

Graphical Design Documentation

MIT 16.82 Class Presentation

20 Feb 2020

Purposes of Graphical Documentation

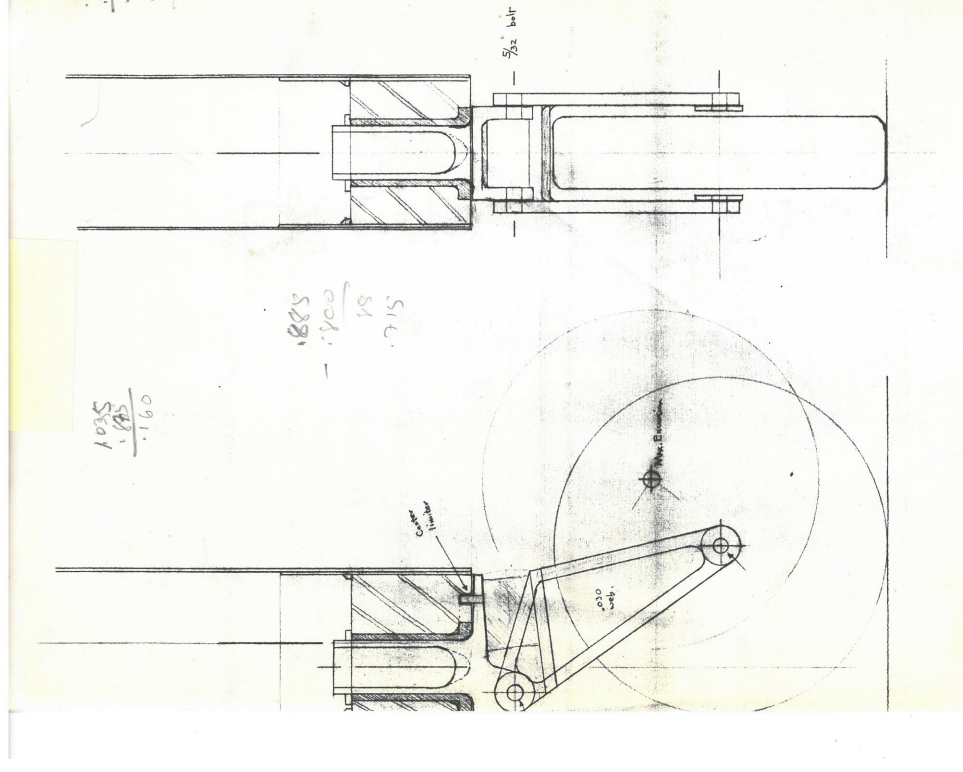
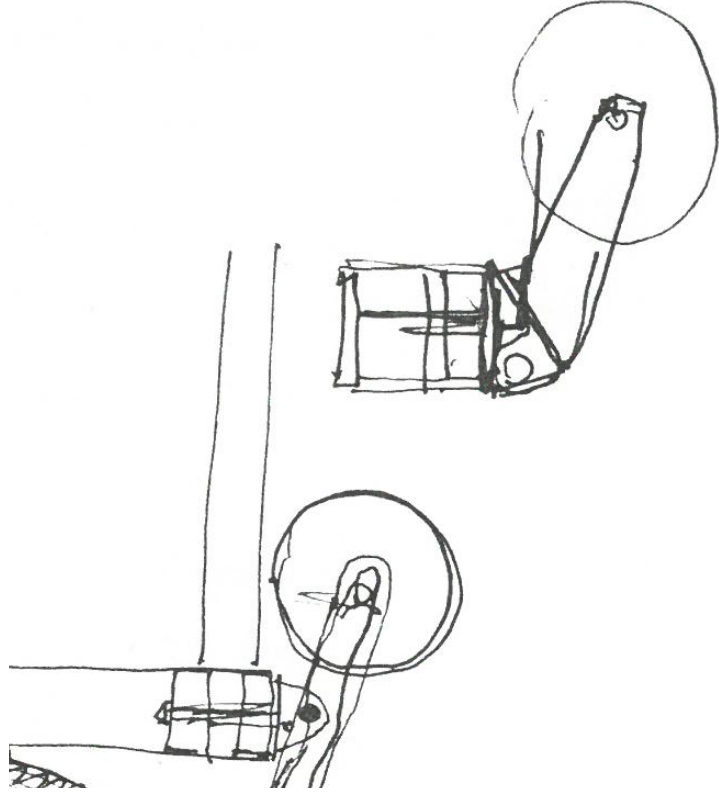
- **Facilitate** design process
 - “lay down” and visualize ideas and concepts
 - convey ideas and concepts for critique, comments, suggestions
- **Sell** concept
 - to potential sponsors
 - to customers
- **Communicate** design concept and data
 - “release” drawings and key parameters of latest/current design iteration
 - locate major components and subsystems to enable parallel work
 - promote catching of problems (geometric interference, mismatches ...)
- **Transmit** design and data
 - for refinement, addition of details
 - for manufacturing
 - for testing
 - for deployment
- **Archive** design and data

