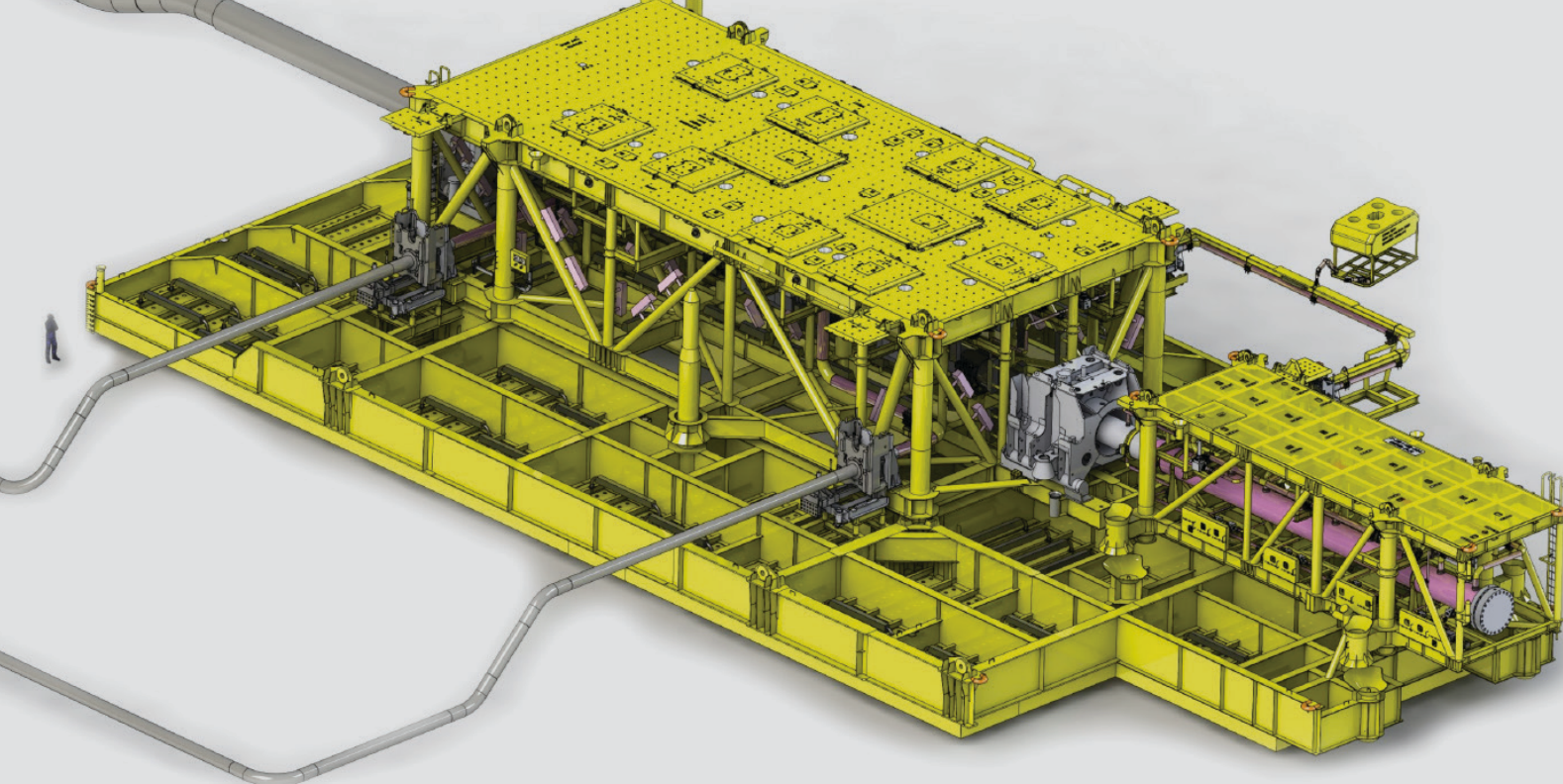
CONSTRUCTION

48 subsea structures weighing a total of 26,000 MT



INSTALLATION

Three deepwater installation vessels utilized over a 4 year period



Gas Export Riser Base (GERB) Module 3

Detailed Engineering

Locations for engineering were selected based on their proximity to the Ichthys field in Western Australia and fabrication yard in northern Indonesia. Specifically, high-end conceptual engineering was executed in Perth, while detailed engineering was completed in Singapore with support from Dubai.

