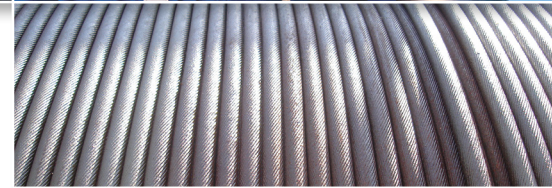




Wireline High-Tension Conveyance System



Wireline High-Tension Conveyance System

TuffLINE* torque-balanced wireline composite cable deployed on a new integrated conveyance system expands wireline data acquisition capabilities with unprecedented improvements in safety, efficiency, reliability, and sticking avoidance.

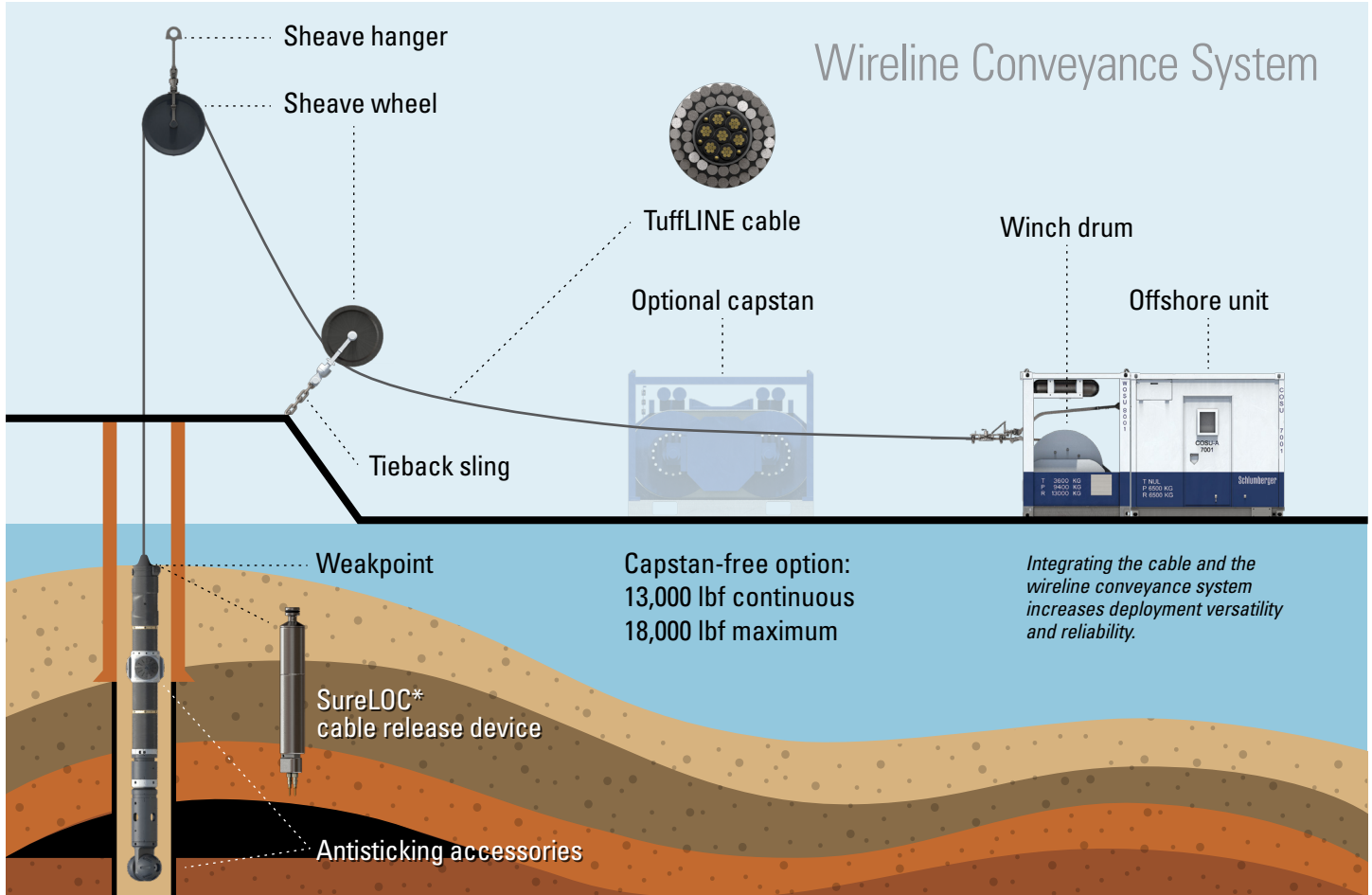
Applications

- Deepwater and ultradeepwater wells
- Extended-reach and complex trajectory wells
- Deepwater wells with rig-up constraints for capstan operations
- Reservoir sampling and pressure measurement involving long station times with long and heavy toolstrings

Benefits

- Increased safety for high-tension operations with risk mitigation and prevention
- Improved wireline logging efficiency from fewer runs of heavier, longer tool combinations and avoidance of drillpipe conveyance
- Reduced cable maintenance and related transportation logistics
- Greater sticking avoidance through minimized risk of fishing operations and associated NPT
- Increased deepwater rig-time savings with no cable seasoning required

Wireline Conveyance System



SYSTEM

CABLE

ACCESSORIES

RELEASE

TRACTOR

PLANNER

Deepwater and ultradeepwater challenges

As deeper reservoirs come into play worldwide, wells today easily exceed 36,000 ft, 30,000 psi, and 500 degF. In these challenging conditions, wireline conveyance—in particular, the cable—becomes the most critical component of wireline operations with numerous concerns:



Schlumberger designs and manufactures a variety of innovative composite cables to meet conveyance conditions.

- High tension—With heavy strings in deep, complex wells, the cable logging tension can exceed 15,000 lbf.
- Tool sticking prevention and mitigation—Along with necessitating the use of conveyance accessories, 22,000 lbf of instantaneous pull is possible.
- Wireline tool fishing—With wireline cable and pipe coexisting in the well during this complex and time-consuming operation, cable breakage and the loss of a well section are not uncommon. Using a reliable cable-release device to remove the cable from the well before fishing can save days of rig time.
- Well access in highly deviated wells—Conveyance accessories are critical for guiding the toolstring and reducing drag forces.
- Long, heavy toolstrings in deep wells—Longer wireline tool combinations can reduce the number of wireline descents in a well to save rig time, but the wireline cable must sustain a significant increase in electrical power and telemetry rates in supporting multiple tools.

High-tension exposure of wireline cables is the most significant concern owing to potentially disastrous premature mechanical and electrical failures.

