



**Dean Pick, Kinitics Automation**

**Abstract: Designing an SMA Actuator**

In bringing a Shape Memory Alloy (SMA)-based actuator to market, the designer should be aware of information gaps that exist when applying standard design methodology. These gaps can manifest into a disconnect between the desired performance specifications and the end result. SMA actuators can incorporate electrical, mechanical, thermodynamics, fluid dynamics, and material phase transformation aspects inside a single package. While common form factors for the active SMA element are commercially available there is no standard format for presenting the critical information needed to correctly apply the material. While it may be tempting to rely solely on a simple heat up and cool down process model to predict performance, this can lead to an oversimplification of the design problem. Safe working loads, material biasing, and fatigue life considerations can all have important ramifications late in the design phase and must be considered at an early stage, which necessitates a more in-depth analysis of the application's requirements than for a non-SMA actuator. These gaps in standard design methodology can be bridged by having a material integrator as part of the design team from the early stages of development.

**Author's Bio: Dean Pick**

Dean Pick is the president of Kinitics Automation, a company based in Vancouver, BC that develops and manufactures motion control products based on SMA materials and the company's proprietary Bundled Wire technology. Dean is a Professional Engineer with a Bachelor of Engineering Science degree from the University of Waterloo, and is the inventor of five granted patents in the fields of transmission control and shape memory alloys. He has worked extensively in the automotive, process control, and manufacturing industries.