Graphical Design Documentation

MIT 16.82 Class Presentation

20 Feb 2020

Purposes of Graphical Documentation

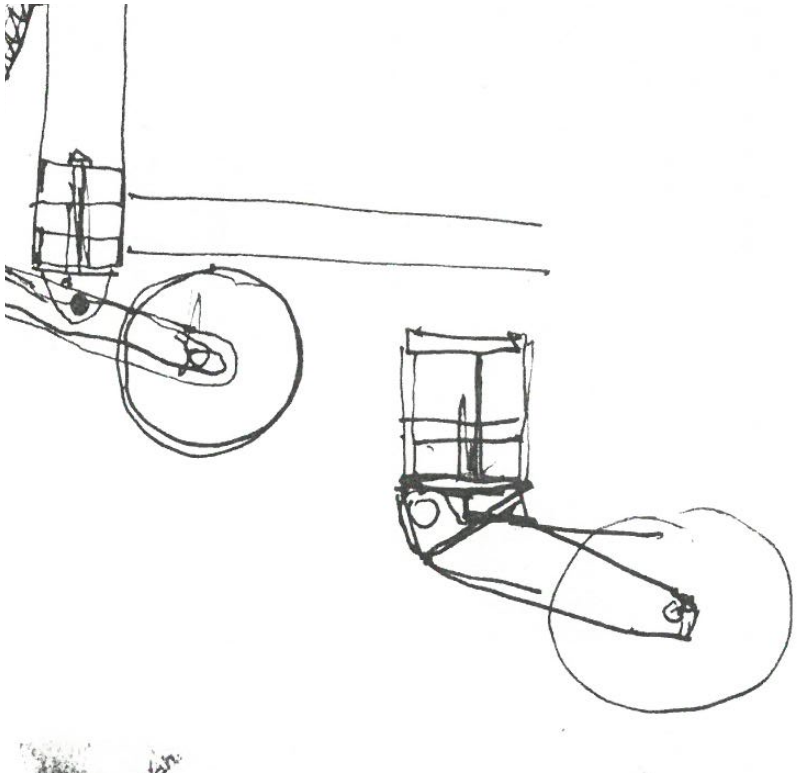
- **Facilitate** design process
  - "lay down" and visualize ideas and concepts
  - convey ideas and concepts for critique, comments, suggestions
- **Sell** concept
  - to potential sponsors
  - to customers
- **Communicate** design concept and data
  - "release" drawings and key parameters of latest/current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

