The Relationship between Air Properties and the Deflection Experienced by an Electric Arc, Year Two

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This experiment is a continuation on a previous experiment which was aimed determining whether or not properties of the air, such as temperature and relative humidity, had any influence in the behavior of electric arcs. The purpose of this year's experiment thus was to further explore the findings from last year and have the experiment as a whole undergo rigorous control testing to verify the previous results. A Tesla Coil was used as the electric arc generator. A plant growth chamber capable of controlling both temperature and humidity to a high degree of accuracy was used as the vessel for the experiment. Data would consist of pictures of arcs taken from above the arcs. These pictures were then process through Microsoft Paint. Maximum deflections of the arcs from an ideal path of the arc were collected and statistically analyzed through Microsoft Excel. The relationship between temperature and average arc deflection was found to approximate an inverse J-curve with deflection reaching a positive peak at the 25°C mark and then decreases in either side of this mark; the average deflection was negative at the 12°C and 45°C marks. The control testing showed that the relationship was not caused by mechanical asymmetries inherent to the experimental set-up. When taken in conjunction with the results from the previous year's experiment, this project very clearly shows that electric arc behavior is related to temperature conditions. It implies that electric arc behavior, what is currently thought of as a chaotic and unpredictable phenomena, is more ordered and something that can perhaps even be predicted if enough research is done into the specific initial conditions which affect arc paths.

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