Reel Reporter

Vol. 8 Issue 3 | Newsletter of the International Coiled Tubing Association | 7/ 2003

There's a lot going on!

ICoTA European Chapter Annual Golf Competition September 5th

(application on Page 10)

"*What's New In Coiled Tubing*" 4th Annual ICoTA Roundtable Thursday, October 16th Metropolitan Centre Calgary, AB

www.icota-canada.com

Gulf Coast Chapter Golf Tournament

October 17th
Blackhorse Golf Club
Cypress, TX

(application on Page 12)

OFFSHORE EUROPE 2003
OIL & GAS EXHIBITION & CONFERENCE

2-5 SEPTEMBER 2003
ABERDEEN, SCOTLAND

The International Coiled Tubing Association (ICoTA) is a not-for-profit, member-funded organisation with the primary objective of improving communication and promotion of technical awareness within the coiled tubing industry.

Membership comprises individuals from all sectors of the coiled tubing industry including service users, service providers, tubing and equipment manufacturers.

Mission Statement

The ICoTA mission is to enhance communication, gather technical expertise and promote safety, training, competencies and industry accepted practices.

ATCE 5-8 October 2003

www.spe.org/2003atce/
Denver

SPE/ICoTA 9th European Coiled Tubing and Well Intervention Round Table

19 & 20 November
Aberdeen, Scotland

Follow the link at www.icota.com

INSIDE:

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Why Flagging the CT is not Accurate

Ken Newman, CTES

Accurate depth measurement in CT applications continues to be an elusive target. There are several factors which make this target elusive:

- Stretch - Changes in length due to thermal elongation, internal and external pressure difference, helical buckling, and axial force can be accurately calculated. However, the axial force stretch component is more complicated for CT than for other jointed pipe tubulars because there is both elastic and plastic elongation.
- Depth wheel inaccuracy – A 7.6394" diameter depth wheel measures 2 ft with each rotation. However, if this wheel wears 0.02", or gets a build-up on its surface of 0.02", it causes a 0.26% error. This error seems trivial, but in 15,000 ft it causes an error of 39 ft, assuming the wheel runs perfectly with no slippage. This error can be reduced by using a larger wheel, such as an 11.4592" wheel which measures 3 ft with each revolution. A 0.02" change in the wheel diameter causes a 0.17% error, or 26 ft in 15,000 ft.
- Depth wheel location – there are 2 common locations for depth wheels, at the reel levelwind and below the chains. The wheel below the chains measures stretch proportional to the axial force while running in and out of the well. Since the axial force pulling out of the well is higher than the axial force running into the well, the amount of stretch measured is different in one direction than in the other. This does not occur with the measurement at the levelwind, which does not include stretch, except for a minor amount due to reel back tension. However, the pipe passing through the levelwind often has come curvature to it, which can cause depth measurement errors.
- Correlation issues – The depths measured when running CT are expected to correlate with depths measured previously either by casing tallies and/or wireline logs. There will be errors in these previous measurements making the actual desired depth questionable.

To avoid these issues, some type of downhole correlation is desirable with accurate placement in the wellbore. One method often employed is to run some type of downhole reference device such as a casing collar locator (CCL), tubing end locator (TEL), tubing nipple locator (TNL), or tagging a known location in well such as a packer. This device is used to locate the desired placement point in the well and the CT is "flagged" at surface. The flag is a visible mark placed on the CT such as paint or tape.

Once flagged at the desired location the CT is pulled out of the well, and the tools are changed to whatever tools are desired to perform the service such as a bridge plug, perforating guns, etc.

The CT is then run back into the well until the flag is at the previously measure location, and the tools are activated to perform the service, based upon the assumption that the end of the CT is now at exactly the same location as when the flag was applied.

