In industrial measurement engineering, the rule that applies equally to cranes, lifting tackle, lifting platforms or other specialised areas is: tailored solutions are desired more often than not when measuring force, because constructions are complex and parts geometry is demanding. By using thin film technology, tecsis opens up a great variety of user-oriented possibilities in this area.

Latest state of the art: One persuasive argument for force transducers with thin film sensors is their excellent temperature response, good long-term stability and integrated amplifier electronics. Another is the automated production process, which makes fast and cost-effective building of prototypes possible with large-scale production quality. Manufacture is carried out entirely at tecsis’ production facility in Offenbach. This guarantees short routes, flexible solutions to meet individual requirements, and dependable “Made in Germany” quality. This is all founded on tecsis’ many years of project experience and its competence in engineering and applications.

An overview of the persuasive principle

Just like strain gauges, the thin film sensor is placed directly in the force flow of the force transducer. This makes for accurate and reliable measurement of the force-proportional tensile, compressive and tangential stresses that occur.

The crucial difference from the usual strain-gauge method is: instead of using an adhesive bond, the elongation-sensitive resistors are deposited onto the sensor body atomically in a PVD process (Physical Vapour Deposition). In this method, the standardised thin film sensors are mass produced from a special high strength stainless steel: laser spot welding is used to place the (always identical) sensors into the individually designed force transducers also made of stainless steel. This virtually does away with manual work and the associated potential for faults, variations in quality and cost burdens.
The functional principle in detail

Elongation is measured via a Wheatstone-bridge circuit consisting of four elongation-sensitive thin film resistors (even the elements to compensate for zero-point temperature dependency and sensitivity are implemented on the sensor). The newest „state of the art“ development of tecsis consists of redundant sensor, which includes two complete measuring circuits on a diameter of only 7 mm, as well. The typical deviation of both channels caused by interference can almost be avoided.

The alignment and subsequent welding-in of the sensors in the force transducer are important manufacturing steps. Once the integrated amplifier electronics is placed into the transducer, assembly is complete and the fully automated calibration process can begin. Force measuring instruments in the range from 1 kN to 1300 kN are used for this. Analogue and digital industry-standard output signals are available for further processing in the user control system.

Advantages

- **Latest technology**
  You benefit from improved long-term stability and very good temperature response of standardised, mass-produced thin film sensors and highest safety thru the redundant sensor.

- **Highly competent engineering**
  You will receive advice from experienced experts on optimal solutions for the force transducer’s design and its integration in your application – even if the task is of a complex nature.

- **Made in Germany**
  You get affordable prototypes of mass-produced quality delivered fast. These as well as the subsequent series are entirely “Made in Germany”.

Diverse fields of use

- Cranes
- Construction equipment
- Bottle cleaning machinery
- Aerial work platforms
- Stage equipment
- Welding-tongs robots
- Presses
- Conveyors
- Paper-making machines
- Stacker cranes
- Explosive areas

Which is the right system for the application and which technology offers the best price-performance ratio? At tecsis you talk to experts who can give you sound advice.

The path to the right solution

Choose between thin film sensors, bonded-on strain gauges and hydraulic force transducers

Finite element simulation of the force transducer in the real situation including calculation of disturbing variable

Prototype construction and investigation of disturbing variable influence

Comparison against simulation results and implementation of further refinements to the prototype

Making the test product available for use by the customer, parallel investigation of endurance strength and obtaining the necessary approvals, risk analysis etc.

tecasis appeals through...

- Its competence across a broad spectrum of integrated mechanical and electronic solutions in the areas of force, pressure and temperature measurement.
- Targeted engineering by experienced engineers and technicians highly competent in applications-who are able to translate customer-specific requirements into dependable and affordable solutions.
- Rigorous market orientation through closeness to customers, precision, flexibility and dependability in realisation of the given tasks.