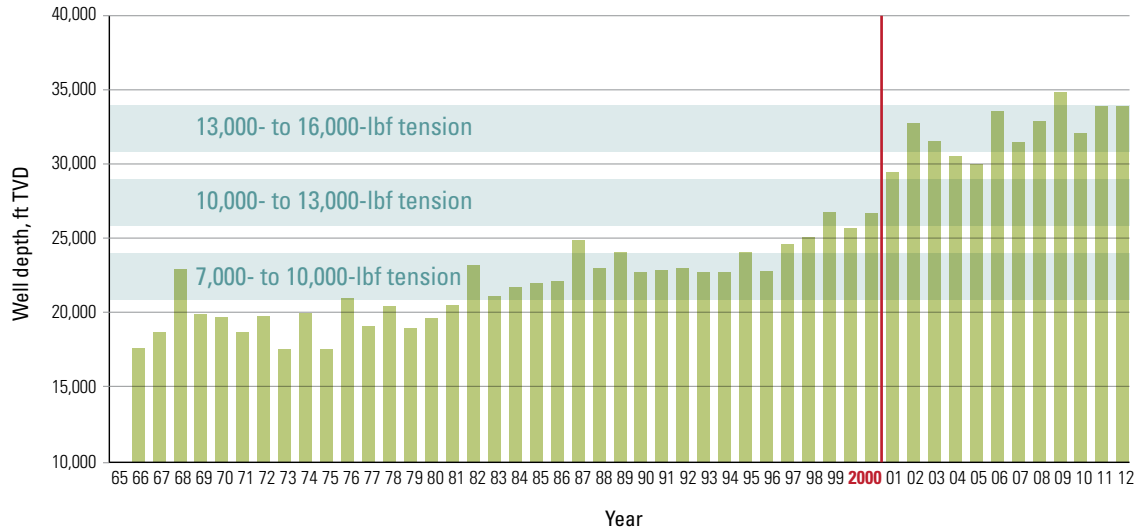
- Torque is the primary cause of premature cable breakage.
 - High tension and cable cycling lead to torque accumulation at sheaves and other pinch points. This in turn causes birdcages to form and leads to breakage.
 - After every high-tension trip in the well, torque relief maintenance in specialized cable shops is required for standard high-strength cables.

- High-strength cable spooled in a well can break at the ends-free rating, which is thousands of pounds of force lower than the specified ends-fixed breaking strength. Load imbalance between the inner and outer armors caused by rotation of the ends-free cable leads to a substantially reduced safety margin above the cable's safe working load (SWL) and increased risk of breakage in extreme tension situations.

- High-tension spooling on the drum leads to cable crushing and electrical failure in addition to drum flange or core damage and catastrophic failure.

Schlumberger is the industry leader in deepwater wireline operations, with a proven record of success in the Gulf of Mexico, as well as the North Sea, West Africa, and Brazil and emerging markets such as India, Asia, and Australia.

- Schlumberger involved with >95% of >30,000-ft wells in the Gulf of Mexico
- Max. TD logged: 35,935 ft
- 289 descents > 30,000 ft MD
- 1,182 descents > 25,000 ft MD
- 2,478 descents > 20,000 ft MD
- 2,308 descents with capstan

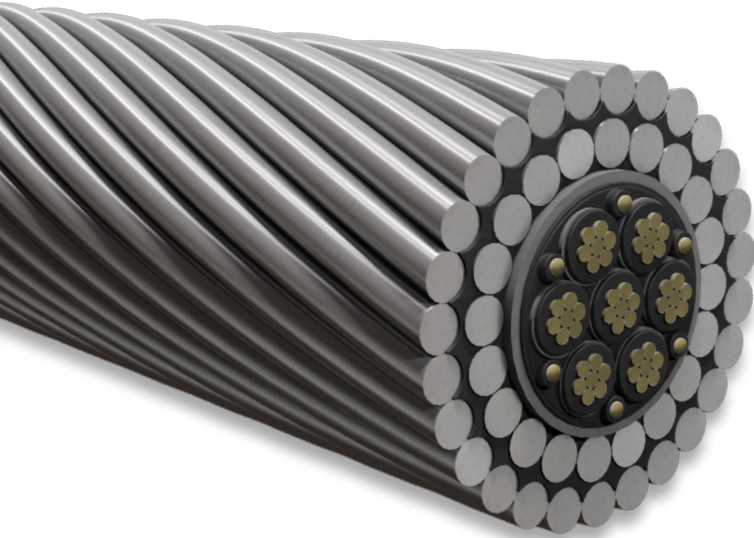


Integrated wireline conveyance system

In addition to the complete tension-relief capstan package currently used in many deepwater operations, Schlumberger has reengineered the wireline conveyance system from the surface equipment through the cable to provide a complete conveyance solution for every possible well environment.

Unparalleled safety, reliability, efficiency, and sticking avoidance are also integrated into the conveyance system for all wireline operations, including jobs in the extremes of ultradeep water.

The core of the reinvented wireline conveyance system is **TuffLINE 18000** torque-balanced composite wireline cable. It overcomes all the traditional limitations of high-strength cables, reduces operational risk and logistics associated with cable maintenance, and enables capstan-free operations in wells with logging tensions up to 13,000 lbf, with an 18,000-lbf SWL to free a stuck tool and an additional 9,000-lbf safety margin.

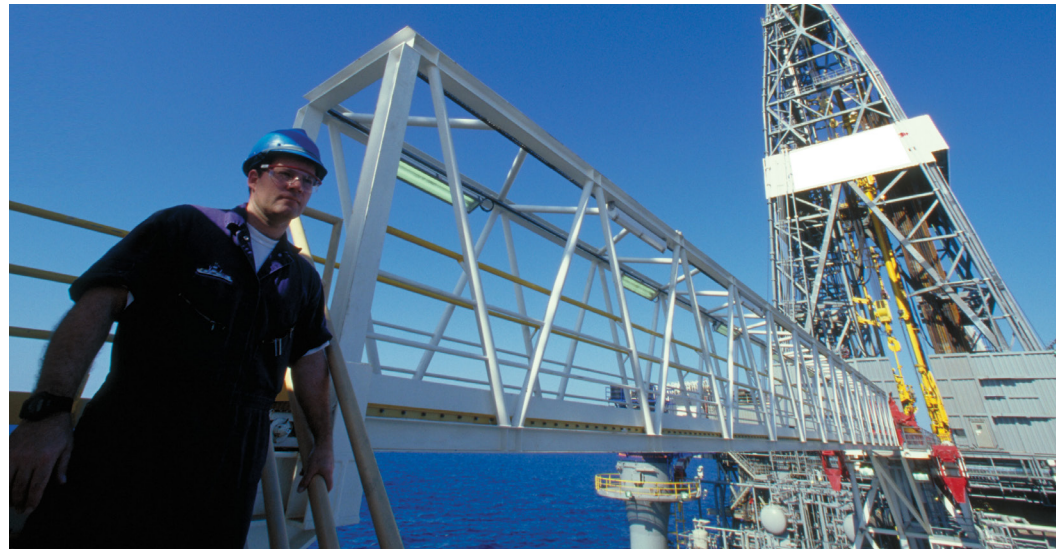


TuffLINE 18000 torque-balanced, crush-proof composite cable is for operations with up to 18,000-lbf tension.

