GunDRILL™ Reamer *Gun drilled boreholes while drilling*

MAKING IT SIMPLE

Today's challenging drilling environment demands superior performance from the tools in the BHA especially for 3D, high angle and extended reach wells. The client's highly deviated 71.5 degree well was drilled through challenging sand shale sections. The challenge was to pull the BHA to surface safely overcoming high torque, multiple sticking points and difficult intervals.

MAKING IT BETTER

To assist drillers in overcoming these challenges, Tercel developed the GunDRILL Reamer – a tool that creates gundrilled boreholes while drilling to enable reaming through a simple blade design that uses proprietary Tungsten Carbide Inserts (TCI) to provide more reaming or stabilization according to the drilling and formation conditions and maintains the gauge for extended durations.

MAKING IT HAPPEN

Using Tercel's design and applications engineering expertise the GunDRILL Reamer enables clients world-wide to benefit from gundrilled boreholes while drilling and reduced risk of sticking in complex formations. The innovative blade design of the GunDRILL Reamer enables the operator to maintain gauge for longer than conventional stabilization elements, reducing non-productive time and saving money for the customer.

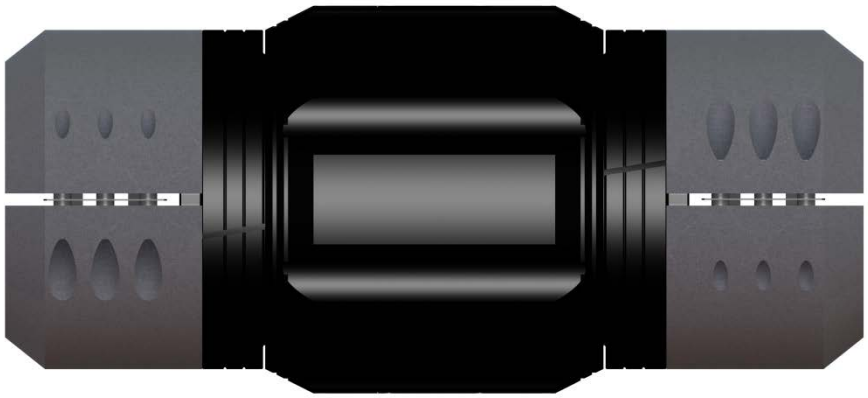
By utilizing the Tercel GunDRILL Reamer the borehole is reamed to perfection, the BHA can be pulled to surface safely overcoming high torque, multiple sticking points and difficult intervals. In some situations it increases ROP due to smoother running in hole and casing /completions can be set to TD without issue.

The bi-directional GunDRILL Reamer is suitable for applications where front and back reaming is likely

This directional variant is suitable for applications where drilling directional holes with mud motors and sliding is required.

The single direction (uni-directional) GunDRILL Reamer is suitable for applications where only back reaming is required.

RotoTEC® *Protects casing and drill pipe integrity*



The RotoTEC® is a drill pipe deployed tool designed to eliminate casing wear and reduce torque and drag in the drill string. Unwanted casing wear and torque and drag can occur when the drill pipe tool joints come into contact with the casing under side-load during any pipe movement, creating a frictional load between the surfaces.

The RotoTEC has a less stiffening effect than rigid sub based tools and a modified protector can be manufactured to provide additional Total Flow Area (TFA) should Equivalent Circulating Densities (ECD) become an issue.

Successful installations have resulted in as much as a 30 to 35% reduction in torque and, in one case, wells drilled sooner and the attainment of TD reduced from 4-5 days to 1-2 days.

MAKING IT BETTER

Tercel's Casing Protectors guarantee casing integrity at every stage of the drilling process - reducing rotational friction between the drill string and casing, reducing torque and drag and preventing casing wear.

Applications

Eliminates casing wear and reduce torque and drag significantly by providing low friction free rotating positive stand-off surfaces in the following applications:

- Drilling operations
- Completions operations
- Multi-lateral activity

Features

- High strength composite
- High resistance to clamp slippage
- High side-load rating per tool
- High revolutions life per tool
- Generous fluting
- Drill pipe protection bearing
- Wear indicators
- Short compact design
- Lightweight construction

Benefits

- Reduces torque and drag
- Eliminates casing wear
- Protects drill pipe
- Enhanced limited rig capability/reduces stress on surface equipment
- Does not increase stand height in derrick regardless of quantity
- Does not increase number of connections in drill string
- Maximized flow area
- Minimal ECD impact
- Less stiffening effect than rigid sub based tools
- Does not affect drill string ratings as external to pipe
- Reduces drill string drag during lower completion installations i.e. sand screens/liner running
- Drilling riser protection

Core Head Bit *Flexible design, optimized coring performance*

Tercel provides all types of core heads that can be fitted with PDC, Dual, Impregnated cutting structures, steel or matrix bodies. The Core Heads are based on the same design approach as conventional fixed cutter drill bits and can be further customized according to specific applications. Such applications as lithology, formation hardness, abrasiveness, and core barrel adaptation requirements.

The flexibility and wide range of design features that focus on the cutting structure, inner and outer reinforcement and hydraulic settings are ideal for drillers looking to find the right Core Head for their specific application.

Blade count, spiraling severity and cutting structure (PDC, Impregnated, Dual, TSP or natural diamond) as well as core head profile and internal design can all be customized accordingly to help customers optimize both drilling performance and the quality of recovered core samples.

