Heavy Oil Systems
Experience and expertise to enhance productivity
In the emerging and rapidly growing market of heavy oil extraction, production using conventional techniques can be difficult and costly.

To meet customers’ heavy oil production challenges, Cameron offers a range of expert solutions—including customized wellhead solutions—designed to reduce the cost and complexity of producing heavy oil.
Heavy oil is a type of highly dense and viscous crude oil that cannot be recovered through ordinary production means. Most heavy oil requires heat or dilution to flow into a well or through a pipeline. In addition, heavy oil contains a high proportion of sulfur, heavy metals, waxes, carbon residues, and other impurities, which make heavy oil costly to produce and refine. However, the vast accumulations of heavy oil hold great potential as the earth’s remaining conventional light oil reserves diminish.

Currently, there are several proven methods of recovering heavy oil. Cold heavy oil production with sand (CHOPS) allows sand to enter the wellbore along with the oil, greatly improving well productivity. This method of production is suitable for lighter, less-viscous grades of heavy oil. Heavier crude requires thermally assisted production methods. These methods can achieve greater recovery of the reserves but subject the equipment to extreme operating conditions. Such thermal in situ recovery methods typically employ steam to heat the oil and reduce viscosity. The steam softens the oil, dilutes it, and separates it from the sand grains. It also creates cracks and fissures in the formation through which the diluted oil can flow.
Cyclic steam stimulation (CSS) involves injecting steam into the reservoir. Afterward, the reservoir is allowed to soak for a period. Then, the heavy oil is transported to the surface through the same string of casing used to inject the steam.

Steam-assisted gravity drainage (SAGD) involves drilling a pair of horizontal wells, one above the other. Steam is injected through the upper wellbore, softening the oil so that it can drain into the lower wellbore as it is pumped to the surface.

In any application, Cameron equipment ensures that your drilling and production program is executed effectively and efficiently.
Steam-Assisted Gravity Drainage (SAGD) systems

Heavy oil recovery is enhanced with SAGD systems. Cameron high-temperature-rated equipment is ideally suited for steam-assisted applications and features independent strings for production tubing, electrical feed-through connector, and coiled tubing instrumentation access.

- Field-proven WKM* valves feature expanding metal-to-metal seats and high-temperature injected stem packing rated to 550 degF (287.8 degC)
- Dual-string tubing hanger features graphitic rope packing in a tapered bore arrangement, imposing a zero-extrusion gap and creating a backup metal-to-metal seal
- Cameron Type N lockscrews use high-temperature stamped graphite packing, which isolates threading from contamination by wellbore fluids
- Packoff assembly features high-temperature packing on the surface to production casing annular seals
- Explosion-proof electrical feed-through connector meets international regulatory agency standards
Cyclic Steam Stimulation (CSS)

Boosting heavy oil recovery during the primary production phase can be achieved with CSS by thinning the oil to allow increased flow. Cameron engineering and R&D teams are uniquely suited to design the optimal CSS solution to your specific drilling and production objectives.
Cold Heavy Oil Production with Sand (CHOPS)

Increased well productivity can be accomplished by allowing sand into the wellbore with the oil. Cameron CHOPS wellheads feature operational flexibility and ease-of-use.

- Wellhead features unique SpoolTree® horizontal subsea tree system
- Production wing valves and flowline do not need to be removed for well intervention or for progressive cavity pump repair
- Operator benefits from improved safety and no lost production time waiting for flowline reconnection
- Casing head and tubing spool feature Cameron field-proven quick-connect system with dual seals to enable rapid completion and testing
- Mandrel casing hanger has large-bypass flutes to enable cement returns to be safely taken up the BOP stack
- After cementing, the seal assembly can be run, locked down, overpulled, and pressure tested prior to the release of the running tool
- Annulus is securely sealed and tested prior to nipping down the BOP stack

This QC quick-connect system was deployed in the Orinoco belt of eastern Venezuela.
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