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Survey Winch Survives the Arctic Clutches of Siberia



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An Altra Industrial Motion Company

Survey Winch Survives the Arctic Clutches of Siberia

Geophysical survey trucks are worked long and hard, yet are required to consistently produce massive amounts of accurate data; day after day. When the survey area is Arctic Siberia, the working conditions are such that only the best engineering components can be used in the specialist equipment.

Siberia is a large region that extends in part north beyond the Arctic Circle where summers are short and climatic conditions can be among the worst on Earth. However, it also has some of the world's largest mineral deposits including diamonds, gold, silver, molybdenum, nickel, palladium, lead, coal, gypsum and zinc. Its oil and natural gas deposits are such that despite already being a major supplier to much of Europe, many of its reserves are as yet untouched.

A manufacturer of geophysical surveying trucks wanting to develop a winch drive for lowering a sensitive scanner into Arctic boreholes up to 3,000m deep, launched a search for a suitably robust, reliable and accurate clutch. This search soon led them to the Warner Electric division of Altra Industrial Motion and the E320 VAR-04 tooth clutch, size 3200.

The tooth clutch is positioned between a slow-moving gear motor and the winch drive. This arrangement enables slow, controlled movement up and down the borehole and also allows positioning of the scanner at set points, so that accurate measurements can be taken.

Tooth clutches are recognised as providing great torque in a small envelope size. In operation they are zero backlash, so can attain and hold a set position with precision accuracy, ideal for the borehole survey work to be undertaken. (They are also used in many other applications with similar demands on accuracy, such as printing, machine tools and gearbox applications.)



The Warner Electric E320 VAR-04 clutches require no wear adjustment and feature sealed bearings for dry operation and a fixed inductor mounted on the ball bearings.

Tooth clutches are so-called because they have two contacting plates – one driving, the other driven – with intermeshing teeth. When the clutch is engaged the plates are brought into contact, with the teeth alternating and providing a positive drive; when disengaged, the plates are separated axially, a distance sufficient for the teeth of the driving plate to rotate without touching those of the driven plate. They can be set up to be normally engaged or normally disengaged, and the actuation can be mechanical, electromechanical, electromagnetic, or pneumatic.

The geo-survey clutches are electromagnetic and activated by power-on. They are designed for engagement at very low speeds, while serving as a positive coupling drive without slipping. The Warner Electric E320 VAR-04 clutches require no wear adjustment and feature sealed bearings for dry operation and a fixed inductor mounted on the ball bearings, while their 3200 Nm static torque capacity makes them ideal for the hard-working winch drive. Other versions of the E320 clutches are also available, such as models with unsealed bearings for use with external lubrication systems.

In use, the clutch is used to control the slow, careful descent of the scanner down the borehole, so that it does not swing against the sides and cause damage to the instruments. It allows the scanner to be stopped at precise points in order to take readings. Its simple robust design is suitable for use in the ultraharsh Arctic environment, where more delicate mechanisms would be likely to fail. It is notable that there are so few people and so few roads in Arctic Siberia that shipping in replacement parts could take a very long time and compromise the busy schedule of a comprehensive survey.

It is inevitable that more and more mineral and hydrocarbon surveys will be carried out in Siberia in the coming years, as its abundant and valuable natural resources are mapped and assessed for recovery to serve developing world markets.



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