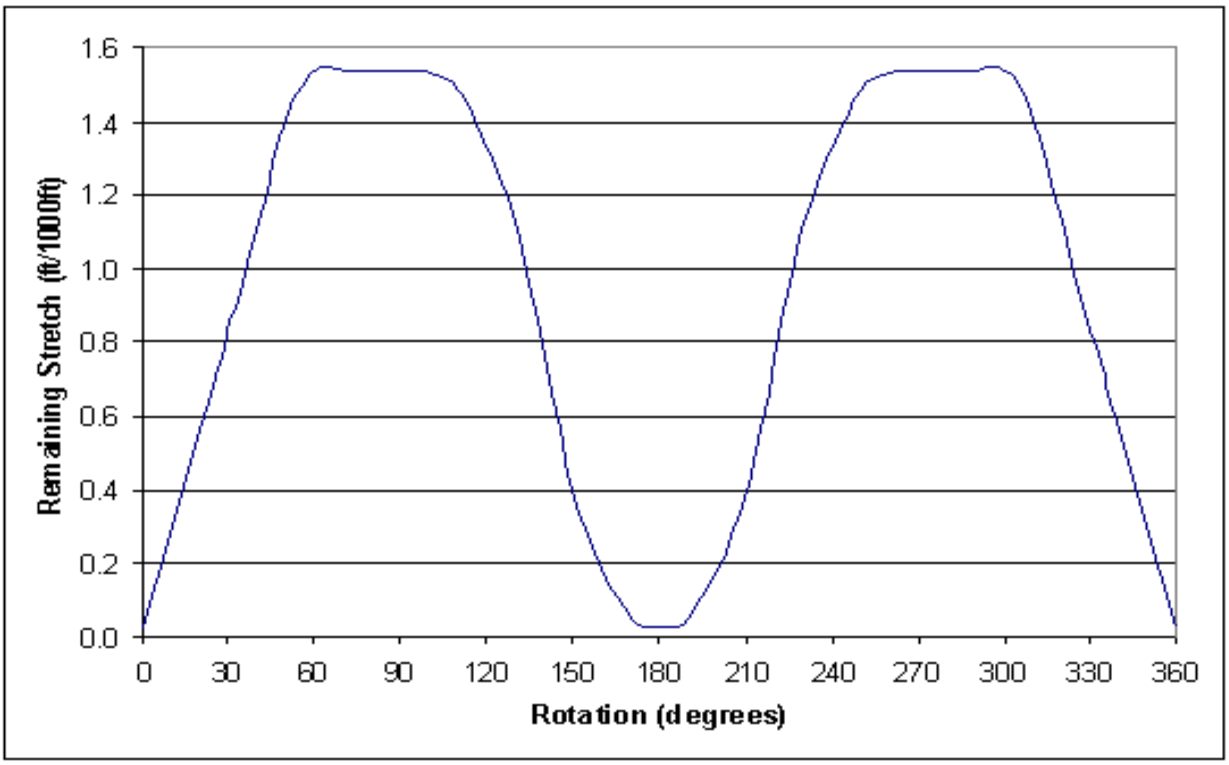
Unfortunately, this is not correct! The length of the CT has changed due to plastic elongation, so that the end of the CT is at a different location. CTES has performed significant research into this plastic elongation phenomenon over the last 8 years, some of which is documented in SPE papers 38408 and 54458. As part of this work, software was developed to calculate the plastic elongation. So… if we're able to calculate this elongation, what's the big deal? Why don't we just calculate the elongation, and move the flagged position by this amount before firing the guns?

Unfortunately, that won't work either! The reason has to do with another issue CTES has measured, but cannot yet explain – the CT rotates when it is being run in and out of a well. SPE paper 60737 shows that the CT rotates significantly. The plastic elongation is very dependent on the rotational orientation.

So, we have an unknown rotational orientation of the CT when it is being bent over the guide arch and reel. What difference does this unknown make?

Consider a short section of CT in a string that is run into a well. First it is unbent from the reel, then bent and unbent over the guide arch. This bending and unbending causes the CT to have sever residual stresses as it enters the chains. Once it gets below the injector it sees a significant axial load which, due to the residual stresses from bending, causes plastic elongation. It then comes back out of the well and onto the reel. If the CT section is in exactly the same rotational orientation when it comes across the guide arch and onto the reel, the plastic elongation disappears. However, if it is in a different rotational orientation, the plastic elongation doesn't disappear.

The following figure shows a study in which the above scenario was calculated repeatedly with different amounts of rotation.



As was mentioned above, if there is no rotation, the plastic elongation (or strain) is zero. However, if the CT section is rotated about 40 degrees, the plastic stretch is 1 ft per 1,000 ft. Note that this was for one specific CT size, wall thickness, axial load, and grade, but it presents the problem. Since we don't know the rotation of the CT, we can't accurately predict the plastic stretch.

