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**To:** Dr. Matt Bohm

**From:** Team PAS

**Project:** Plasma Arc Speaker

**Subject:** Customer Needs, Requirements and Functionality

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The customer needs important to the development of the plasma arc speaker include safety due to the high voltage of the system, the variation in electrode tip distance for arc initiation and increased volume, the vertical electrodes to prevent arc contact with the electrical equipment, the ease of operation, and the blocking of AM radio waves.  The plasma arc not only creates music, it emits an uncontrolled broad spectrum of AM waves.  If the AM waves are left unshielded, the Federal Communications Commission (FCC) could impose severe penalties.  
  
Cost is also a customer concern due to the high cost of existing plasma arc speakers.  A low cost working plasma arc speaker allows for the opportunity to market the product as a viable speaker option in the future.  The finished product must be aesthetically pleasing to ensure competitiveness in the commercial market.  Material selection and recycling parts is strongly encouraged for low cost, but should not be at the expense of the product ascetics.    
  
Requirements drawn from the customer needs include designing the electrode housing to be vertical, stand alone around 6 inches tall, and insulated from the electrode connections.  The housing must produce 360 degree sound distribution (or as a secondary plan, focus the sound in one direction if voltage capabilities are too low). AM waves must be blocked without allowing the blocking mechanism to contact the electrodes to avoid an arc forming between the mechanism and electrode.  A negative wire connection must also be made to the Faraday cage in the event that an arc is created between the electrodes and the cage.    
  
The top electrode should be capable of being lowered and raised without allowing more than a two inch electrode tip distance.  The total project must not exceed $500.  Electrodes could be made of tungsten drill bits to contribute to lowered cost, if the bits are capable of producing an arc.  If a fan is needed for ozone removal or the optional electrical component housing, specifications for volumetric flow rate and heat dissipation will be set.   
  
The attached black box and functional model detail the processes of the inputs of gas material, electrical energy, and the control signal becoming the outputs of plasma and gas material, thermal, acoustic, and electrical energy, and the status signal.