Technical Features

⊘ String pulling and running

A double passage load design is adopted, with slip as the main lifting mechanism and lifting ring as the auxiliary. The stress on casing is reduced thereby to better protect the casings against damage, resulting in much safer and easier operation.

⊘ Dovetail slot type reducing mechanism and arc rail type jam-free structure

The slip support matches with the slip cylinder via a tilted dovetail slot, so that the dovetail slot mechanism can move smoothly without jamming and avoid the disadvantage when used at an inclined plane.

⊘ On-site replaceable slip structure

The on-site replaceable slip structure makes the replacement quick and easy, maximizes the clamping area of slip to minimize the compressive stress per unit area, reduces casing damage, and enhances operation safety.

⊘ Slip self-locking structure

There is a pyramidal face structure between the slip and spindle. Once the slip clamps the casing, the weight of casing string forces the slip move down relative to the spindle, so that a pyramidal face self-locking is generated to prevent the casing from loosening.

⊘ Multi-functional moving bracket

The bracket can be butted with derrick floor and/or connected to the top drive system. It features safe use and easy assembling/disassembling. By using the multi-functional bracket, the shortcoming in manual misalignment correction can be overcome, the labor intensity and operating risks at the drilling floor can be reduced, and thus the top-drive casing running tool can be quickly and efficiently transported and installed.

Applications

February-April 2013
Saskatchewan and Alberta, Canada
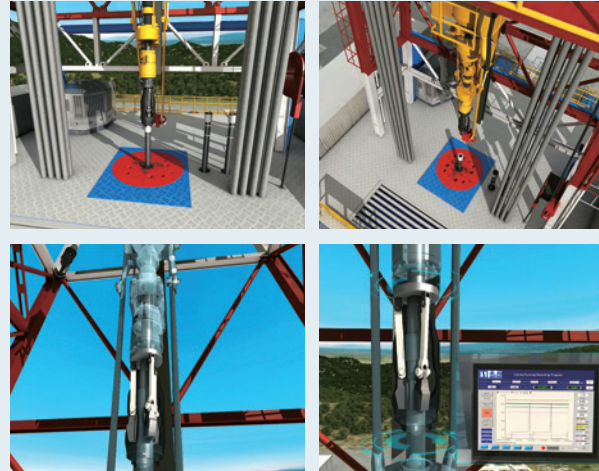
September 2013
Yixin-4 shale gas exploration & appraisal well in Sichuan

October 2013
Ti 201-H1 horizontal shale gas well in Sichuan

February 2014
Yang 202-H1 horizontal shale gas exploration & appraisal well in Sichuan

Top-Drive
Casing Running Tool

China National Petroleum Corporation

CNPC's BPM top-drive casing running tool, which integrates the mechanical parts and hydraulic parts, is used for casing running during oil & gas well cementing operation or used as the drive device for casing drilling. We have developed two series of such tool in two configurations (internal slip and external slip) suitable for running casings of different specifications (4-1/2″ to 20″) covered by standards such as ISO 11960, API 5CT, GB/T 19830 and SY/T 6194.

Technical Parameters

Model	XTG140	XTG168	XTG244	XTG340
Casing Size Range (inch)	$4\frac{1}{2}$-$5\frac{1}{2}$	$6\frac{5}{8}$-$8\frac{5}{8}$	$9\frac{5}{8}$-$13\frac{3}{8}$	$13\frac{3}{8}$-20
Torque Capacity (kN·m)	35	35	50	50
Load Rating (kN)	3150	2250	4500	4500
Thru Bore (mm)	32	32	76	76
Seal Pressure (MPa)	35/70	35/70	35/70	35/70
Tool Height (mm)	2500	2540	2540	2540
Acting Mode	External slip	Internal slip		

Functions

The tool operates in a mode whereby rotating, pulling & running and mud circulating are integrated. Lifting ring/slip double passage lifting and tiny-tooth-mark cog clamping are adopted. The on-site replaceable slip design broadens the clamping scope and enables the tool suitable for running casings of different specifications. The all-casing database intelligent software is introduced, so that the optimal clamping torque can be automatically set according to casing specification and the records can be automatically generated.

