

# Drawworks Technology



# Introduction

## AC gear driven drawworks

Our ADS and SSGD lines of AC electric gear driven drawworks offer cutting edge technology to the drilling industry. These drawworks provide the following benefits:

- AC-powered motors that provide significantly more performance and have made possible a machine that requires approximately half the space and weight with lower maintenance than traditional drawworks
- Unique AC-powered control characteristics, such as regenerative braking and load holding without using the friction brakes
- Sophisticated braking systems offering precise control, while maximizing safety

## DC chain driven drawworks

Our conventional, chain driven drawworks are proven, reliable machines that have set many standards in the drilling industry. The robust design and simplicity of these drawworks allow for easy operation and maintenance.



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# Why choose our drawworks?

With over 100 years of experience and thousands of drawworks in the field, NOV is the world's premier drawworks manufacturer. Our line of drawworks models range from 700 horsepower drawworks for mobile land rigs to 9000 horsepower active heave drawworks for floating rigs.

Our brands: Varco<sup>®</sup>, National<sup>®</sup>, Oilwell<sup>®</sup>, Dresco<sup>®</sup>

By bringing the talents and resources of these legacy companies together, we are positioned to provide a wide variety of superior quality drawworks to meet any application.

## AC motors

We manufacture 1150 and 1500 horsepower AC induction motors specifically designed for continuous drawworks oilfield drilling duty. These motors provide increased electrical performance and superior mechanical durability.

High-quality heavy-duty construction, state-of-the-art design and ISO 9001 manufacturing standards ensure reliable performance in the naturally hostile oil rig environment.

## Drawworks brakes

Our drawworks are equipped with several types of braking systems to provide maximum performance and safety. All drawworks are equipped with at least one of the following:

- Universal disc brakes
- Band brakes
- NOV friction-plate brakes
- Hydraulic caliper disc brakes
- Air caliper disc brakes
- Baylor<sup>®</sup> eddy current brakes

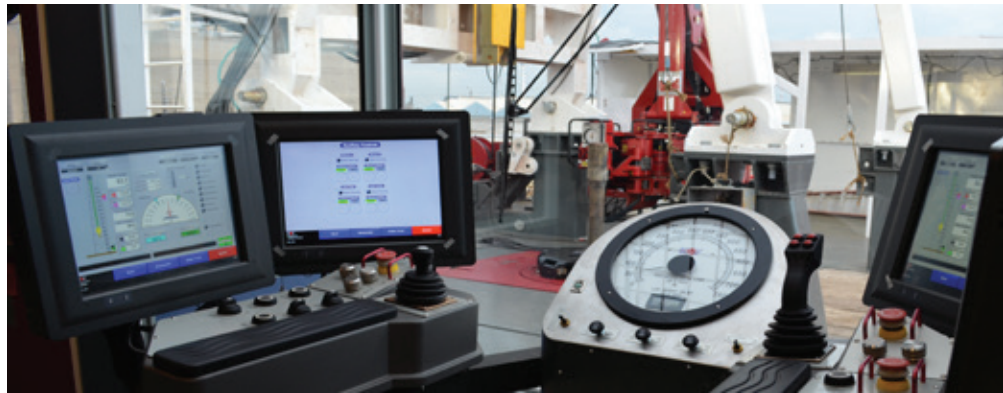
Our Baylor eddy current brakes and control systems have set the industry standard for dynamic braking since 1954. All Baylor brakes meet DNV, ABS, and Lloyds Registry safety and design standards, and are certified for use in hazardous environments.





## Fleet Care

- Safety 24/7
- Technical support
- Field service
- Repair
- Spare parts
- eHawk remote support
- NOV Technical colleges and Training centers
- Installation and commissioning
- Field engineering
- Rentals



### Drawworks controls

We've delivered more control systems for DC and AC drawworks than any other supplier. Whether a simple mechanical brake handle or an advanced joystick/man-machine interface system, the purpose of controls is to help the driller maximize safety and efficiency.

For over 10 years, we have provided advanced automatic drilling controls, including electronic drilling systems, that use AC motors or friction-plate brakes to precisely control drum payout, maximize bit ROP and bit life, and significantly reduce drilling and tripping time and costs. Drawworks controls can be standalone, or they can be combined into Cyberbase™ or Amphion™ integrated control cabins.