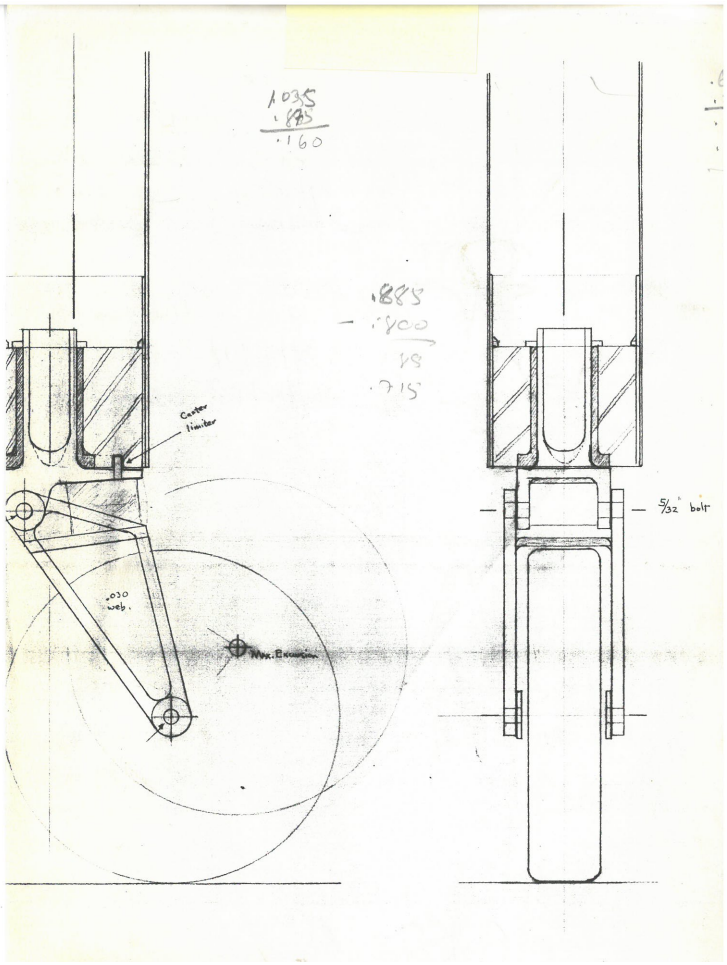
Graphical and Data Precision Levels

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

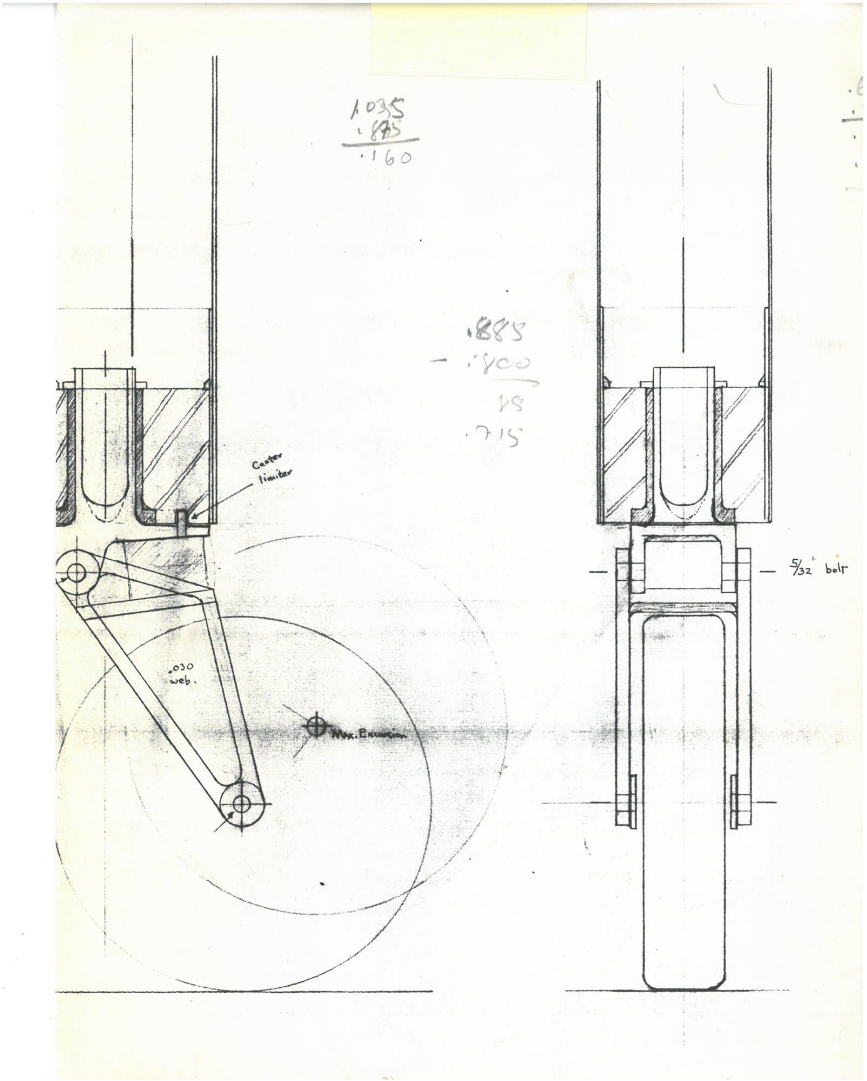
Sketch vs. Accurate Drawing

Daedalus front landing gear





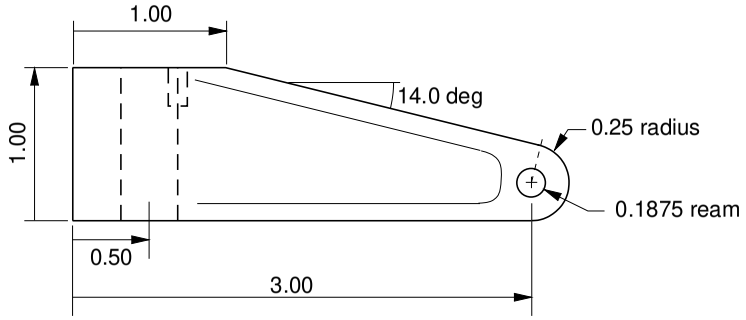
Terse vs. Detailed Manufacturing Drawing

