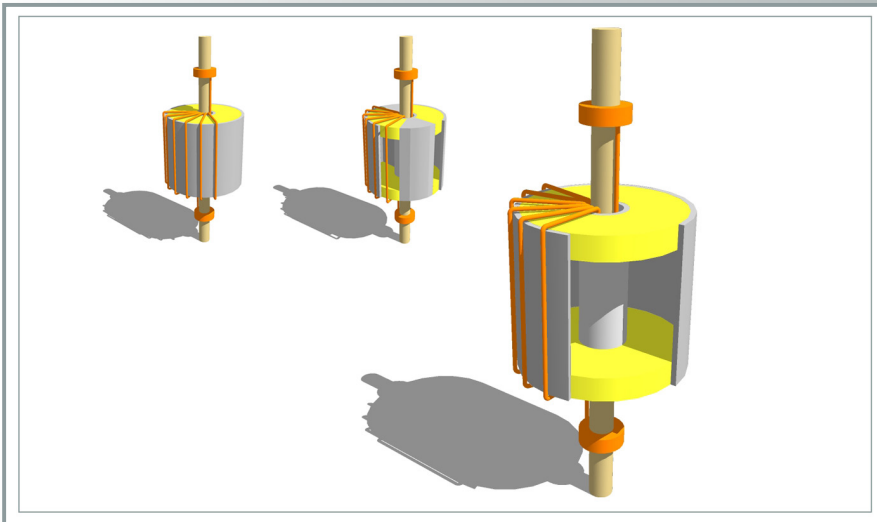


# Multi-winding Homopolar Electric Machine Offers Variable Voltage at Low Rotational Speed

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## Technology Summary

A nineteenth century invention by Michael Faraday, the Faraday disc machine, has undergone a twenty-first century improvement at ORNL. Now known as a homopolar electric machine, the ORNL invention offers greater (and variable) voltage output at low rotational speeds without a gearbox. Previous designs have been restricted to low voltage output at high rotational speed, thus requiring heavy and expensive gearboxes.

The invention incorporates multiple turns of wire for the current to traverse, similar to the windings of a toroidal coil, thus producing greater voltage at lower rotational speeds. The current flow through the machine's vessel interacts with a constant magnetic field, and each turn of wire increases the voltage of the machine, allowing reduction of the rotational speed. The device can be used as either a motor or a generator.

## Advantages

- Variable voltage and speed design
- Internal mechanism allowing for low speed, high torque applications
- No gearbox
- Longer life and reduced cost when operated at low speed (e.g., wind power)

## Potential Applications

- Wind turbines and power industry generators
- Applications requiring low speed, high torque operation without a mechanical gearbox

## Patent

Charles W. Van Neste, *Multi-winding Homopolar Electric Machine*, U.S. Patent Application 12/819,717, filed June 16, 2010.

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