SWACSM Abstract

Effect of Primary Power Source on the Load Voltage Relationship in Load Cells from an Instrumented Scrum Machine

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ABSTRACT
To measure force generated by rugby union players during the scrum, we instrumented a scrum machine using S-type load cells for voltage force data collection. Data collection may take place in a variety of settings with varying access to primary power. The voltage outputs from electronic equipment may change when using battery versus AC power. **Purpose:** To compare the load-voltage relationship in S-type load cells between wall outlet AC power and a lithium ion battery pack and inverter. **Methods:** Dead weight calibrations of two load cells under two power supply conditions were performed up to 200kg. Voltage data was obtained using 1) outlet power from the lab, and 2) using a lithium ion battery pack and inverter (Yeti 1500x Goal Zero, South Bluffdale, UT). A linear model was created to estimate the influence of power source (battery vs wall plug) on the load-voltage relationship (i.e. voltage = β0 + β1•load + β2•load.cell(7) + β3•power.source(plug) + β4•time + β5•load • power.source(plug)). **Results:** The linear model indicated a main effect of the power source was present (p = 0.003) but not a load x power source interaction effect (p = 0.085). On average, voltage values from the load cell were about 0.001 volts greater than when using the battery. **Conclusion**: The lithium ion battery pack reliably produces voltage outputs greater than wall AC outlet power. Thus field data collection using the lithium ion battery pack is permitted, providing the volt difference is accounted for when analyzing data.