962-L1-254   **Tanya L. Leise*** (`leise@rose-hulman.edu`), Tanya Leise CM130, Rose-Hulman Inst. of Tech., 5500 Wabash Ave, Terre Haute, IN 47803-3999. *Shape Memory Alloys Calculus Project.* Preliminary report.

Shape memory alloys (SMAs) are fascinating materials that can be "trained" to return to a particular shape by heating. SMAs are widely used in a great variety of products, from bone anchors to thermal actuators. Their behavior can be modeled in a manner that is accessible to calculus students and that leads them to discover the key property needed for "training" to be possible. Students experience a basic calculus concept (derivative tests for locating minimums) in a sophisticated engineering context. The mathematical model of a SMA is kept simple enough to be understood by calculus students, but remains quite challenging for them to grasp. The use of temperature as a parameter, in addition to the main variable of strain, forces the students to think deeply about how to apply the derivative test appropriately and the different roles variables can have in a function. The project can be done in small teams of three students, taking one class day for getting them started and doing the hands-on demonstrations, then allowing them a week to finish the report, using Maple or a similar CAS. The SMA experiments perk the students' interest, while exploring the mathematical model using basic calculus concepts enables them to understand the physics underlying SMA behavior. (Received September 04, 2000)