Applications

- Design adapted from soft to hard formations

Features

- Premium PDC or Impregnated cutting structure
- Wide range of cutting structure reinforcement (impact arrestors, Impregnated back-up, inner and outer gauge protection)
- Connection adaptation on Core Barrel requirements
- Premium stabilization features

Benefits

- Optimized cutting efficiency and core head durability
- Improved core integrity

MAKING IT BETTER

With operators drilling to ever-greater depths in more challenging well environments, today's drill bit technologies must deliver high rates of penetration and high quality boreholes quickly and cost effectively without unplanned damage or downtime. Tercel's unique, reliable and practical drill bit products are engineered to cover the broadest range of formations, all engineered for better performance.

RockBITS *Optimum drilling performance, increased ROP*

Tercel's Tungsten Carbide Insert (TCI) and Milled Tooth Bits are designed for high durability, increased ROP and optimum drilling performance and are manufactured with different bearing designs to suit each drilling application.

The teeth of Milled Tooth Journal Bearing Bits are hardfaced with a wear and impact resistant material to enhance cutting structure life.
The TCI and Milled Tooth Journal Bearing Bits have special alloy bearing components that reduce bearing surface speed and resulting heat by up to 50% and provide extended bearing life with a specially formulated extreme pressure lubricant.

TCI and Milled Tooth Open Bearing Bits, have two different, bearing arrangements (depending on the bit size) that allow the bits to withstand higher weight on bit, impact loads and rotational speeds. The optimized cutting structure design, coupled with improved teeth hard facing material on the Milled Tooth Bits, results in longer life and higher ROP.

Finally, there are the TCI and Milled Tooth Sealed Bearing Bits, where the balanced load distribution, bearing sealing arrangement, lubrication and grease reservoir systems are able to increase drilling hours and reduce the occurrence of early seal failure.

MAKING IT BETTER

With operators drilling to ever-greater depths in more challenging well environments, today's drill bit technologies must deliver high rates of penetration and high quality boreholes quickly and cost effectively without unplanned damage or downtime. Tercel's unique, reliable and practical drill bit products are engineered to cover the broadest range of formations, all engineered for better performance.

Applications

- Soft to hard and abrasive formations
- Rotary or Motor systems

Features

- Aggressive cutting structure
- Balanced load distribution
- Advanced cutter structure hard facing
- Consistent bearing life

Benefits

- Increased ROP
- Low cost per foot
- Increased stability
- Consistent bit performance

EzeeGLIDER® Reduces torque and drag

The EzeeGLIDER® is a highly durable, wear resistant engineered polymer centralizer that reduces torque and drag and does not bind or jam as metal products do. The tool has demonstrated field proven lower friction coefficients, leading to superior drag and rotational torque reduction and no requirement to rotate the completion assembly at any point during the operation.

Customer benefits of the tool, made from a high temperature high-pressure injection-molded engineered polymer, include reduced torque and drag and enhanced deployment and removal capabilities in ERD, highly deviated and horizontal well bores.

The EzeeGLIDER also extends well construction boundaries, increases the length of open hole completion to provide additional reservoir exposure/drainage and places forces where they are required instead of being lost in the form of drag.

MAKING IT BETTER

Whether it be vertical, horizontal or ERD wells, cased or open hole applications, or weak formations, Tercel's broad selection of centralizers are playing a key role in reducing torque and drag and reaching planned TD.

Applications

- Lower sand screen and multi-lateral completions
- Extended reach/horizontal wells
- Horizontal liners (cemented or un-cemented)
- Deploying deep set packers
- Rotating cemented liners
- Drilling with casing/liners
- Multi-laterals/window exits
- Protection of open hole packers/accessories
- Tough open hole conditions

Features

- Material has an ultra-low friction co-efficient
- High durability and wear resistance
- Thermal stability and insulation
- Light weight low density material
- Spiral 25 degree or passive 5 degree blades
- High compressive strength
- Short compact design

Benefits

- Extends the current well construction boundaries on ERD and highly deviated wells
- Increases length of open hole completion providing additional reservoir exposure/drainage
- Provides a bearing when drilling with casings or with liners
- Allows wells from fixed locations to access by-passed oil
- Improves operational efficiency and puts forces where they are required instead of being lost in the form of drag
- Allows liners to be consistently rotated whilst cementing providing better zonal isolation
- Can eliminate the need for other friction reduction tools
- Provides string rotation while running liners and casings to ensure they reach planned depth

NightHAWK Drilling Jar System (NESDJS)

Getting you out of a tight spot

The Tercel NightHAWK Series Drilling Jar System (NESDJS) is a unique jar design that can be assembled as a mechanical, hydraulic mechanical, or double-acting hydraulic mechanical all in one design. The jar can be modified simply in a service facility by changing out two simple components to meet any requirements in the field.

The NESDJS features a mechanical latch system that locks the jar in place until the settings are exceeded by pulling or slacking the drill string while stuck, and once released enters into a hydraulic delay that uses the drill string's energy while delaying the release, creating energy to jar the drill string.

The NESDJS is designed for multiple jarring events, and utilizes unique hydraulic valves and spacing for optimal jarring force.

MAKING IT BETTER

Tercel jars are completely sealed, with no open ports, to prevent cuttings or drilling fluids damaging the tool, preserving jar life and increasing efficiency. The adaptable designs offer flexibility which respond directly to the customer's needs.

Applications

Drilling Vertical, Directional and Horizontal Wells

Features

- Reliable latch system eliminates the need for safety clamps and premature firing.
- Valve and metering system regulates preferred delays while jarring.
- Unique internal and external coatings standup in brines and chlorides.
- Spline system handles all torsional loads.
- Short jarring impact optimizes jarring force.
- Can be run in conjunction with NES accelerator.

