

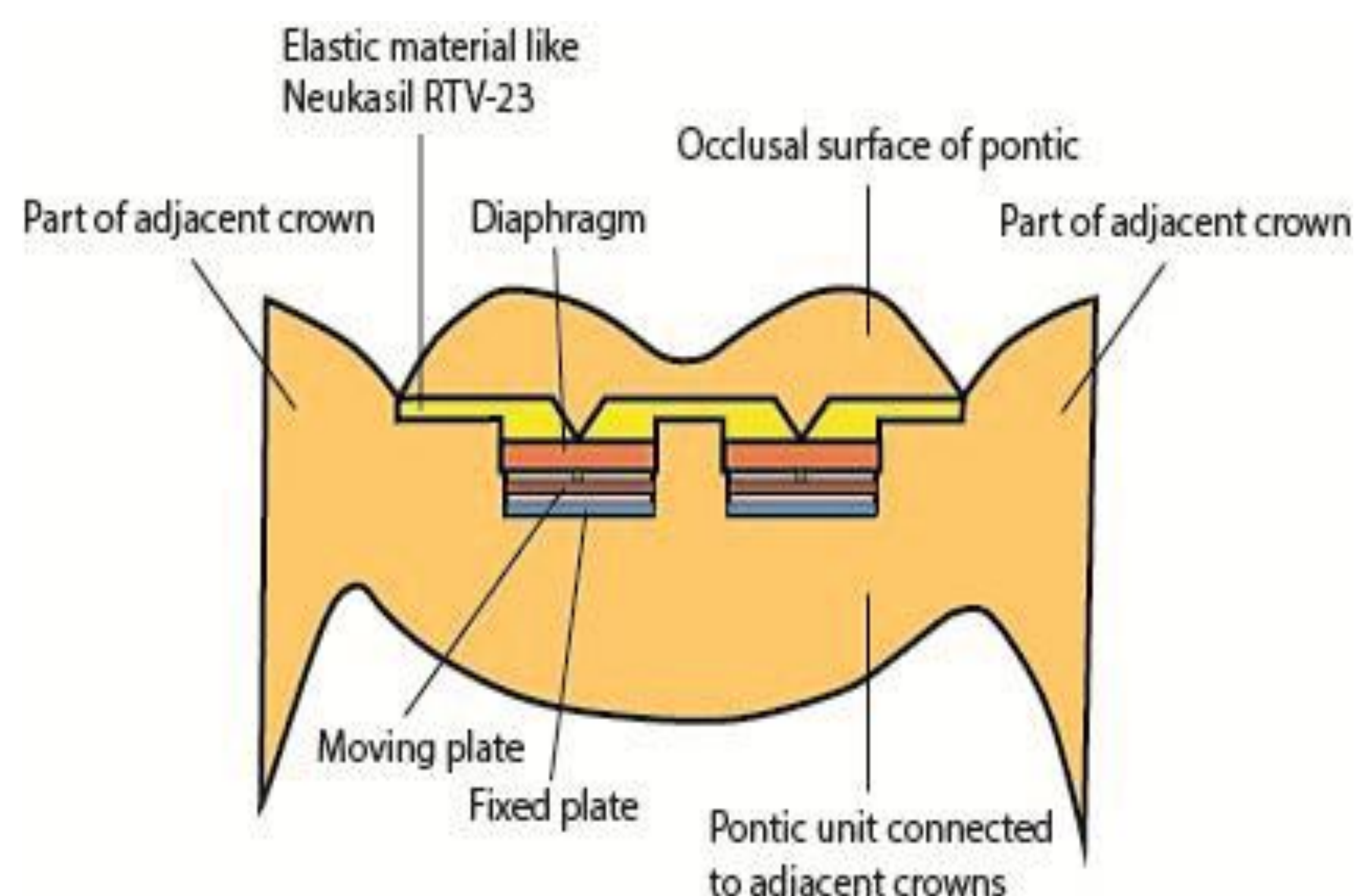
# Design of a Pressure Sensor to monitor Teeth Grinding

