

Subsea Construction Solutions



A Lifetime of Lifting in the Subsea



National Oilwell Varco has taken on the mission to deliver a new wave of construction vessel equipment, addressing the industry demand for access to deeper waters.

The many challenges of working in the ocean space are harsh conditions, ultra deep water, speed of operations, environmental impact, weight of equipment and the safety of your people. We understand. To meet these challenges you will need the best lifting and handling equipment to make it happen.

Through our relationships with vessel designers and end users we have had the opportunity to expand our role as an equipment supplier, and optimize our equipment to make your job easier and safer. The main outcome of this effort is an overall better versatility both for vessel owners and contractors, because — what you need, is flexibility to configure the equipment to meet different operating missions requirements.

You don't simply need a crane, a winch or a pipelay system. You need a partner who is by your side from the development of the lifting solution, through the build process, on hand for installation and testing, committed to the training of your personnel and close by through the lifetime of your products, as day after day your vessels lower equipment to the sea bed, transfer from deck to deck or carry out the delicate task of moving your equipment on board.

Don't you deserve a partner who understands a lifetime of lifting?

NOV has a broad range of products suitable for different operations in deepwater. We have focused on two examples of vessel types, shown on the following pages.



Subsea Construction Vessel



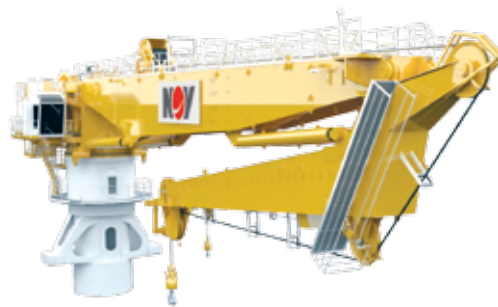
The equipment package is configured for deep water construction missions and can place a workload of 600 mt at 500m depth and 382 mt at 3000m depth. Furthermore, we provide umbilicals and flexible flowlines for your vessel if required by the job.

This NOV equipment package consists of:

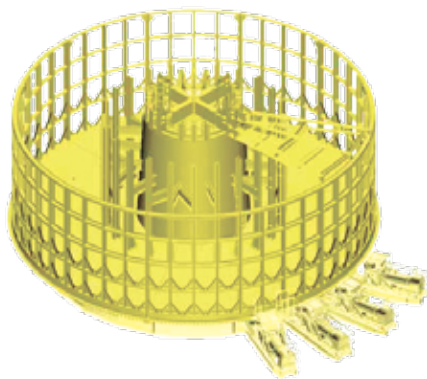
- Knuckle Boom Crane (KBC) with Active Heave Compensation (AHC)
- Storage Carousel and Loading System below deck
- Lattice Boom Crane (LBC) with Active Heave Compensation (AHC)



Lattice Boom Crane with AHC



Knuckle Boom Crane with AHC



Storage Basket Carousel

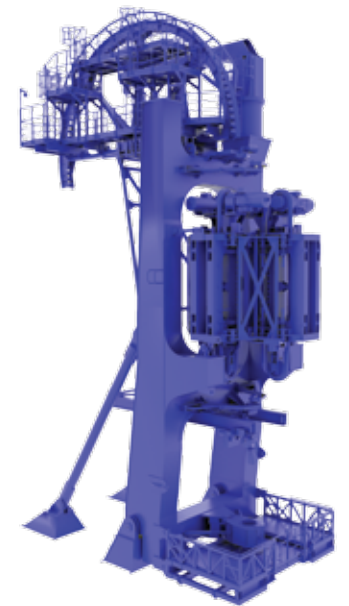
Flex Lay Vessel



The mission equipment package is configured for deployment of deepwater flexible riser and umbilical systems and can operate at water depths up to 3000m.

This NOV equipment package consists of:

- Flex Lay Tower (VLS)
- Knuckle Boom Crane (KBC) with Active Heave Compensation (AHC)
- Storage Carousel and Loading System
- Reel Hub Drive System
- Abandonment and Recovery (A&R) Winch



Flexlay Tower (VLS)

The core value NOV brings to the Subsea Construction Vessel is our unique ability to combine our products into solutions that are configurable and modular, and can be integrated through well-defined interfaces – enabling a greater level of flexibility to Vessel designs.

