

# A Low Voltage Flexo Actuator – preliminary design, test and kinematic models

Tapio Heikkilä <sup>1</sup>, Terho Kololuoma <sup>2</sup>, Markku Suomalainen<sup>1</sup>, Samuli Soutukorva <sup>1</sup> and Minna Kehusmaa <sup>1,\*</sup>

<sup>1</sup> VTT Technical Research Centre of Finland Ltd

<sup>2</sup> The Warming Surfaces Company

\* Correspondence: tapio.heikkilal@vtt.fi

## Abstract:

Light weight, low-voltage activated flexible technologies will enable novel, safe and extremely low cost mechanical actuators. These are suitable for a variety of applications which imply recyclable grippers, part holders, conveyors e.g. for hygienic food handling applications and other active IoT devices. Novel findings with ionic liquid based actuators enable low operating voltages revolutionizing hence the development of even paper based flexible robot structures.. We report our first prototype of a low voltage flexo actuator, suitable for utilization of printing technologies for the use of the fabrication of the electroactive material stack. Key results are composed of the choice of the additives to tune the actuator fluid and material properties, and kinematic modelling of the actuator for a device of a chain of actuators.

**Keywords:** flexo actuator; low voltage; kinematics