For more information, refer to these NOV drawworks control products:

- Electronic drilling system MotorDriller™
- Ideal™ autodriller
- Kinetic energy monitoring system (KEMS)
- Cyberbase
- Amphion



**You can be confident in the worldwide service and support that is available to you when you buy an NOV drawworks.**

Our worldwide products and services support includes service, repair, technical support, spare parts, 24/7 eHawk remote support, installation and commissioning, and internal and external training throughout the lifetime of your drawworks.

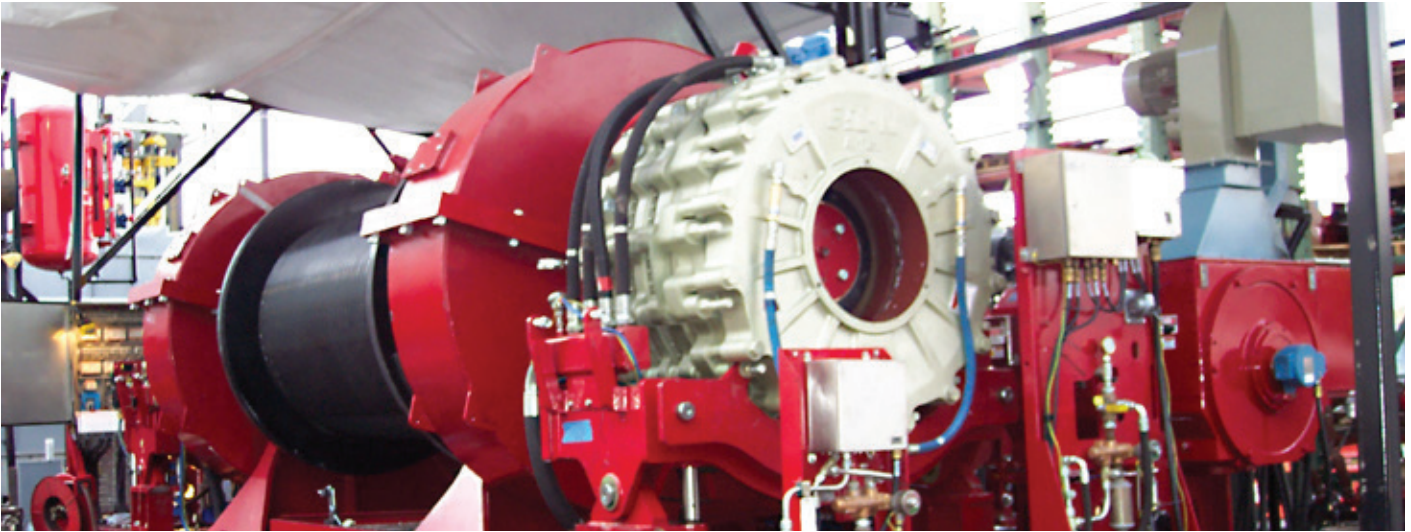


# ADS Drawworks

provide drillers with enhanced hoisting control capabilities which increase the efficiency, productivity, and safety of the drilling process.

**NOV**  
ADS-0150





ADS drawworks are equipped with AC motors which provide significantly more performance and have made possible a machine that requires approximately half the space and weight with less maintenance than traditional drawworks.

### Features

- Choice of two, three, or four AC motors with regenerative braking (see specifications table on the following page)
- Unique modularity of common components offering configurable drawworks models for individual customer applications from 1800 to 6000 HP
- High-capacity water and air-cooled friction-plate braking systems offer precision control of the dynamic and static braking capabilities
- Robust single speed gear drive reduces space, and single unitized frame with simplified drum provides a significantly reduced moment of inertia

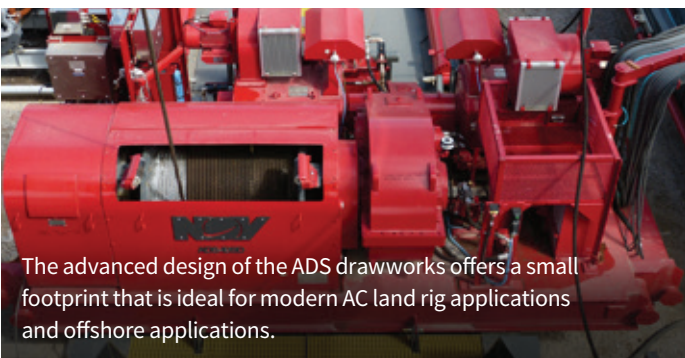
### Brakes

- An advanced braking system that offers precise proportional control to improve drilling and tripping technology
- Unique AC-power control characteristics allow regenerative braking and zero-speed load holding without using the friction-plate brakes