Graphical and Data Precision Levels

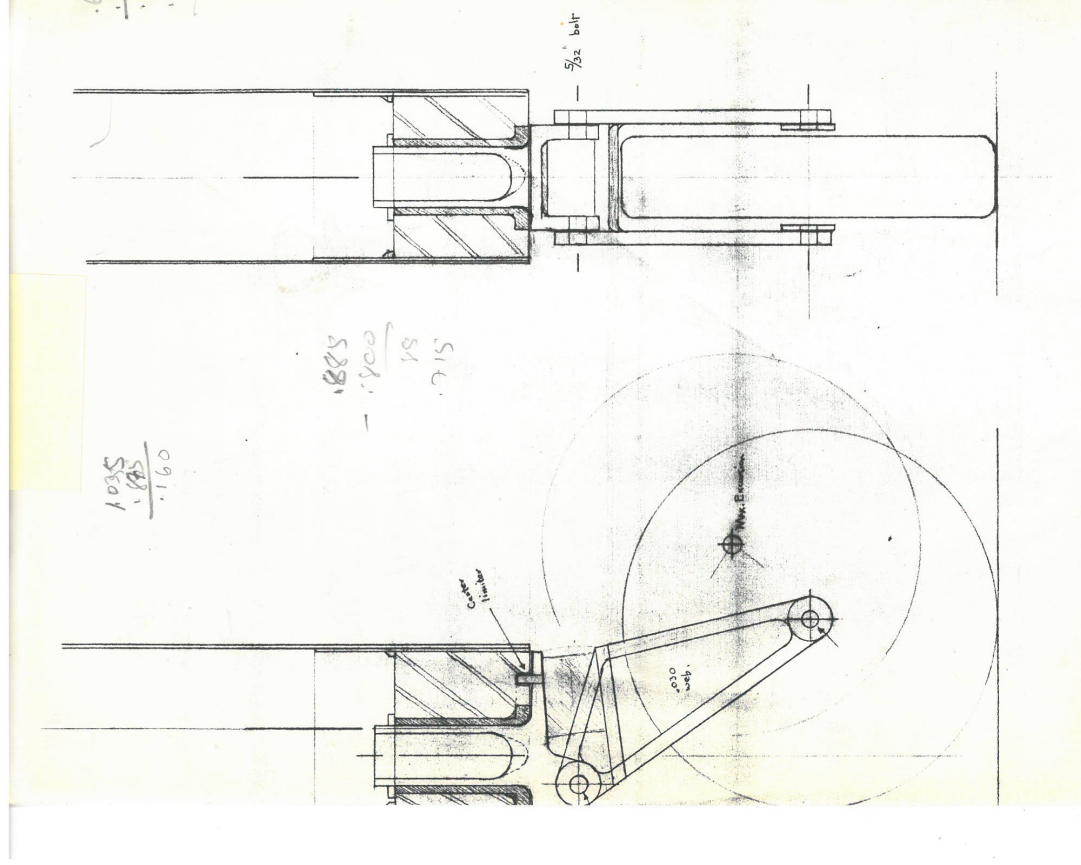
	Design Stage			
	brainstorming	conceptual	preliminary	detailed
Doodle, cartoon, sketch	✓	✓		
Accurate drawing	✓	✓	✓	
Precise drawing		✓	✓	✓
CAD model rendering			✓	✓