So, don't depend on a flag on the pipe to give you an exact location in the well!

To avoid this issue, downhole depth correlation should be done on the same run as the service being performed. This eliminates the depth error due to the unknown rotation and plastic elongation. Fortunately, many tools (listed above) are now available which make this possible. New CCLs are available which indicate casing collar locations by sending hydraulic pressure pulses to surface, avoiding a cable inside the CT. Varius TNL and TEL tools are available. These tools make CT services requiring accurate depth location possible.

By: Ken Newman, CTES, L.P.

Glossary of Coiled Tubing Terms

Accumulator: A pressure vessel charged with nitrogen gas and used to store hydraulic fluid under pressure for operation of pressure control equipment.

Accumulator Precharge: **An initial nitrogen charge in an accumulator which is further compressed when the hydraulic fluid is pumped into the accumulator storing potential energy.**

API: **American Petroleum Institute**

AW Rod Thread: **A parallel thread with three threads per inch (3 TPI) similar to the BW THREAD. The thread is square cut and is used in applications of 1.75" OD thread or less.**

Balance Point: **Footage of coiled tubing in the hole where the buoyed weight of the tubing is equal to the well pressure acting against the cross-sectional area. Note, this is a static condition with the pipe full of fluid and does not include frictional forces of the stripper assembly and/or pipe rams, if engaged.**

Ballooning: The increase in diameter and decrease in length of tubing due to the effects of temperature change, cycling or high internal pressure.

Banana Blade: **A design of under reamer blade that enables reaming in both RIH and POOH mode. The name reflects the shape and the design minimizes the risk of becoming stuck due to overlying debris.**

(Glossary continued next page)

Bending Cycle: The act of straightening or bending coiled tubing. One bending cycle for the purpose of CYCLE actually includes six such bends, off, and then back onto the work reel.

Blowout: **An uncontrolled flow of pressurized wellbore fluids and/or formation fluids from the wellbore or into lower pressured subsurface zones (underground blowout).**

Blind Rams: **Rams whose ends are not intended to seal against any coiled tubing. The seal against each other to effectively close the hole.**

Boot: **The boot provides a solid connection from bare wires to the KEMLON PIN in the SWBPV bulkhead. It consists of a gold plated pin crimped to the wire. A Teflon sleeve to protect the pin and a rubber boot to cover and seal the connection.**

B.O.S.S. Tool: **Ball Operated Shear Sub, a ball operated hydraulic release tool. This tool is used to release the coiled tubing from the bottom hole assembly if it was to become stuck.**

Bullhead: **Any pumping procedure in which fluid is pumped into the well against pressure.**

BW Rod Thread: **A parallel thread with three threads per inch (3 TPI) similar to the AW THREAD. The thread is square cut and is used in applications of 1.75" OD thread or greater.**

Check Valve: **A valve that allows flow through it in one direction only. This device is installed at the coiled tubing connector and allows fluid to be circulated down the string but prevents backflow. This device may be a ball-and -seat type or flapper type.**

Choke: **A device with either a fixed or a variable aperture used to control the rate of flow of liquids and/or gas.**

Choke Line Valve: **The valve(s) connected to the end part of the well control stack which controls the flow to the choke.**

Christmas Tree: **A term applied to the combination of valves and fittings assembled above the top of the tubing spool on a completed well to contain well pressure and control the flow of hydrocarbons and other fluids.**

Circulation: **The movement of fluid or gas, from a vessel on surface, down a tubular string, returning up the annulus and back to a vessel or pit on surface.**

Closing Ratio: **The ratio of the wellhead pressure to the hydraulic actuation pressure required to close the well control component.**

Collapse: **The flattening of the coiled tubing due to external pressure or external pressure combined with either tension or bending.**

Collapse Pressure: **The amount of pressure required to flatten the sides of pipe.**

Collector: **The means of transferring electrical signals from the rotating coiled tubing reel to a stationary plug and so onwards to remote surface instrumentation.**

Concentric Operations: **Well operations conducted using small diameter coiled tubing inside of conventional tubing or tubingless completion's. This is normally performed with the Christmas tree in place using a small rig or hoisting unit.**

Control Panel: **An enclosure displaying an array of switches, push buttons, lights, valves, various pressure gauges, and/or meters to control or monitor coiled tubing operating functions.**

Core Diameter: **The diameter of the core of the work reel onto which the coiled tubing is spooled.**

CYCLE: The name for the BJ SERVICES CT life monitoring system. All bases have access to it and updates are based upon information written on specific sheets by the job supervisor. For more information contact the Operations Engineering Department.