Benefits

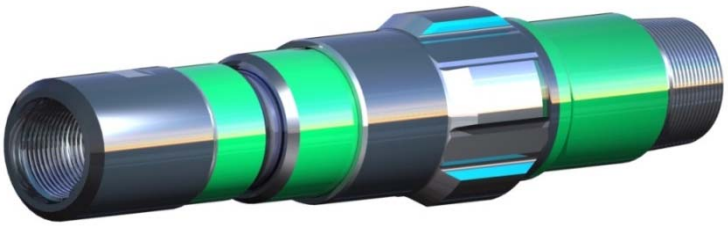
- Jarring the drill string loose prevents loss of high cost BHAs and sidetracking.
- Can be run in both tension and compression.
- All tools built with high temperature rated seals as standard, allowing the tool to be operated under extreme conditions.
- Double acting hydraulic mechanical setup beneficial in horizontals to activate jar both ways.
- Lower costs and minimal parts for adjustment for preferred jar setup.

Specifications

Body Size	Hole Size Range
3-1/2"	4-3/4" to 5-7/8"
4-3/4"	5-7/8" to 6-1/4"
5"	6" to 6-1/2"
6-1/2"	7-7/8" to 8-3/4"
6-3/4"	8-1/2" to 9-7/8"
8"	11-7/8" to 12-1/4"
9"	12-1/4" to 17-1/4"

NightHAWK Short Bit to Bend (SBTB) Motors

Vertical to horizontal in one trip



The Tercel NightHAWK Series, Short Bit to Bend (SBTB) Stack is a mud lubricated bearing assembly capable of achieving high build rates while having a lower setting of offset on either an adjustable or fixed housing assembly. By lowering the required offset compared to conventional motors, the SBTB motor can be rotated during drilling without costly damages, resulting in drilling horizontal wells without a trip, from vertical build to horizontal with one setting.

The SBTB Motor features the same reliable components as the conventional NightHAWK series of motors for driveshaft and adjustable assemblies, and features new age bearings to take on and off bottom axial loads that shortens the motor in bearing length.

MAKING IT BETTER

Tercel motors feature the strongest driveline on the market today, dramatically reducing service and maintenance costs, increasing MTBF performance, and lowering overall operating costs for customers.

Applications

Vertical, directional, horizontal and short radius applications

Features

- New age bearings allow for high on and off bottom loads in compact design.
- Improved Weight on Bit capacity.
- Available up to 3 degree adjustable and fixed housings.
- Can be run in all mud types.
- Choice of thread protector or a thread on stabilizer according to drilling situations.
- Oversize driveline handles high torque and stalls.

Benefits

- Compact stack allows greater build rates with a lower offset angle then conventional motors.
- Greatly increased motor steer-ability due to lower offset.
- Horizontal wells can be drilled with one trip, no need to trip for adjustment.
- Less deflection in motor while rotating.
- Straighter well bores with less deviation.

Specifications

Body Size	Hole Size
4-3/4”	5-7/8” to 6-1/4”
5”	6” to 6-1/2”
6-1/2”	7-7/8” to 8-3/4”
6-3/4”	8-1/2” to 9-7/8”
8”	11-7/8” to 12-1/4”

NaviGATOR™ ***Improves the probability of casings and liners reaching TD when rotation cannot be applied***

NaviGATOR with Shoe

The NaviGATOR™ is a casing-based tool that ratchets and rotates the end of a casing or liner string by reciprocating the pipe. A casing reamer shoe or guide shoe with an eccentric profiled nose can be placed below the tool so that the relative rotational motion from reciprocation can be used to orientate the nose over or past obstructions.

The tool, which can be used on cemented or un-cemented casing strings, completions, liners and sand control screens, is simple to install and improves the probability of casings, liners and other open hole deployed systems reaching planned TD.

NAVIGATOR WITH SHOE

The NaviGATOR with shoe sees the shoe placed below the tool so that the relative rotational motion from reciprocation can be used to orientate the nose over or past obstructions.

MAKING IT BETTER

Tercel's Navigator tools play a crucial role in rotating the end of casings and liners and avoiding obstructions; dramatically improving the probability of casings and liners reaching planned TD when rotation cannot be applied.

Applications

- Lower sand screen completions
- Liners (cemented or un-cemented)
- Floated casings
- All casing strings
- Slotted or pre-perforated liners
- Gravel pack installations
- TTRD completions
- Multi-lateral completions
- Casing exits

