Drilling with Xs GTE system

Preparing the equipment

• Place the casing crown up against the end of the casing taking care to align the crown to the squared edge of the casing.

The XS crown serves as a centralizer for the XS driver in order to receive the maximum energy when drilling. For this reason, it is very important that the crown be perfectly aligned with the casing. The central line of the XS crown must be perfectly parallel to the central line of the casing. Tack weld in three places to hold the crown in position, and then weld around the upper edge of the crown using an electrode approx 3/32" in diameter. Grind the weld down afterwards to minimise interference between the crown and the drilled hole. In cold weather, it is recommended that the components to be welded be preheated. Insert the driver bit into the DTH Hammer in the conventional manner, and if a short starter tube is to be used, attach it to the DTH hammer at this time.

Starter Casing

• The crown and first casing assembly should be cut to match the length of the DTH Hammer (or DTH Hammer and starter tube) minus 8". This should put the top of the casing to approximately 2"- 3" below the top wrench flats. This will allow access to the wrench flats and facilitate the adding and removal of drill tubes as drilling progresses.

Casing length

• Ideally, subsequent casing should match the length of each drill pipe. However many casings are of random lengths, and care should be taken when adding random casings not to cover the top wrench flats of the drill pipe, or be too low for the reach of the diverter. It is desirable to measure each casing and record the length on it so that it is known before adding to the column. Occasionally a casing can be cut to offset these discrepancies.

Assembling the Driver and Crown

• Locate the Diverter into the raised position by raising the control handle. With the winch, raise the driver/bit, the DTH hammer and starter tube assembly and attach it to the thread of the saver sub on the rotation head. Raise the assembly and rotation head high into the drill mast to allow the casing to be positioned. With the winch, lift the starter casing with the crown onto the drill table, and secure. Slowly guide the driver bit into the starter casing and feed it all the way down to the crown. By lifting the driver up and down and turning the driver a few degrees each time, insert the driver through the crown. The driver is in position when the driver protrudes through the crown approximately 3". Turn the driver slowly in the normal drilling direction and the crown will lock onto the driver. To make sure you are locked into the correct position, pull back on the drill string, and this should have for effect to raise the complete assembly. Lower the diverter by operating the up/down lever until the diverter sits on top of the casing.

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Starting to Drill

• Drilling is started by lowering the starter casing with the driver to the ground whilst slowly rotating with the hammer air supply partially on. As the driver bit closes into the DTH hammer, it will start to drill. (Note, it is easier to start a casing hole with an air pressure of less than 200psi) It is imperative that the operator monitors the discharge pipe to ensure a good flow of debris. Once the casing starts penetrating the ground, it is advisable to commence water and/or foam injection. When the casing is level with the drill table, drilling is stopped and the hammer air turned off. The diverter is raised (if using Xs air diverter) to expose the flats on the top of the starter tube which can then be secured in the table with the drill tube wrench. The rotation head can then be unscrewed and travelled to the top of the mast.

Adding Casing

• The length of casing should match the length of the drill pipe. Many casings are of random length, and care should be taken when adding casings not to cover the top wrench flats of the drill pipe. It is desirable to measure each casing and record the length on it so that occasionally a casing can be cut to offset any discrepancies. Drill tubes need to be inserted into the casings whilst in the horizontal position, preferably on the ground. This can be done manually or with a draw cable.

To lift the assembly into the drill mast, it is recommended that a proper double hook and chain be attached to the winch. The drill tube/casing assembly is then raised into the mast, the upper drill tube thread aligned into the saver sub and the two screwed together. The winch with the casing still engaged can then be lowered until the hook sits on the drill table leaving the drill tube hanging from the rotation head. The winch rope can now be loosened, allowing the top loop to run down the casing.

A sling can now be attached to the casing, and then the casing lifted enough to allow the hook to be disengaged. At this point, the drill tube is to be engaged and tightened onto the tube held by the wrench below. The casing is then lowered onto the previously drilled casing, clamped into position and tack welded in three places. The casing joint should then be welded all around using an electrode approx 3/32”in diameter not forgetting to grind the weld down afterwards to minimise interference between the crown and the drilled hole. In cold weather, it is recommended that the components to be welded be preheated.
The sling can now be removed from the casing.

Continuing to Drill

• Lower the Diverter onto the casing with the control handle if using Xs air diverter. Drilling can now recommence by slowly rotating with the hammer air supply on, and water and/or foam injection engaged. As the driver bit closes into the DTH hammer, it will start to drill. With the addition of each casing, only sufficient down thrust should be applied to make the DTH hammer run smoothly. Again, it is important that the operator monitors the discharge pipe to ensure a good flow of debris.
Drilling can continue in this manner until the top of casing is level with the drill table where the whole process starts over again.

Changing driver's position for sub-drilling

• When the casing is drilled to the desired depth, the driver bit can be disengaged from the crown bit by reversing the rotation. It helps the disengagement process if the driver bit is thoroughly flushed with air, water and foam if available. This can/should be done with the DTH hammer in the lifted position to allow the hammer to go into the by-pass mode allowing for more flushing air and fluids to pass.

Once this is done, the driller should mark the drill string with chalk, giving himself a reference point for the relocating process. The driver should then be rotated in reverse approximately a 1/4 of a turn, and then lifted. If the driver is disengaged, the drill tubes will rise, leaving the casing in the hole. If the driver bit does not disengage on the first attempt, rotate it back and forth into and out of the locked position with the rotation motor. After the driver/bit is disengaged, pull back 12" and then turn exactly 90 degrees. You are now in the correct pass through position. Always with the air turned off, lower the drill string until your chalk mark reaches the same position. i.e. the bottom of the drilled hole. Once you are sure of your level position, the rotation and the air can be turned on again so you can drill the socket.

The drill string should advance while the casing stays still. If both the drill string and the casing advance, this means that you have relocked the driver bit into the crown. You will then need to start the procedure over again

Retrieving the driver bit

• When the socket is drilled to the desired depth, the driver bit can be retrieved from the hole. Simply pull back the driver bit against the bottom of the crown bit, and then turn slowly while applying a light pressure on the drill string. Do this until you can feel the driver bit/drill string lifting. Once you have passed the driver bit through the crown, pull straight back.

Relocating the Driver Bit

• Should it be found necessary to advance the casing further after the driver bit is disengaged, care should be taken to ensure that the hole has been flushed clean to prevent any debris from getting in the way of the locking lugs between the driver and crown.

After having thoroughly cleaned the hole, turn the hammer air off. The driver can be re-engaged by lowering the driver bit back down until it sits up against the crown bit. Once this is done, the driller should mark the drill string with chalk where it intersects with the casing. We can assume that the driver bit sits on top of the crown bit at this moment. Now, pull back the driver bit 12'' and turn a few degrees. Lower it back down to the point where it sits up against the crown bit. Repeat this procedure until you see that the chalk mark has dropped down... You may have to perform this procedure a few times before you are successful. The hammer and chalk mark should drop/lower by about 4 '' if you are in the correct locking position or, it will drop all the way down if you are in the pass through position. If you are in the pass through position, simply pull back as you did in retrieving the driver bit until you have passed up through the crown bit, turn 90 degrees and go back down again to reach that 4'' displacement of the chalk mark. Turn clockwise to relock and try to pull back. If you feel a restriction and the casing wants to come back, then you are 100% sure that you are in the correct locking position. Drilling can recommence