Sketch vs. Accurate Drawing

Daedalus front landing gear



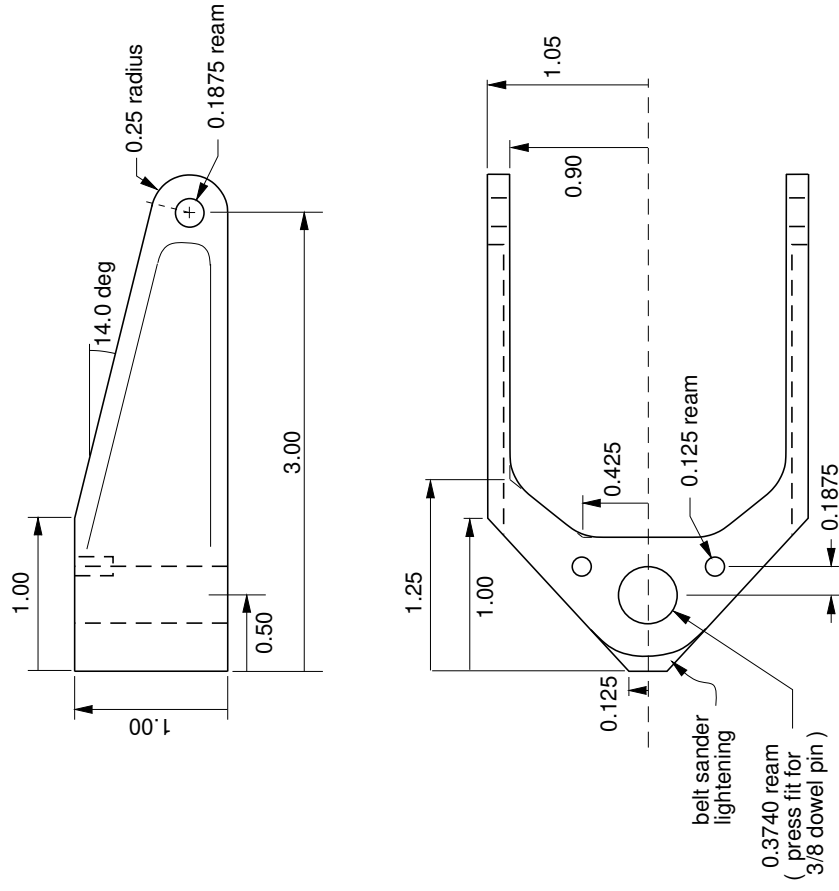
Terse vs. Detailed Manufacturing Drawing



