

## Measuring Chamber Pressures of Different Caliber Artilleries Using a Capacitive Pressure Sensor

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In order to measure the chamber pressures of different caliber artilleries, a novel capacitive pressure sensor with an elastic pressure-sensitive element is presented in this paper. It uses a circuit cylinder as its stationary anode and the internal electronic piezo gauge shell as its moveable cathode with an electrode distance of 0.5 mm, and constructs a coaxial cylinder capacitor converter. The device principle and structure are given and the device mechanical and thermal characteristics are theoretically simulated using the finite element software ANSYS. Various physical properties were experimentally tested. Results show that the device possesses a very good temperature stability and its capacitance shows an approximately linear relationship with the subjected pressure. It has a sensitivity of 0.00753 Pf/MPa, and a pressure measurement range of 0–600 MPa, and can withstand an instantaneous high temperature of 3,000°C. By using the sensor shell as the device elastic sensitive element, its volume is reduced and its applications are extended; therefore, it can be used to measure the chamber pressures of various different caliber guns. In addition, its lower cost is helpful in promoting wide applications.

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