GENERAL QUAD BUILDS
FRAME BASICS

Quad I
Quad X
Hex I
Hex V
Hex Y
Hex IY
Oct X
Oct I
Oct V
OTHER TYPES OF FRAMES
WHAT MAKES A GOOD FRAME?

- Durable
- Rigid (No Flex)
- Light
- Accessible
The Good, Bad and the Ugly
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How to build a Basic Frame
What is Needed?

- Extruded aluminum arms (x4)
- Acrylic plate (x2)
- M3 Screws (x8)
- M3 Lock Nuts (x8)
Are these Arms a Good Design?
Simple Stress Test

SolidWorks Simulation Static Study

- Motors provide 400g thrust ≈ 3.92N force.
  - 1N = 1kg m/s^2
- One end treated as rigidly fixed.
- Other end has a 130N force applied upwards at the end.
- Yield stress for aluminum is $2.275 \times 10^8$ N/m^2
  - Can be written as $2.275 \times 10^8$ N/m^2
Simple Stress Test

Mass = 0.024kg * 4 arms = 0.096kg ≈ 100g
Simple Stress Test

Mass = 0.016kg \times 4 \text{ arms} = 0.064kg = 64g (36\%\ reduction)
Evaluation?

Pay attention to the ranges of colors, not the colors themselves.
Simple Drop Test

Solidworks Simulation Drop Test Study

- Height of 1m.
- 1kg mass attached to end of arm.
- Arm at a 30 degree angle.
- Yield stress for aluminum is $2.275 \times 10^8$ N/m$^2$
  - Can be written as $2.275 \times 10^8$ N/m$^2$
Simple Drop Test

No weight relief 1kg mass rigidly attached at end

Yield Stress = 2.275 e+0008 N/m^2
Simple Drop Test

Yield Stress = 2.275 e+0008 N/m^2

Weight relief 1kg mass rigidly attached at end
Pay attention to the ranges of colors, not the colors themselves.
How to Make the Arms?

Band Saw or Mill

Mill

Drill Press or Mill

Band Saw or Mill
How to Make the Arms?

Important dimension !!!
M2 [2mm] holes (for motor mount).
20mm center to center
Epic or Imagineering
Other Things to Think About

- Weight relief on the plastic sheet.
- Landing legs
- Where / how to attach the ESCs.
- Damping for the microcontroller.
- Other unique ideas.