### Controls

Automation of repetitive drilling operations is offered through a variety of user-friendly NOV control systems. The control system software includes the following features as standard:

- Monitoring and control of brake and lube system
- Monitoring of AC motor temperature and cooling pressure
- Interface to hook load sensor (dead line)
- Dynamic floor and crown saver system
- Disc brake testing system
- Disc brake burnishing system
- Slip and cut function
- Drawworks power management system



The advanced design of the ADS drawworks offers a small footprint that is ideal for modern AC land rig applications and offshore applications.



# Automated Drawworks Systems (ADS)



## Specifications – NOV ADS\*

ADS options with 1150 HP AC motors												
	Model	Intermittent horsepower	Continuous horsepower	Drum size (in.)	Skid dimensions L x W (in.)	Weight (lbs)	Lines	3rd layer hook load (tons)	Motors	Gearbox	Brakes	
LAND	ADS-10SD**	2000	1800	30 x 55	276 x 119	64,325	8 10 12	352 428 500	2 ct x 1150 HP	1 ct x GB15	1 ct x 36 in. (A)	
	ADS-10D **	2800	2300	36 x 71	295 x 108	98,800	10 12 14	460 537.5 610.5	2 ct x 1150 HP	2 ct x GB15	2 ct x 36 in. (A)	
OFFSHORE	ADS-10T	3200	2950	36 x 71	328 x 108	112,000	10 12 14	572.5 669 760	3 ct x 1150 HP	2 ct x GB15	2 ct x 36 in. (A)(W)	
	ADS-10Q	5600	4600	54 x 84	319 x 197	160,000	10 12 14	637.5 775.5 906	4 ct x 1150 HP	2 ct x GB30	2 ct x 48 in. (A)(W)	
	ADS-2000SD	2000	2000	30 x 55	247 x 108	63,500	8 10 12	352 428 500	2 ct x 1150 HP	1 ct x GB15	1 ct x 36 in. (A)	
ADS options with 1500 HP AC motors												
	Model	Intermittent horsepower	Continuous horsepower	Drum size (in.)	Skid dimensions L x W (in.)	Weight (lbs)	Lines	3rd layer hook load (tons)	Motors	Gearbox	Brakes	
LAND	ADS-30D**	3600	3000	36 x 71	319 x 108	105,200	10 12 14	597.5 698 793	2 ct x 1150 HP	2 ct x GB15	2 ct x 36 in. (A)	
OFFSHORE	ADS-30T	5020	4500	54 x 84	377 x 132	159,000	12 14 16	790 897.5 999.5	3 ct x 1500 HP	2 ct x GB30	2 ct x 48 in. (A)(W)	
	ADS-30Q	6000	6000	54 x 84	377 x 132	164,000	12 14 16	984.5 1118.5 1245	4 ct x 1150 HP	2 ct x GB30	2 ct x 48 in. (A)(W)	
	ADS-1500SS	2000	1500	30 x 55	91.5 x 191.5	53,000	8 10 12	286.6 348.6 407.2	1 ct x 1500 HP	1 ct x GB15	1 ct x 36 in. (A)	
* NOMENCLATURE and MODEL CLASSIFICATION:											(A) Air-cooled (W) Water-cooled	
D	Double motor	SD	Single gearbox double motor									
Q	Quadruple motor	T	Triple motor									
Specifications are subject to change without notice. ** Alternative configuration is available on request.												



Our Dual Speed Gear Driven™ (DSGD) drawworks are setting new standards in the drilling industry. These AC drawworks feature a two-speed helical gearbox mounted directly on the drum shaft which is ideal for any application where size and weight are critical factors. The two-speed functionality provides both extremely fast hoisting speeds and heavy hook load hoisting capabilities. The simple design of the DSGD drawworks allows for easy operation and maintenance. Both transverse and longitudinal skid configurations are available to fit any substructure design.