TuffLINE 18000 cable is complemented by the 18,000-lbf-rated **OSU-PA** offshore unit, **SureLOC 12000** cable release device, and **WeIIISKATE*** low-friction well conveyance accessories: rollers, standoffs, and hole-finder roller bottom noses.

The advanced **Well Conveyance Planner** is used to forecast logging tensions, provide design recommendations for the optimal conveyance package, and determine the associated risk. The result is a completely integrated high-tension wireline conveyance system that ensures risk minimization, helps prevent tool sticking, and provides tools to reduce high fishing NPT.

Successful deployment of these systems in deepwater locations across the world has delivered proven deepwater rig-time savings and sticking avoidance.



The integrated wireline conveyance system brings together people, process, and technology to meet the challenges of deepwater operations.

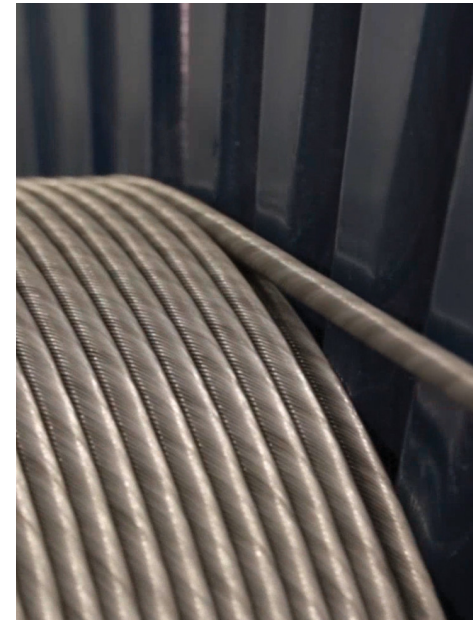
Revolutionary ultrastrength TuffLINE 18000 torque-balanced composite wireline cable

Applications

- Deepwater and ultra-deepwater wells
- Extended-reach and complex trajectory wells
- Unconventional and horizontal well logging in combination with the UltraTRAC* all-terrain wireline tractor
- Deepwater wells with rig-up constraints for capstan operations
- Reservoir sampling and pressure measurement involving long station times with long and heavy toolstrings in sticky holes

Benefits

- Increased safety for high-tension operations with risk mitigation and prevention
- Improved wireline logging efficiency from fewer runs of heavier, longer tool combinations and avoidance of drillpipe conveyance
- Reduced cable maintenance and related transportation logistics
- Greater sticking avoidance through minimized risk of fishing operations and associated NPT
- Increased deepwater rig time savings with no cable seasoning required
- Efficient, safer, high-quality wireline alternative to no-log and drillpipe-conveyed measurements in horizontal laterals

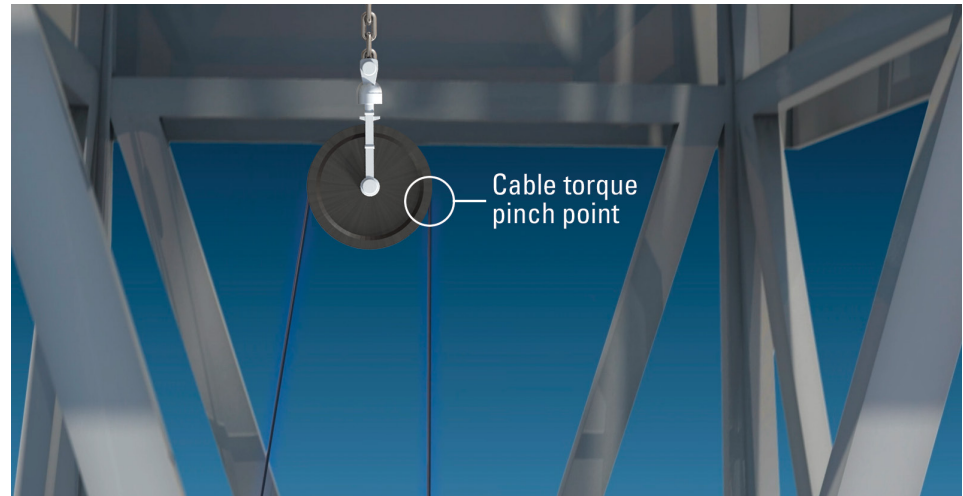


Cable crush on a drum is prevented by the TuffLINE cable's multishielded core package and polymer encapsulation of the armors.

Torque

Torque is inherent in all conventional cables as the helically wound armors try to unwind naturally. Although the oppositely wound armors create a dynamic balance that prevents possible birdcage formation and cable breakage, high-tension descents and cable cycling during wireline operations cumulatively increase torque in both the inner and outer armors. Eventually the inner armor can no longer counter the higher torque of the stronger outer armor and a birdcage occurs at a pinch point such as a sheave wheel or capstan at low tension. When tension increases, such as in a stuck-tool situation, the conventional high-strength cable prematurely parts at the SWL or below, dropping thousands of feet of cable in the well. The result is a lengthy and high-risk fishing operation, at times leading to loss of the toolstring and well sections and deepwater-rig NPT costing in excess of USD 10 million.

To avoid this unfortunately common situation, high-tension cables must be regularly removed from service—after every job with high tension—and sent to a maintenance facility to be twisted (detorqued) to remove excessive torque stored in the armors.

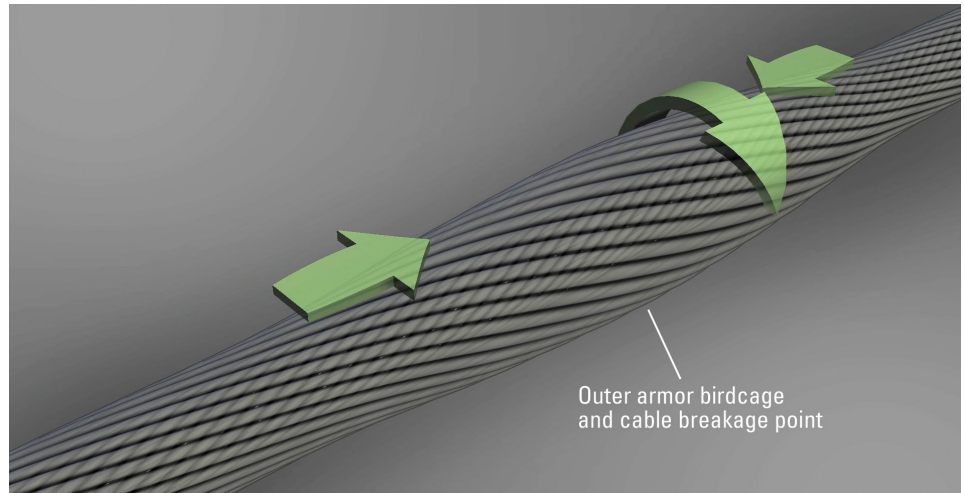


Torque accumulates at pinch points for conventional cable under high tension, which in turn causes birdcaging and cable breakage.