Data Key: The security control for CIRCA. To access CIRCA a key has to be used. Each issue of CIRCA has a unique key which is not interchangeable.

Diametrical Growth: **Change in the diameter of the tubing.**

Diamond Matrix: **A term used to describe a particular type of bit.**

Dimple Connector: **A tubing connector using grub screws to secure BHA's to the coiled tubing.**

Defect: **A defect is an imperfection of sufficient magnitude to warrant rejection of the product.**

DMUR: **Drilling, Milling and Under-Reaming**

Dongle: **A computing term for a Data Key. See above.**

Drag: **Friction between a moving device (such as coiled tubing) and another moving or non moving part (such as tubing or formation walls).**

E-Line: **Electric line, a small-diameter conductive line used in electric wireline operations.**

Elongation: **The increase in gage length of a tensile test specimen, expressed as a percent of the original gage length.**

Emergency Shut-down Device (ESD): **System to shut-down a well or series of wells in the event of an emergency**

Fatigue: **The process of progressive localized permanent structural change occurring in a material subjected to conditions which produce fluctuating stresses which culminate in cracks or complete failure after a sufficient number of fluctuations.**

Fish: **A universal description for a downhole obstruction not intended to be there. Normally used to describe an item of equipment left in the well as a consequence of a previous workover operation.**

Flow Tee: **A piece of iron in the shape of a "T" allowing gas and fluids to be circulated out of the side to a tank or pit.**

Friction Coefficient: **A dimensionless figure utilized in CIRCA to define the condition of the well. The higher the coefficient the 'rougher' the well is assumed to be.**

Friction Lock: A term used to describe the situation whereby further entry into the well with the coiled tubing is not possible. The situation occurs due to formation of a Helical Spiral and so the driving force from the injector is not transmitted to the BHA thereby preventing further progress into the well.

Gate Valve: A valve which employs a sliding gate to open or close the flow passage. The valve may or may not be full-opening.

Grapple Connector: **A tubing connector using grapples to connect BHA's to the bottom of a coiled tubing string.**

Gravity Stabilized: The CT is lying straight within the hole, however, it is beyond the Neutral Point and therefore, if conditions change, it is possible for the CT to form a Helical Spiral.

Hardness: **A measure of the hardness of a metal as determined by pressing a hard steel bar or diamond penetrator into a smooth surface under standard conditions.**

Hardness (Testing): **Testing of the hardness of a material.**

Helical Spiral: **This term describes the manner in which the coiled tubing is lying in the well i.e. similar to a spring. The situation occurs as a result of forces opposing the direction of RIH such that the rigidity of the coiled tubing is not sufficient to overcome them and the coiled tubing conforms to the shape of the completion with 3600 wall contact.**

Hipp Tripper: **See percussion hammer**

Hydril: **Registered trademark of a prominent manufacturer of oilfield, equipment especially annular blowout preventers.**

Hydrostatic Head: **The pressure which exists at any point in the wellbore due to the weight of the column of fluid above that point.**

Injector Head: **A piece of equipment with one or more motors driving one or more chains equipped with gripping blocks to inject or withdraw coiled tubing from a wellbore. Usually equipped with a stuffing box to allow this to be accomplished with pressure in the wellbore.**

Jar: **A percussion tool operated manually or hydraulically to deliver a heavy downward or upward blow to an item in the borehole.**

Kick: **Intrusion of formation liquids or gas that results in an increase in pit volume or an increase in observed wellhead pressure.**

Kill Line: **A high-pressure line between the pumps and some point below a well control component. This line allows fluids to be pumped into the well or annulus with the well control component closed.**

Lift Frame: **A frame used to connect the injector head to a wellhead or test tree on a floating rig.**