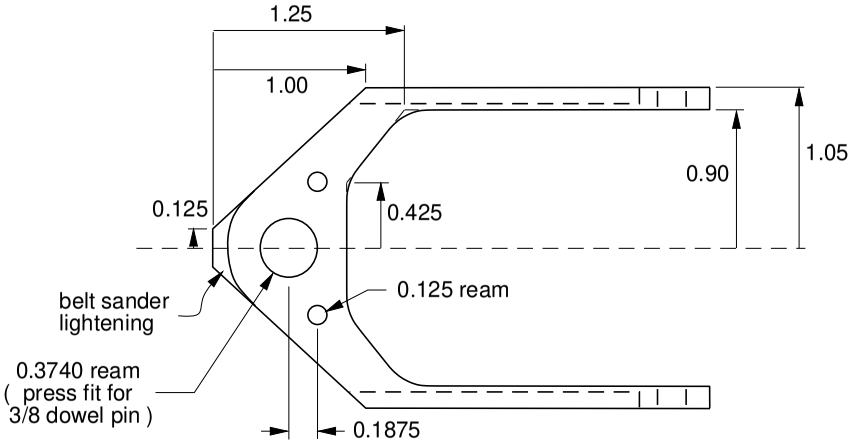


30% eSTOL Nosewheel Fork

2024 or 6061 Aluminum

MD 11 Apr 19





Manufacturing vs. Documentation Drawing

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2024 or 6061 Aluminum

