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**From:** PAS

**Project:** Plasma Arc Speaker

**Subject:** Concept Variant Sketches, Analysis, and Decision Matrix

**Date:** Friday, March 4, 2011

Ten concept variant (CV) sketches have been developed for analysis using the decision matrix. Factors in the design that vary are the positions of the electrodes, the device used to lower and raise one electrode, and the electrode housing.

The CV sketches are analyzed using six objectives. These objectives, with the weight of importance noted in parenthesis, are safety (5), ease of operation (4), following the FCC laws (3), low cost (1), ease of development (3), and look pretty (1). The budget and electrode separation distance are constraints on each concept.

Safety is the most important factor in the design because of the use of high voltages within the product. Ease of operation ranks high on the importance scale because the electrical engineering group will also be using the product. Following the FCC laws falls in the middle of the importance scale since the arc is capable of producing AM waves, but the level produced is relatively uncertain. Low cost is a small concern since any design produced is very likely to come in under the budget. The product could potentially be mass produced and it is being built by two undergraduate students, therefore, ease of development falls in the middle of the scale of importance. Looking pretty does not warrant much importance, but if the final product looks nice, nobody would complain.

Results from the decision matrix showed that CV 8 scored the highest and collectively satisfied the objectives the best, but several other concepts came close to the score of CV 8. The decision matrix contributed to understanding the most important factors in the design and how the team can move forward with compiling a final design to meet the objectives of the product.