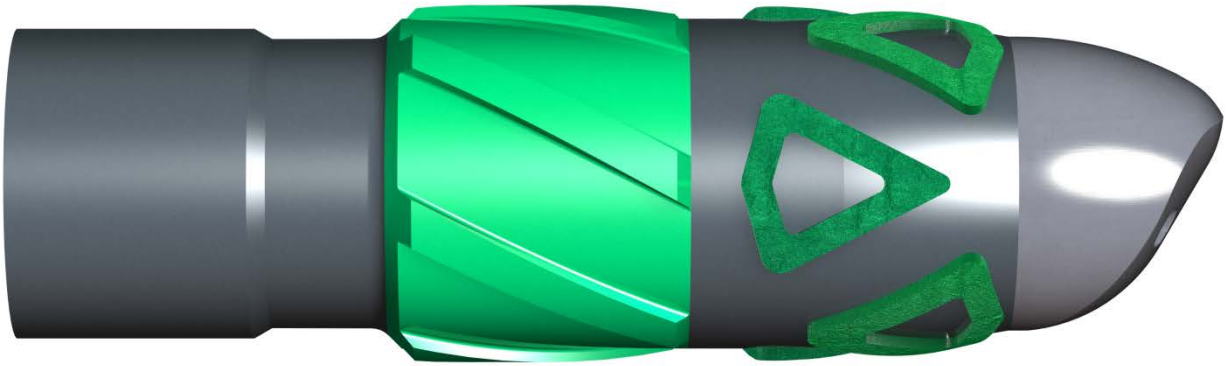
Features

- Available in most standard casing/liner versus open-hole combinations
- Drill out ID matches casing being run
- Flow by areas have been maximised for circulation and cementation
- Strength to suit casing specifications
- Supplied with customer specified casing connections
- Continuous ratchet with higher strength than connection
- Can be provided with either a SLICK body or a REAMING body

Benefits

- Increases probability of casings, liners and other open hole deployed systems reaching planned TD
- Provides end of string rotation where the full string cannot be rotated
- Rides over ledges or orients to path of least resistance
- Provides improvement in operational efficiency
- Low cost Insurance
- Fast drill out - tool has no components to drill out other than the eccentric aluminium nose, therefore reducing drilling inside casing time, thus protecting BHA
- Simple to install and use, no operator required

BridgeBUSTER® *Reduces drill out time, improves casing shoe stability*



The BridgeBUSTER® is a reamer shoe designed to be run on the bottom of the casing or liner to enable strings to be washed, rotated and reamed to planned TD. The BridgeBUSTER fitted with the FastDRILL nose reduces the time required to drill out while still maintaining a high compressive strength. The right hand spiral stabilizer and cutting structure with 360 degree coverage minimizes the risk to the BHA and improves casing shoe stability.

With the customer's need for flexibility and customization in mind, there are at least 35 variations of the BridgeBUSTER developed to date with the tool able to match whatever casing weights and threads the client requires.

Benefits to customers include improved drill out times without compromising the reaming capabilities, a reduction in NPT and increased opportunities to reach TD.

MAKING IT BETTER

Tercel's Casing and Reaming Shoes offer a range of options for increased drilling efficiencies and reduced NPT. The shoes protect casing integrity, make it possible to ream to planned TD and facilitate casing runs and cementing.

Applications

Provides enhanced deployment in problematic formations, coal beds, sloughing shale, ledged wellbores, ERD, highly deviated and horizontal wellbores for applications such as:

- Lower sand screen completions
- Liners (cemented or un-cemented)
- All casing strings
- Slotted or pre-perforated liners
- Gravel pack installations
- TTRD and multi-lateral completions
- Casing exits

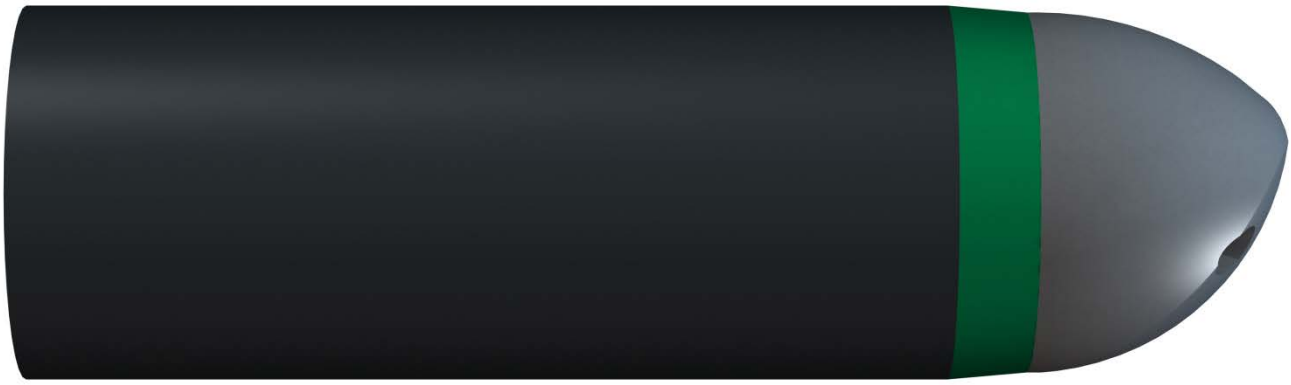
Features

- Fast drill out eccentric aluminium nose
- 360 degree cutting structure coverage
- Large flow by area
- Short compact design
- Matched to client casing weights and threads
- Hollow tool
- Can be provided with shear out flotation plugs
- Right hand spiral stabilizer
- Casing bore protection

Benefits

- Increases probability of casings and liners reaching planned TD
- Can be run in conjunction with a NaviGATOR™ to provide end of casing rotation when the full string cannot be rotated
- Provides low cost improvement in operational efficiency
- Fast drill out significantly reduces drilling inside casing time protecting BHA and casing
- Fast drill out time significantly reduces the risk of damage to the casing shoe integrity which leads to leak off or ledge issues at the shoe
- Improves bit performance

SlickSHOE™ *Enhanced deployment in problematic formations*



The SlickSHOE™ is an eccentric aluminum nosed casing guide shoe that guides casing to TD when ledges or washouts may exist and when a cement nosed guide or float shoe is not considered robust enough.

The SlickSHOE is more robust than a cement nosed guide or float shoe and is available in most casing sizes and connections. Flexibility is also key to the SlickSHOE which can be provided with shear out flotation plugs and a bullnose or run in conjunction with the NaviGATOR™ to provide end of casing rotation when the full string cannot be rotated.