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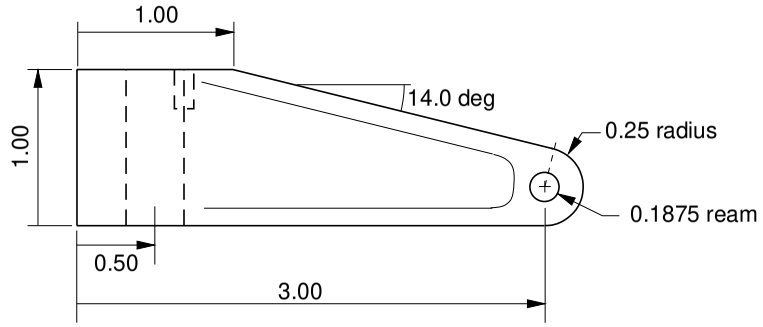
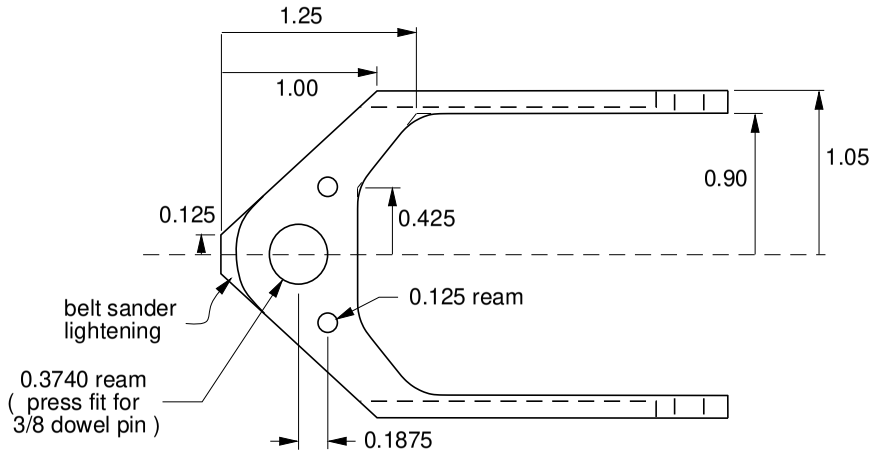
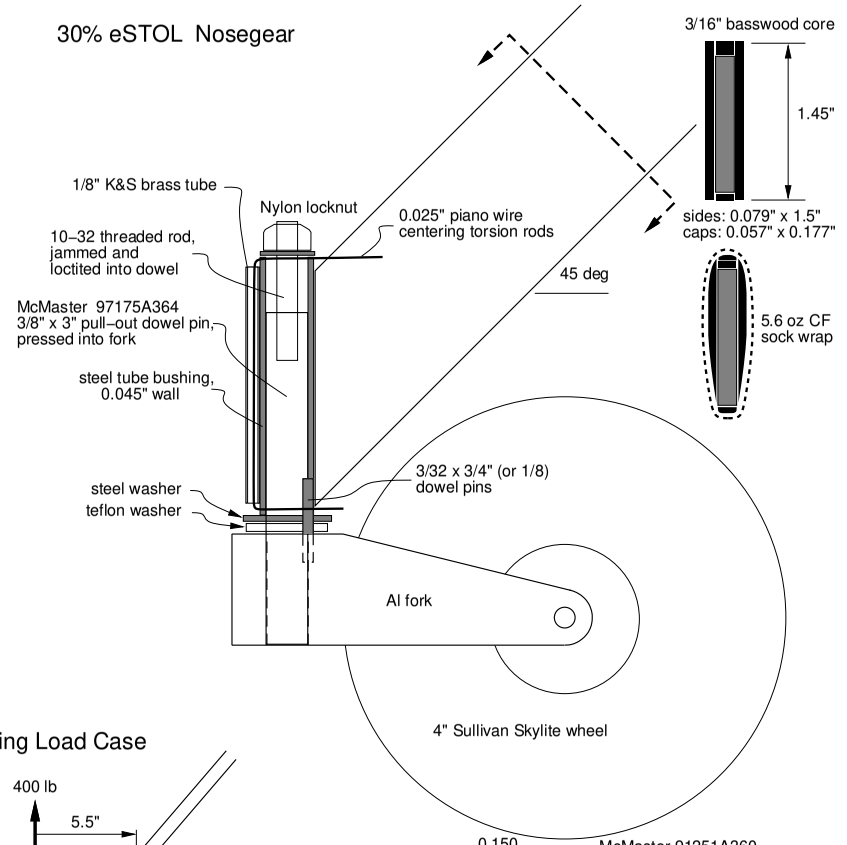
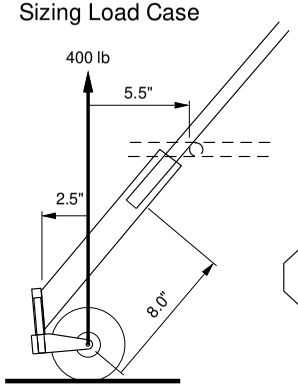


