United Kingdom Rocketry Association (UKRA)

Getting Started with Openrocket.

Openrocket is a great open source piece of software that enables users to design and simulate rocket designs using a variety of materials and commercially available rocket motors.
This easy to use guide is based on a script used in rocketry workshops delivered by the author and seems to do the job getting people started. This document takes you step by step through creating and simulating a rocket and its flight. Whilst the rocket being simulated is very basic in design, the process should give you some skill in using the software.
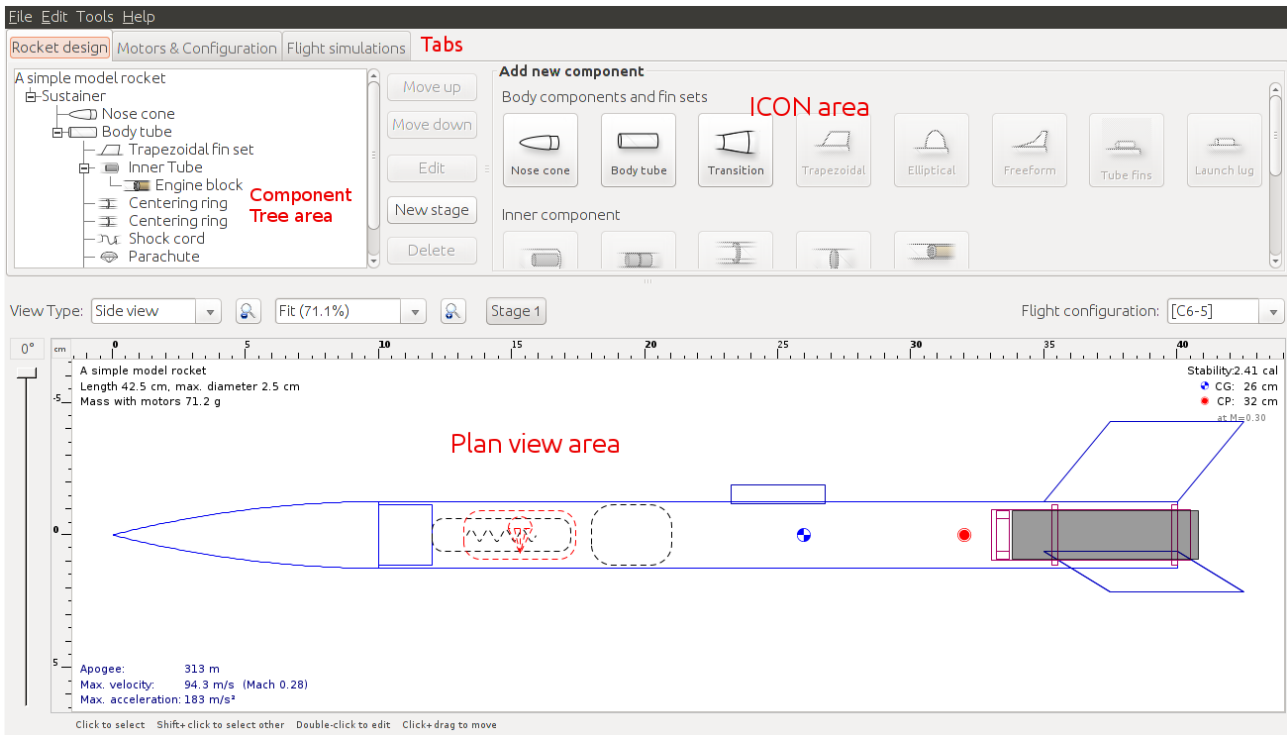

Version 2.1
Jo Hinchliffe 2018

Before you begin, download Openrocket from the website http://openrocket.info/

You will also need the Java runtime environment installed.
It can be downloaded from here https://java.com/en/download/

Once both of these software elements are installed you can open Openrocket!

You will be met with a page similar to the above image but with all the areas blank. I have included the above screenshot to show the different areas of the software window allowing the easy identification of different parts of the software as I refer to them in this document.

Should you wish to look as a complete design before using this guide (such as the one above) you can click "File", then "Examples" and select a file to open.
When you are ready to go through this guide you should start with a blank page. Click "File" and then "New".

Click the Nosecone icon,

In the dialogue box that appears;

- Select shape from dropdown "ellipsoid"
- set nose length to 8cm
- base diameter = 3cm
- Wall thickness = 0.2cm
- Click Material = PVC
- Click "shoulder" Tab

- Diameter = 2.6
- Length = 2cm
- Click Apply

Click Body Tube Icon,

In the dialogue box set;
- Length = 45cm
- Outer diameter = 3cm

(Double check but the inner diameter should automatically set to 2.6cm therefore giving a wall thickness of 0.2cm)

- Set Material = "cardboard"
- Click Apply

Click Trapezoidal icon in the icon area.
You will need to have the body tube highlighted in the plan view for the fin set icons to be available to select. Either click on the body tube itself in the plan view area or click its name in the component tree area.

In the dialogue box set;

- No of fins = 3
- Root chord = 4cm
- tip chord = 4cm
- Height = 2cm
- Sweep = 1.5cm
- Sweep angle = 36.9
- Fin cross section = rounded
- thickness = 0.3cm
- material = birch
- Click Apply

You should note now that the centre of pressure (CP) symbol (red dot inside red circle) is behind (toward the fin end) the centre of gravity (CG) symbol (blue quartered circle).
The top right hand corner of the plan box contains some text about their positions.
The "Cal" number is to do with stability. It is the number of calibres (diameter of the body tube) behind the CG the CP is. We ideally aim for the CP to be between 1 and 2 calibres behind the CG. Over 2 calibres is OK but is classed as 'overstable' and may turn more into any prevailing wind resulting in a ballistic flight!

Again with the Body tube highlighted
Click the Inner Tube icon

In the dialogue box set the following parameters;

- Outer dia = 1.9cm
- Inner dia = 1.8cm
- wall thickness = 0.05cm
- length = 7cm
- material (cardboard)
- In the "Motor" tab check "this is a motor mount" dialogue box
- Click Apply

With the Inner tube (motor mount tube) highlighted
Click Centring ring icon

In the dialogue box set;

- Outer dia = 2.6cm
- (next should automatically set to) inner dia = 1.9cm
- Set thickness to 0.5mm
- Set "position to parent" to -7cm
- Material Balsa

Repeat and add another centring ring but leave the "position to parent" at 0 to add one at base of motor mount

Highlight body tube

Click Parachute icon

In the dialogue box set;

- Diameter 30cm
- Position "top plus" 3cm

Now is the time to save your work.
Click "File" then "Save As" and give your work a unique filename.

Click to highlight inner tube/motor tube and then click the "motors and configuration tab in the tabs area.

- Click "new configuration"
- Click "select motor"

There are all kinds of ways you can constrain the lists of commercially available motors.
For example, you could set the software to search for an individual motor manufacturer or for the motor diameter.
For our run through we need to find an "Estes B6-4" motor and select it, making sure to add a 4

second delay in the motor selection dialogue box.

- Click "Add the motor" (should dump you back onto the main page)

Click the Flight simulations tab from the main 3 tabs

You should see that there is a single simulation listed that hasn't been run with your motor details in it. Highlight it and then click the "run simulation" button. The slots will fill with data. Then click the plot button and ok the next dialogue and you should get a flight simulation graph.

Congratulations! If you made it this far you have designed and simulated a small and not terribly efficient rocket! Time for you to experiment and play and design something amazing!