Customer benefits include a significant reduction in the risk of damage to the casing shoe cement integrity, improved bit performance and longevity (as the bit spends less time in hole), fast drill out times and the increased probability of reaching planned TD.

MAKING IT BETTER

Tercel's Casing and Reaming Shoes offer a range of options for increased drilling efficiencies and reduced NPT. The shoes protect casing integrity, make it possible to ream to planned TD and facilitate casing runs and cementing.

Applications

Provides enhanced deployment in problematic formations, coal beds, sloughing shale, ledged well bores, ERD, highly deviated and horizontal well bores for applications such as:

- Lower sand screen completions
- Liners (cemented or un-cemented)
- All casing strings
- Slotted or pre-perforated liners
- Gravel pack installations
- TTRD completions
- Multi-lateral completions
- Casing exits

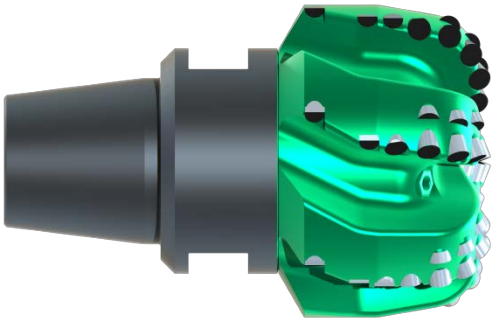
Features

- Fast drill out eccentric aluminium nose
- Large flow by area
- Short compact design
- Matched to client casing weights and threads
- Hollow tool
- Can be provided with shear out flotation plugs
- Can be provided with bullnose

Benefits

- Increases probability of casings and liners reaching planned TD
- Fast drill out time significantly reduces the risk of damage to the casing shoe cement integrity which could cause leak off or ledge issues at the shoe
- Fast drill out significantly reduces drilling inside casing time thus protecting BHA and casing
- Improves bit performance
- Provides low cost improvement in operational efficiency
- Lower cost insurance
- Can be run in conjunction with a NaviGATOR to provide end of casing rotation when the full string cannot be rotated

Fixed Cutter PDC Bits *Longer bit life, improved performance*



Fixed cutter Polycrystalline Diamond Compact (PDC) drill bits are an integral part of the driller's toolkit, yet can still vary widely in terms of stability, ROP and effectiveness in hard and abrasive formations. Tercel's ultra stable PDC technology allows for longer life in tough formations and optimum drilling performance across a wide range of vertical and directional drilling applications.

Tercel provides a broad portfolio of fixed cutter bits for all environments including bits targeted at rotary steerable and steerable motor applications; large diameter bits designed for surface hole and soft shallow formations; and fixed cutter bits for all other uses. A high spiral design for improved lateral and torsional stability or cutting structure reinforcement is also available.

The result is enhanced stability, steerability and directional response, delivering optimized penetration rates, reduced vibration and improved toolface control.

Tercel drill bits are customized according to specific operator requirements.

MAKING IT BETTER

With operators drilling to ever-greater depths in more challenging well environments, today's drill bit technologies must deliver high rates of penetration and high quality boreholes quickly and cost effectively without unplanned damage or downtime. Tercel's unique, reliable and practical drill bit products are engineered to cover a range of formations, all engineered for better performance.

Applications

- Soft to medium – hard formations
- Vertical – deviated well profile
- Drive system adaptation: RSS, PDM, Rotary

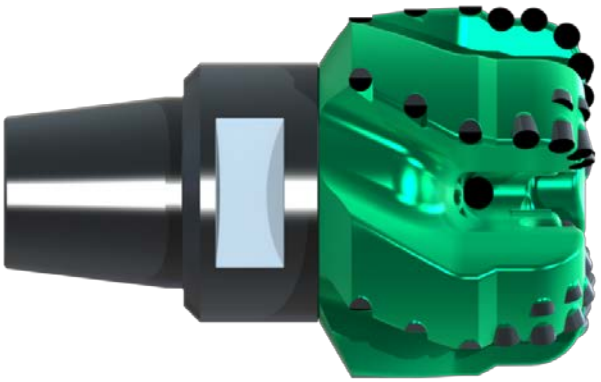
Features

- Premium PDC cutter technology (abrasion, impact, mechanical resistance
- Wide range of cutting structure reinforcement (torque control features, impact arrestors, back up cutters)
- Bit body design features defined to optimize cutting efficiency, durability, directional and dynamic response

Benefits

- High flexibility in PDC drill bit design
- Product customization to match the application requirements (geo-mechanical environment, directional objectives, drive system, hydraulics)

MicroCORE™ Bit *Geological insight while drilling faster*



The MicroCORE™ Bit, developed in collaboration with TOTAL, is a revolutionary drill bit design that allows the continuous generation of micro-cores, while drilling. The core, broken by the bit is carried to the surface up the annulus along with the drilled cuttings.

With operators looking to improve drilling efficiencies and geological insight through the analysis of larger formation samples, the MicroCORE Bit eliminates cutting in the central area where the cutting process efficiency is at its poorest. The generation of high quality undisturbed cuttings provides crucial geological information, giving operators the opportunity to analyze a continuous flow of valuable formation material while drilling faster.

The result is significant drilling performance improvements with ROP increases of up to 35%* and the generation of micro-cores from 5 to 30mm providing decision critical information without the cost of an additional run.

