3-D Printed, Carbon Filled-Plastic Electrode Performance for an Electro-Hydrodynamic Air Moving Device

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***Abstract*—When air molecules are subjected to a high voltage potential between the two electrodes with an optimized geometry, the molecules become ionized and, through momentum transfer, cause a bulk flow of neutral air molecules. The lack of moving parts and reduced noise are desirable features in air moving devices (AMD). Ionic AMDs have previously been investigated as early as 1709 and continue to be optimized. The electrode used in the current study was a 3-D printed cone structure with fine point needles at the end of the smaller diameter section, allowing for electric fields to form around the sharp geometry of the needle. The opposing electrodes were the back end of the same conical structure. Measurements of volumetric flow rate and static pressure were taken using a flow bench. Air moving devices were placed in series to observe the effect on efficiency.**

It was confirmed that 3-D printed ionic AMD had comparable results to non-3D-printed devices, in terms of airflow and pressure when placed in series. As devices were added in series, the airflow stayed steady, perhaps decreased slightly, but static pressure increased as expected. It was observed that efficiency increases to some optimal number of devices, then begins to decrease, also as expected.