## Features and benefits

- No HPU required
- No brake-water cooling system required
- Requires less horsepower input and fewer drives than single speed drawworks of the same maximum hook load
- Lightweight small footprint and allows for easy moving between rig locations
- All DSGD models can be CE/Atex marked

## Drawworks control system

Control system software includes the following as standard:

- Monitoring and control of brake and lube system
- Monitoring of motor temperature and cooling pressure interface to hook load sensor (dead line)
- Dynamic floor and crown saver system
- Disc brake testing system
- Disc brake burnishing system
- Slip and cut function



## Service/Dynamic braking

Normal service braking is performed by the AC motors by generating power into braking resistors. The motors and frequency drives are capable of holding the maximum hook load at zero speed indefinitely. Load speed is limited by the control system to stay within the capacity of the motors.

## Park/Emergency braking

A disc brake system is utilized for parking and emergency situations. It consists of two air-cooled discs with spring-applied air-released calipers to provide fail-safe braking capability. These brake calipers are normally operated remotely via the NOV drawworks integrated control system. Emergency brake controls on the DSGD drawworks allow the load to be manually lowered using the brake calipers.



## Specifications – NOV DSCG

Model	Continuous horsepower	Motors	Number of lines	2nd layer hook load (Tons)	Drawworks dimensions L x W (in.)	Drum dimensions Dia x L (in.)	Weight (lbs)																																																														
<b>DSGD-250</b> (Transverse)	1150	1	6	191	276 x 104	25 x 49	67,000																																																														
			8	250				<b>DSGD-250</b> (Longitudinal)	1150	1	6	191	134 x 216	25 x 49	67,000	8	250	<b>DSGD-375</b> (Transverse)	1500	1	8	260	354 x 165	28 x 56	71,000	10	318	12	375	<b>DSGD-375</b> (Longitudinal)	1500	1	8	260	146 x 268	28 x 56	68,000	10	318	12	375	<b>DSGD-500</b> (Transverse)	2300	2	8	346	396 x 126	31 x 56	108,000	10	424	12	500	<b>DSGD-500</b> (Longitudinal)	2300	2	8	346	320 x 118	31 x 56	92,000	10	424	12	500	<b>DSGD-750</b> (Transverse)	3000	2	12
<b>DSGD-250</b> (Longitudinal)	1150	1	6	191	134 x 216	25 x 49	67,000																																																														
			8	250				<b>DSGD-375</b> (Transverse)	1500	1	8	260	354 x 165	28 x 56	71,000	10	318				12	375				<b>DSGD-375</b> (Longitudinal)	1500	1	8				260	146 x 268				28 x 56	68,000	10	318				12	375				<b>DSGD-500</b> (Transverse)	2300	2	8				346	396 x 126				31 x 56	108,000	10	424	12	500	<b>DSGD-500</b> (Longitudinal)	2300
<b>DSGD-375</b> (Transverse)	1500	1	8	260	354 x 165	28 x 56	71,000																																																														
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			12	375				<b>DSGD-375</b> (Longitudinal)	1500	1	8	260	146 x 268	28 x 56	68,000	10	318	12	375	<b>DSGD-500</b> (Transverse)	2300	2	8	346	396 x 126	31 x 56	108,000	10	424	12	500	<b>DSGD-500</b> (Longitudinal)	2300	2	8	346	320 x 118	31 x 56	92,000	10	424	12	500	<b>DSGD-750</b> (Transverse)	3000	2	12	655	372 x 142	36 x 72	127,000	14	750																
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# Single Speed Gear Driven (SSGD) Drawworks

The AC electric-powered SSGD drawworks offer a design unique to the industry. By overpowering a drawworks with AC motors, we created a single-shaft, single speed drawworks with hoisting performances comparable to a conventional drawworks.

The result is a simple design with few mechanical parts, a small footprint, and lightweight. These drawworks require minimal maintenance and are entirely self-contained.





## Single Speed Gear Driven Drawworks

### Electric motors

The SSGD drawworks are equipped with 1150 HP and 1500 HP AC motors. The motors feature forced air cooling and have temperature sensors installed in the stator windings.

### Safety philosophy

Like all NOV drawworks, the SSGD drawworks control system is designed to provide enhanced safety and efficiency for the operation, machinery, and the personnel onboard the rig. This is achieved by an active control philosophy with equipment self-checks and monitoring.

The primary safety requirement is that one single point of failure shall not cause any hazardous condition leading to either personnel injury or damage to the equipment.