Lobe Pattern: **In a PDM motor the Stator consists of a series of internal spiral grooves in a rubber molding. The Rotor consists of a series of external spiral grooves on a coated steel shaft. The ratio of the rotor grooves to stator grooves is the Lobe Pattern. The higher the ratio, the better the motor (usually).**

Lubricator: **A specially fabricated length of casing or tubing usually placed temporarily above a valve on the casing head or tubing head. It is used to run tools into a producing well and provides a method for sealing off pressure and thus should be rated for the highest anticipated pressure.**

Manifold: **An assemblage of pipe, valves, and fittings by which fluid from one or more sources is selectively directed to various system or components.**

Maximum Anticipated Surface Pressure: **The highest pressure predicted to be encountered at the surface of a well. This pressure prediction is based upon a wellbore filled with gas from the surface to the completion interval.**

Mill: **A downhole tool with rough, sharp, extremely hard cutting surfaces for removing metal by grinding or cutting.**

Milling: **The act of operating a mill to remove metal from the wellbore.**

Moineau Principal: **The name given to the operating method of PDM motors due to the inventor Rene Moineau. He was the first to patent such devices between 1930 and 1948.**

Mud Motor: **See PDM**

(Glossary continued on page 6)

NC Thread: **Originally a mining thread, tapered with 12 threads per inch with the threads having a conical shape. Similar in appearance to a Regular Thread.**

Neutral Point: **The transition zone between the Stable region (no helical buckling possible) and the Unstable region (helical buckling may occur).**

Opening Ratio: **The ratio of the well pressure to the hydraulic actuation pressure required to open the well control component.**

Ovality: **The difference between the largest and smallest outside diameter on a cross-section.**

Overbalance: **The extent to which the hydrostatic pressure of the fluid column exceeds the formation pressure.**

P.D.C.: **Polycrystalline Diamond bit is a recent advance in bit design. Discs of polycrystalline man-made diamond are fixed to a tungsten carbide insert. The manufactured insert combines the hardness of diamond with the impact resistance of tungsten carbide.**

P.D.M.: **Positive Displacement Motor is the term to describe a motor which operates on the Moineau Principal. It is the most common design of motor used on CT DMUR operations. A metal Rotor is forced to turn inside a rubber Stator due to the force of fluid passing through it.**

Percussion Hammer: **A drilling tool that delivers high frequency blows to the bit.**

Permanent Installation: **Installation of coiled tubing left in place for the purpose of injection or production.**

Pipe Rams: **The rams in a well control device which are designed to seal around coiled tubing to close and isolate pressure in the annular space below the rams.**

Pipe/Slip Rams: **Combination rams which provide the function of a pipe ram and slip ram in one ram body.**

P.L.T.: **The abbreviated term for a Production Logging Tool. Irrespective of the tools run all flow analysis operations are defined as a 'PLT'.**

Pin: **The pin or Kemlon Pin, to give it its manufacturers name, provides a solid electrical connection from a high pressure zone to a low pressure zone. The pin is rated to 20,000 psi and consists of gold pins set in ceramic and surrounded by a metal housing complete with o-rings to provide the pressure seal across the bulkhead.**

Plug Back TD: **the bottom of the well.**

Plug Valve: **A valve whose mechanism consists of a plug with a hole through it on the same axis as the direction of fluid flow. Turning the plug. 90o opens or closes the valve. The valve may or may not be full-opening.**

Polished Rod Clamp: **Fastening device to connect the polished rod to the bridle of a beam pumping unit.**

Power Fluid: **Pressurized hydraulic fluid dedicated to the direct operation of functions.**

Precharge: **See "Accumulator Precharge"**

Pressure Test, Well Control Component: **The process of pressure testing internally the well control component or well control stack.**

Radiographic Inspection: **Inspection carried out through the use of X-ray.**

Reel: **Device to hold hoses or coiled tubing usually equipped with a rotary joint allowing for the pumping of gas and fluids through the hose or tubing.**

Regular Thread: **A tapered thread with a high number of threads per inch with the threads having a conical section. Similar to the NC Thread.**

Regulator (Pressure): **A hydraulic device that reduces upstream supply pressure to a desired (regulated) pressure. It may be manual or remotely operated and, once set, will automatically maintain the regulated output pressure unless reset to a different pressure.**