TuffLINE 18000 wireline composite cable is the first polymer-encapsulated ultrahigh-tension cable. The armors are effectively locked with respect to the electrical core and themselves by a unique polymer encapsulation process that prevents armor torque accumulation. Furthermore, the inherent torque is balanced by reducing the number of outer armor strands and increasing the thickness of the inner armor strands. This approach also decreases cable weight and friction and increases the tension available at the tool head without compromising the cable's strength.

The result is the first torque-balanced ultrahigh-strength wireline cable delivering

- substantial reduction in torque-related premature cable breakage
- near-elimination of the lower ends-free breaking strength of the cable to provide unprecedented overpull safety margins for high-tension cable
- elimination of the need to season new cable, which typically requires 24 h of additional rig time and can potentially cause permanent elongation leading to possible depth control concerns
- substantial reduction in cable removal from service—especially from remote operations—to send the cable to a maintenance facility to be twisted to remove the built-up torque.



High-tension cycling leads to cable birdcage formation at low tension and subsequent breakage when tension increases.

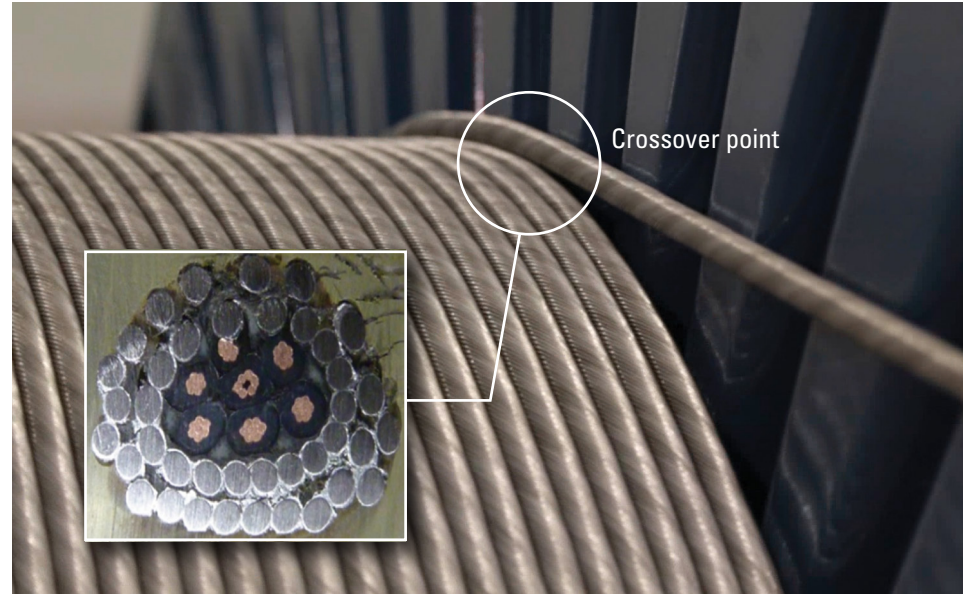
TuffLINE 18000 cable makes high-tension cable behave like standard cable.

Cable crushing and cold flow

When cable is spooled at high tension onto a drum and then stored for an extended time, cable crushing and cold flow will occur at several points, deep within the spooled layers of cable. The damage to the cable is electrical, resulting in a permanent short circuit in the cable at each point of cold flow.

The primary cold flow point on the drum occurs precisely at the first layer crossover (on the drum flange) when the cable tension is its highest while logging up near the total depth of the well. At this point the cable bends over itself under high tension. As additional layers are formed, the further application of crushing force leads to flattening of the cable. The cable deformation causes the loosened armors to open up and create a path that the polymer in the electrical core follows as it slowly squeezes out (i.e., cold flows) during extended storage. Cold flow gradually reduces the conductor insulator thickness, and with sufficient time and no tension relief from spooling of the cable, the lack of insulation produces a permanent short circuit. Several crush points will form at either flange end of the drum as long as the logging tension remains high.

In a typical deepwater scenario, cold flow can happen as early as after eight descents with surface logging tension at or above 10,000 lbf. To prevent cold flow, a tension-relief capstan device must be deployed between the logging unit and the well to reduce spooling tensions to safe levels below 8,000 lbf.



Spooling conventional cable at high tension on the drum exacerbates the torque imbalance to cause cable crushing and electrical failure.

TuffLINE cable is exclusively manufactured at the Schlumberger Houston Conveyance & Surface Equipment Center.



TuffLINE cable, WellSKATE accessories, SureLOC release devices, and UltraTRAC tractors are manufactured at the Houston Conveyance & Surface Equipment Center (HCS) in Sugar Land, Texas, USA.

Specifications

Ends-fixed breaking strength, lbf	28,000
Ends-free breaking strength, lbf	27,000
Safe working load, lbf	18,000
Temperature rating, degF [degC]	1 h: 465 [241]
	24 h: 450 [232]
Cable OD, in	0.5
Cable weight, lbm/1,000 ft	In air: 416
	In freshwater: 331
Max. (rms) voltage, V	Per helical conductor: 800
	Center conductor: 1,250
Max. current per conductor, A	1.61

OSU-PA and OSU-PB 18,000-lbf offshore units

The OSU-PA is the Schlumberger flagship heavy-duty modular offshore unit, capable of pulling up to 18,000 lbf (Det Norske Veritas [DNV] 2.7-1 and 2.22 certified) with drum capacity for 33,000 ft of TuffLINE 18000 cable or standard high-strength cable. If operating conditions will result in tension exceeding 18,000 lbf, the OSU-PA can be interfaced with a capstan with special ultrastrength cables.

In combination with TuffLINE 18000 cable and the WDR-59 high-strength drum, the OSU-PA can provide continuous spooling of up to 13,000-lbf tension and instantaneous pull of 18,000 lbf for stick prevention and mitigation without a capstan.

The OSU-PA incorporates the new highly integrated Enhanced Wireline Acquisition Front-End (eWAFE) for the surface data acquisition system to provide full redundancy, increased power, and enhanced telemetry capabilities.

The OSU-PB version is the CE-marked electrohydraulic unit certified for Zone 2 (ATEX) operations.

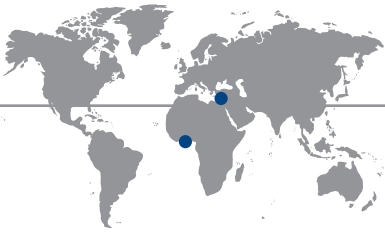


The modular OSU-PA offshore unit is DNV certified capable of pulling up to 18,000 lbf.