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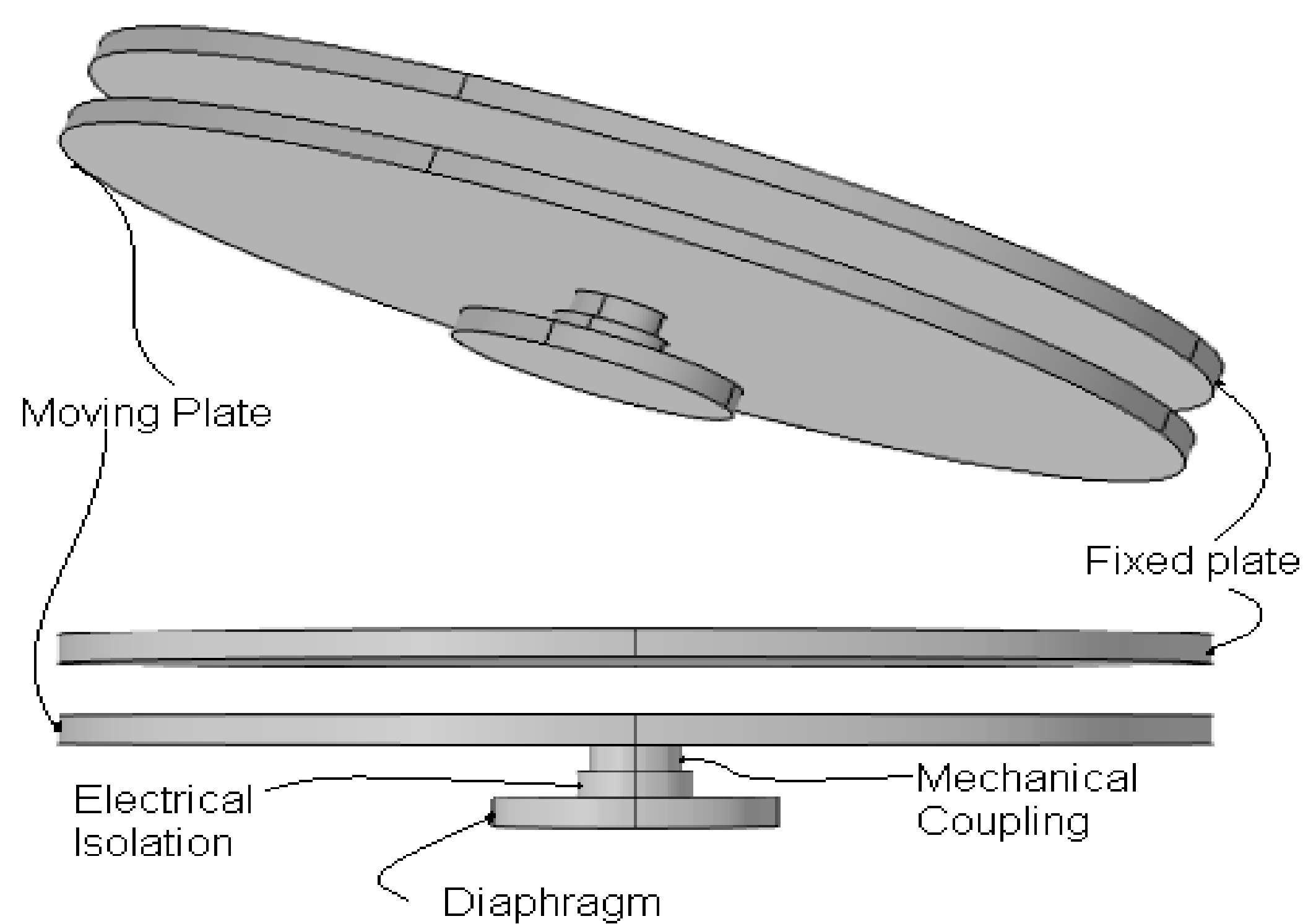
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**Introduction:** Teeth grinding behavior and other oral conditions require the ability to accurately measure the pressure on the teeth. Placing a sensor in the mouth requires small size devices with powering and measurement techniques that do not hinder the normal life of the patient. See Fig. 1.