Technical Parameters

Typical Subsea Capabilities

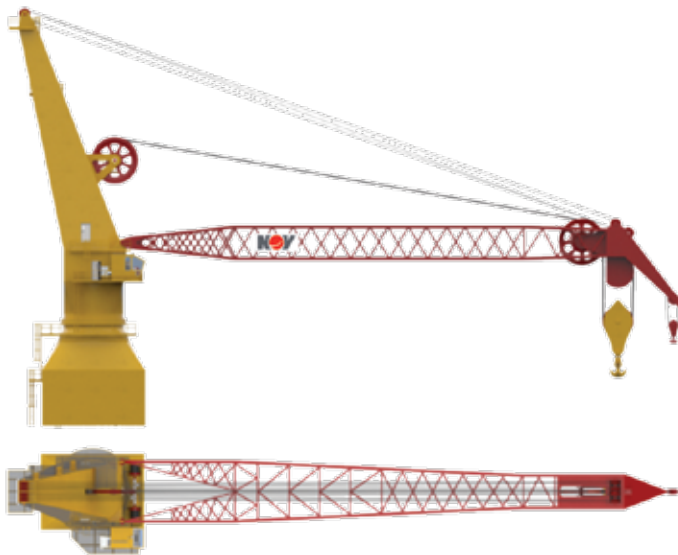
Cranes

	MSB LBC			OC-K KBC*
Main Hoist Option	300 mt	450mt	600mt	250mt
Water Depth				
At Water Level	300mt	450mt	600mt	250mt
500m	300mt	450mt	600mt	250mt
1000m	300mt	450mt	580mt	250mt
1500m	270mt	420mt	525mt	220mt
2000m	240mt	370mt	465mt	198mt
2500m	220mt	330mt	420mt	175mt
3000m	190mt	270mt	350mt	153mt

* The KBC is available in different sizes, depending on customers' requirements.

Features and Benefits for AHC Cranes

- Increased weather window
- Intelligent load handling
- High compensation grade
- Reduced power consumption
- Limiting of dynamic forces
- Reduced hazards to the lifted load and laydown area
- Reduced dynamic moment on the structure



AHC Cranes are the most suitable crane for offshore operations on construction vessels.

AHC Technology

It is no secret that floating units operating in heavy seas experience movement. To counteract and gain control of these motions, crane performance is crucial. NOV provides the Active Heave Compensated (AHC) crane as a solution to the unforgiving seas and will help you increase your uptime.



Storage Carousel

Deck Carousel	Ø12m – Ø30m OD
Below Deck Carousel	Ø12m – Ø26m OD
Core Diameter	Ø4m – Ø12m OD or Product Specific
Linear Speed	10m/min – 30m/min
Loading Systems	Articulating Arm or Chute
Capacity Ranges	500mt – 10,000mt
Compartment	Pre-Installed or Project Specific
Power Requirements	150kW – 750kW
Carousel Type	Basket or Carousel (Reel)

Features and Benefits for Carousels

- Storage of flexible pipe, umbilicals, power cables and other typical products throughout transportation and deployment
- Increased time-saving during loading and unloading
- PLC control allows ease of speed matching between Carousel and Lay System
- Full synchronized emergency stop capability



Technical Parameters

Abandonment and Recovery (A&R) Winch

Pull capacity, SWL	From 100mt to 1000mt
Drive	Electric AC frequency controlled or hydraulic closed loop or ring line
Brake Capacity	Fail safe, according to Class rules
Standard Speed Range	0-10 m/min (Power regulated, lower load at higher speed)
Drum Diameters vs. Wire Rope Diameter	Standard $D/d=18/1$ or higher, depending on type of operation
Wire Rope Length	Wire rope length can be adapted according to client requirements
Dynamic Factors	Dynamic factors will be established according to applicable rules, Standard 1,3
Corrosion Protection	Corrosion protection according to client specification or NOV standard offshore painting system

Features and Benefits for A&R Winch

- Controls are step-less proportional for optimal speed adjustment
- Automatic or manual spooling/level wind devices
- Component selection and design based on standardized solutions for increased reliability and maintenance
- Compact design with good ratio between capacity, weight and size of equipment



Flexlay Tower (VLS)

Dynamic Tension Capacity	50mt – 650mt
Holding Capacity	10% greater than above
Standard Speed Range	10 m/min – 20 m/min
Pipe Diameters	4"NB - 20"NB
Installation	VLS can have permanent installation or modular. Typical modular system up to 250mt capacity – mobilized to/from the vessel within 48/72 hours.
Speed Matching	Compensator(s) allow automatic speed matching between the Carousel / Hub Drive System and the VLS.

Features and Benefits for Flexlay Tower

- Used for installation of flexible flowlines, risers and umbilicals in deep water
- Equipment supplied to meet your specific project requirements
- Focus on ease of operation and maintenance along with the Health and Safety of your operators
- Reduced operation costs due to regenerated power supplied back into vessels power system or used to preheat fuel oil



Life Cycle Support

Safety — We Care

Safety is our precedence and we care about our employees, customers, suppliers and the operation environment.

Our Commitment

As an Original Equipment Manufacturer (OEM), NOV provides comprehensive service solutions and assistance to our customers in order to support the lifetime of your equipment, through an integrated network of facilities worldwide.

NOV's Service Support

- Installation and Commissioning
- Field Service
- eHawk Remote Support
- Technical Support
- Modification and Upgrade
- Engineering services
- Spare Parts deliveries
- Repair services
- Warranty Proceedings
- Customer Training
- NOV Technical College
- Rentals



Service Centers Worldwide

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Corporate Headquarters

7909 Parkwood Circle Drive
Houston, Texas 77036
USA

Rig Systems Headquarters

10000 Richmond Avenue
Houston, Texas 77042
USA

For a complete list of NOV's Rig Systems locations, visit us online:

www.nov.com/rigsolutionslocations

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