Specifications

Modular components	Power pack: diesel (OSU-PA), electrohydraulic (OSU-PB), logging cabin, winch module, capstan compatible
Drum capacity, ft	TuffLINE cable: 33,000
Pull capability, lbf	18,000
Capstan	Hydraulic control from the unit Pull capability, lbf: 24,000 Constant low end tension
Special applications	OSU-PB: CE/Zone 2/ATEX

Case Studies



A core imprint of the XL-Rock large-volume rotary sidewall coring service on a subsequent Saturn* 3D radial probe descent in a West Africa well indicates an unsurpassed depth control accuracy of 6 cm with the TuffLINE 18000 conveyance system.*

TuffLINE 18000 composite cable reliably logs at >10,000-lbf tension

As an East Mediterranean well was deepened, the logging tension was expected to exceed 10,000 lbf. Capstan deployment was not possible because of limited time and deck space. The only conventional solution was to convey the wireline logging tools on drillpipe, which would require a total of 7 days of expensive rig time.

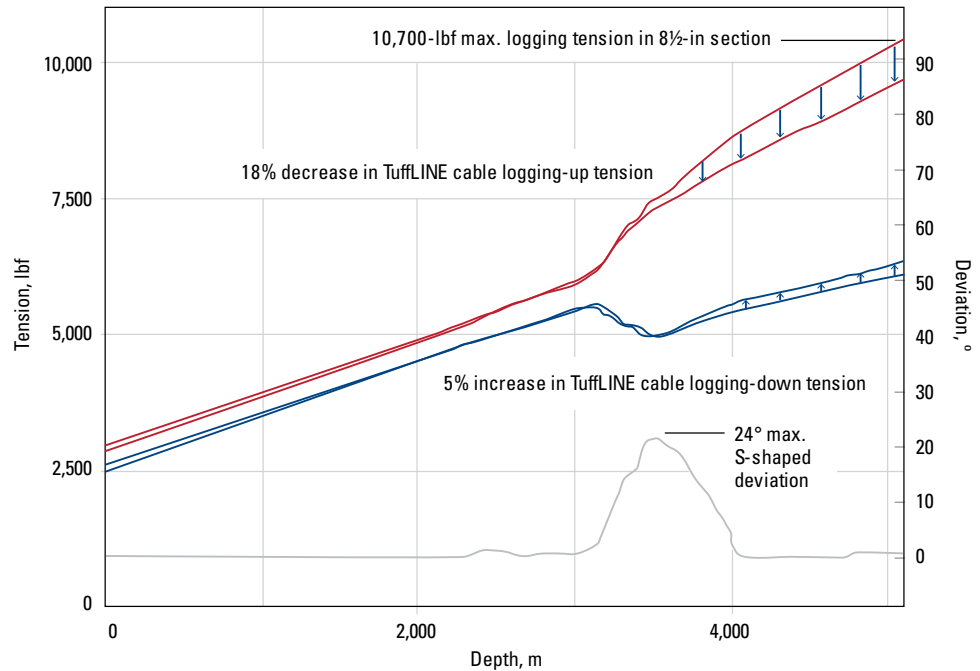
Instead, TuffLINE 18000 cable was deployed on a short notice and the job was completed successfully in 3 days. Despite logging tension exceeding 10,000 lbf on all descents, multiple pulls to 16,000-lbf tension, and repeated cable cycling, no tool sticking occurred.

Using TuffLINE 18000 cable brought the following benefits to the operator:

- Capstan mobilization and its associated operational and logistical risks were avoided.
 - Tension cycles were successful in preventing fishing, without the risk of torque-related cable breakage.
 - Cable seasoning was eliminated to save 1 day of rig time.
 - Cable maintenance trip was not necessary after the job, which would have been expensive and logistically challenging for this remote operation.
- Total reaped similar benefits from using TuffLINE 18000 cable in a 5,400-m, S-shaped deepwater West Africa well. With logging tension expected to be in excess of 10,000 lbf, deployment of conventional high-strength cable would have required use of a capstan, which posed higher operational and safety risks.
- Full data acquisition was completed in a record 3 days, saving 4 days of rig time and USD 5 million.

TuffLINE 18000 cable was quickly mobilized for deployment on an existing winch unit. Eight high-tension descents with full data acquisition were conducted without any tool sticking or HSE incidents, and the low friction coefficient of TuffLINE cable helped in reducing the tension at the surface by 18% to below 10,000 lbf. The accuracy of depth control for the TuffLINE descents was within 6 cm [2.4 in], which enabled aligning sidewall coring points with fluid-extraction stations of the Saturn 3D radial probe.

In addition to saving 4 days of rig time over conventional cable operations, TuffLINE 18000 cable operations delivered a 60% reduction in risk compared with capstan-deployed cable.



Tension planner modeling for the 8 1/2-in section in a deepwater West Africa well shows how TuffLINE 18000 cable would decrease tension. TuffLINE cable deployment also produced a 20% reduction in the effective friction coefficient over conventional high-strength cable.

WellSKATE low-friction well conveyance accessories

Applications

- Open- and cased hole wireline operations, particularly stationary formation tester operations, in a range of hole sizes
- High well deviations (60° or more, depending on well conditions and geometry)
- Complex well trajectories and extended-reach wells
- Horizontal wells using alternative conveyance such as pipe or tractor conveyance
- Washed-out and rugose hole profiles

Benefits

- Significantly reduced friction coefficients by rolling instead of sliding
- Minimized fishing probability by keeping the toolstring away from the borehole wall at all times
- More efficient wireline conveyance to total depth than would otherwise have been possible on drillpipe only
- Reduced sensitivity to washouts and other irregularities through tool centralization and use of a hole finder
- Maximized sealing surface from dual-wheel roller alignment of the tester probe up or down

WellSKATE conveyance accessories help toolstrings achieve ever-deeper well access and reduce the risk of differential sticking in challenging environments. With proper configuration, the WellSKATE accessories significantly reduce the frictional forces present both running in and pulling out of the well. They can also prevent the risk of getting stuck by keeping the toolstring away from the borehole wall during a station log.

In addition to conventional standoffs and centralizers, the catalog of WellSKATE accessories includes low-friction standoffs, tri-rollers, dual-wheel rollers, offset rollers, inline rollers, low-contact-area standoffs, Teflon® bottom noses, and swivel-knuckle roller bottom noses.

WellSKATE conveyance accessories



Tri-roller



Offset tri-roller



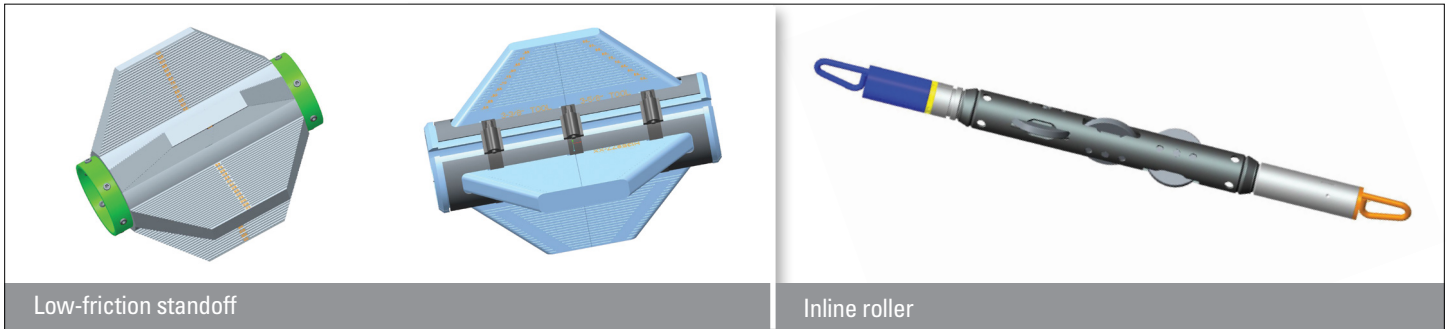
Dual-wheel roller



Roller bottom nose

The wide variety of WellSKATE conveyance accessories all significantly reduce friction by enabling rolling instead of sliding.