Reservoir: **A storage tank for control fluids used to operate the well control components and other hydraulically-actuated devices.**

Rheology: **The term to collectively describe fluid properties. The definition of fluids is important for CIRCA analysis and covers density, viscosity etc.**

Rig: **The derrick or mast, drawwoks, and attendant surface equipment of a drilling or workover unit.**

Riser: **A pipe through which liquid travels upwards.**

Roll-on-connector: **A connector where the tubing is compressed into ridges machined into the tool. Used to attach BHA's to the bottom of coiled tubing.**

R.O.P.: **An abbreviation for Rate Of Penetration, a measure of the efficiency of the DMUR process. As high a rate as possible is the goal, however, this must be achieved without excessive bit wear and/or Stall conditions or overloading of the well surface handling facilities.**

Roto-Jet: **Patented BJ Services tool used for high pressure jetting of scale and solids in the wellbore.**

Rotor: **An internal component of the PDM motor. A polished metal spiral, it enables the force of fluid to be transferred into rotary motion to turn the bit. The performance of the motor is determined by the Lobe configuration of the rotor.**

Runaway: **Uncontrolled ascent or descent of coiled tubing in a wellbore.**

Shear Rams: **The rams in a well control device which are designed to shear the coiled tubing located directly across the ram position.**

Shear/Seal Ram: **Combination ram which provides function of a shear ram and blind ram in one ram body.**

Shore's Hardness: **This is a rating system to define the applicability of rubber to a pressure environment. Thus the higher the number the greater the hardness and therefore the applicability for higher pressures is assured. The rating applies to o-rings and stripper rubbers.**

Shut-off Valve: **A valve that closes a hydraulic or pneumatic supply line.**

Slip Rams: **The rams in a well control device which are equipped with coiled tubing slips that, when engaged, prevent movement of the coiled tubing but do not isolate pressure or control flow.**

Slip Ring: **A term for the Collector. See above.**

Snubbing: **Condition for working coiled tubing though a pressurized stripper, where wellbore pressure applied against the cross-sectional area of the tube creates an upward acting force greater than the weight of the tubing in the wellbore. In this condition, mechanical assistance is required to apply thrust to the tubing while injecting or to maintain control of the tubing when extracting. This condition is commonly called "light pipe operations".**

Spinner, Fullbore: **This tool is supplied by the logging company and measures flow contribution from the formation. The impeller is protected by a centralizer and requires only simple calibration runs. It is susceptible to failure due to foreign matter clogging the impeller.**

Spinner, Inline: **Unlike the Fullbore Spinner this tool requires more passes for calibration and is generally not as reliable as the full bore version, however it is a lot more fragile.**

Spool: **See reel**

Stable: **A CIRCA term to define the CT. When a section is described as stable it is impossible to have helical buckling in that particular section given the conditions. The stable section ends at the Neutral Point with the section below to TD being classed as the Unstable section.**

Stable Spiral: **Describes the section of CT which is beyond the Neutral Point and is therefore in the Unstable region. By definition the CT has formed a helical spiral all sections of which are in contact with the completion tubulars.**

Stabilizer: **A sub utilized in the BHA to prevent excessive lateral movement of the CT during DMUR operation.**

Stall: **A situation during DMUR operations when the applied WOB results in the Torque required to turn the bit is greater than the Torque supplied from the motor. A sharp CT circulating pressure rise will be seen upon this occurring**
Stator: **The stationary rubber element of the PDM motor. The Rotor is held in place by the stator which until the application of fluid pressure, prevents the Rotor from turning. The stator provides the internal seal to enable pressure build-up.**

Stiff Wireline: **BJ Services name for wireline installed into coiled tubing.**

Stored Hydraulic Fluid Volume: **The fluid volume recoverable from the accumulator system between the maximum designed accumulator operating pressure and the precharge pressure.**

Strain Gauge: **The term used to describe an electronic load cell. The strain gauge measures weight by calibrating the changes in resistance as a result of the load, either positive or negative, applied to it.**

String: **An entire length of coiled tubing.**

Stripper: **A device with a resilient elastomeric element used to effect a seal in the annulus. This device is used primarily to isolate well pressure from the atmosphere when injection or extracting the coiled tubing in live wellbores.**