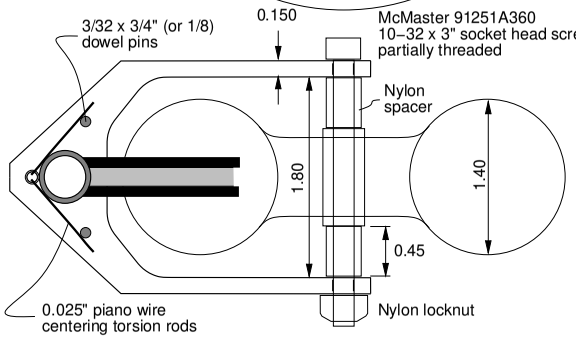


30% eSTOL Nosegear

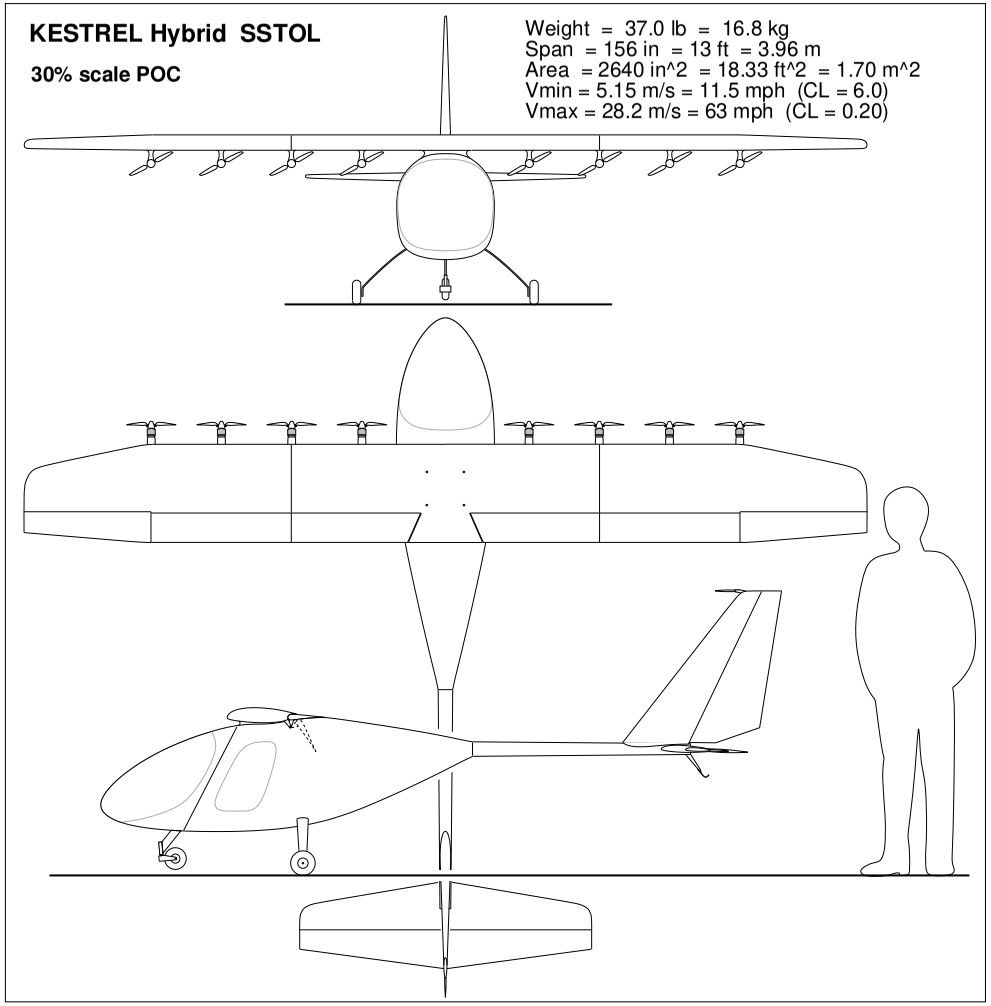


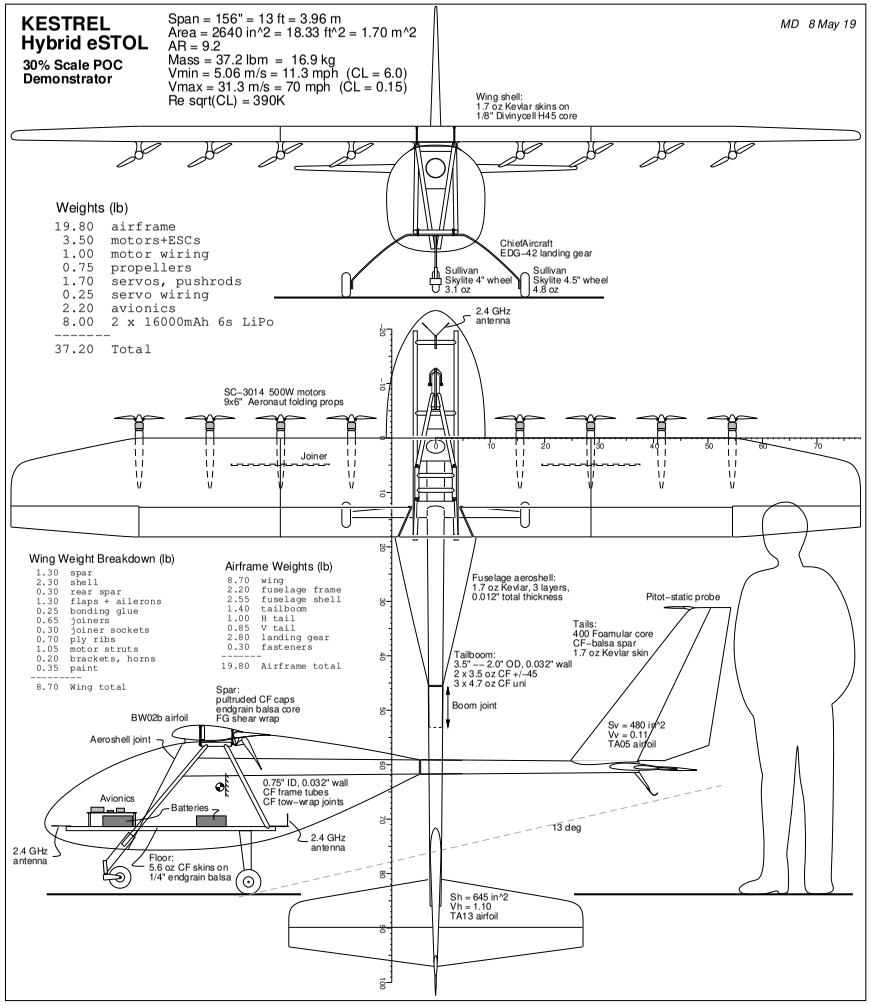
Sizing Load Case





Sparse vs. Detailed 3-View

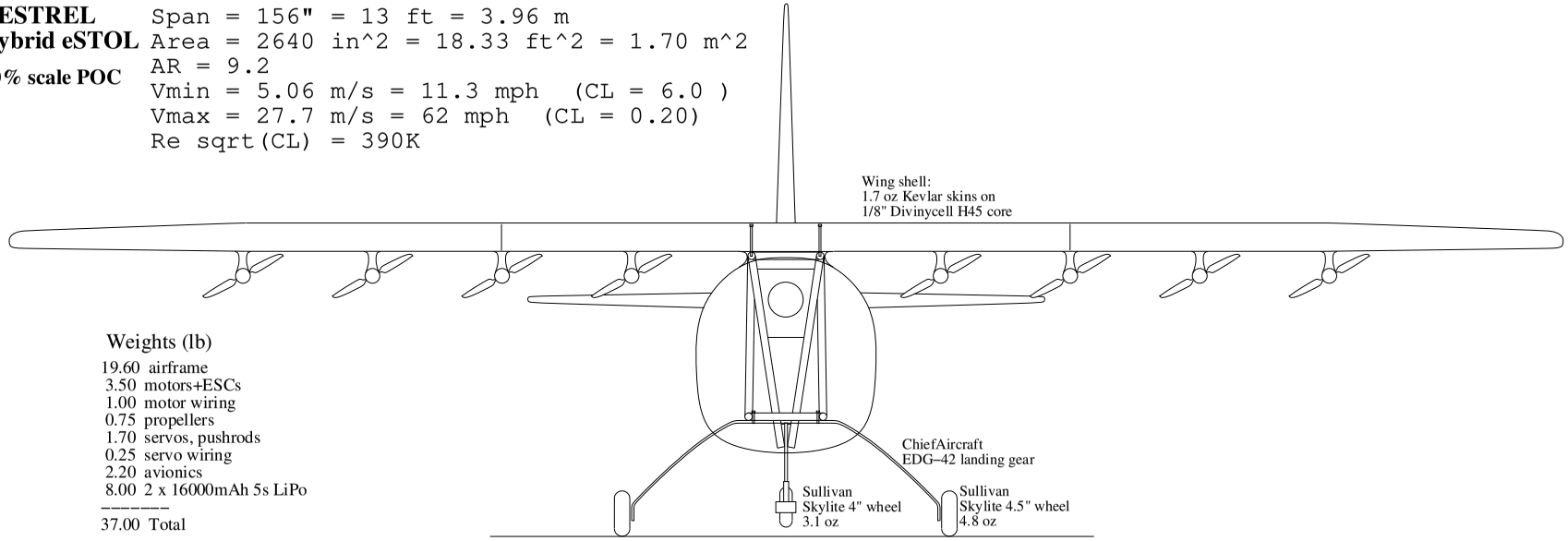