### Drawworks control system

The drawworks control system consists of the following parts:

- Drawworks control cabinet
- Miscellaneous field instrumentation
- Drawworks interface panel
- Emergency stop

Control system software includes the following as standard:

- Monitoring and control of brake and lube system
- Monitoring of motor temperature and cooling pressure interface to hook load sensor (dead line)
- Dynamic floor and crown saver system
- Disc brake testing system
- Disc brake Burnishing system
- Slip and cut function
- Drawworks power management system

### Braking

The SSGD drawworks is designed as a lifting device for drilling operations with fail-safe, spring-applied disc brakes for park and emergency braking.

Normal service braking is performed by the AC motors by generating power into braking resistors. The motors and frequency drives are capable of holding the maximum hook load at zero speed indefinitely. Load speed is limited by the control system to stay within the capacity of the motors.

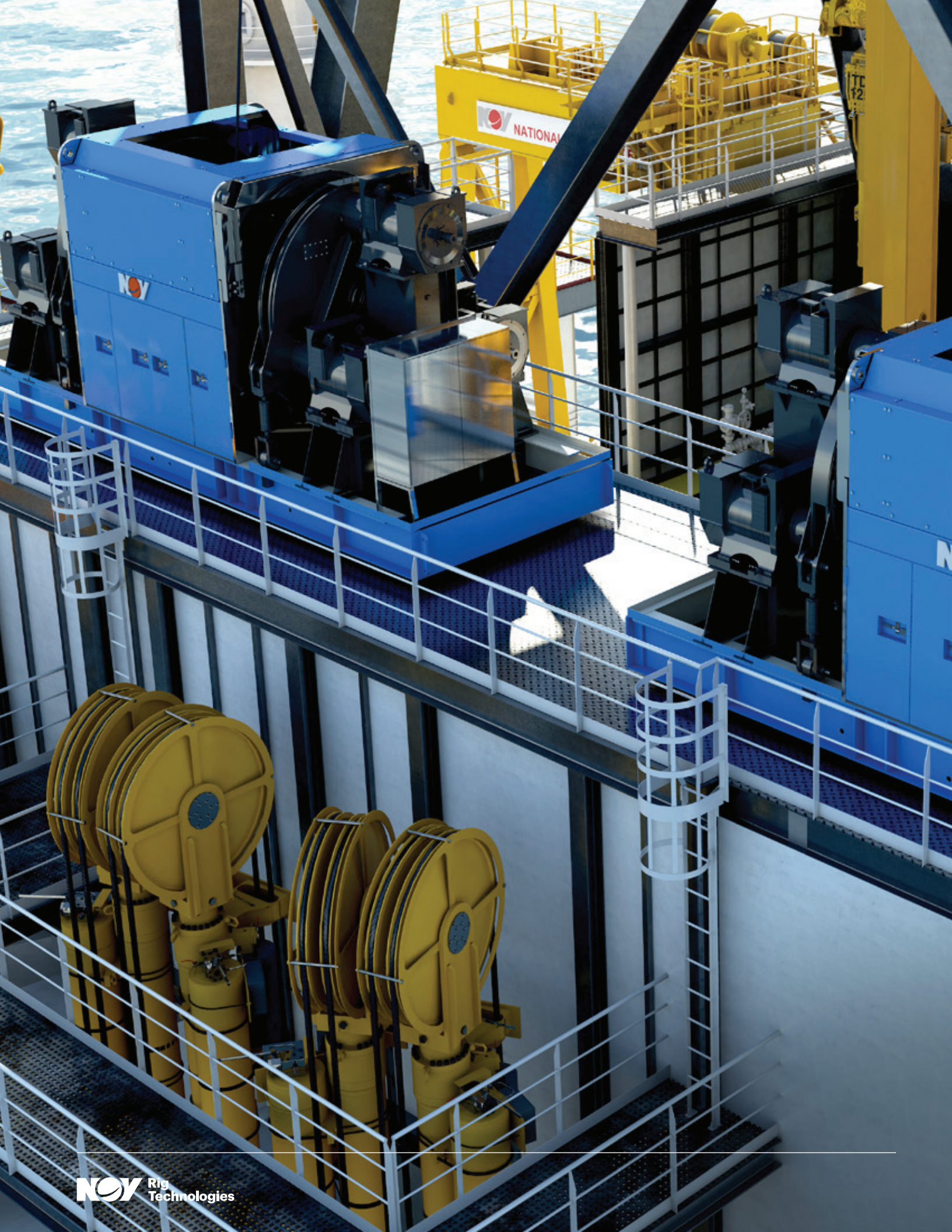


### Specifications – NOV DSCG

	Model	Continuous horsepower	Motors	Number of lines	2nd layer hook load (Tons)	Drawworks dimensions L x W (in.)	Drum dimensions Dia x L (in.)	Weight (lbs)																																																						
LAND	SSGD-250	1150	1	6	191	221 x 108	26.5 x 34	45,000																																																						
				8	250				OFFSHORE	SSGD-500	3450	3	10	422	290 x 154	52 x 82	135,000	12	500	SSGD-750	4500	3	12	675	327 x 142	50 x 82	155,000	14	750	SSGD-750	4600	4	12	650	290 x 154	57 x 82	152,000	14	750	SSGD-1000	6000	4	12	869	300 x 144	48 x 82	161,500	14	1000	SSGD-1000	5750	5	12	869	368 x 154	55 x 82	193,000	14	1000	SSGD-1250	6900	6
OFFSHORE	SSGD-500	3450	3	10	422	290 x 154	52 x 82	135,000																																																						
				12	500					SSGD-750	4500	3	12	675	327 x 142	50 x 82	155,000	14	750	SSGD-750	4600	4	12	650	290 x 154	57 x 82	152,000	14	750	SSGD-1000	6000	4	12	869	300 x 144	48 x 82	161,500	14	1000	SSGD-1000	5750	5	12	869	368 x 154	55 x 82	193,000	14	1000	SSGD-1250	6900	6	14	1093	385 x 154	57 x 100	212,000	16	1250			
	SSGD-750	4500	3	12	675	327 x 142	50 x 82	155,000																																																						
				14	750					SSGD-750	4600	4	12	650	290 x 154	57 x 82	152,000	14	750	SSGD-1000	6000	4	12	869	300 x 144	48 x 82	161,500	14	1000	SSGD-1000	5750	5	12	869	368 x 154	55 x 82	193,000	14	1000	SSGD-1250	6900	6	14	1093	385 x 154	57 x 100	212,000	16	1250													
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Specifications are subject to change without notice.







# Active Heave Drilling (AHD) Drawworks

Active Heave Drilling™ (AHD) drawworks offer an advanced solution to the offshore drilling industry by combining the latest technology in controls and design.