30% eSTOL Nosewheel Fork

2024 or 6061 Aluminum

MD 11 Apr 19

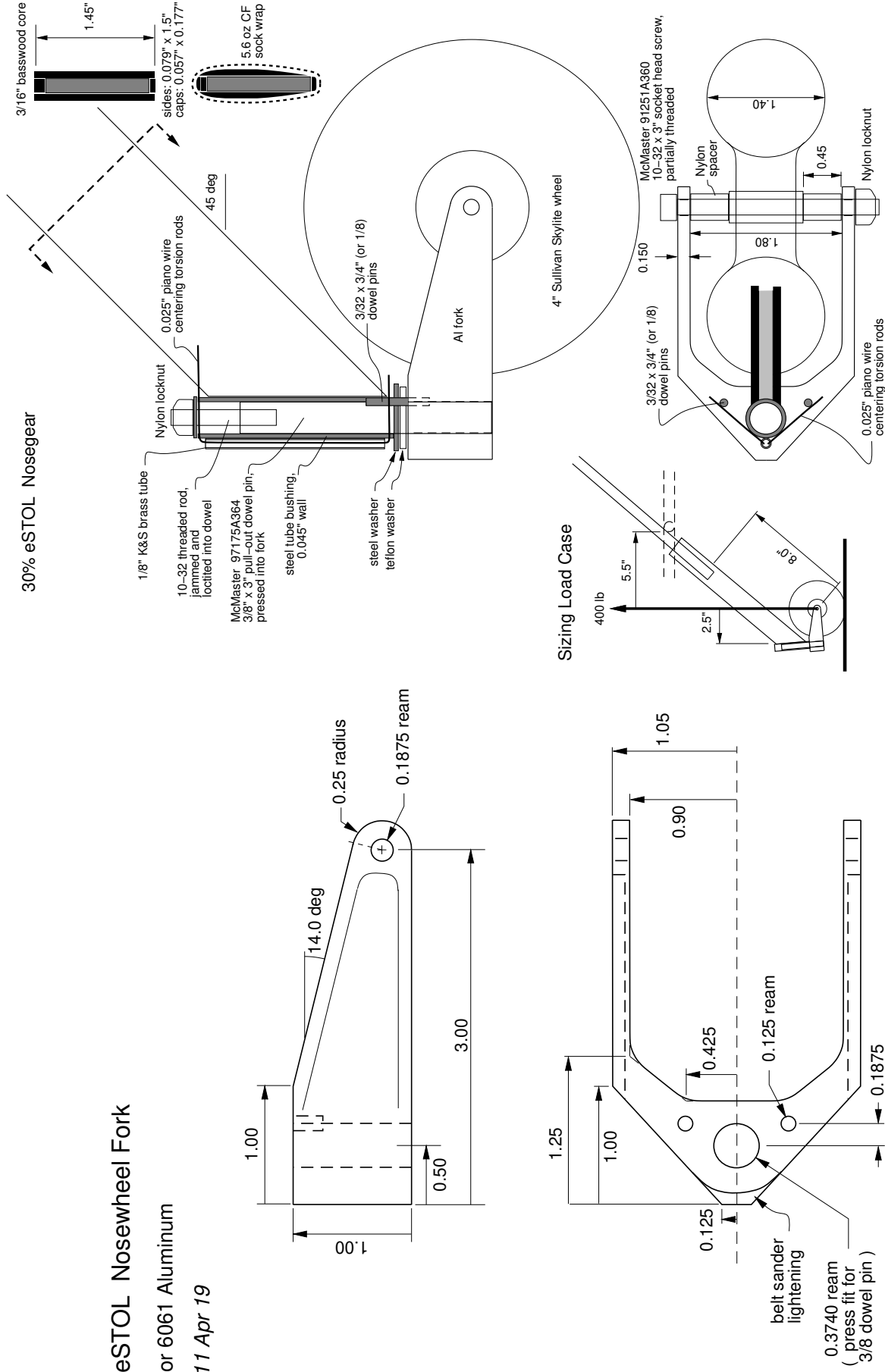


Manufacturing vs. Documentation Drawing

30% eSTOL Nosewheel Fork

2024 or 6061 Aluminum

MD 11 Apr 19



KESTREL Hybrid SSTOL
30% scale POC

Weight = 37.0 lb = 16.8 kg
 Span = 156 in = 13 ft = 3.96 m
 Area = 2640 in² = 18.33 ft² = 1.70 m²
 Vmin = 5.15 m/s = 11.5 mph (CL = 6.0)
 Vmax = 28.2 m/s = 63 mph (CL = 0.20)

The figure contains three technical line drawings of the Kestrel Hybrid SSTOL aircraft. The top drawing is a top-down view showing the rectangular wing with eight propellers (four on each side) and the fuselage with a central vertical fin. The middle drawing is a side profile view showing the aircraft's height, the placement of the propellers, and the folding mechanism of the wing. The bottom drawing is a front view showing the aircraft's width and the arrangement of the propellers. To the right of the side view is a human silhouette for scale. Below the aircraft drawings is a horizontal line with a small circle and a dot, likely representing a ground reference or a specific measurement point.



