Terreplane's Linear Motor Lab is Operational

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Terreplane's open-sided coil linear motor technology enables a 1.5" D cable (or pipe) to become a zipline-type transportation guideway that can outperform the best of tracks, rails, highways, or superconductor corridors available today. This zipline-type guideway infrastructure costs about one fifth of these alternatives.

A key tool in the advancement of this technology is the linear motor lab at Terreplane Technologies, LLC. This lab has become operational with key glitches in electronic control technology being resolved.

Electronic control capabilities include the ability to control voltage and frequency for the three phases of electrical output needed to power the electromagnetic coils of the linear motor's stator. With this latest advance, Terreplane Techologies, LLC (and Homeland Technologies, LLC) is able test voltages up to 230 VAC and frequencies up to 300 Hz to characterize stator and armature performances.

The Figure 1 photo sequence shows the induced movement of an aluminum sheet above the three coils of the stator. Laboratory methods include use of discs and wheels as the reactive components.

Figure 1. Picture sequence of rotating (2' X 2' X 1/8") sheet of aluminum over three coils of linear motor. The sheet undergoes magnetic suspension force and clockwise (left to right) propulsion force. The frequency (Hz) and voltage are displayed on meters as the Eaton controller ramps up in frequency. The sequential voltage values are 10, 25, 37, 48, and 61 V with rotation rate increasing rapidly in this 5-second sequence.

Both this new Linear Motor Lab and the Vehicle Prototyping Lab are more than research labs. Both use testing methods similar to what will be used for commercial systems; this makes the transition from laboratory to commercial systems easier. In the case of the Linear Motor Lab, the control system is a commercially available Eaton controller designed to operate three-phase rotary induction motors; these controllers have pricings starting at slightly over $100.

For this approach, the stator is the vehicle chassis that moves along the zipline cable/pipe (which is the armature). Figure 2 is a 3D model of a half-scale linear motor.

Figure 2. 3D print of half-scale linear motor stator (burgundy and blue) over tube armature (yellow). In today's R&D approaches, the gap between printing of 3D representations and working prototypes is becoming increasingly small.

Two U.S. patents are pending in the US (Appl. No. 15/204345 and 15/808966) on this novel linear motor. The first application has been nationalized in over 40 countries. The research and prototyping process includes 3D printing of casts/molds in which cores are self-assembled over the coils in a patent pending process (currently in provisional stage).