MAKING IT BETTER

With operators drilling to ever-greater depths in more challenging well environments, today's drill bit technologies must deliver high rates of penetration and high quality boreholes quickly and cost effectively without unplanned damage or downtime. Tercel's unique, reliable and practical drill bit products are engineered to cover the broadest range of formations, all engineered for better performance.

Applications

- Exploration or development wells
- HPHT applications
- Medium to hard formation drilling
- Deep or long extended wells
- Drive system adaptation: RSS, Rotary, PDM, Turbine

Features

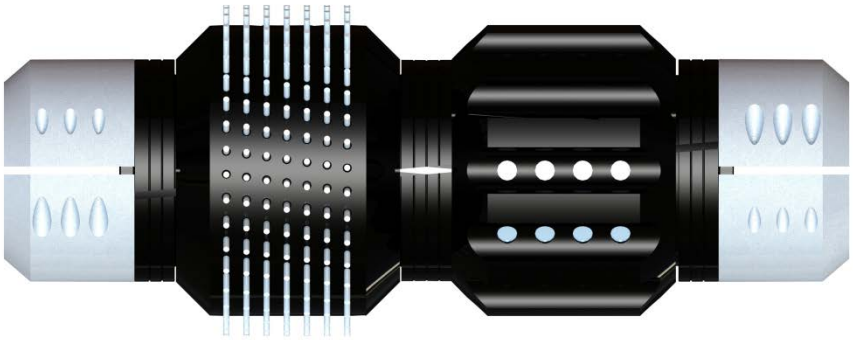
- Large core with ejection pad
- Force balanced cutting structure
- High volume junk slot area for core
- Optimized jet hydraulics

Benefits

- Higher quality cutting samples for formation evaluation
- Increased ROP
- Improved cutting efficiency
- Greater bit stability

CleanUP™ Tool – Clamp On

Clears debris without dedicated clean up trip



Tercel's CleanUP Tools clean and prepare the host casing immediately prior to setting a production packer, liner hanger or integral liner hanger packer onto the completion assembly. The tools play the crucial role of pushing debris ahead of critical components such as formation isolation valves, inflow control devices and other functioning downhole equipment.

The Clamp On CleanUP tool reduces debris on top of formation isolation valves and glass disc subs, is a low cost improvement in operational efficiencies and improves the probability of attaining TD. The Clamp On tool can be pulled out of the hole and re-used if required.

MAKING IT BETTER

Eliminating the need for a dedicated wellbore clean up trip but still reducing the potential risks from steel swarf and other debris saves the client both time and money as no time consuming dedicated clean-up trip is required.

Applications

- Lower sand screen completions
- Formation isolation valve/completion isolation valve
- Advanced completions with surface controlled inflow control devices
- Slotted or pre-perforated liners
- Gravel pack installations
- Multi-lateral completions
- Whipstocks with packers for casing exits
- Liner tie back packers
- Multi zone horizontal completions

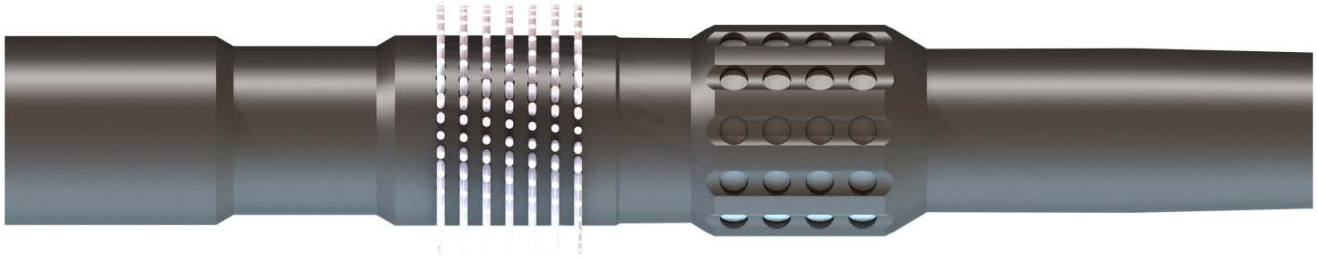
Features

- 360 degree brush coverage
- Free rotating tool
- Field proven Industry standard carbon steel bristles
- High strength rare earth magnets
- Polymer body
- Clamp on tool
- Field proven securing clamps
- Short compact design
- Easy to install
- Requires no premium connection
- Material independent of completion metallurgy

Benefits

- Low cost insurance in case your well is not as clean as expected
- Reduces risk of elastomeric packer leaks when setting
- Reduces debris on top of formation isolation valves and glass disc subs
- Provides low cost improvement in operational efficiency
- Utilizes gravity to move debris down hole which is easier than removing debris
- Does not require a premium connection as it is clamped to the completion or tool
- Keeps ferrous debris away from critical components
- Free rotation does not induce torque in completion components
- 360 degree debris cleaning
- Has no effect on length of BHA or completion tally

CleanUP™ Tool – In Line *Clears debris without dedicated clean up trip*



Tercel's CleanUP™ Tools clean and prepare the host casing immediately prior to setting a production packer, liner hanger or integral liner hanger packer onto the completion assembly. The tools play the crucial role of pushing debris ahead of critical components such as formation isolation valves, inflow control devices and other functioning downhole equipment.

The In Line CleanUP Tool is a disposable tool that reduces debris on top of the formation isolation valves and glass disc subs. The assembly or multiple assemblies can be positioned and spaced out on the completion pipe as required to clean while running in the hole. The tool also utilizes gravity to move debris downhole - easier than removing debris.