Linewidths and Fonts Matter

KESTREL

Span = 156" = 13 ft = 3.96 m

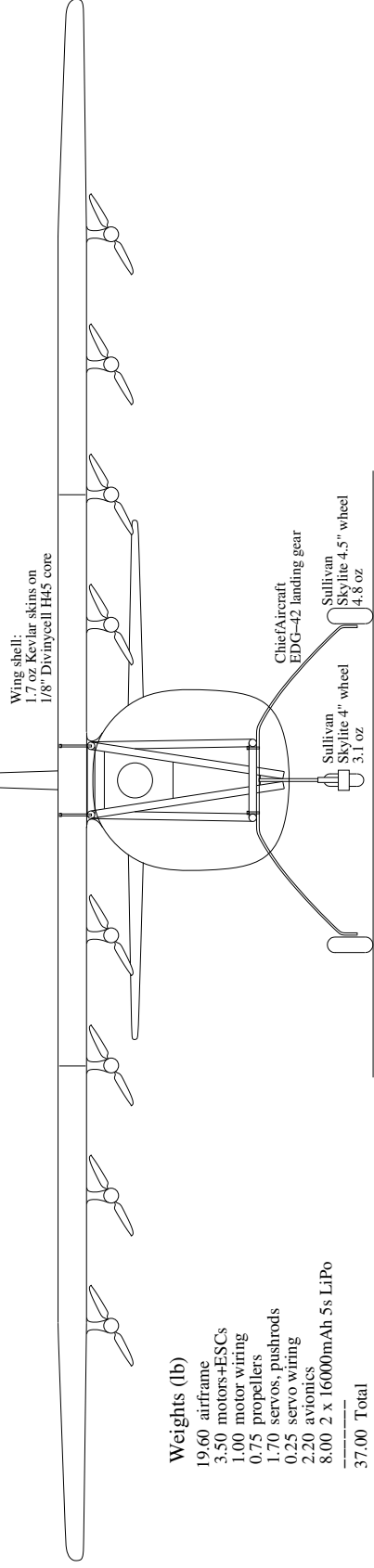
Hybrid eSTOL Area = 2640 in² = 18.33 ft² = 1.70 m²

30% scale POC AR = 9.2

Vmin = 5.06 m/s = 11.3 mph (CL = 6.0)

Vmax = 27.7 m/s = 62 mph (CL = 0.20)