Linewidths and Fonts Matter

KESTREL
Hybrid eSTOL
30% scale POC

```
Span = 156" = 13 ft = 3.96 m
Area = 2640 in^2 = 18.33 ft^2 = 1.70 m^2
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
```



Weights (lb)

19.60	airframe
3.50	motors+ESCs
1.00	motor wiring
0.75	propellers
1.70	servos, pushrods
0.25	servo wiring
2.20	avionics
8.00	2 x 16000mAh 5s LiPo
37.00	Total

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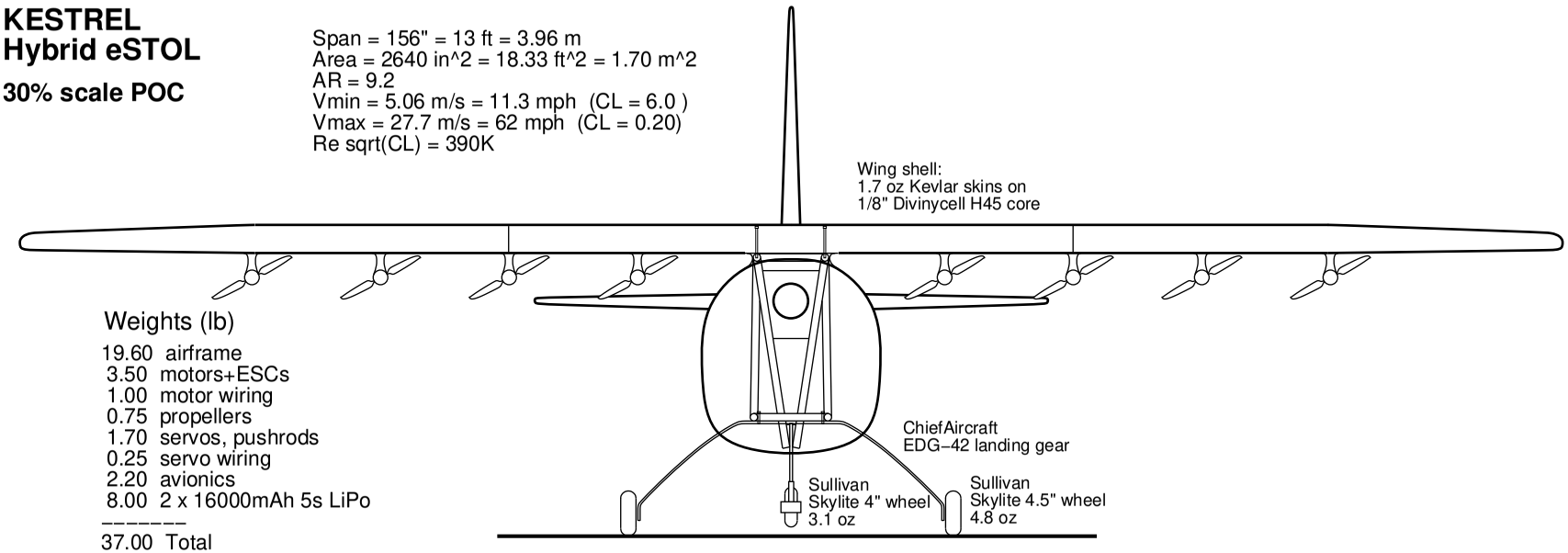

