

FU·SION *n*: a merging of diverse elements into a unified whole **MWD**

FUSION MWD SYSTEMS

CATHEDRAL'S FUSION MWD SYSTEM makes it simple to incorporate a number of MWD components and capabilities into a single system to provide communication, navigating target trajectory, and accuracy. The system can withstand today's challenging drilling environments, while maintaining data storage performance. This system was designed to ensure customer satisfaction on a continuous basis.



CATHEDRAL'S FUSION MWD SYSTEM advances MWD technology by combining the best of Cathedral's existing MWD systems with new technologies that enhance performance and provide operators with additional options not found on standard systems. The FUSION MWD SYSTEM provides both electromagnetic (EM) and positive mud pulse (P+) telemetry options, as well as LWD capabilities including not only gamma ray, but also the latest in resistivity tool technology.

FEATURES:

- Electromagnetic transmission
- Positive mud pulse capable
- Dual Telemetry option
- Resistivity capable
- Rotary steerable compatible
- Air drilling configuration

NEW:

- Head
- Interconnectors
- Gamma sensor
- Surface system
- Survey electronics

ENHANCEMENTS:

- Increased power capability
- Rugged gap sub
- Board re-design
- Modular design
- Rigid mounting

THE FUSION MWD SYSTEM'S CLEAN MODULAR DESIGN ALLOWS FOR EASY ASSEMBLY AND DISASSEMBLY

FUSION-EM (ELECTROMAGNETIC)

The FUSION-EM system incorporates all of the performance milestones from Cathedral's previous systems - reliability, ruggedness, and industry leading depth achievements- while increasing accuracy through upgraded directional and gamma sensor packages.

Advancements to the FUSION-EM tool also include a redesigned transmission and gap assembly, which allows for improved performance in under-balanced and air drilling applications, as well as a new transmitter assembly, which provides more consistent transmissions in a greater range of impedance formations.

The FUSION-EM system can be configured with multiple battery sections both above and below the transmission section.

FUSION-P+ (POSITIVE PULSE)

The FUSION-P+ mud pulse system utilizes a rotary valve assembly, which significantly reduces the chances of failure or plugging compared to hydraulic assist (pilot valve) components in high-viscosity or lost-circulation applications. The FUSION-P+ mud pulse system incorporates the same battery and advanced directional and gamma sensors in the FUSION-EM system, resulting in greater performance. Enhancements on the FUSION-P+ mud pulse system means it performs well as a stand-alone tool with virtually no depth limitations.

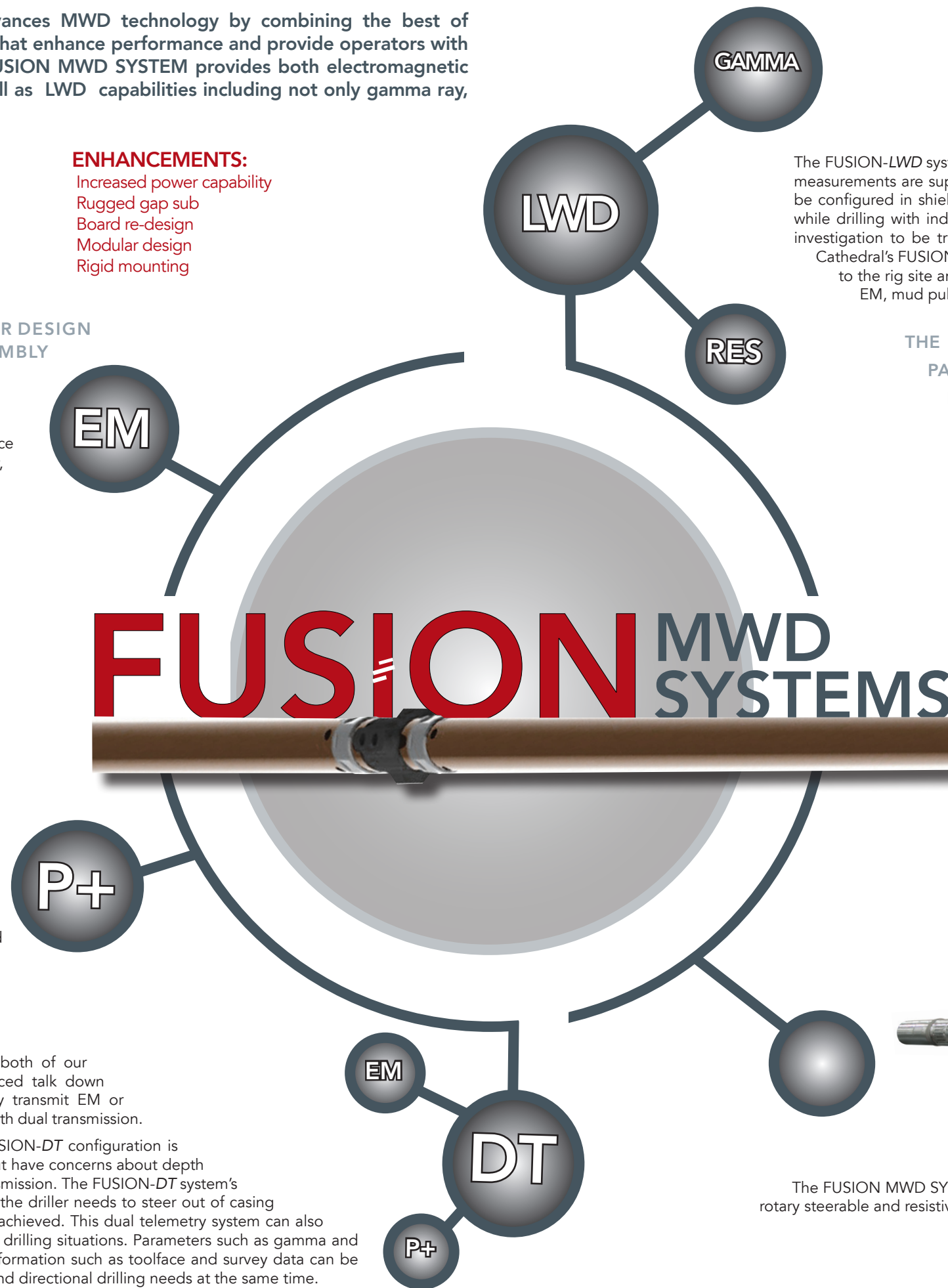
FUSION-DT (DUAL TELEMETRY)