The solution engineered for the Ichthys LNG Project requires the management of complex interfaces with the Subsea Production System (SPS), Central Processing Facility (CPF), Floating Production Storage and Offloading (FPSO) facility and Gas Export Pipeline (GEP).

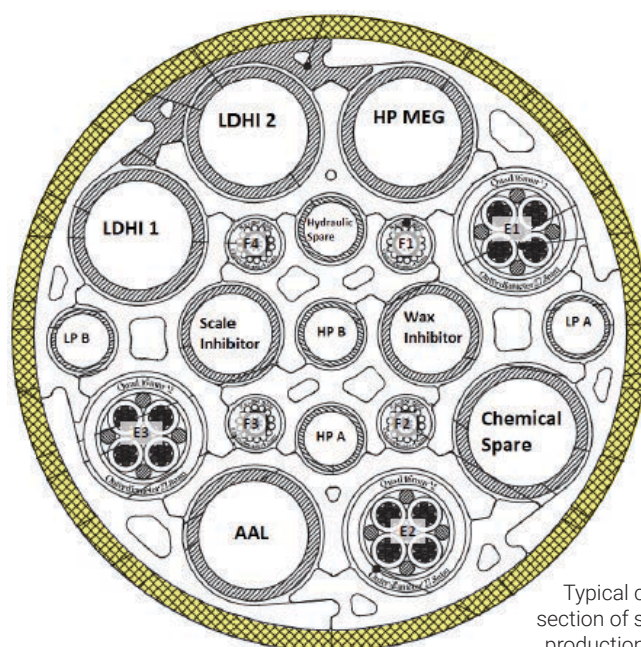
Accordingly, complex interface management was infused throughout the life cycle of the project from the first engineering calculation to the final installation and pre-commissioning campaigns.

DESIGN CHARACTERISTICS

- 40-year design life with 10,000-year storm survival criteria
- Production systems designed for Sour Service, High Pressure (371 bar) and High Temperature (150 °C) conditions
- 250 m average water depth
- Two floating facilities and eight riser systems
- Foundation design for seismic liquefaction
- 8,500 MT Riser Support Structure (inclusive of buoyancy tanks) with skirt suction foundation and scour protection
- Sleepers designed to facilitate induced lateral buckling

SAFETY IN DESIGN

- Failure mode effect analysis
- Consequence assessments
- Inspection, maintenance and repair
- Flexible riser integrity monitoring systems
- Third-party certification

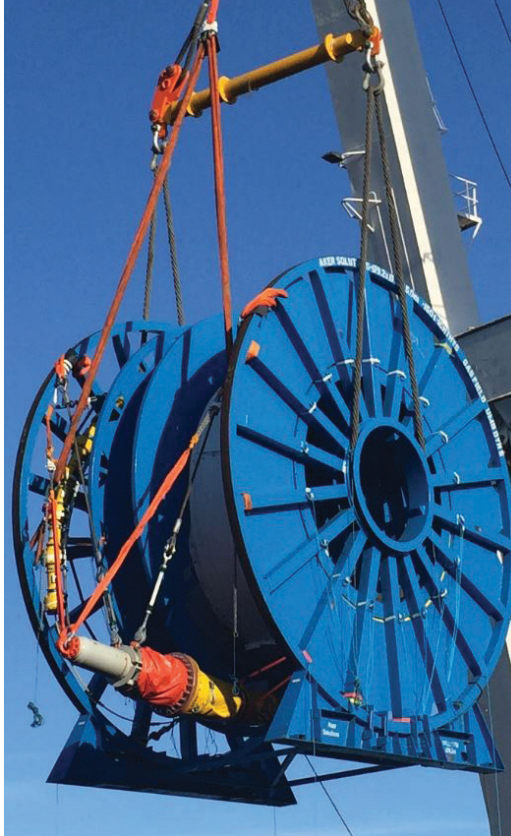


Typical cross section of static production and controls umbilical



CONNECTORS

Total Qty: 100+ | Size: 6" - 22"
Rigid & Flexible Horizontal Connections
& Vertical Connection Systems



