A Brief Introduction to Piezo Technologies and Positioning Systems by Piezo

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Piezoelectricity is defined as the generation of electric polarity in dielectric crystals that are subjected to mechanical deformation. Equally, such materials when exposed to an external electric field undergo mechanical deformation. Quartz is an example of such a material that is used in piezo technology.

Piezoelectric actuators are known for their precise positioning capabilities making them highly compatible with positioning tasks that call for impeccable accuracy, speed and positioning.

There are sectors such as nanotechnology, biotechnology and microelectronics that rely heavily on the precision offered by this unique technology. Letâ€™s take a look at some of the defining attributes of piezoelectric positioning systems:

â€¢ Limitless Resolution: Since such actuators are known to change electrical energy into mechanical energy, achieving sub-nanometer motion range is possible. Since there are no moving parts that come into contact with each other, the chances of resolution being limited are nil.

â€¢ Rapid expansion: Since the response time of such actuators is in microseconds, it is easily possible to attain acceleration rates of over 10,000g.

â€¢ High load moving possible: Since actuators driven by piezoelectricity are capable of generation very high force, they can move loads that weigh over several tons.

â€¢ Neither produce nor are affected by magnetic fields: The piezoelectric effect is linked to electric fields. Hence, these devices are highly compatible with applications that have zero tolerance to magnetic fields.

â€¢ Power efficient: Piezo electric devices consume a low amount of energy even during static operations. Even when these devices are at rest, they do not generate heat. They can be compared with electric capacitors on this front.

â€¢ No moving parts: Thanks to the absence of moving parts such as gears and bearings, the chances of wear and tear are very low. Studies have shown that even after several billion cycles, there is no measurable change in performance.

â€¢ Especially suited for clean rooms: The use of lubricants is eliminated in piezoelectric actuators. Despite this, there is no wear. Besides this a new range of actuators that feature ceramic insulation are devoid of any polymer coating. This makes them ideal for ultra high vacuum applications.

â€¢ Cryogenic temperature operations: Piezoelectricity continues to be generated even at temperatures as low as 0 Kelvin. However, if the actuator is going to be specifically used at cryogenic temperatures, it is wiser to opt for specially made actuators for this purpose.

The piezo positioning technology is used in a number of applications spanning medical studies and life sciences, data storage, optics and photonics, precision mechanics, among many other industries. So if you are looking for desirable traits such as high linearity, accuracy, repeatability and stability, devices based on the piezo technology are highly recommended. With significant advancement in this sector, even the most critical applications can benefit from this technology.

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