The AHD sets new standards for compensation, accuracy, improved wireline life, workable load range, and rig safety by providing proven, active heave motion compensation for floating rig applications. These drawworks eliminate the need for overhead motion compensation machinery which provides a lower center of gravity and less operational cost. The AC electric motors provide improved speed and torque control independent of load and speed, and they provide the ability to keep the maximum hook load at a standstill indefinitely. In addition, braking energy is regenerated and can be fed back into the drilling rig electrical system which increases overall rig efficiency. And due to active heave compensation, the “drilling operational window” is increased by allowing drilling programs to continue in heavier seas than conventional drawworks.

The AHD drawworks are completely self-contained and enclosed. Installation is simple, maintenance is kept to a minimum, and easy access for installation and maintenance is emphasized. The AHD design offers a low weight and low center of gravity of the drilling rig compared to traditional crown-mounted compensation systems, providing increased deck load and lighter derricks and substructures. Several important components are redundant to improve the availability of the Active Heave Drawworks system.

The AHD is designed according to API 7K specifications, normally under supervision by a third party like DNV, Lloyds or ABS.

## Features and benefits

- Reduced overall equipment cost vs. traditional compensator systems
- Reduced weight on deck
- Increased operational capacity and availability
- Better drilling performance and easier equipment landing
- Lower vessel center of gravity
- Single high-speed allows for fast tripping and riser and BOP running
- Self-contained and enclosed unit
- More accurate heave compensation

## Specifications – NOV AHD

Model	Continuous horsepower	Motors	Number of lines	2nd layer hook load (Tons)
AHD-500	4600	4	10	500
			12	600
AHD-750	5750	5	12	640
			14	750
AHD-1000	6900	6	12	869
			14	1000
			16	1125
AHD-1400	10500	7	12	1081
			14	1243
			16	1400
AHD-1600	1200	8	12	1235
			14	1420
			16	1600

*Specifications are subject to change without notice.*

## Operations

- Normal drawworks operations: drilling and tripping
- Autodriller™ operations
- Active heave compensation of full load range of the drawworks
- Landing of heavy BOP and riser loads with active heave compensation

## Complete with all auxiliaries

- Control panel
- Motion reference units (redundant)
- Motor cooling blower skid(s) (redundant)
- Brakes (no additional auxiliary brakes required)





# Conventional Chain Driven DC Drawworks

Our conventional, chain driven drawworks are proven, reliable machines that have set many standards in the drilling industry. The robust design and simplicity of these drawworks allow for easy operation and maintenance.