The results are improved operational efficiencies at low costs.

MAKING IT BETTER

Eliminating the need for a dedicated wellbore clean up trip but still reducing the potential risks from steel swarf and other debris saves the client both time and money as no time consuming dedicated clean-up trip is required.

Applications

Provides enhanced deployment of critical completion components by cleaning the area where they are to be set or by pushing and trapping ferrous debris into a safe non critical area.

- Lower sand screen completions
- Advanced completions with surface controlled inflow control devices
- Slotted or pre-perforated liners
- Gravel pack installations
- Multi-lateral completions
- Whipstocks with packers for casing exits
- Liner tie back packers
- Multi-zone horizontal completions
- Formation isolation valve/completion isolation valve

Features

- In-line tool with premium connections matching metallurgy
- Field proven Industry standard carbon steel bristles
- High strength rare earth magnets
- 360 degree brush coverage
- Short compact design
- Easy to install

Benefits

- Low cost insurance when your well is not as clean as expected
- Reduces risk of elastomeric packer leaks when setting
- Reduces debris on top of formation isolation valves and glass disc subs
- Provides low cost improvement in operational efficiency
- Utilizes gravity to move debris down hole which is easier than removing debris
- Keeps ferrous debris away from critical components
- 360 degree debris cleaning

SwivelMASTER® *Putting you in the zone*

The SwivelMASTER® is a workstring deployed tool that resolves potential sticking and loss of hookload on drill strings by allowing the upper string to be rotated without rotation or torque being applied to the string or BHA below. A lockable mechanism also allows full torque to be transmitted to the BHA below. The result is a dramatic reduction in workstring friction above the SwivelMASTER.

With a reduction in sticking so crucial to operators in attaining TD, the SwivelMASTER reduces the hookload required to reach TD and pay zones and extends well construction boundaries, allowing application engineers to model the well and predict any issues before running in hole.

The significant increase in available force at the tool and reduction of drag also facilitates the deployment or retrieval of complex equipment in ERD wells - equipment that would previously have been lost in hole - providing significant savings in client time and cost.

MAKING IT BETTER

Tercel's SwivelMASTER has enabled drilling to reach TD and completion on the world's longest horizontal well at 12,376 meters. With 200 runs and no failures, SwivelMASTER's track record is unrivaled.

Applications

Provides enhanced deployment and retrieval capabilities in ERD, highly deviated and horizontal well bores for applications such as:

- Lower sand screen and multi-lateral completions
- Horizontal liners (cemented or non-cemented)
- Slotted or pre-perforated liners
- Gravel pack installations
- TCP gun deployment
- Fishing
- Firing jars
- Deploying deep set packers
- Casing exits

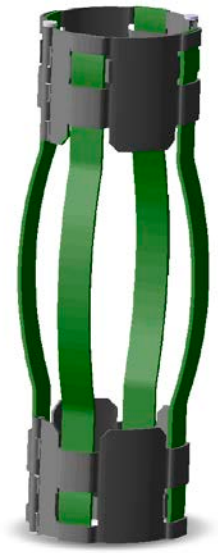
Features

- Clutch mechanism allowing the string above the tool to be rotated independently from the string below
- Heavy duty compression and tension bearing
- High torque capacity clutch
- Standard rotary connections
- Large ID
- Multi-function option
- Long life rotary seals
- Adjustable operating pressures
- Hydraulic function
- Back-up locking feature
- Short compact design

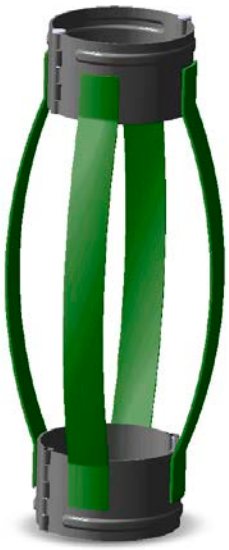
Benefits

- Extends the current well construction boundaries on ERD and highly deviated wells
- Increases length of open hole completion providing additional reservoir exposure/drainage
- Allows wells from fixed locations to access by-passed oil
- Improves operational efficiency
- Reduces cost and risk
- Eliminates the need for other friction reduction tools such as sub based friction reduction tools
- Provides force required for firing jars by eliminating drag
- Eliminates stick slip when deploying critical components such as whipstocks and multi-lateral completions
- Facilitates offshore well development from onshore or artificial island rig sites
- Reduction of drag in tension allows retrieval of equipment that would previously have been lost in hole

Bow Spring Centralizer *Reduces Torque and Drag*



Hinged Non Weld
Bow Spring Centralizer



Hinged Welded
Bow Spring Centralizer

Slip On Welded
Bow Spring Centralizer

Bow Spring centralizers are specially designed for vertical wells where low starting forces as well as high restoring forces are required. The Bows of these centralizers are heat treated in a special furnace which gives it the particular 'bow spring' action.

The specific hardness of the bows is calculated to ensure its performance exceeds the API 10D standards. Balancing the Starting Forces with the Restoring Forces taking care of the Running Forces makes it the ideal product for today's severe downhole drilling conditions. The flexing of the bows is a critical factor for these centralizers and the bows undergo a special state of flexing before assembly to ensure that they do not snap off under extreme stress conditions.

MAKING IT BETTER

Whether it be vertical, horizontal or ERD wells, cased or open hole applications, or weak formations, Tercel's broad selection of centralizers are playing a key role in reducing torque and drag and reaching planned TD.