UMBILICALS

Production Controls, HV Power &
Communications Umbilicals
Total Length: 58 km
31 Steel Tube Flying Leads



DIVERLESS BEND STIFFENER CONNECTORS

Total Qty: 42 | Largest Ever DBSC Order
Nickel Coated. Unique De-latching System
Requires Zero ROV Intervention

Global Supply Chain Management

The sheer magnitude of the Ichthys LNG Project coupled with the unique design requirements, in particular the 40-year design life, resulted in a number of highly challenging first-of-a-kind products.

Procurement of over \$600 million USD of in-field equipment from vendors across multiple continents demanded a new level of excellence in Supply Chain Management.

To ensure that product quality was maintained without jeopardizing the project, McDermott developed a robust package management system utilizing the expertise of quality assurance engineers, subject-matter experts, third-party certification and project controls to ensure delivery to specification, schedule and budget.

FLEXIBLES

Total Qty: 44 | Total Length: 41 km
Includes Qualification of World's First 12"
Production Riser & 10" Smooth Bore
Gas Export Risers



VALVES

Total Qty: 267 | Size: 2" - 42"
Includes World's First 42" Forged Body Subsea
Valves, Conforms to Zero Leak Test



LINE PIPE & BENDS

Total Length: 64 km & 300 Induction Bends
Seamless Carbon Steel Pipe, Seam Welded
Duplex Pipe & Metallurgically Clad Pipe





Riser support structure tower (with auxiliary buoyancy tanks) and skirted shallow foundation onboard the Intermac 650

Construction & Fabrication

Our in-house fabrication capabilities provide proactive management and mitigate risks that are typically inherent with a high level of external interface in fabrication.

Early engagement of the fabrication team ensured that sufficient levels of constructibility inputs were incorporated into the engineering and procurement phases.

Fabrication

McDermott fabricated 26,000 MT of subsea structures, including:

- Riser Support Structure
- Gas Export Riser Bases
- Production Riser Bases
- MEG Distribution Manifold
- Flowline End Terminations
- In-Line Tees
- Mid-Depth Buoys
- Flexible Pipe Connection Assemblies
- Spools and Well Jumpers
- 2.5 years of Site Inspection Testing

On-site testing and certification significantly reduced offshore risk of failure and downtime during installation campaigns, including:

- Factory Acceptance Testing (FAT)
- System Integration Testing (SIT)
- Mock up testing

Riser Support Structure (RSS)

Weighing in at more than 8,500 MT and standing 110 m tall in 250 m of water, the sheer number of flexible risers and field location required a number of innovative engineering solutions.

General Considerations

The RSS structure was designed to improve efficiency during seismic loading. Temporary auxiliary buoyancy tanks were used to aid the launch of the tower with foundation from the barge in field and improve maneuverability while lowering the structure into place. This reduced the loading of the crane.

Riser Support Structure Arch

Designed to accommodate 25 flexible pipeline and umbilical risers, the arch measures 125 m in length and is 14 m tall. Installed separately, the arch is connected to the tower structure through grouted connections at multiple stabbing locations.

Suction Skirt Gravity Base Foundation

Susceptibility of the field to cyclones and seismic activity along with a challenging mixture of sandy and silty carbonate sands required that a unique base be designed for the foundation. A rectangular, doughnut shaped, shallow skirt comprised of multiple suction compartments with novel sliding hatches provides the passive suction pressure required to withstand the uplift and lateral loads in extreme conditions.



