

Experimental Investigations and Numerical Simulation of Electrothermally Actuated Micro-gripper

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Abstract

Micro grippers are widely used in Micro assembly and Micro-manipulation of biological samples. Most of the micro manipulators depend on the principle of micro gripper which holds the object, where the needed force is provided by micro actuators. At the micro-scale, thermal actuation delivers larger forces to the required member compared to the widely-used electrostatic actuation.

In this paper an attempt has been done to electrically actuate the micro gripper which is manufactured using Micro Wire cut EDM process. The Electrical actuation was given using Variable DC power supply. Voltage was gradually increased starting from 0.1 V. Notable deflection in the arms of Micro gripper was seen from the input voltage of 1.0 V. The Experiment conducted was validated using simulation carried out in COMSOL Multiphysics® software. The Physics used were Joule heating and structural mechanics. Simulations carried out with COMSOL Multiphysics® software fairly agree with the Experimental Results.

Reference

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Figures used in the abstract

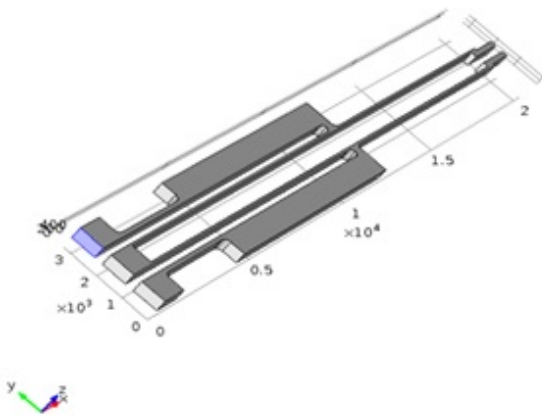


Figure 1: Microgripper modelled in COMSOL.

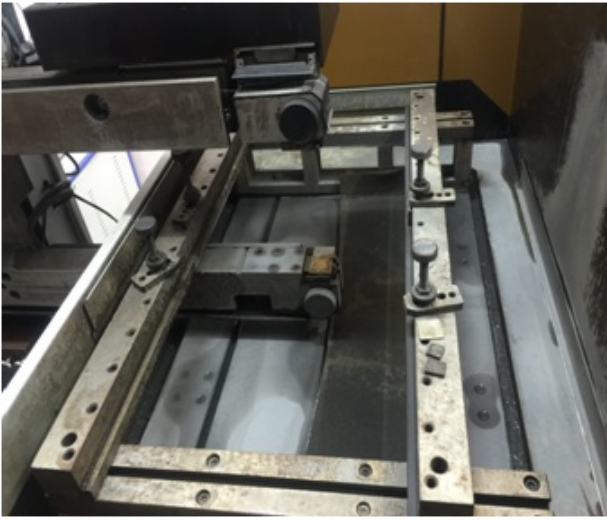


Figure 2: Electrical Discharge Machining Machine.

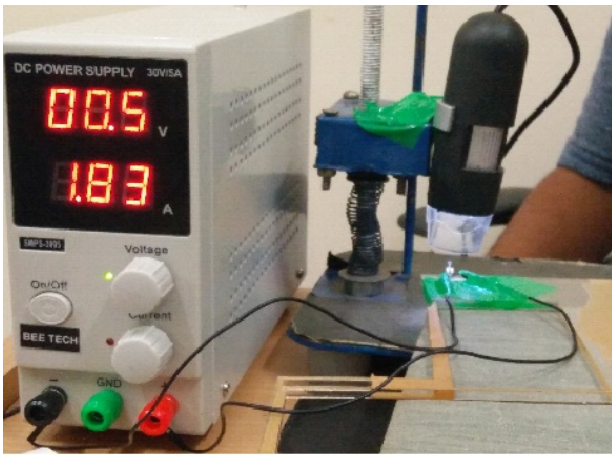


Figure 3: Electrical actuation using variable DC Power supply.



Figure 4: Fabricated Microgripper compared with a coin.