Hinged Non Weld Bow Spring Centralizer

In this type of centralizer the end collars have hinges which split it into two halves. The bows are locked to the end collars via a special locking mechanism. These centralizers can be shipped in half reducing the freight cost.

Hinged Welded Bow Spring Centralizer

In this construction the bows of the centralizers are welded onto the end collars making it a Hinged Centralizer along with a Welded Construction.

Slip on Welded Bow Spring Centralizer

In this type of centralizer the end collars do not have any hinges hence these centralizers can 'slip on' to the casing.

Integral Stop Collars

All Bow Spring Centralizers are available with integral stop collars where set screws are available on the end collars. In this case stop collars are not required, however this would not float on the casing.

S-type centralizer Reduces Torque and Drag

The Tercel S-type centralizer is a single piece glider centralizer has been developed to meet growing demands worldwide for a centralizer which can perform satisfactory in open hole as well as cased hole. It combines the highest restoring force with zero starting force and zero running force. The centralizer is used to position the casing in the centre of the wellbore in vertical, deviated and horizontal wells.

The Tercel single piece glider centralizer reduce the effect of channeling by improving the cement flow, thereby resulting in a more uniform cement thickness in the well bore. By reducing the pipe movement before cement sets the centralizers are able to minimize gas channeling.

Tercels single piece glider centralizers are one piece construction in special high strength steel which imparts excellent hardness and spring action ensuring an unmatched ability to come back to its original shape after undergoing rigorous stress loads conditions, these centralizers can pass through highly constricted spaces and then again regain their original shape without any deformity to give excellent standoff in the open hole area.

Its bow spring design makes it highly flexible and its single piece construction makes it structurally robust and gives extra strength to withstand high stress conditions in demanding downhole situations making it the most preferred choice of cementers.

The specific hardness of the centralizer is calculated to ensure its performance exceeds the API 10D standard.

Applications

- Suited for both Cased and Open hole.
- Suited for vertical, inclined or deviated holes
- Especially suited for extended reach wells

Features & Benefits

- Centralizer is made from a single piece of steel with no welds between the collars and bows. The absence of these welds increased the ability to withstand extreme loads and makes it suited for highly demanding well conditions
- Bows of single piece glider centralizer are able to give high restoring force with zero starting and running forces thus minimising drag during running of the casing

MAKING IT BETTER

Whether it be vertical, horizontal or ERD wells, cased or open hole applications, or weak formations, Tercel's broad selection of centralizers are playing a key role in reducing torque and drag and reaching planned TD.

Technical specifications

Tercel S type Single piece glider centralizer

Casing size	Hole Size	ID +1/8" /0.0	No of Bows	Starting force (max) as per API-10D	Starting force observed	Restoring force (min) as per API-10D	Restoring force observed
4 1/2"	6 3/4"	4 5/8"	4	464 lbf	0	464 lbf	1972 lbf
7"	8 1/2"	7 1/8"	6	1040 lbf	0	1040 lbf	1727 lbf
9 5/8"	12 1/4"	9 3/4"	6	1600 lbf	0	1600 lbf	2946 lbf
13 3/8"	16"	13 9/16"	8	2440 lbf	0	1220 lbf	2140 lbf
13 3/8"	17 1/2"	13 9/16"	8	2440 lbf	0	1220 lbf	2140 lbf
20"	24"	20 1/4"	10	3760 lbf	0	1880 lbf	1940 lbf

SingleRUN™ Motor Works past ledges to avoid further NPT

SingleRUN™ Motor systems are designed to be run on the bottom of the final casing or liner string to ream or drill to planned TD through pumping only. The motor is available from new in a wide range of sizes, stages and rotor stator configurations to suit the customer's application.

The SingleRUN Motor is easy to use - not complicating final string installation - and can provide up to 100 hours of in-well operating use, requiring the same power output, OD and connections as a standard serviceable motor.

Customer benefits include a low cost drilling method without a rotary or top drive and the ability to run the liner to TD and wash and work the string past the ledges, due to the rotation gained from the motor in the string.

MAKING IT BETTER

Straightforward yet innovative, our products are practical, often multi-functional and designed to reduce unnecessary complexity whilst maximizing performance. They are easy to deploy, uncomplicated to the user and fit seamlessly with existing drilling and well construction equipment.

Applications

- Lower open hole completions
- Slotted or pre-perforated liners
- Difficult open hole wellbore conditions
- Final string cemented casings or liners
- Sand control screens
- Cemented completions
- Getting complicated final strings to TD with many accessories
- Drilling new formation at TD with casing or liners
- Drilling up cement plugs set on prior drilling trip due to losses
- Mud cap and/or under balanced drilling with liners
- Milling and fishing operations
- Well head abandonment
- Drilling shallow single string tubings (salt domes and shallow gas)

Features

- SingleRUN™ Motor systems are easy to pick up and use and do not complicate final string installation operations.
- The tool is a non-serviceable mud motor designed for 100 hours of in-well operating use.
- The motor has the same power output as a standard serviceable motor
- The motor has the same OD and connections as a standard serviceable motor
- Motor is available in a wide range of sizes, stages and rotor stator configurations

Benefits

- Gets your casing or screens to TD when hole problems would stop normal deployment
- Can eliminate the need for a wiper trip prior to running casing or liners after long logging jobs
- Provides low cost improvement in operational efficiency
- Rotates end of string when full string rotation is not possible
- Drill/ream casing or liners back to TD by pumping alone
- Does not complicate job even with hydraulic liner hanger
- Provides a low cost method to drill without a rotary or top drive
- Provides low cost insurance