

# Developing a 3D Printable Magnetic Liquid Crystal Elastomer Actuator

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4D printing is a relatively new process that was created to enhance the printing process in the world today. 4D printing uses a different element of time to allow the substances that are created to react to many different things such as cold temperatures, hot temperatures, and even magnets. These studies are important because this can be a new type of technology that could help redevelop the process of things being built across the world, different materials that could potentially help the human body and can be more eco-friendly for not only humans but the world. Our project focuses on the formulations that are used to create the Smart materials and how durable they can be when put under pressure. Two different formulas were used and tested to see which formula could actually print the material and which formula could actually withstand pressure that could be put on it in the ecosystem. We called the formulas Liquid Crystal Elastomer (LCE) Type 1 and Liquid Crystal Elastomer Type 2. The differences between the solutions was that one contained more of one chemical substance than the other. Type One contained more Toluene than type 2. Type 2 contained more Diethanethiol than Type 1 LCE. These changes tremendously helped the outcome of the solution and how it is in terms of durability. The gathered data would then be applied to modern day structures and also inside the human body to create a safer environment and a healthier lifestyle.