These drawworks are designed to provide maximum power in minimum space and feature DC electric motor drives.

## Power

These drawworks are powered with DC motors.

## Brakes

Disc brakes or band brakes are used as the primary braking system with Baylor eddy current brakes as an auxiliary. Friction-plate brakes can be used as auxiliary brakes in conjunction with Electronic Drilling System (EDS).

## Controls

These drawworks can be controlled remotely or by a manual driller's control console which is mounted on the skid.



## Specifications – NOV Conventional Chain Driven Drawworks\*

Model	Horsepower	Number of lines	Hook load (Tons)			
			Drum clutch low		Drum clutch high	
			Transmission low	Transmission high	Transmission low	Transmission high
LAND	610-E	6	130	92.5	55	32.5
		8	167.5	120	72.5	42.5
		10	202.5	147.5	87.5	52.5
	80-UE	6	160	102.5	50	32.5
		8	207.5	132.5	65	42.5
		10	250	160	80	50
	110-UE and 110-UDBE	8	250	160	90	57.5
		10	302.5	195	107.5	70
		12	355	227.5	125	80
	1320-UDBE	8	330	207.5	135	85
		10	402.5	252.5	165	102.5
		12	470	295	190	120
OFFSHORE	1625-UDBE	8	440	275	175	107.5
		10	537.5	335	212.5	132.5
		12	625	392.5	250	155
	2040-UDBE and 2040-UDBEL	10	879	530.5	291.5	176
		12	1017	614	337	203.5
		14	1144.5	691.5	379.5	229
		16	1263	762.5	418.5	253

\* NOMENCLATURE and CLASSIFICATION:

**E** Electric (has band brakes)      **UDBEL** Universal Disc Brake Electric Long Drum  
**UE** Unitized Electric (has band brakes)      **UDBE** Universal Disc Brake Electric

Specifications are subject to change without notice.



Total quality control and worldwide services are NOV's assurance of optimum product performance in the field.





# Dual Active Heave Drawworks (AHDD)

The Dual AH drawworks solution builds on the proven performance and value delivered by NOV's active heave compensating drawworks, which has been in operation on several rigs since 1999.

The control system for the Dual AH drawworks solution is identical to that of our single AH drawworks system, with the addition of a link between the two drawworks.

Traditional top mounted compensators are eliminated using the dual AH drawworks, reducing components in the derrick and lowering the rig's center of gravity as well as increasing available deck capacity.

Numerous improvements related to wire rope wear have been successfully implemented in our dual AH drawworks technology, including a larger drum with less layers, larger sheaves, larger wire rope, and a larger rope/sheave ratio. These improvements extend drill line life to a larger degree than the fatigue induced by heave compensation.

With significantly fewer moving parts and a simpler brake design compared to traditional drawworks, the dual AH drawworks provides greater reliability. The dual AH drawworks is mounted on the drill floor or lower where it is easy to access and maintain. Traditional compensators are mounted high in the derrick and are difficult and hazardous to access even in desirable weather conditions.

The dual AH drawworks does not have any stroke or pressure issues to consider. The operator simply activates the active heave compensating mode and the control system phases the drum rotations with the vessel heave. Operating a joystick activates hoisting or lowering. The dual AH drawworks provides significant heave compensation because it is not limited by cylinder stroke found in traditional systems.









## Dual Active Heave Drilling Drawworks (AHDD)

### Advantages and features

There are numerous advantages associated with installing two independent AH drawworks as a dual AH drawworks solution versus a single drawworks.

#### Redundancy

If one unit fails, the other provides:

- **100% Lifting capacity**
- **50% Speed capacity**
- **50% Heave compensating capacity at high loads**
- **30% Heave compensation capacity at low loads**

Continuous uninterrupted operations can continue even if one unit is stopped for maintenance. This redundancy also increases safety for fixed-to-bottom operations since one unit will continue heave compensation even if the other is stopped.

