PML ROCKSIM FAQ

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We offer RockSim files for every PML rocket, and RockSim data on every PML component on the RockSim Page of our website. PML was the first high-power manufacturer to provide this to our customers, and is still the manufacturer that provides the most simulation data and information to their customers.

What You Need To Know About Simulations

We use RockSim as our tool because it's one that's readily available and that many modelers have. Real-life conditions in flight like temperature, launch site altitude, humidity, launch lug drag on the rod, winds (a biggie) and variation in actual motor performance from the "perfect motor" RockSim uses (another biggie) are going to affect the real flight, sometimes substantially. Motor performance can vary up to 15% from manufacturer's specs and still achieve certification. Also, the user's ignition technique and/or device can make a big difference as well. A motor chuffing a bit on the pad can make a big difference in an actual flight performance vs. the simulation which of course ignites perfectly every time. Also note that an altimeter you may use to evaluate the accuracy of the simulation prediction can be off by 10%-15% as well.

RockSim (or any simulator) is just that, a simulation, so *use it as a guide, not a gospel*. We've provided the information to assist our customers in motor and delay selection, but everyone needs to understand that it is indeed only a simulation. However, since we do use RockSim for all our simulations, and also include the files we use on our website, the individual modeler can download the files and run their own simulations for the flight conditions they usually experience. As noted on the front page of our Motor Recommendations Chart:

"Data was produced from RockSim simulation software with 500' elevation launch site, 70% humidity, 75 deg. F, 0 mph wind, 0 deg launch rod angle."

These are clearly relatively "perfect" conditions to allow repeatability in producing our charts. Sure, 0 mph wind might be unrealistic for most people's flying conditions, but what is "realistic"? 5 mph? 10? Depending on the launch sites you personally fly at, anything from 2 to 20 mph might be a typical wind condition. So, the only "fair" way for us to produce the chart is to set it at known conditions, clearly state what those conditions were, and leave it to the user's experience (or THEIR copy of RockSim) to make adjustments to the data we provide as they deem prudent.

Motor Recommendations Chart

The numbers on the Motor Recommendations Chart, (available on the Specs Page of the website) are from simulations run using RockSim software. All these simulations are run on "bone-stock" kits, so if you add nose weight or make other modifications you will need to adjust the file accordingly to match your situation. We recommend you weigh

your kit when you're done building and painting and enter that weight into RockSim to get the most accurate simulation results.

Keep in mind that these predictions were made with the "flight day" in the simulator set essentially "perfect" as mentioned above, and the real world isn't. Your actual flight will likely be different than the simulated one.

Days with absolutely no wind are quite rare, so be sure to compensate for flight conditions on the day you actually fly. For example, if it is a windy day and you've added some launch rod angle, the rocket's altitude will be lower, the speed of the rocket at apogee will be higher (since it will be going at an angle instead of straight up) and you may also need a slightly shorter delay. Conversely, if you're flying in a high-altitude area (Denver, for example), the air is thinner and therefore produces slightly less drag on the rocket. In that case you may want to choose a slightly longer delay. The essential thing to remember is that these are just simulations. Launch conditions as mentioned above can and WILL cause differences in actual flights. PML recommendations for motors, delays, and altitude predictions are to be used only as a guideline to provide you a starting point for making your decision as to what motor and delay to fly for the launch conditions at the time of flight.

RockSim 5.0 and Higher

People sometimes ask if we intend to offer PML RKT files and component data for RockSim 5.0 or higher. We worked with Apogee before they released version 5.0, so updated PML data files are ALREADY in 5.0 and above. We updated our component data files on the PML website at the same time 5.0 was released, so if you download our component data you'll have the latest as well.

Regarding updating our Motor Recommendations Chart simulations with 5.0 or higher, the differences between 4.0 and 5.0 or higher files for generalized altitude and delay predictions with various motors are not significant enough for us to rework all the files for 5.0 or higher. Also, the files we have provided for 4.0 still work with 5.0 or higher, though the reverse isn't true. 5.0 or higher use a different file format that will not open with 4.0.

Real-life flying conditions will cause variations greater than the difference between the two versions. For example, motor thrust variation of up to 15% is allowed by both the NAR and Tripoli motor testing organizations for a motor of a certain classification, and the difference between the 4.0 and 5.0 or higher simulations isn't nearly 15%. The difference between simulations could very easily be "washed away" by real-world conditions. It's simply not worth the time involved to do it because the real world is going to be different from the simulation anyway. Version 4.0 or 5.0 or 6.0 or "whatever-point-oh", the data will just be a guide for you to go by, not absolute data that you should expect to match with your flight.