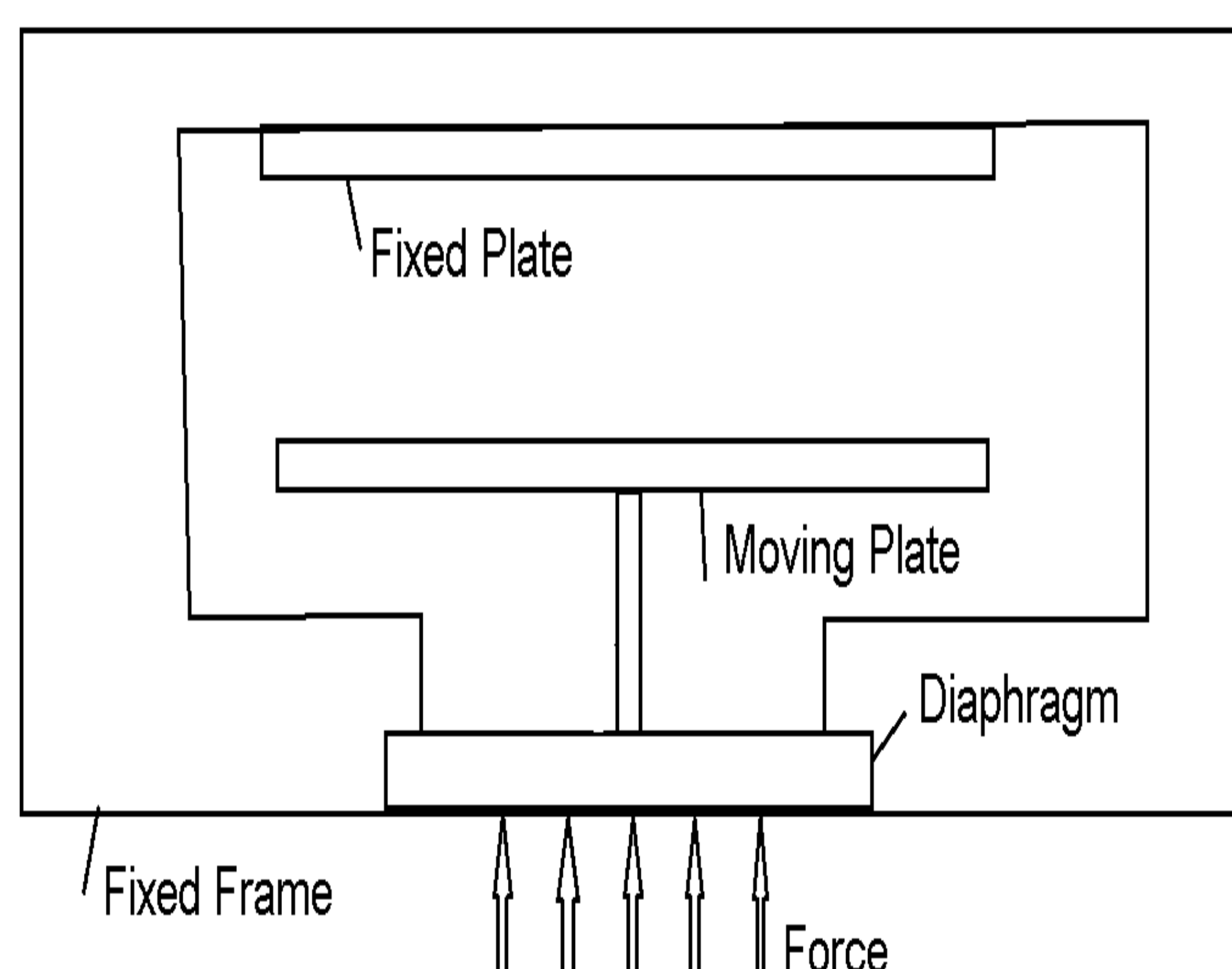


**Fig. 1** Sensors inside a pontic or a crown.

## Sensor Structure and Operation

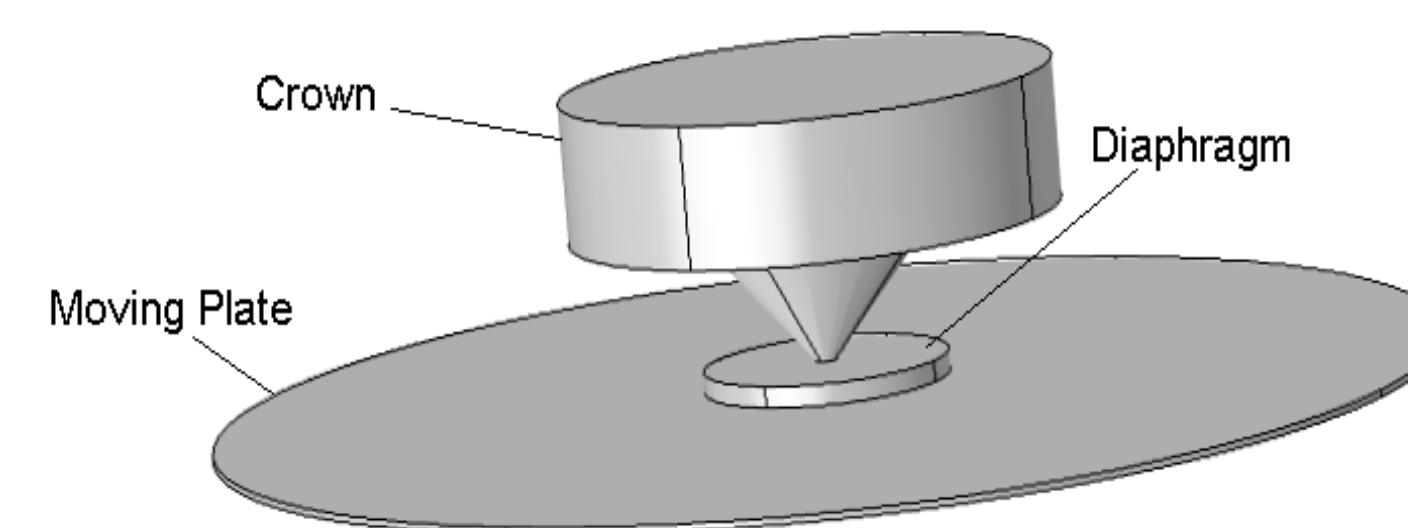


**Fig. 2** COMSOL drawing of the capacitive sensor.

