Magnetostrictive level probe

Operating principle
The operation of Magnetostrictive Level Probe is based on the principle denominated Wiedemann effect and allows a continuous and highly accurate reading of the level of liquids inside a tank.
The level transmitter XMT consists of an electronic circuit with microprocessor located in the head and of a stainless steel rod housing a wave guide located inside the tank.
A high frequency electric impulse is generated by the electronic device. In the exact point of intersection with the magnetic field generated by the permanent magnet housed in the float, a mechanical impulse caused by the magnetostrictive torsional deformation is generated. The mechanical impulse travels at the speed of sound in the wave guide up to the detector located in the measuring housing.
By measuring of the time elapsed between the sending of the initial signal and its return the exact position of the floats along the rod is defined with 0,01 mm. resolution.

Summary
General trends across different measurement technologies reflect market drivers. Refined digital electronics are making level sensors and other measurement devices more user-friendly, more reliable, easier to set up, and less expensive. Improved communication interfaces feed level measurement data into a company's existing control and/or information system.

Today's level sensors incorporate an increasing variety of materials and alloys to combat harsh environments such as oils, acids, and extremes of temperature and pressure. New materials help process instruments fulfill specialized requirements as well, such as assemblies made of PTFE-jacketed material for corrosive applications and electro-polished 316 stainless steel for cleanliness requirements. Probes made of these new materials allow contact transmitters to be used in virtually any application.

The trend today is to replace mechanical and pressure-based measurement tools with systems that measure the distance to the fluid surface by a timing measurement. Magnetostrictive, ultrasonic, guided-wave radar, and laser transmitters are among the most versatile technologies available. Such systems use the sharp change of some physical parameter (density, dielectric constant, and sonic or light reflection) at the process-fluid surface to identify the level.

These emerging technologies make use of the latest electronic techniques and incorporate embedded microprocessor-based digital computers for control, analysis, and communication functions.

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Inside the probe tube there is a rigid wire made of magnetostrictive material. The sensor circuitry emits pulses of current through the wire, generating a circular magnetic field. The level transmitter is a magnet, which is integrated into the float. Its magnetic field magnetizes the wire axially. Since the two magnetic fields are superimposed, around the float magnet a torsion wave is generated which runs in both directions along the wire. One wave runs directly to the probe head while the other is reflected at the bottom of the probe tube. The time is measured between emission of the current pulse and arrival of the wave at the probe head. The position of the float is determined on the basis of the transit times.