KREUZ SUBSEA

SUBSEA UMBILICAL, RISERS AND FLOWLINES (SURF) AND MOORING CAPABILITIES

Your Integrated Offshore Subsea Solutions Partner
Since 2010, participates in all major SURF projects in the region

Owns and operates SURF vessel “Kreuz Installer” - one of its kind in the region

One stop solution – combining construction, diving and marine operations strengths

Worked for all majors – Conoco Philips, Petrofac, Shell

Handled all products
Project Profile – South Belut

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- **Assets Deployed**
  - a. 9 x Inline Tee (29Te)
  - b. 48 x rigid spools (8” and 14”)
  - c. 1 x 14” rigid riser
  - d. 1 x 49 te PLEM
  - e. Umbilicals in 10 sections
    - 3 section x 218mm dia = total 9.6km
    - 1 section x 189mm dia = total 4.8km
    - 6 sections x139mm dia = total 18.6km
  - f. Flying leads
    - 17 x hydraulic, 42 x electrical
  - g. 8 x venture flowmeter with protection structure
  - h. 10 x UTH assemblies
  - i. 318 x concrete mattresses
  - j. Subsea and topside support of:
    - hydrotest of spools, risers and pipeline
    - electrical and hydraulic testing of umbilical and flying leads

- **Loading reels on Kreuz Installer**

- **8 off 6” flexibles**

- **Cobra head**
Project Profile – South Belut..
Project Profile – Bawal and Tembang

**Phase -1**

1. Various topside works
2. Subsea works
   - Tie-in Spools
   - Isolation of the Keong Manifold
   - Pre Lay of Concrete Mattresses
   - SDU-2 installation
   - Umbilical pull in on Hang Tuah
   - 7.5 km of Umbilical (Hang Tuah Platform to SDU 2)
   - Installation of the SDU-2 Protection Frame; Spool Removal from T6 Manifold
   - Laying of 8” Tembang Flexible Flowline; Trenching Operations.

**Phase – 2a and 2b**

1. Umbilicals
   - 32.35 km from SDU-2 to SDU-1
   - 1.75 km from SDU-1to Bawal UTA
2. Flow Meter & Check Valve Protection Frame
3. EHFL Jumper between
   - SDU-1 to Bawal well- 02
   - UTA to Bawal well- 01
4. Trenching of the umbilical
5. Concrete Geo textile lined Mattress on the crossings along the Umbilical route
6. Tie-in between
   - Bawal-02 well and 14” pipeline including installation of Venturi flow meters and check valves
   - 14” Bawal Pipeline and Keong Riser.
7. Dewatering and N₂ packing of 14” pipeline

**Phase – 2c**

1. 8” Spool between Bawal well-01 and Bawal-01 Tee
2. 1 x flange Protection frame
3. Check Valve and venturiflowmeter Protection Frame
4. 2 x Hydraulic Flying Lead
5. 9 x Electrical Flying Leads
6. 6m x 2m Geotextile coated concrete mattresses on the EHFLs

**Client**
- Swiber

**End Client**
- ConocoPhillips

**Project Start**
- 03 Feb 2012

**Project End**
- 28 Sep 2012

**Assets Deployed**
- Toisa Paladin
- Kreuz Installer
- Kreuz Supporter

**Project Location**
- Bawal Field
- Natuna Sea
- Indonesia

**Water Depth**
- 82m
12" Flexible Riser/Flow-line Recovery and Re-lay Operation
Recover the Temporary 12" CDW-B Flexible Riser
Re-lay 12" CDW-B Flexible Flow-line to CDW-B platform.
Tie-in Flexible Flow-line to Rigid Riser
Relay 12-inch CDW-C from FPSO to subsea and tie-in to existing flow line.