LV 108 in IHUC mode, installing flexible risers from the Central Processing Facility to the subsea gathering system

Transportation & Installation

Scope of Work

Three primary deepwater installation vessels were scheduled over a 4 year period to execute the transportation and installation scope of work:

- Pre-Lay Survey
- Sleeper Installation
- Rigid Pipe Installation: Reeled & J-Lay
- RSS & MDB Installation
- Rigid Pipe J-Lay
- CPF & FPSO Anchor Piling
- Subsea Structure Installation
- CPF & FPSO Mooring Chain Installation
- Tie-In Spools Installation
- Flexibles and Umbilicals Installation
- CPF & FPSO Mooring Hook up
- Flexible Riser & Dynamic Umbilical Pull-In
- Pre-Commissioning of Relevant Systems

Management of Prime Subcontractor

McDermott partnered with Heerema Marine Contractors (HMC) for installation of the following by the Aegir:

- 140 km of 18", 12" and 6" Pipelines
- RSS Tower and Arch (8,500 MT)
- 49 Driven Piles (35,000 MT)
- 49 Pile Mooring Chains (7" x 1,000 m)
- 12 Subsea Structures (6,000 MT)

Offshore Pipelay, Riser Installation & Hook-Up

The strategic management of in-house and third party vessels.

6"/8" Carbon Steel & 12" Corrosion Resistant Alloy Line Pipe

- Three 25 m diameter, 900 MT Reels: 6" MEG Distribution Pipe (1,400 MT), 6" & 8" MEG Distribution Pipe (1,800 MT) & 12" Condensate Transfer Pipe (1,500 MT) Free-issued 12.2 m joint of line pipe, welded into strings for spooling onto reels

18" Corrosion Resistant Alloy Line Pipe

- Free-issued 12.2 m line pipe sections quad jointed
- Installation using J-Lay techniques

Mooring Chains Hook-up

- Pre-installation of the forty nine 7"x1000 m mooring chains associated driven piles before the arrival and hook-up of the two floating facilities

Flexibles & Umbilical Products

- Twenty five dynamic pull-ins and 95 km of product deployed from fifty one reels and one carousel



8 Million Work Hours LTI Free Ceremony in Batam, Indonesia

Quality, Health, Safety, Environment & Security (QHSES)

Taking the Lead with QHSES

McDermott is committed to setting a leading example in all areas of Quality, Health, Safety, Environment and Security, and encourages our partners, subcontractors and clients to join us in the pursuit of outstanding QHSES performance. Taking the Lead is a company-wide initiative that brings a single, united QHSES culture to our diverse workforce and organization.

FiFOcus Offshore Wellness Program

The FiFOcus Offshore Wellness Program enhanced the long-term engagement of employees offshore by addressing the non-work related factors that impact their overall state of wellness, including: mental wellbeing, social engagement, emotional stability and physical health.

Risk Management

Key resources were integrated into the project teams to ensure risks were identified early and managed effectively without compromising our ability to deliver on time. McDermott actively participates in forums where best practices in risk management are shared.

Outstanding Results

Leadership, communication and a proactive approach to risk management are critical to achieving outstanding QHSES results. The Ichthys LNG Project is no exception, achieving 20 million project work hours without a lost time incident.

Project Management & Execution

Interface Management

Dedicated external and internal interface management teams were assigned to mitigate risk across all phases of the project with considerable focus on free-issued items.

Project Control Tools

A suite of tools were used to formally manage cost schedule, risk, opportunity, lessons learned and deliverables. These tools are essential to control increasingly complex projects.

Third-Party Certification

Confidence in the integrity of our work is assured through the engagement of independent third parties, including: certifying authorities, an independent verification body and marine warranty surveyor.



**Taking the Lead
with QHSES™**



McDermott is a premier, fully-integrated provider of technology, engineering and construction solutions to the energy industry. For more than a century, customers have trusted McDermott to design and build end-to-end infrastructure and technology solutions to transport and process oil and gas into the products the world needs today. Our proprietary technologies, integrated expertise and comprehensive solutions deliver certainty, innovation and added value to offshore, subsea and downstream energy projects around the world.

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