WellSKATE conveyance accessories



By using low-friction conveyance accessories to reduce the frictional drag forces acting on a toolstring, deeper wireline descents are possible in wells that would otherwise require alternative methods of conveyance.



Schlumberger

Schlumberger

In addition to lowering friction, rollers reduce the contact area with the borehole in comparison with that of a conventional standoff to decrease the likelihood of differential sticking for long toolstrings

SYSTEM

CABLE

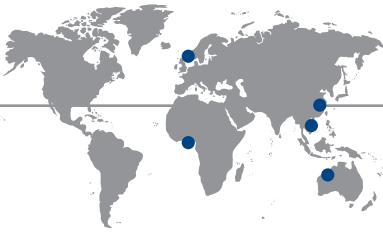
ACCESSORIES

RELEASE

TRACTOR

PLANNER

Case Studies



WellSKATE low-friction accessories improve wireline formation tester efficiency and effectiveness

The use of WellSKATE low-friction well conveyance accessories has positively reduced tool fishing operations for Apache in Australia. In one deepwater reservoir with differential pressures exceeding 1,000 psi, it is common for conventionally deployed wireline formation tester strings to become stuck. A typical example of the reduction in sticking produced by the WellSKATE accessories is from a sampling operation with the MDT* modular formation dynamics tester in a well with 41° deviation and 1.8°/100-ft dogleg severity. A total of 17.6 h of pumping time and nine sampling stations were conducted without any tool sticking. But for the subsequent mechanical sidewall coring operation (which has a shorter toolstring) that was run without WellSKATE accessories, multiple activations of wireline jars were necessary to free the stuck tool.

For comparison, an MDT toolstring run in a neighboring well the year before did not use WellSKATE accessories and became stuck, necessitating fishing.

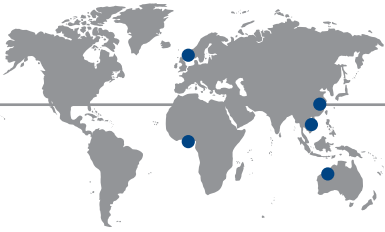
On the North West Shelf off West Australia, WellSKATE tri-rollers helped prevent a 150-ft MDT sampling toolstring from being stuck in a sidetrack well after the string had been stuck and fished in the main well. Further logging tension reductions of 500 lbf moving up and 300 lbf moving down were achieved to enable access to the target reservoir. The use of WellSKATE accessories also enabled an MDT tool reach total depth in a well with 59° deviation in Norway without any overpulls in the 24-h logging operation.

In the UK, an MDT tool was run on WellSKATE accessories in a 60°-deviated well with no sticking or overpulls, even after 7 h of pumping fluids with the tool stationary.



The WellSKATE tri-roller included on an MDT sampling string maintains two of the three wheels in constant contact with the wellbore, which not only reduces the surface contact area to prevent differential sticking but also provides an excellent static friction breaking effect when moving off a station after several hours of sampling.

Case Studies



In Vietnam, an MDT toolstring deployed with three WellSKATE tri-rollers completed seven station logs in a 36-h operation at 15° deviation. On the last station, the cable became differentially stuck for 4 h, but it was then freed to be able to pull out of the hole.

In China, WellSKATE rollers were similarly employed to reduce the drag coefficient of a large MDT string from 0.43 to 0.17 to successfully access the target reservoir at 18,045 ft and 70° deviation.

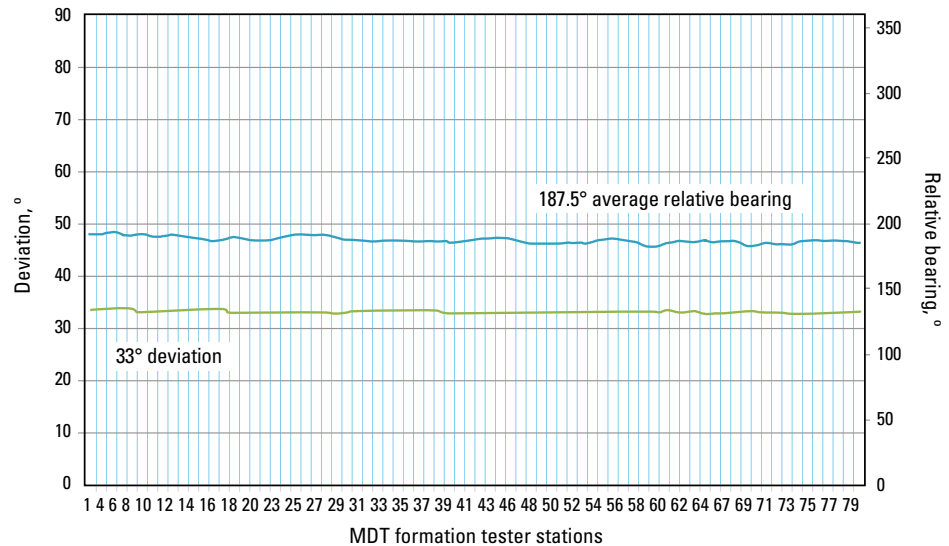
Difficulties in achieving a good probe seal for the MDT tool in 12¼-in boreholes in West Africa were resolved by installing three WellSKATE dual-wheel rollers close to the probe. The rollers helped the tool reach total depth—unlike an MDT toolstring that became lost in hole in another well logged in the same field—and kept it facing down to assure good sealing that enabled measuring formation pressure at 80 stations and collecting fluid samples.

The new offset-wheel tri-rollers help further reduce the wheel surface contact area and wheel drag in 12¼-in boreholes for MDT toolstrings.



The maximum stationary time for the MDT tool was 8 h, and the maximum differential pressure experienced was 2,400 psi. The expected normal tension was about 10,000 lbf, but with the WellSKATE accessories the normal tension was only 8,500 lbf. Friction was similarly reduced by the use of WellSKATE dual-wheel rollers in Vietnam on the second run of the MDT tool in a well. The friction reduction lowered the head tension by about 600 lbf compared with the first run.