BPM top-drive casing running tool enables automated connection and running of the casing strings. It provides the force to rotate the casing and circulate the mud, reduces potential safety hazards caused by sticking or block during casing running, and enhances the success rate of casing running operation.

Patents Authorized

● Invention Patents

ZL 200910078565.0 —— A casing running method by using top drive drilling system

ZL 200910252433.5 —— A portable bend angle gauge

ZL 200810056832.X —— A method to control rotary torque of top-drive device

ZL 201010117605.0 —— A pipe string moving and centralizing device used for drilling rig

● Utility Patents

ZL 200920105896.4 —— Top-drive casing running device

ZL 200920107550.8 —— Casing spacing & slip constraining device

ZL 201020289868.5 —— Self-positioning & self-lubricating thrust ball bearing

ZL 201120120215.9 —— Wireless explosion-proof casing detecting device

ZL 201120336246.8 —— Internal slip type top-drive casing running device

Configuration

Depending on casing size, BPM top-drive casing running tool is available in two configurations, namely internal clamping & driving (internal slip type) and external clamping & driving (external slip type). The external slip type tool is used for casings with diameters less than 6-5/8″ (168mm), while the internal slip type tool for casings with diameters equal to or larger than 6-5/8″ (168mm). Both types contain the following main parts: the thread used to connect top drive system, the
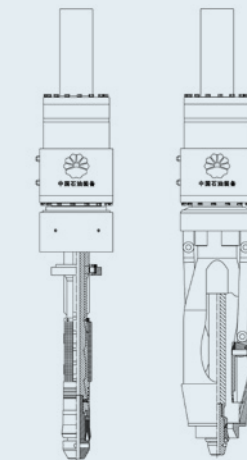

Internal Slip Type   External Slip Type

hydraulically-driving mechanism used to reset or open slip, the slip mechanism used to transmit working load (pulling force and torque), the sealing mechanism used to achieve mud circulation, and the guiding head used for casing alignment.

Working Principle

The top end of the tool is connected with the main shaft of top drive device, which controls the make-up torque of casing during casing running operation. The details are as follows: the hydraulic power source of top drive system get the upper/lower oil chambers of driving mechanism filled with oil and reach rated pressure; the piston, by moving up and down, reset/open the slip mechanism and then release/clamp the casing, so as to transmit the rotary force and lifting the load to complete the screwing on, lifting and running of casings. Self-sealing cup packing casings are adopted to enable mud circulating while running casings, in order to reduce or avoid complicated accidents. The sealing pressure can reach 70MPa, the same with that of IBOP of the top-drive system.
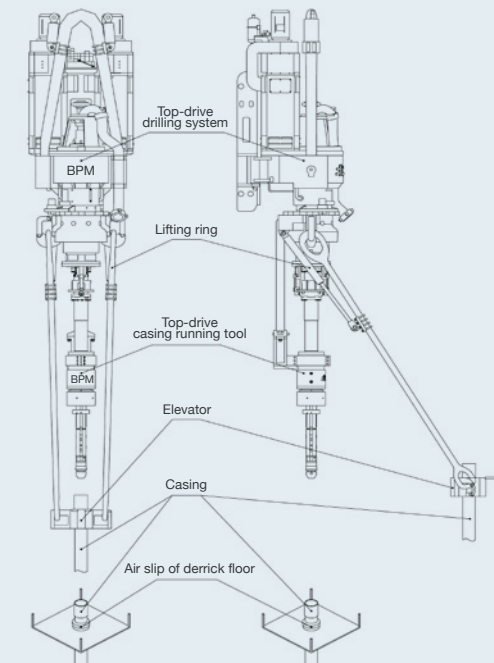
Assembly of Top Drive System and Casing Running Tool