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Rugged, Reliable and Inexpensive Solutions are in Demand:

Position Transducers and Angle Sensors for Off Road Vehicles

The automation trend in off road vehicles continues. Examples can be seen in road construction, agricultural, forestry and railroad equipment. Automation makes it possible to produce inexpensively with consistent quality in the long run. Working equipment with increased performance also places increasingly demanding requirements on the components used. These components must provide increased working speeds, higher machine utilization levels and a larger range of functions. These requirements have had effects on the development of the sensor technology used in these special markets.

Position transducers and angle sensors in mobile applications must not only be precise, they are also required to work as reliably and maintenance-free when subjected to heavy vibrations, moisture and extreme temperature fluctuations. In addition, desire for affordable technology also plays a major role. Current development work focuses on simple connection technology, features matched to the application and a rugged design.

The right operating principle for every task

In the process it becomes apparent that the conductive plastic potentiometers are still important systems in many applications in the field of off road mobile machines. However, in highly dynamic applications, during continuously rotating or high-frequency actuation, contactless processes, which operate virtually wear-free, are increasingly more interesting. Depending on the application case, different operating principles are used in the process, e.g. inductive or magnetic processes. This means that instead of initially implementing paths or angles via levers, hinges or cables subject to wearing and debris in order to detect

them at a suitable location, it is considerably simpler to pick up the measured value directly with a rugged sensor. The wearing of the mechanical design is avoided, dirt and debris become less critical, even if the machine cannot be cleaned at short intervals and even in the case of more demanding requirements on the throughput or speed. Position detection does not become a problem.

Potentiometer for toughest environmental conditions: Railway track-laying system

Linear conductive plastic potentiometers also often contribute to design simplifications. The LWX position transducer was developed especially for applications under tough environmental conditions. Thanks to a replaceable gasket on the push rod and a patented volume compensation which reliably prevents the penetration of dust, water and oil, the sensor meets the requirements of the protection type IP67.

The conductive plastic potentiometer was able to prove its durability in practical use. In case of the railway track-laying system, the sensor detects the penetration depth of the spikes with which the rails are secured. The spikes are pounded in pneumatically and the conductive plastic potentiometer is directly mounted on the outside of the hammer cylinder. The heavy vibrations and moisture, dust and extreme temperature differences in outside use, do not impair the sensors operation. Other interesting applications for linear potentiometers can also be found in agricultural machines including sprayer arm positioning, and plow plate allignment. The position transducer can be attached on the outside of the cylinder and can, for example, therefore replace mechanical indicators.

Conductive plastic potentiometers in control and operating units

Potentiometers are also used as a versatile problem-solver on off road vehicles in other areas. They can easily be integrated in control and operating units of cranes, farm tractors and forestry machines and are easily modified if necessary. An increased torque on the potentiometer

shaft protects against accidental misadjustment. Other features include the addition of integrated switch functions which often eliminate the need for separate external microswitches.

With joysticks on off road forestry machines for example, it was possible to integrate a thumbwheel controller as an option. With a standard potentiometer, it would not have been possible to solve the problem due to the strictly specified dimensions. The potentiometer used was customised for installation in the ergonomically shaped joystick, and at the same time, the characteristic curve of the specific control task was also modified.

Magnetostrictive position transducers: broad range of applications

Magnetostrictive position transducers, with their reliability and accuracy in mobile applications, also play an important role among the durable transducers. These sensors are especially well-suited when it is difficult to provide a mechanical connection between the sensor and the moving part, for example on mobile saws, or lifting devices. Magnetostrictive position transducers of the latest generation not only have the monitoring and lineazation of the measured values integrated, they also guarantee a high degree of safety and dynamics during the measured value transmission.

The magnetostrictive position transducers of the TLM and TMI series are offered with effective lengths up to 4.5 m with a resolution independent of their length of 5 µm. The magnetostrictive position transducers of the TIM series are especially designed for the mobile segment and are offered with effective lengths of up to 2.5 m. The TLM, TMI and TIM series are insensitive to shocks and vibrations and comply with the protection class IP67. Any desired adjustment speed of the position sensor can be set. It does not have any mechanical connection to the position transducer and can be integrated directly to the moving machine part. These systems are tolerant to misallignment in both verticle and horizontal directions. If required, the position transducer of the TLM and TMI series can also operate with several position markers.