Quantum Tubing and RockSim

Many people ask about why Quantum Tubing is not in the PML RockSim database... here's the answer. The manufacturer says the QT density is 1.05 g/cc. However, when you add QT to the materials database using that figure and construct tubes from it (basically just pull up one of our phenolic tubes, change to "custom", then change the material) you'll find that the weights in RockSim don't match our measured weights of the tubes. We've tried "fiddling with" the 1.05 number, but then once one tube is right, say the 2.1 at 10.7 oz, another tube is off by enough that the "fiddling" of the density in the RockSim materials database is no good. What we suggest you do is just build the kit in RockSim from phenolic, then add a mass object right at the CG point for the difference in weight. (The weights of the tubes are shown in our webstore). Here's a quick reference of tubing weight differences, all for 36" pieces of tubing:

Airframe Size	PT Weight	QT Weight	Difference
2.1	8.7 oz.	10.7 oz.	2.0 oz.
2.5	10.3 oz.	11.3 oz.	1.3 oz.
3.0	12.1 oz.	15.2 oz	3.1 oz.
3.9	15.3 oz	18.0 oz	2.7 oz.

Also, keep in mind that RockSim 4.0 doesn't take into account the weight of fin tabs through the airframe wall, epoxy, paint, etc. There's also no way to easily add piston strapping or shock cord. We took care of these difficulties in the RockSim RKT files we provide by adding a mass object to bring the RockSim weight of the kit up to our measured weight of the actual kit. The minor weight difference you're going to get between RockSim and QT is going to be different from what the real rocket weighs when you build it anyway, since build techniques (amount of epoxy), painting, etc. will vary from builder to builder.

What we suggest is to use RockSim as a design tool to figure fin sizes needed, etc., then build the real rocket. Weigh the completed rocket, add a mass object at the CG to make the RockSim rocket weigh what the real one does, THEN do your simulations. That way your simulator rocket weighs exactly what your real one does, so you don't have to worry about build differences and slight component weight differences in the RockSim component database. Also, there's going to be enough difference in RockSim's "idealized/perfect" motor thrust and how your real motor burns, wind and temperature, humidity, etc., that the little bit of difference between QT and phenolic isn't going to matter much. You shouldn't worry about dialing in RockSim to the n-th degree, because it's just a simulation...a real life flight is going to be different no matter how perfect your input into RockSim is.

CPR Systems and RockSim

See the Close Proximity Recovery (CPR) Systems FAQ for information on CPR component weights for use in RockSim. We recommend creating a Mass Object or Objects with the weight of the CPR components involved.

PMLRockSimFAQ.doc

Parachute Sizing and RockSim Descent Rate Calculator

RockSim has a parachute descent calculator as one of it's features. The parachute descent calculator function routinely "over-recommends" what size PML chute is necessary in 4.0. Said another way, RockSim 4.0 will report that the chute we ship with a kit is far too small; the rocket descends too fast, according to RockSim. Apogee admits that the descent rate calculation in RockSim 4.0 uses a fixed Cd, which may lead to incorrect chute sizing calculations. Here's their reply when we asked them about it:

> *"This is one of the things we expect to change in a future version of RockSim. We want to allow the user to change the Cd for the particular parachute. Right now, it is fixed, and it may be too high or too low (depending on the parachute)."*

PML has been designing and flying high-power rocket kits for nearly 12 years as of this writing. We have a pretty good handle on how to size chutes for our kits, and tens of thousands of customer flights have proven that out, so we recommend ignoring the chute descent rate calculator feature of RockSim.

Custom Work and RockSim Files

We welcome customers forwarding us RockSim files of their projects, as it sometimes helps us understand what you're after. However, YOU STILL MUST PROVIDE US A DETAILED PARTS LIST OF WHAT YOU NEED, INCLUDING CUT LENGTHS, DIAMETERS, ETC. <u>YOU MUST PROVIDE US WITH THE SAME LEVEL OF DETAIL AS IF YOU HAD NOT INCLUDED THE ROCKSIM FILE</u>. We will not "decipher" the RockSim file to determine exactly which parts it contains. Look at the RockSim file as a way to help us ***understand*** your parts list, not a way to ***produce*** your parts list and measurement data.