A complex MDT operation on drillpipe was completed successfully in the UK with a combination of WellSKATE accessories. Three tri-rollers, one dual-wheel roller, and a roller bottom nose were installed in a 172-ft MDT string to help navigate the challenging conditions of 2,000-psi maximum differential pressure, dogleg severity of 4°/100 ft, and maximum 62° deviation. Two logging runs for data acquisition and sampling were successfully completed across a large 4,200-ft openhole section to total depth without any sticking issues.



The WellSKATE dual-wheel roller on an MDT string in West Africa served the dual purpose of friction reduction and probe orientation in the 12¼-in borehole. With its relative bearing maintained at approximately 180° across all stations in the 33° deviated well, the probe was always in the ideal orientation (facing down) and experienced only one lost seal as opposed to the typically high 30% rate.

SureLOC electronically controlled cable release device

Applications

- All wireline openhole and most cased hole operations
- Highly deviated and extended-reach wells
- Differentially partially stuck logging cables
- H₂S environments (SureLOC 12000 device)

Benefits

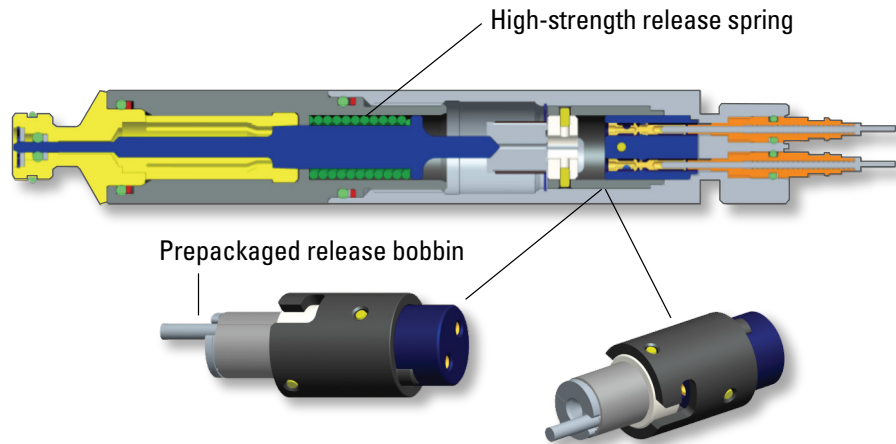
- Reliable cable release under the most challenging tool-sticking situations
- Full conveyance pull capability for stick prevention and mitigation prior to releasing the cable
- Higher-rated release devices such as the SureLOC 12000 device with increased surface pull capability
- Longer, heavier toolstring combinations to reduce well descent trips



The SureLOC device brings new capabilities and reliability to cable release under a wide range of downhole conditions.

Mechanical weakpoints are conventionally used in operations with high cable tension to safely separate the cable from a stuck tool downhole. Different strength weakpoints are used to ensure breakage before the cable SWL is exceeded. Under certain conditions the surface-applied tension is too high or cannot be effectively transmitted to break the weakpoint. The result is a lengthy cable-attached cut-and-thread fishing operation or in the worst-case scenario a broken cable left in the well on top of the fish.

To overcome the operational limitations of mechanical weakpoints and previous-generation electronically controlled release devices (ECDs), Schlumberger developed the SureLOC 12000 and 8000 cable release devices. Installed in the wireline logging head, the SureLOC 12000 device is activated by a software command and electrical power to reliably release the cable under a wide range of downhole conditions. Combined with TuffLINE crush-proof electrical cable, the success rate for SureLOC electronic release reliability exceeds 97%.



The higher-rated release spring and prepackaged release bobbin assembly of the SureLOC device deliver superior efficiency and consistent performance.

Specifications

	SureLOC Cable Release Device
Safe working load, lbf	SureLOC 8000: 8,000
	SureLOC 12000: 12,000
Max. tool-release head tension, lbf	At surface: 1,000
Temperature rating, degF [degC]	SureLOC 8000: 400 [204]
	SureLOC 12000: 500 [260]
Pressure rating, psi	SureLOC 8000: 20,000
	SureLOC 12000: 30,000
Special applications	SureLOC 12000: MP35N® H ₂ S-resistant alloy

Case Study



SureLOC 12000 device releases cable where conventional release devices cannot perform

Operations in HPHT reservoirs in the Gulf of Thailand experience frequent tool-sticking situations. The limitations of the previous-generation ECRD had led to the tandem use of a mechanical weakpoint and a frequent reduction in wireline logging operations. The SureLOC 12000 device was deployed to provide increased reliability, pulling capability at surface, and the ability to release under tool head tensions of 1,000 lbf. As a result, wireline fishing operations have been reduced, resulting in a significant efficiency improvement. A full set of logging data is once again being acquired. As a result, the operator has estimated financial benefits summing to millions of dollars.

In a stuck-tool situation in continental Europe, the logging cable was partially differentially stuck. This implies high tool-head residual tension. It would not have been possible to release the cable from the stuck tool with a mechanical weakpoint or conventional ECRD. The SureLOC 12000 device enabled safe cable release and retrieval with 1,000 lbf of head tension. With the cable removed from the well, an open-ended fishing operation was possible, which saved several days of traditional cut-and-thread operations and potential cable breakage at the differentially stuck point.



Remote and challenging deepwater operations can significantly reduce operational risk and NPT by employing the reliable SureLOC cable release device in the wireline conveyance system.

UltraTRAC and UltraTRAC Mono all-terrain wireline tractors

Applications

- Formation evaluation and testing in horizontal and highly deviated extended-reach wells
- Borehole imaging services
- Perforating
- Production logging
- Cement and corrosion evaluation
- ReSOLVE* instrumented wireline intervention service
 - Nonexplosive plug setting
 - High-force axial shifting
 - Selective shifting with a universal shifting tool (UST)
 - Milling
- ABC* analysis behind casing services

Benefits

- Eliminates the need for expensive drillpipe or coiled tubing conveyance
- Reduces the risk of equipment damage inherent in challenging logging conditions
- Reduces fishing risk with reverse tracting capability and the superior pulling capability of TuffLINE cable
- Simplifies operations to a single descent in both open and cased holes across multiple well diameters and various conditions
- Saves time by logging while tracting for quicker data acquisition in multiple passes of the UltraTRAC Mono tractor
- Mitigation of fishing risk and associated NPT



The wheels for the UltraTRAC tractor are available in multiple diameters and proprietary designs optimized for the well geometry and conditions.

The UltraTRAC and UltraTRAC Mono* all-terrain wireline tractors efficiently convey measurement, perforating, and intervention tools through horizontal and high-angle well sections to extend the access of high-strength wireline cables.

UltraTRAC tractors deliver the same high reliability of conveyance in both open- and cased hole environments, with the UltraTRAC Mono tractor providing the industry's first long-reach monocable tractor for both perforating and logging-while-tractoring deployment.

The reliable, cost-effective alternative to drillpipe-conveyed logging (TLC* tough logging conditions system and LWD)

Operators in North America, West Africa, the Middle East, and the North Sea are coming to rely on UltraTRAC and UltraTRAC Mono tractor conveyance for obtaining critical formation evaluation data from advanced measurement suites.