Stripper Rubber: **Inserts made of rubber compounds run inside stuffing boxes to seal well pressure in the well bore as the coiled tubing is being run into or being withdrawn from the well.**

Stripping: **Condition for working coiled tubing through a pressurized stripper, where wellbore pressure applied against the cross-sectional area of the tube creates an upward acting force less than the weight of the tubing in the wellbore. In this condition, mechanical assistance is required to apply thrust to the tubing while injecting or to maintain control of the tubing when extracting. This condition is commonly called "light pipe operations".**

Stuffing Box: **A device that prevents leakage around the coiled tubing as it is being run into and out of the wellbore.**
Stub Acme Thread: **A parallel thread form with 10 threads per inch with square sided threads. A fine version of the AW and BW Threads.**

Swab Valve: **The top most valve on the tree installed above the flow "T" so that tools may be lubricated out of the well with the well flowing.**

Swabbing: **The lowering of the hydrostatic pressure in the wellbore due to upward movement of pipe and/or tools.**

(Glossary Continued on page 8)

SWBPV: **An abbreviation for the Stiff Wireline Back Pressure Valve. The valve is used exclusively on Stiff Wireline operations.**

TC (Tungsten Carbide) Matrix: **The form a particular type of bit or mill can take. More coarse than diamond bits and therefore for softer materials.**

T.R.T.: **Tension Release Tool.**

Tapered Mill: **A particular bit type either TC or Diamond Matrix. Used for enlarging holes in blockages of debris or for dressing fish. Two types exist either concave or convex depending upon external or internal drilling of the obstruction being required.**

Total Depth (TD): **See plug back T.D.**

Tensile Strength: **The greatest longitudinal stress that a metal can bear without tearing apart. A metal's tensile strength is greater than it's yield strength.**

Transition Point: **The Point on the tapered coiled tubing string where tubing segments of different wall thickness are welded together.**

Trip: **The event which involves deployment of the coiled tubing string from the reel into the wellbore and the subsequent retrieval of the coiled tubing back onto the reel.**

Torque: **The shear force produced when the rotation, from the motor, (an axial force) is resisted due to the friction between the fill and the Bit. The greater the torque the greater the shear force.**

Triaxial Stress: **The total equivalent stress acting on the CT as a combination of the axial stresses (due to tension or compression), radial stress (due to pressure) and hoop stresses (due to any applied torque).**

Ultrasonic Inspection: **Testing through the use of ultrasonic waves to detect discontinuities or corrosion in metal structures.**

Underbalance: **Relating to a condition in which the pressure in the wellbore is less than the pressure in the formation.**

Underreamer: **A device used to underream. Usually to enlarge the wellbore below the casing.**

Unstable Spiral: **Describes the section of CT which is beyond the Neutral Point and is therefore in the Unstable region. By definition the CT has formed a helical spiral. However, sections of the CT are not in contact with the completion tubulars, e.g., due to a diameter change or a nipple. This will be the most likely place for a failure to occur.**

Useable Hydraulic Pressure: **The hydraulic fluid volume recoverable from the accumulator system between the maximum designed accumulator operating pressure and the minimum operating pressure.**

Weak Link: **A description of the shear sub utilized to pull off the tool string when stuck downhole. Two types are utilized in Stiff Wireline, either the shear pin type in the SWBPV or the collet release used in the TRT. See above.**

Weight Bar: **A heavy weight or bar placed near the BHA. The bar provides weight so that the tools will lower properly into the well. Also called sinker bars or stem.**

Well Control Component, Annular Type: **A device which can form a seal in the annular space around any object in the wellbore or upon itself. Compression of a reinforced elastomer packing element by hydraulic pressure effects the seal.**

Well Control Component, Ram Type: **A device designed to form a seal on the well bore with or without coiled tubing in the well. The equipment can use one set of blind rams, shear rams, slip rams or pipe rams to effect the required seal arrangement of the equipment, an/or existing well conditions. Combination shear/seal and pipe/slip rams are available.**

Well Control Stack: **An integral body or an assembly of well control components including ram-type BOPs, annular type BOPs, spools, valves, and nipples connected to the top of the wellbore to control well fluids.**