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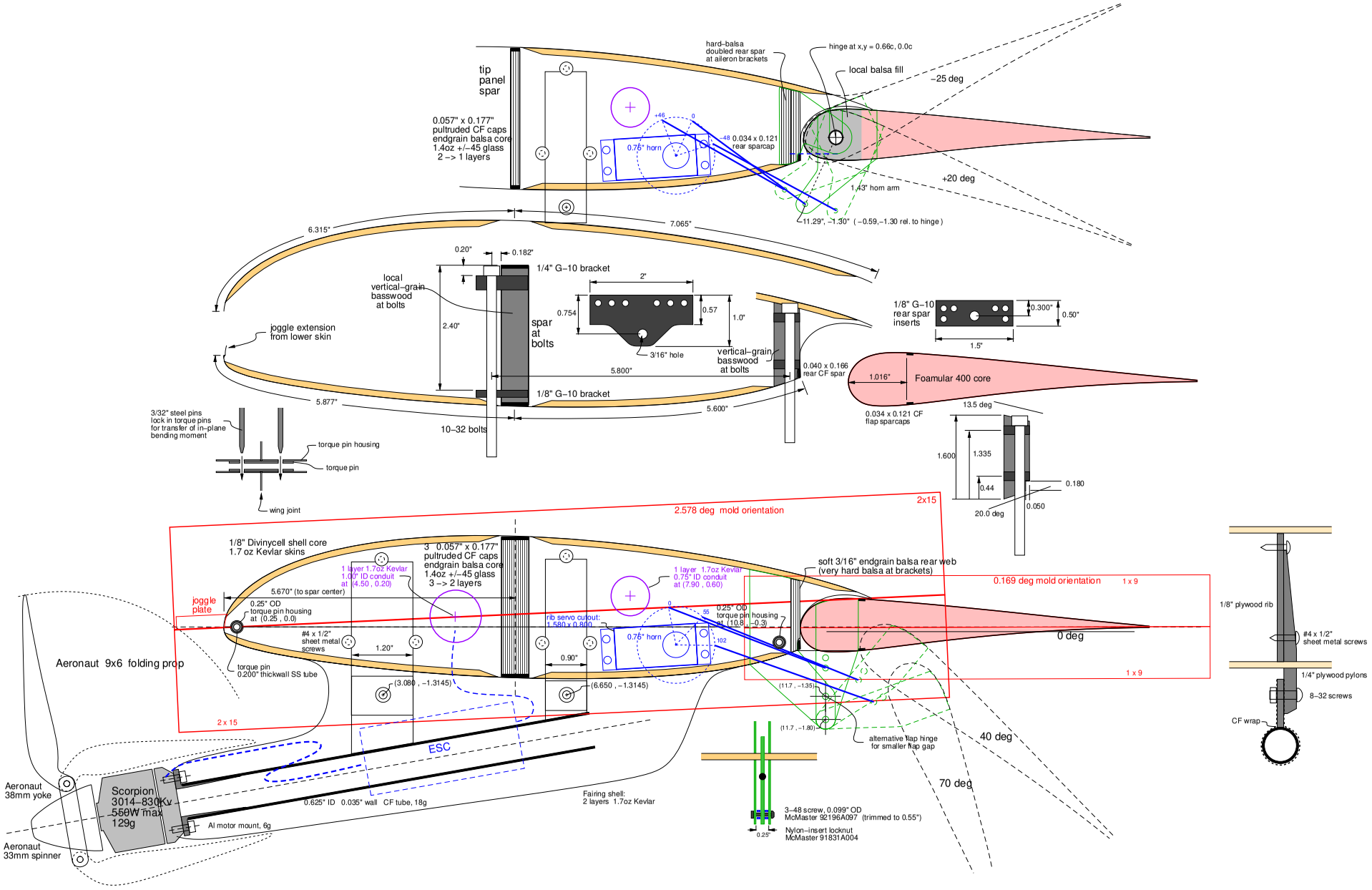
Use Color for Identification, Not Decoration



Existing 2D Drawing Packages

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

Avoid "art" packages (needlessly complex)

- Illustrator
- Clip Studio
- Artweaver
- ...