- Conveying the Sonic Scanner* acoustic scanning platform and FMI-HD* high-definition formation microimager on the UltraTRAC all-terrain tractor provides the information required for effective well stimulation design in one-third the time of drillpipe-conveyed logging.
- Deploying PressureXpress* reservoir pressure while logging service on the UltraTRAC all-terrain tractor enables conducting quick and reliable reservoir pretest programs that reduce operator risk exposure through superior-quality formation pressure data.

Specifications

	UltraTRAC Tractor	UltraTRAC Mono Tractor
Applications	Openhole logging Cased hole perforating, logging, and intervention	Openhole logging while tractoring Cased hole perforating, logging while tractoring, and intervention
Maximum speed, [†] ft/h [m/h]	3,200 [975]	2,400 [730]
Temperature, degF [degC]	347 [175]	302 [150]
Pressure, psi [MPa]	20,000 [138]	20,000 [138]
Hole size—min., in [cm]	3.6 [9.1]	3.6 [9.1]
Hole size—max., in [cm]	15 [38.1]	15 [38.1]
Outside diameter, [†] in [cm]	3.375 [8.57]	3.375 [8.57]
Length, [‡] ft [m]	Drive sections: 2 to 8 Min. (2 drives): 15.35 [4.68] 8 drives: 39.19 [11.94]	Drive sections: 2 to 6 Min. (2 drives): 23.45 [7.15] 6 drives: 46.32 [14.12]
Maximum pull per drive section, [†] lbf [N]	400 [1,780]	400 [1,780]
Maximum force, lbf [N]	3,200 [14,230]	2,400 [10,675]
Power, cable requirements	AC, heptacable	DC, multiconductor cable (mono and hepta)

[†] Depending on wheel size

[‡] Depending on the configuration and excluding the 2.8-ft [0.85-m] logging head. The incorporated CCL, head tension cell, addressable cable-release device, and shock absorber are standard features that do not add extra length.

Well Conveyance Planner

Applications

- Deepwater high-tension wireline operations
- Complex surface rig-up for high-tension operations on offshore rigs
- Deviated and extended-reach wells

The Well Conveyance Planner is a comprehensive conveyance planning tool for both high-tension and routine operations that calculates the pulling capabilities (both the maximum continuous for logging and maximum instantaneous to get free) and associated operating risk by identifying the weakest components in the system. Input data is the relevant well information, including borehole geometry, mud, and the expected temperature and pressure.

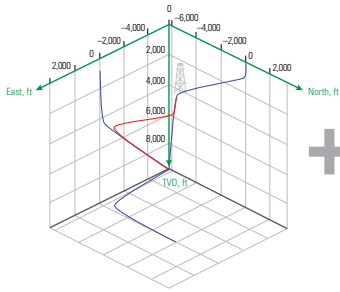
Benefits

- Reliable, time-saving identification of the optimal wireline conveyance package
- Evaluation, prevention, and mitigation of conveyance operational risk in high-tension operations
- Mitigation of fishing risk and associated NPT

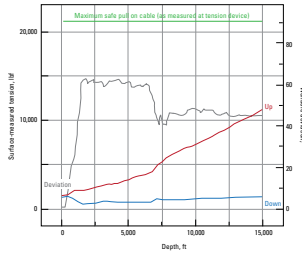
The planner then analyzes the data and recommends the optimal conveyance system while identifying system components that exceed specifications along with the potential operational risk. The user has the option to modify the conditions and the equipment and enter specific customer requirements. The planner then immediately recomputes the new pulling capabilities of the conveyance package. The previously available high-tension planner and the drum force simulator reports are included and can be generated upon user request.

The fishing flowchart is a complementary planning tool to help better plan future possible fishing operations. Its purpose is to reduce the fishing risk and the associated fishing NPT, especially on deepwater floating rigs where excessively high surface tension and the complex rig structure add substantial HSE and operating risk to traditional fishing operations.

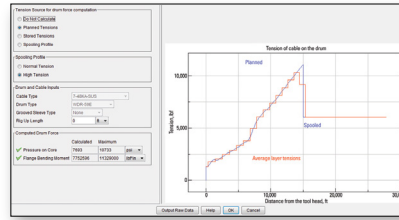
Well Conveyance Planner



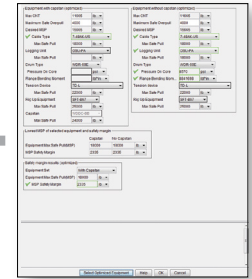
Well Profile



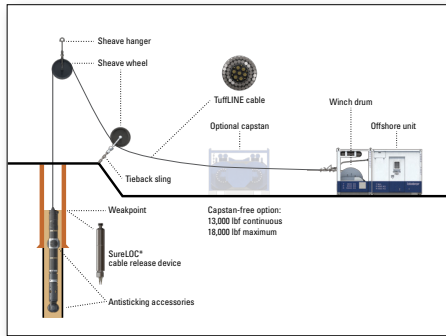
Surface Tension



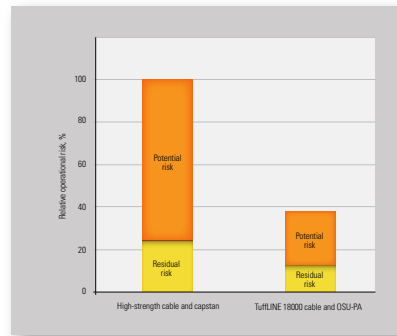
Drum Force



Optimized Conveyance Package



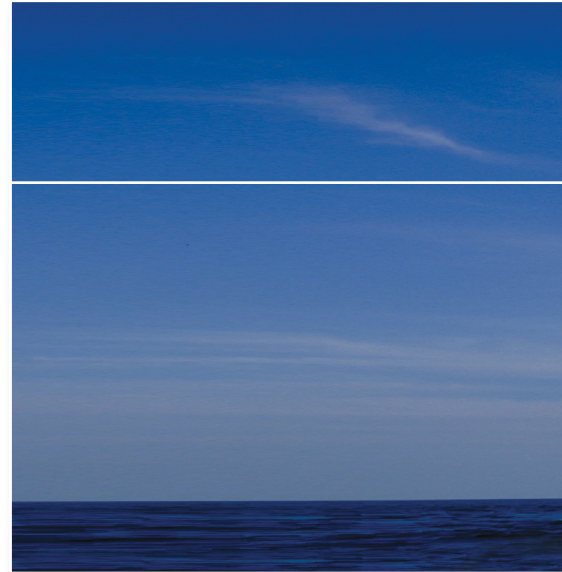
Wireline Setup



Relative Operational Risk

The Well Conveyance Planner comprehensively assesses the operational conditions in relation to conveyance capabilities to recommend the optimal conveyance system and assess potential operational risk.

Wireline High-Tension Conveyance System



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