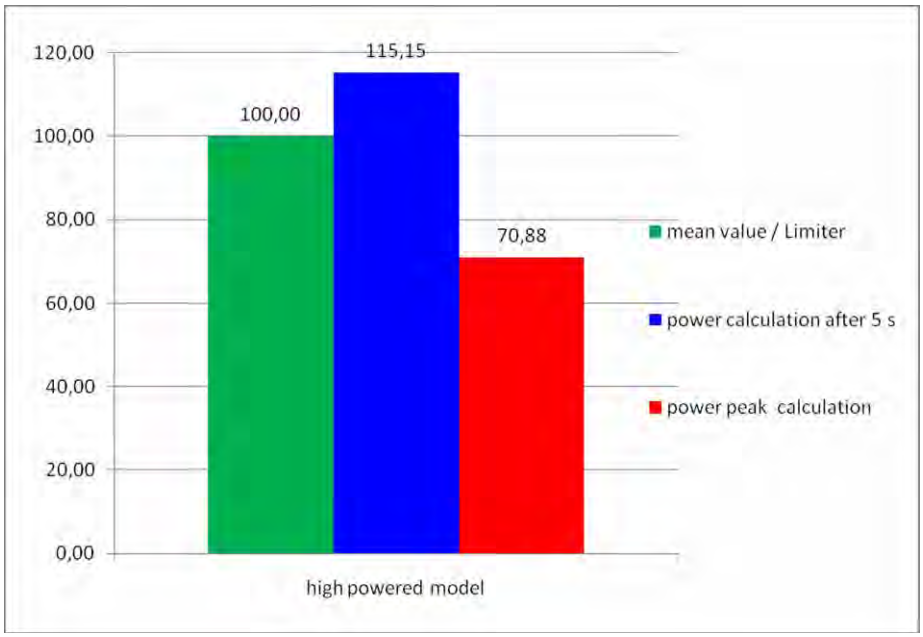
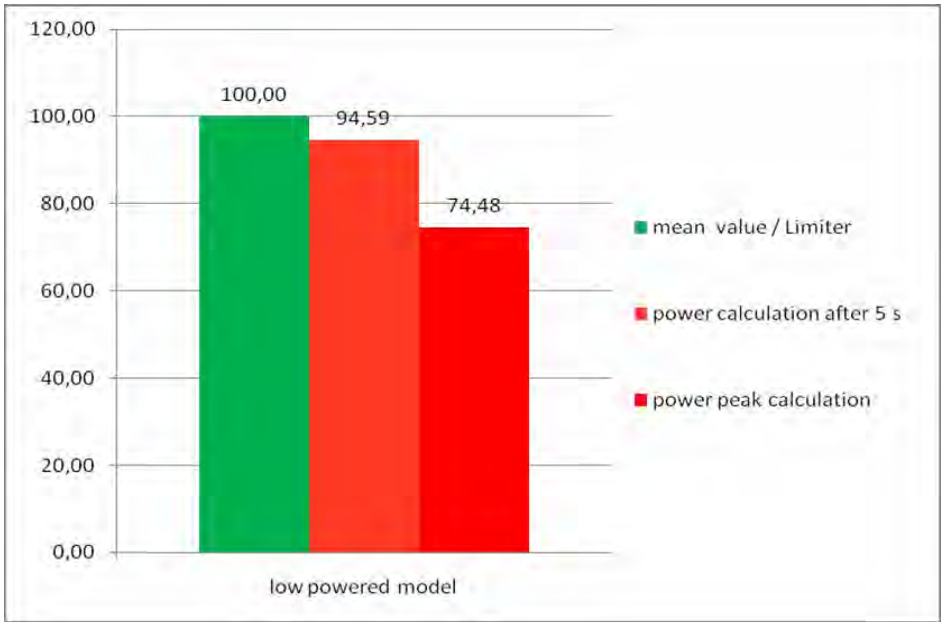
b) For models without energy limiters the motor's energy in watt-sec over the motor run is calculated as **integral of** the measured wattage ~~multiplied by~~ **over** the motor run time. A freshly charged battery (4.15 to 4.2 volts per Li cell, 1.2 volts per NiCad or NMH cells) ~~should~~ **must** be used. ~~When the motor has reached full power, wattage is measured using a commercial wattmeter via 3.5 mm male and female bullet connectors furnished by the contestant.~~ **The Energy is measured using a commercial energy data logging device via 3.5 mm male and female bullet connectors furnished by the contestant. The data sampling rate of the measuring device must be 5 samplings per second or better. The measuring starts by releasing the start button and ends when the ESC stops supplying energy to the motor.**

Reasons:
Available measuring data shows, that models without EL may have a disadvantage by the current measuring (wattage at the maximum point of motor run). This can't be eliminated by a later point of measuring during the motor run. Let's create an example: Take a high powered model (like the actual straight climbers) and do not use an EL. The wattage drops during a ground run very fast due to the high drag of the large props. Measuring such a model 5 seconds after the motor reached full power (or also in the midpoint of the run) and multiplying this watt amount with the run time, will increase the energy amount for these models significantly. What's the conclusion for the users of such models? They will remove the EL's to gain an advantage. That can't be the way to go. Therefore we should use the integral of current and voltage measured over the full motor run time. Progression of the energy output doesn't influence any measuring imperfection. Therefore, propulsion configurations with a different range of power output become comparable. The measurement devices for such a process are anyway necessary and available for models with energy limiters. As an exception, if in a contest only models without EL are to be used and all participants agree, a local rule may allow choosing the simple way of a measurement after 5 seconds(or at mid point) using a wattmeter.

Supporting Data
Based on a number of in-flight and ground run measurements in the last two years and on comparisons of different model types got the following results:



cont/…


120,00
100,00
80,00
60,00
40,00
20,00
0,00
100,00
94,59
74,48
low powered model
mean value / Limiter
power calculation after 5 s
power peak calculation

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