2 Riser Clamps Installation at CDW-B Platform
Install 2 New Riser Clamp
Recover, replace and re-install 1 riser Clamp at CDW-B

3 Riser Clamps Installation at CDW-C Platform
Install 4 x New Riser Clamp at CDW-C

4 Rigid Riser Installation
2 x Rigid Riser (3-sections) at CDW-B Platform
1 x Rigid Riser (1-section) at CDW-C Platform
12" Flexible Flow-line Length #2 (Prod #2) Subsea Repair Works
Subsea repair work with Armadillo modules and inject preservation gels
Hydro test the entire CDW-C (Prod #2) Flow-line) at holding period of 24 hours

5 Pre-commissioning
De-oiling of the CDW-B from CDW-B to FPSO
Leak Test of both CDW-B from FPSO to CDW-B Platform
Leak Test of both CDW-C from FPSO to CDW-C Platform
Dewatering with N2 for CDW-B and CDW-C Line
**Project Profile – Cendor**

1. Bridge Bumper Recovery
2. 6 x 12” Riser Clamp Installation at Platform CDWB
3. 6 x 12” Riser Clamp Installation at Platform CDWC
4. Existing Riser Clamp Removal
5. WD PLET Pre-Flushing and FSO Flow-line Removal
6. WD PLET Chute Installation and Temporary Valve Support Removal
7. Tie-in and Leak Test of 8” Flexible Riser
8. FSO Flow-line Re-routing and deoiling operation from 8” Flexible Risers
9. Lower down the 8” FSO Flow-line from FSO and removal of Buoyancy Modules (4 nos)
10. 9 nos x 6” x 800m Old Manuli Hose Recovery and Cutting Operation
11. 10 nos x 6” x 1km New Manuli Hose Recovery and Cutting Operation + 2 nos Buoyancy Modules

**Client**
- Petrofac

**End Client**
- Kizyura

**Project Start**
- Aug 2014

**Project End**
- Sep 2014

**Assets Deployed**
- Kreuz Installer

**Project Location**
- Cendor Field
- South China Sea
- Malaysia

**Water Depth**
- 65m
Project Profile – Champion Waterflood

- **Assets Deployed**
  - a) 500 x Concrete Mattresses
  - b) 11 x Flexible Pipeline includes 16", 12" and 8" Dia flexibles
  - c) 8 x Type 1 and Type 2 Umbilical installation
  - d) 4 x composite Power cable installation
  - e) Pre and Post lay survey
  - f) Subsea Riser installation with clamps
  - g) 5 x J tube installation with clamps
  - h) Flexible flow line tie-in to risers
  - i) Subsea cable pull-in inside J-tube
  - j) Grout bag Support
  - k) Post Laying Concrete Mattress Operations
  - l) Dropped objects protection frame
  - m) Cable laying and pull-in
  - n) Pre and Post lay survey

- **Project Details**
  - **Client**: Swiber
  - **End Client**: Crest Odyssey
  - **Project Start**: 03 Feb 2012
  - **Project End**: 28 Sep 2012
  - **Location**: Champion Field, South China Sea, Brunei
  - **Depth**: 110m

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Project Profile – Bernatai Installation

1. 12” Gas Export Riser Tie-in Work to PLET and close PLET valves
2. Mattresses installation for umbilical crossing
3. FPSO Mooring Chain Hook-up
4. 12” GEP Dynamic Riser Recovery and Hook-up
5. Umbilical Installation
6. 12” HP, 12” LP and 8” Dynamic Riser Hook up
7. Open PLET valves and PLET Mechanical Protection Installation
8. FPSO Floating hose installation
Project Profile – Nong Yao SBM

- Positioning of Calm Buoy
- Chain Hook Up and final Tensioning
- Cutting of Extra chain Underwater by diver (Broco Cutting)
- Two Flexible Risers Installation 6” x 190mtr (includes 14 x Buoyancy Module and 10 x Ballast Module)
- Riser Leak Test
- Two 6” Floating Hose Installation
- Floating Hose leak test
- Mooring Hawser Installation

**Client**

Equatoriale

**End Client**

Mubadala Petroleum

**Project Start**

May 2015

**Project End**

Jun 2015

**Assets Deployed**

Kreuz Installer

**Project Location**

Gulf of Thailand

South China Sea

Thailand

**Water Depth**

75m
Project Profile – Nong Yao SBM

View of Buoy and Installer

Chain Hook-up

Flexible risers

Floating hoses

a. Positioning of Calm Buoy
b. Chain Hook Up and final Tensioning
c. Cutting of Extra chain Underwater by diver (Broco Cutting)
d. Two Flexible Risers Installation 6” x 190mtr (includes 14 x Buoyancy Module and 10 x Ballast Module)
e. Riser Leak Test
f. Two 6” Floating Hose Installation
g. Floating Hose leak test
h. Mooring Hawser Installation

