Clutch-Type, Heavy-Duty MULTI-FUNCTION CIRCULATING TOOL (MFCT-HD)

Specialized Tools: Circulating Tools

The Clutch-Type, Heavy-Duty MULTI-FUNCTION CIRCULATING TOOL* (MFCT-HD) from M-I SWACO is a valuable option when well cleanout is required in deeper, deviated wells and/or when it is necessary to start and stop the cleanout operation at several places in the wellbore.

Applications

This tool is an enhanced version of the original MFCT device and is suited for use in deeper, deviated wells where there is a requirement for higher tensile and torsional ratings. It is also applicable when it is desirable to lock this type of circulating tool in the open/closed position, such as performing an inflow test on a liner lap.

The Clutch-Type, Heavy-Duty MFCT unit has the same basic functionality as the original version. It allows higher circulation rates to be achieved at various times during a wellbore cleanup to displace debris or fluid out of the hole.

It also allows flow rates to be boosted at a liner top to increase the annular velocity of the wellbore fluid, thereby increasing the cleaning action. The tool is particularly suited to wells with small liner diameters in which well-cleanup operations are performed prior to running completions or test strings. The tool can be run when drilling cement and milling/polishing liner-top PBRs.

The use of this tool also allows the spotting of chemical pills and the efficient displacement of wellbore fluids. In addition, it offers the benefit of pipe rotation and circulation above a liner, with the jetting ports open, while protecting the lower string from potentially damaging torque. When the tool is open, only the drillstring above the tool can be rotated. When the tool is closed, the complete string can be rotated with circulation directed through the bit or mill.

Features

- Does not require darts or balls to be pumped down the drill pipe
- Can be cycled open and closed in the hole as many times as required by simply slacking off/picking up the drill pipe
- Allows drilling/milling to take place with the tool in the string
- Internal clutch for drillstring rotation above the tool with the circulating ports open
- Can be locked closed in compression to avoid premature opening while RIH; can be locked open in tension to allow the tool to be picked up off the liner top while continuing to circulate at high rates

Advantages

- Allows flow rates to be boosted at a liner top to increase the annular velocity of the wellbore fluid, thereby increasing cleaning action
- Allows spotting of chemical pills and efficient displacement of wellbore fluids
- Gives the benefit of pipe rotation and circulation above a liner with the ports open, while protecting the lower string from potentially damaging torque

How it works

The Clutch-Type, Heavy-Duty MFCT device is run with a suitable no-go device (liner-top dressing mill, bearing sub or stabilizer) below it, allowing it to be operated without putting the lower string in compression. No darts or balls need to be pumped down the drill pipe, and the tool can be operated in the hole as many times as required by simply slacking off/picking up the string. When Running In Hole (RIH), the tool is fully stroked out, with all circulation passing through the end of the drillstring. In this initial position, rotating torque is transmitted to the whole drillstring. The tool has shear screws installed to ensure that it will not open prematurely while RIH. If the shear screws are inadvertently sheared by high drag forces, the tool will remain closed and RIH can continue without any further action being taken.

To operate the Clutch-Type, Heavy-Duty MFCT device, the driller sets the tool down and applies the required weight to shear the screws. When the screws are sheared, the outer body of the tool moves down a short distance, putting the tool into the "locked-closed" position. The string is then picked up and slacked off again to move the outer body down the full stroke length, putting the tool in the open position. High circulating rates can now be achieved through the circulating ports. If required, the tool can be picked up off the liner top into the "locked-open" position. Rotation is still not transmitted below the tool in this position. To close the tool, the string is slacked off and picked up once again, returning it to the original closed position. The tool can be opened and closed as many times as required by manipulating the string.

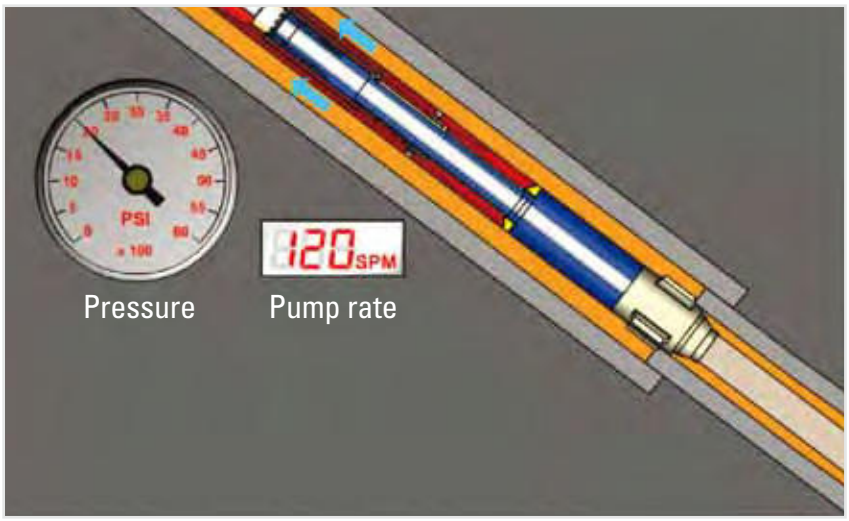

Figure 1. Slack off onto the liner top without circulation with sufficient weight to shear the shear ring and open the circulation ports. Check circulation rates to establish that the tool is open.

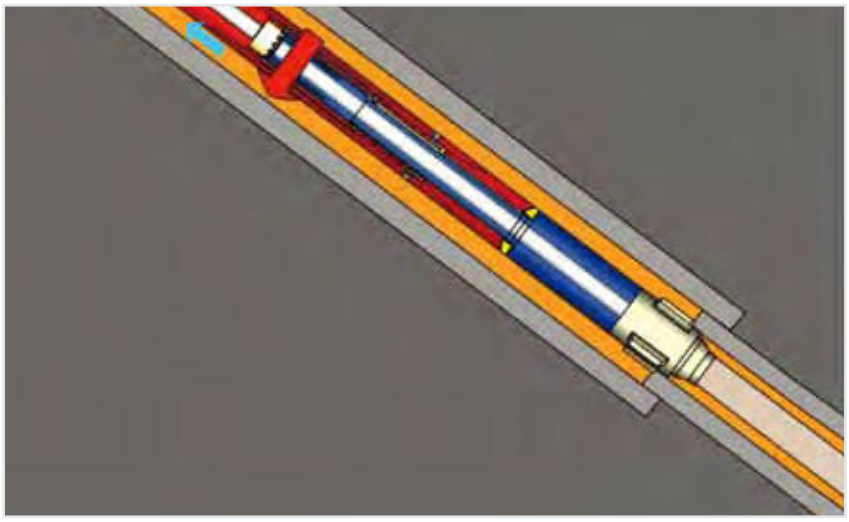

Figure 2. Slack off onto the liner top without circulation to open the tool. Displace the drill-pipe/casing annulus and rotate the string. Note that the clutch is now disengaged and only the upper string is rotated in this position.