Tesla Turbine: Outdated or Modern Innovation?

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The Tesla or bladeless turbine, developed by Nikola Tesla in 1913, has a cost-efficient and simple design. The tangential flow of a fluid and its viscosity interacting with the turbine's discs initiates the boundary layer effect, causing rotation of the inner axle. Despite unsuccessful large-scale use, we hypothesized that a household or small-scale turbine would be more effective and, at a mid-level air pressure in our trials (60 to 70 pounds per square inch), could generate relatively high voltage and RPM about the axle without overconsuming the fluid used in operation. We initially designed a 3D model of the Tesla turbine as a guide, then used it to construct our physical turbine. Operating the turbine with water at a flow rate range of 1.11 to 2.15 gallons per minute from household facilities generated a maximum of 1V at 476 RPM. Operating it with pressurized air at a range of 40 to 80 PSI with a low-pressure and non-industrial air compressor generated a maximum of 10.2V at 2,831 RPM and was incredibly more consistent. Additionally, there wasn't a statistically significant difference between the voltage output at 70 and 80 PSI as the turbine reached its maximum potential. We concluded that 70 PSI generated the highest RPM and voltage while using the least amount of fluid and that the turbine is widely applicable for small-scale items, as seen by the success in powering an Arduino Uno and circuit with about 10V. Based on our analysis, the Tesla turbine is effective at the household or non-commercial scale, should be used as a clean source of electricity generation, and be 3D printed with our model to help everyone easily access the resources they need.