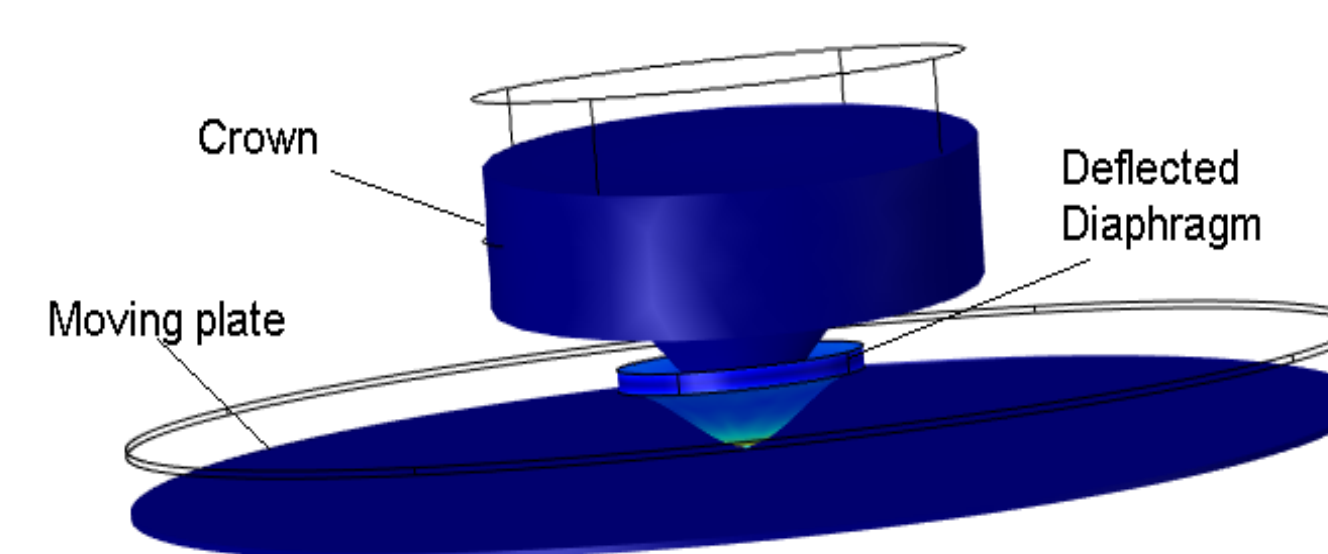


**Fig. 3** A schematic drawing showing the operation of the sensor.

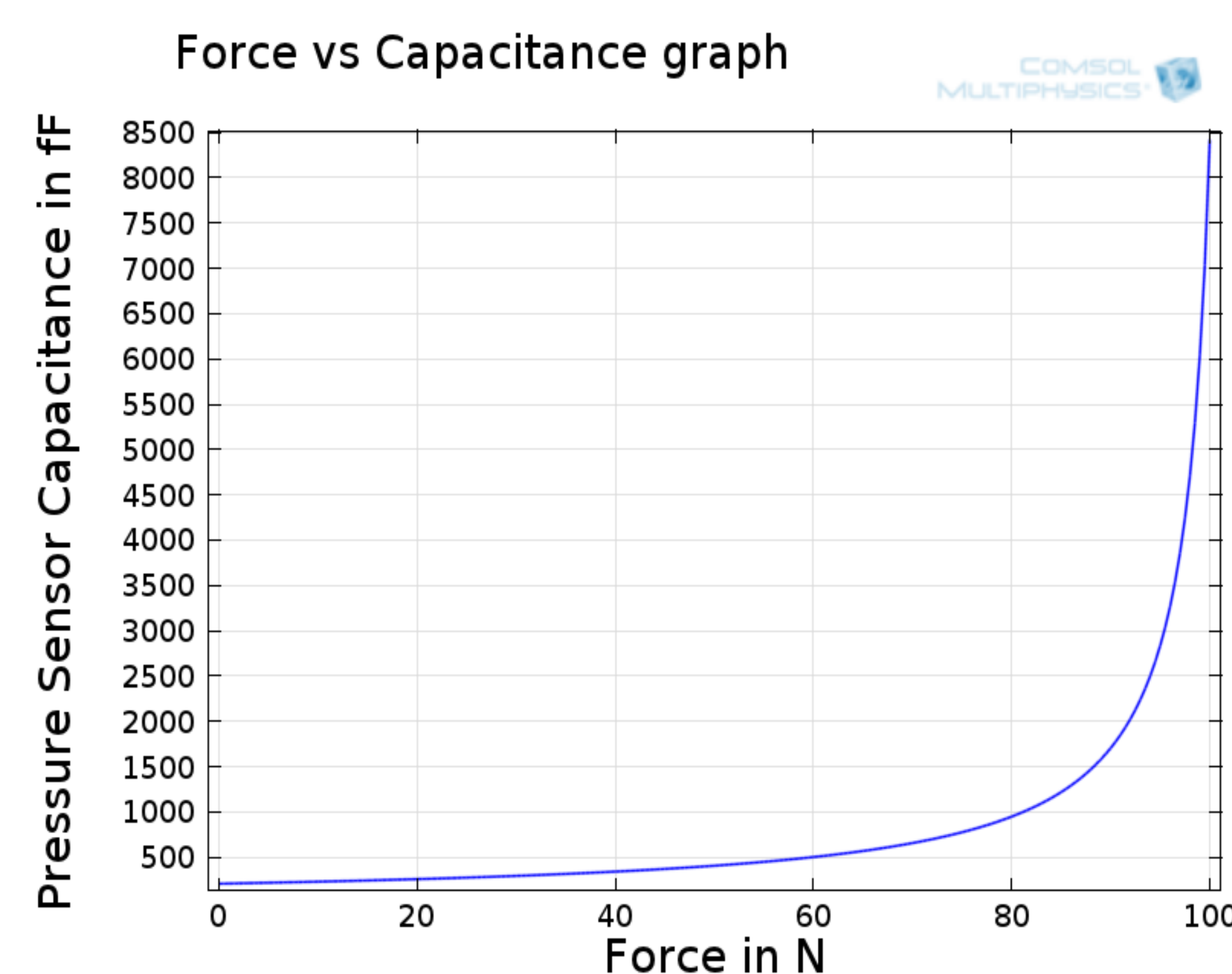
**Results:** The sensor geometry is shown in Fig. 4. Deflection is shown in Fig. 5. The capacitance change with force is nonlinear for small number of sensors (Fig. 6). The change becomes linear when using 20 sensors (Fig. 7).



