## Introduction

The purpose of this project is to build a prototype to demonstrate the versatile application of shape memory alloys/polymers for active surface shaping for reflectors. The concept behind this design is to use shape memory alloy (SMA) elements to either make final adjustments once a reflector is deployed, or to change the shape of a reflector surface to modify its optical properties. The shape change will be an active system that will be controlled by a computer using a breadboard.

## Product Specification

The SMA reflector prototype will be comprised of a computer system, breadboard, Nition wire, elastic membrane reflector surface, and a current source. The primary objective of this prototype is to change the shape of a representative reflector using SMA technology while maintaining a smooth surface, approximately within 10-20mil RMS.

## SMA

In order to change the shape of the representative reflector petal, a shape memory alloy will be used. There are several alloys that lend themselves to shape memory characteristics; the most notable however is Nickel-Titanium, these SMA's change shape via heating and/or cooling. To actuate the SMA for this project, an electrical current will be applied to alloy which will in turn heat the alloy.

## Current Source

The current source is critical to changing the shape of the reflector, without the current the SMA cannot be heated and therefore no change in shape will take place. Current will need to be varied to achieve different shapes; this will be done using a computer program such as lab-view.

## Computer

In order to control the current applied to the SMA, a computer will run a program which will accept input parameters for current, which in turn will change the shape of the representative reflector petal to the desired shape.