Client
End Client

Project Start Project End
May 2014 Jul 2014

Assets Deployed
1MAS300

Project Location
Gulf of Thailand South China Sea Thailand

Water Depth
44m
Project Profile – SOGT

- Assets Deployed:
  - 2 x PLEM (80 te for 36” / 60 te for 28”)
  - Spool Installation
  - 2 x SPM with 6 x Anchored Chain
  - 2 sets x Under buoy hoses
  - 2 sets x 20” Floating Hoses

- Project Location:
  - Sabah
  - South China Sea East Malaysia

- Water Depth:
  - 34m
Project Profile – Wassana

- SPM Buoy Installation
- Connect anchor chains with SPM
- Laying of manuli hose - 4" x 2 km and 6" x 2 km
- Connect manuli hose to SPM
- Connect floating hose - 6" x 2 nos
- Mooring hawser Installation
- Concrete mattress installation
Project Profile – West Desaru

1. Laying of 8” flexible from PLET to FSO
2. Laying of 6” Manuli hose
3. Removal and recovery of old manuli hose and buoyancy module installed along hose
4. Metrology, fabrication and tie-in of 8” subsea spools
5. Installation of WD PLET
6. Installation of concrete mattress along the flexible

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Client: Petrofac
End Client: 22 May 2012
Asset Deployed: Kreuz Installer
Project Start: 21 Jul 2012
Project End: Peninsular Malaysia

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Project Location: Cendor Field
150km offshore
Water Depth: 65m
Asset that deliver SURF

Kreuz Installer

Kreuz Endeavour

State of the art, unique and differentiating assets
Kreuz Installer

DP2 Multipurpose Diving and construction support

- DP2 Multi Purpose
- 1700 sqm deck area (10 t/m2), can take 8 reels
- Main Crane 155 MT at 6.5m
- Auxiliary crane 70te at 10m
- 16-men single bell SAT (inbuilt) + SPHL / 300m
- 3 x moon pools
- 98 accommodation
- 8.5 kts speed, 10 m³/day fuel during operation
- Principal dimensions
- LOA = 129.10m, Breadth = 24.7m and max draft = 6.0m

Extremely versatile asset – capable to perform construction, diving and SURF works. No other equivalent in the existing markets in the same capabilities
Kreuz Endeavour

DP2 Multipurpose Diving & construction support
MT-6024 / SPS Code and Clean Design

- DP2 Multi Purpose
- 1300 sqm deck area (10 t/m2)
- 140 MT at 12m AHC Crane / 3000m
- Auxiliary crane 40te at 13.5m
- 18-men twin bell SAT + SPHL / 300m
- 3 x moon pools
- 130 accommodation
- 15 kts speed, 7te /day fuel during operation
- Principal dimensions
- LOA = 120.80m, Breadth = 25m and max draft = 7.70m

Combines shallow and deepwater capabilities, specification meets most geographies and Clientele
Kreuz Endeavour – Video
Testimonials

…The Project itself was not as easy as we… ….Kreuz Subsea team that have been working hard to bring us where we are today … within time-frame, within budget and, most importantly, safely!

To CEO…We met you … two years ago, we did talk about COPI and Kreuz Subsea core values – I am here witnessing that, from beginning until the end, you have been consistent with these values

“…Another big milestone achieved safely and timely…your flexibility coping with changes, determination, awareness on safety are very well recognized

Poki R Satari, Manager, Bawal Development & Tembang Acceleration Project

.. good personnel and good equipment, Kreuz Subsea provided a very professionally managed project that delivered safely and on schedule.

David Mooney

“… good work ethic and commitment…. HSE onboard ‘KI’ of very high standard.”

Peter John Richardson, TL Offshore
Kreuz Subsea is an integrated turnkey solutions provider in IRM, SURF and Subsea Construction Services incl Hyperbaric Welding – Unique and differentiating model
Going beyond limits