#### Lower fast line speed, reduced line and sheaves inertia

A traditional system, with 400 ft/min hook speed with 14 lines, will have 5600 ft/min fast line speed. The dual AH drawworks uses 16 lines, but the fast line speed is divided between the two drawworks. 400 ft/min hook speed, with 16 lines and dual drawworks, will equal 3200 ft/min fast line speed at each drawworks a 43% reduction in fast line speed.

Additionally, the dual AH drawworks will use 16 lines of smaller wire size than a traditional set-up with each drawworks working with only 8 lines. Reduced inertia and line speed means quicker accelerations, improved heave compensation capacities, minimized wire slack problems, improved tripping speeds, and greater responsiveness.

#### Less drill line wear and no cut and slip

Wear on the drill line is largely dependent on the wire and sheave inertia and efficiency as well as line speeds. Using dual AH drawworks, drill line wear is reduced and is distributed to both ends of the drill line using a fixed line length in the system. The complete line is changed out when the ton-mile limit is reached, thus eliminating normal cut and slip operations.



#### Lower line pull and brake capacity

A 16-line reeving will lower the load on the drill line, the drawworks, and the brakes. The required braking capacity will be reduced compared to a traditional 14-line set-up.

#### Easy change-out and handling of wire

New drill line is pulled into the system using the old line and the old line is then placed back on the drill line spooler for shipment onshore.

### Specifications – NOV Dual Active Heave Drilling Drawworks

	Model	Continuous horsepower	Motors	Number of lines	2nd layer hook load (Tons)
OFFSHORE	AHDD-1250	11500	10	12	951
				16	1250
	AHDD-1400	13800	12	12	1065
				16	1400
	AHDD-1600	15000	10	14	1263
				16	1600

*Specifications are subject to change without notice.*



### Field service

Our growing staff of proven field service personnel is available 24/7 to support all NOV products. Knowledgeable field service technicians can quickly deploy to your operating site to resolve your equipment issues, whether structural, mechanical, electrical, or software-related. Our FAST solution service trucks are pre-stocked with an extensive list of NOV’s top drive, iron roughneck, BOP, EDS, and Amphion replacement parts, filters, consumables, and tools to get your NOV equipment running at OEM specifications. Expert on-call technicians are ready to provide FAST, on-site service, and repair.



### Training

Field technicians train extensively on NOV Rig Technologies product lines including competency training and evaluations through our NOV technical colleges and training facilities to ensure the highest quality service and support for your equipment repairs on-site.

### Repair

Our highly skilled shop technicians overhaul, repair, rebuild, and recertify a wide range of NOV equipment to the NOV Quality Assurance and OEM specifications — using only OEM parts. Our worldwide network of repair centers provides unrivaled quality customer service, on-time delivery and unmatched technical integrity. In addition, equipment exchange programs are available at various facilities. Through the Used Equipment Refurbishment Program, we provide viable, short turnaround solutions to immediate capital equipment needs, complete with data books and certificates of conformance as required.

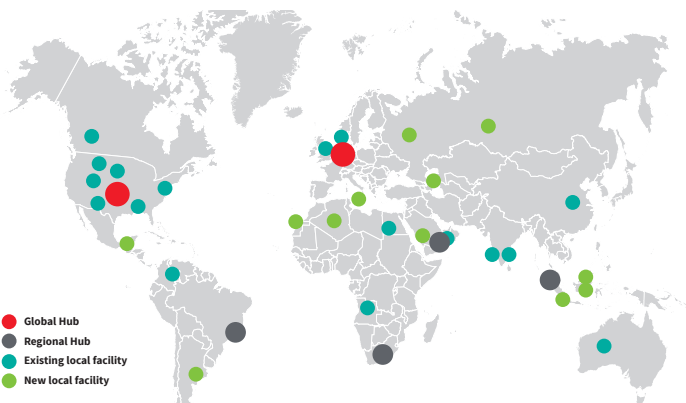
### Technical support

One phone call to a technical support center initiates a technical support team of multi-skilled backgrounds to troubleshoot and resolve your worldwide equipment needs, 24/7. Our team of highly skilled and experienced technical support members work together with our global pool of qualified field service technicians and subject matter experts to keep your rigs operating. The technical support team utilizes our web-based application, “Tracker,” to record, manage, and resolve issues.

### Field engineering

Our field engineering groups offer the unique service of providing one-off, rig-specific equipment designs, modifications, and solutions to your rig-specific issues.

For 24/7 Support Services: [+1 281 569 3050](tel:+12815693050)



Comprehensive aftermarket products and services



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