Re sqrt(CL) = 390K



KESTREL Hybrid eSTOL

30% scale POC

Span = 156" = 13 ft = 3.96 m

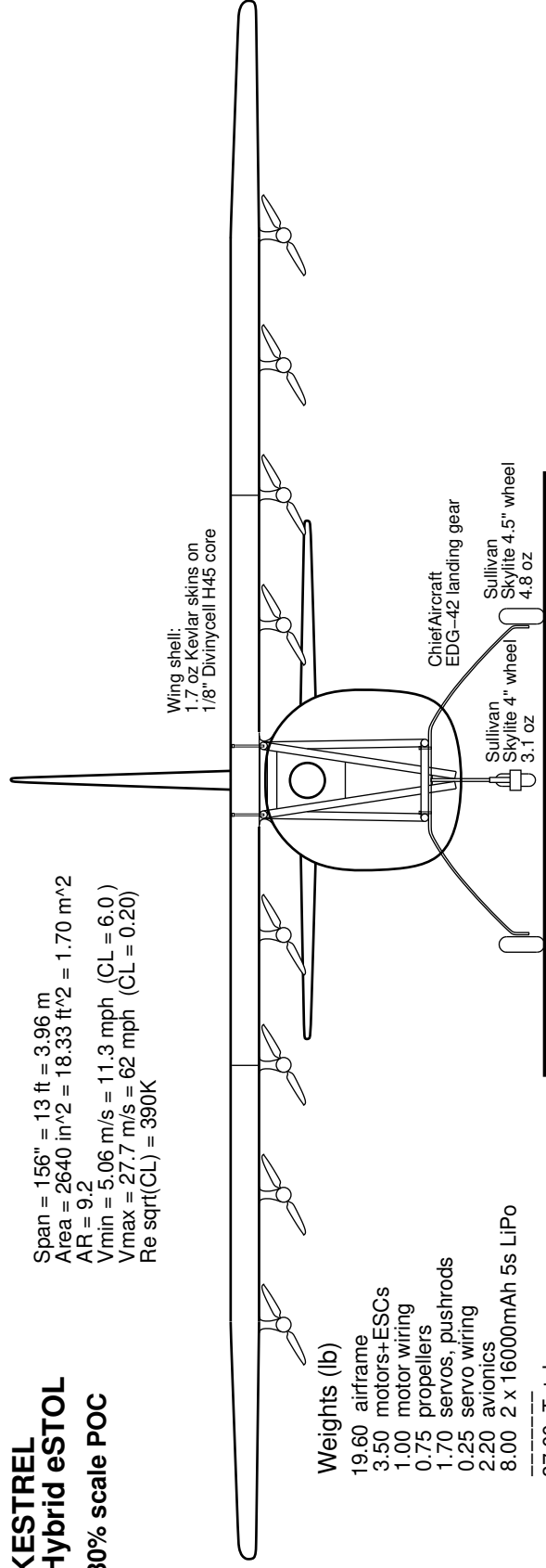
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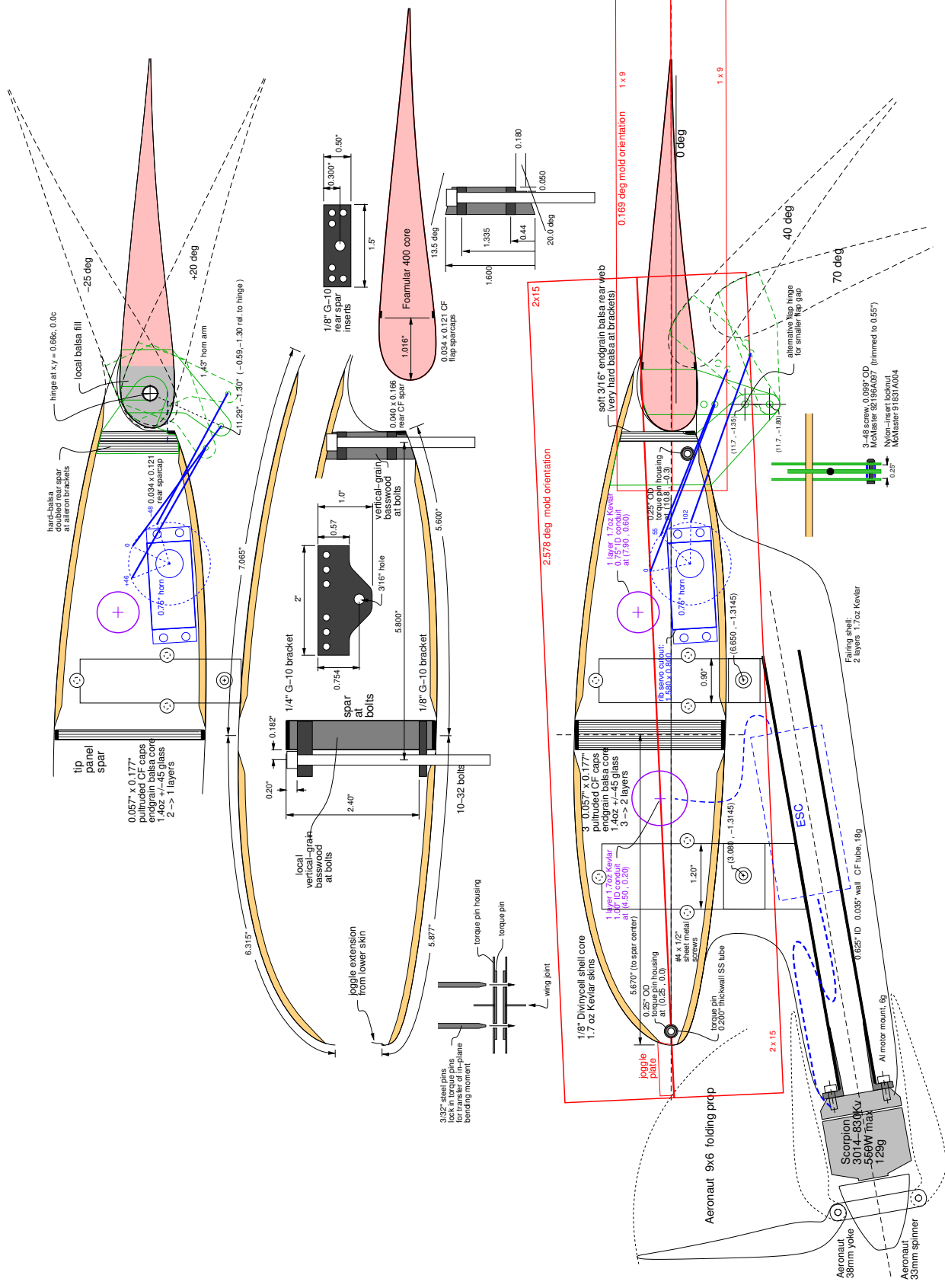
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Vmax = 27.7 m/s = 62 mph (CL = 0.20)

Re sqrt(CL) = 390K



Use Color for Identification, Not Decoration



Existing 2D Drawing Packages

- ivtools idraw
- idraw
- Xfig
- IPE
- inkscape
- graphic
- ...

Avoid “art” packages (needlessly complex)

- Illustrator
- Clip Studio
- Artweaver
- ...