Well Control Equipment Drill: **A training procedure to ensure that coiled tubing personnel are familiar with correct operating practices to be followed in the use of well control equipment for blowout prevention.**

Wellhead: **An assemblage of valves and spools located below the Christmas tree and above the casing strings for the purpose of hanging and isolating the various tubular strings.**

WOB: **An abbreviation for Weight On Bit, i.e., the force transmitted to the bit through the CT weight and the injector head. Too little WOB leads to excessive bit wear per foot of penetration and excessive WOB will cause a Stall and/or cleaning problems. The optimum WOB is one that enables DMUR to take place keeping the CT pressure below the Stall pressure.**

Yield Strength: **A measure of the force required to deform tubular goods to the extent that they are permanently distorted.**

Please feel free to contribute to the Coiled Tubing glossary or to offer corrections or alternative definitions

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ICoTA European Chapter
Annual Golf Competition 2003

An invitation to this year's ICoTA golf tournament at Hawkshill Course, Newmachar Golf Club on Friday 5th September 2003

A great opportunity to entertain clients on the final day of 'Offshore Europe'

COST: £260.00 plus VAT per team
Includes soup and sandwiches on arrival & carvery after golf
Teams of four players invited

Great Prizes!
**Winning Team *Runner-up Team *Best Individual *Runner-up Individual*
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   f) Matrix Acidizing and Acid Cleaning
   g) Logging, Perforating
   h) Cement Squeezes, Cement Plugs, Abandonment, Profile Modification
   i) Cased Hole Drilling & Under-reaming
   j) Mechanical Services
      i) Fishing
      ii) Inflatable packer installation
      iii) Sliding Sleeve operations
      iv) Milling/ cutting
      v) Other downhole tools operation
   k) Depth Control During Operations
4) Open-hole Drilling
   a) General/ Job Planning
   b) Re-entry Coiled Tubing Drilling
   c) New Well Coiled Tubing Drilling
   d) Special Drilling tools
   e) Extended Reach, Tractors
   f) Slimhole Drilling
   g) Underbalanced Drilling (see also 8,d)
5) Permanent Installations, Completions, Pipelines
   a) General
   b) Velocity Strings
   c) Coiled Completions, Gaslift
   d) Flowlines
   e) Pipeline Workover/Cleaning
   f) Underbalanced Completions
   g) ESP Completions
6) Coiled Tubing Downhole Tools
   a) Motors
   b) Bits
   c) Check Valves
   d) Other
7) Well Control, Safety & Environment
   a) General
   b) Well Control Equipment
   c) High Pressure Wells
   d) High Temperature Wells
   e) Deployment of Tool Strings
8) Modeling Software
   a) General
   b) Fatigue
   c) Tubing Forces
   d) Hydraulics
9) Surface Equipment
   a) General
   b) CT Units
   c) Well Control Equipment
   d) Surface Separation Equipment
   e) Data Acquisition and Control Systems
10) Rig-up on Floaters (Dynamically positioned semi-submersible rigs, Drill ships)
11) New Technology and Techniques

ICoTA Gulf Coast Chapter
Third Annual Golf
Tournament2003

An invitation to this year's ICoTA Golf Tournament
Blackhorse Golf Club, Cypress Texas
17th of October 2003

A great opportunity to entertain clients

COST: **$400.00 per team**
Includes Lunch and drinks
Four person scramble

Great Prizes!
**1st, 2nd and 3rd place team prizes*
**Longest Drive *Nearest the Pin *Hole-in-one*

Return form by mail to Jim Holmes, ICoTA, P.O. Box 5302
Bryan, Texas, 77805-5302 or Fax: 1-979-260-1822

Team Organiser: Name.....**Company**.....

Tel.....**Email**.....

Address.....

Team Members:

Name	Handicap	Company
1.....	.....	.....
2.....	.....	.....
3.....	.....	.....
4.....	.....	.....

PAYMENT: is required in advance to confirm your booking
You can pay by credit card or by sending a check payable to
Jim Holmes, ICoTA, P.O. Box 5302 Bryan, Texas, 77805-5302
or Fax: 1-979-260-1822

For more information about the event call Brian Smith at 281-285-7829
or email bsmith10@slb.com