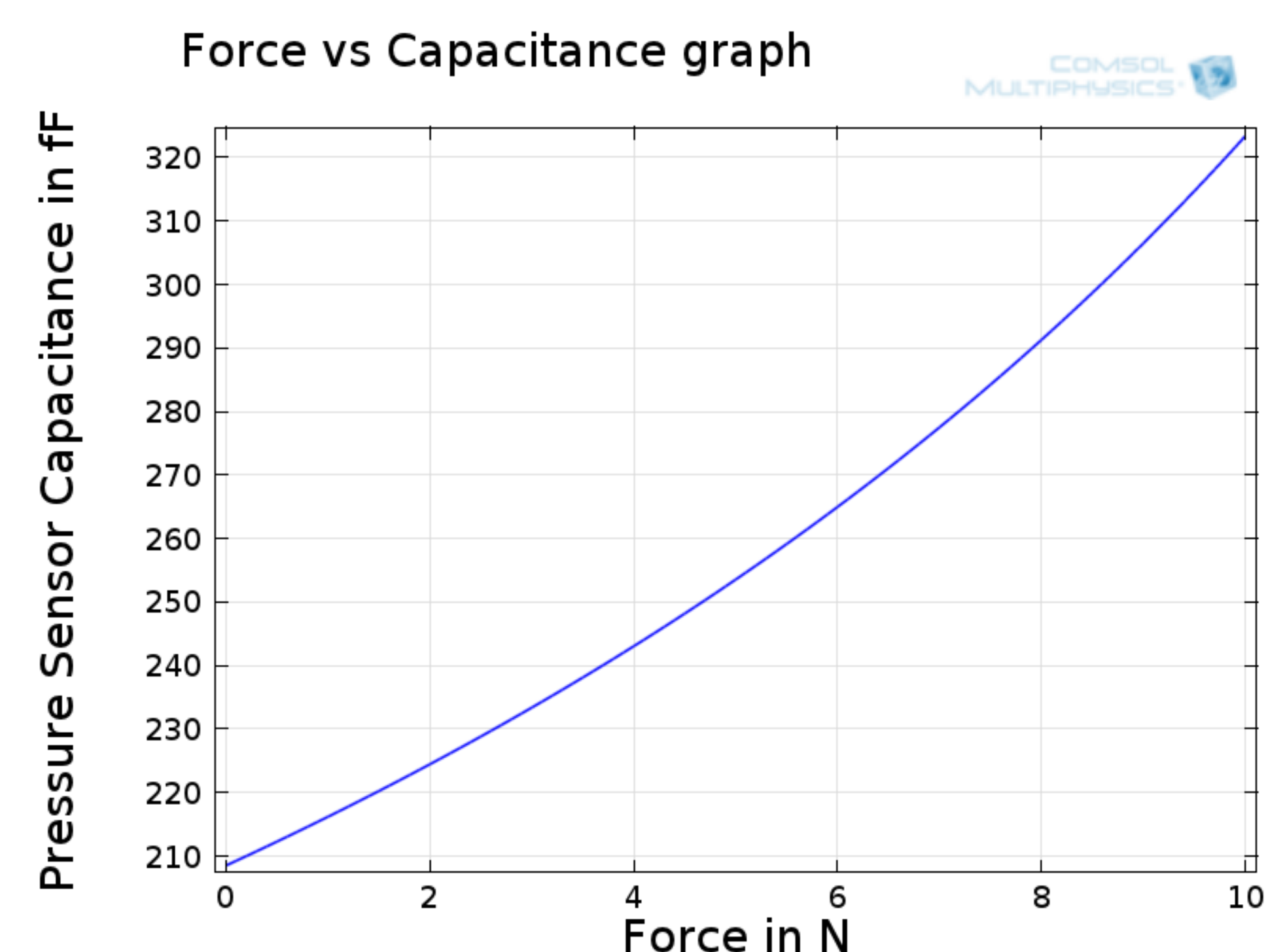
**Fig. 4** Sensor geometry.



**Fig. 5** Sensor geometry after applying force.



**Fig. 6** Capacitance change with force.



**Fig. 7** Capacitance change with maximum force of 10N.

**Conclusions:** Capacitive pressure sensor with miniature size, low power consumption, and suitable dynamic pressure range has been designed using COMSOL. The simulation by COMSOL verifies that sensor characteristics can be made linear if a large number of sensors are used.