The FUSION-DT system combines the proven benefits of both of our FUSION-EM and P+ mud pulse systems. The new, advanced talk down capability, means this dual telemetry device can effectively transmit EM or positive mud pulse alone, or can be run in concurrent mode with dual transmission.

With the option to alternate to the P+ mud system, the FUSION-DT configuration is ideal for operators who want to exploit the benefits of EM, but have concerns about depth limitations or specific formations that can inhibit EM-only transmission. The FUSION-DT system's versatility is also ideal for re-entry and casing drill-out where the driller needs to steer out of casing before the EM gap sub exits and normal EM transmission is achieved. This dual telemetry system can also be used to increase the frequency of LWD data points in fast drilling situations. Parameters such as gamma and resistivity can be sent using one transmission method and information such as toolface and survey data can be captured using the alternate signal, satisfying both geology and directional drilling needs at the same time.



FUSION-DT



FUSION-LWD (LOGGING WHILE DRILLING)

The FUSION-LWD system offers two data suites: gamma ray and resistivity. Conventional gamma ray measurements are supplied in typical AAPI format and if desired, the gamma sensor assembly can be configured in shielded housing to supply focal gamma readings. FUSION-LWD offers resistivity while drilling with industry accepted 400 kHz and 2 MHz readings allowing for multiple depths of investigation to be transmitted or stored for future analysis. Resistivity systems are connected to Cathedral's FUSION MWD SYSTEM with a telescoping connector, which offers easy transportation to the rig site and quick assembly on location. The LWD data can be transmitted to surface by EM, mud pulse or with dual telemetry.

THE REDESIGN OF OUR DIRECTIONAL AND GAMMA SENSOR PACKAGES PROVIDES EXCEPTIONAL ACCURACY AND DURABILITY

GAMMA RAY

GAMMA SENSORS:

The FUSION gamma ray sensor has been completely redesigned to reduce the effects of external shock and vibration. The new sensor is rated to 175°C. Gamma is an inexpensive and reliable solution to determine formation boundaries.



FOCAL GAMMA:

The FUSION focal gamma sensor provides more precise and focused geological information through larger ranges in depth investigation and increased radial capability. It is complimented by our stop-and-shoot technology. Focal gamma readings can be invaluable in determining formation definition in a targeted area.

FUSION-RES (RESISTIVITY)

The symmetrical, performance-enhancing design of the FUSION-RES system and the centrally located antennas provide real-time compensation eliminating invasion effects due to measurement delays, and improve accuracy through cancellation of variations in receiver channels. The FUSION-RES system is effective in all mud types and provides a range of transmission formats. High resolution data can be stored downhole, retrieved and processed as required.



TELESCOPING CONNECTION

The FUSION MWD SYSTEM configuration allows for interface to additional sensors and systems (i.e., rotary steerable and resistivity) through a telescoping connection located at the bottom of the tool string.

MOTORS

As part of the comprehensive maintenance program, all tubular components are inspected for thread and fatigue damage, and magnetism. Each motor is then degaussed and placed on our Dynamometer which additionally verifies the force and torque capabilities.

Our motor fleet is also monitored through our Continuous Improvement Process (CIP), which allows us to track individual component life history. This process provides us the ability to predict component life cycles and implement design modifications for continuous improvement and reliability.

OUR EQUIPMENT IS METICULOUSLY MAINTAINED, SERVICED AND TESTED BY QUALIFIED TECHNICIANS IN OUR STATE-OF-THE-ART MOTOR FACILITIES

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HEALTH, SAFETY & ENVIRONMENT

Minimizing losses for injuries, environment, equipment or property, is the cornerstone of Cathedral Energy Services operational philosophy. Management is centered in its belief that accidents are preventable and that the safety of employees, the general public and the environment is one of its greatest responsibilities.

Achievement towards creating a safe and healthy workforce is focused on empowering all personnel to fully participate in the Company's health, safety and environment programs. Striving to continuously improve the knowledge, experience and competency of its workers, management invites the participation of employees and consultants in the development process. Hazard assessments, job safety analyses, management inspections, field safety meetings, and the right to refuse unsafe work are a few examples of the Company's proactive measures to ensure a safe work place, whether it is in the field or at our facilities.

Cathedral Energy Services Ltd. has been involved with the Alberta Partnerships' Certificate of Recognition (COR) program since 2000. Between external audits, annual maintenance safety audits are conducted by the Company's Health, Safety and Environment Manager. Cathedral is a member of ISNetworld (Canada and USA), ComplyWorks (Canada) and PEC/Premier (USA) where the Company's Health, Safety and Environment data and other pertinent information is provided to allow member clients to access and grade our Company's compliance with government regulations.



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Cathedral Energy Services is a leading international provider of proven and innovative drilling and completions services.

Cathedral Energy is committed to providing value-added services and solutions. Our success is measured by the quality of our people, innovative technology, and the satisfaction of our customers. We build strong beneficial partnerships to maintain a competitive advantage. Based in Calgary, Alberta, Cathedral is a publicly traded company listed on the TSX under the symbol CET.

CathedralEnergyServices.com