Engineering Sketch Pad (ESP) Training
Session 7: Putting it All Together

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Revised for v1.11

esp

Overview

- Multi-intent models
- Using UDCs to build aircraft components
- Assembling an aircraft
- Hand-on exercises
    - myGlider
    - myAircraft
- Course summary

- During the design of an aircraft, various coupled models are needed
    - different disciplines
        - structures
        - controls
        - aerodynamics
        - . . .
    - different intents
        - conceptual design
        - preliminary design
        - detailed design
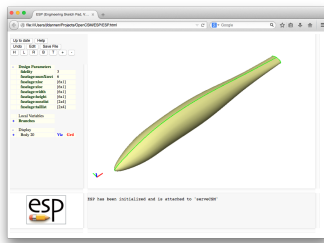- There needs to be communication between these models

ESP **Using UDCs to Build Aircraft Components**

- Build a UDC for each major component type
    - wing
        - also used for tail surfaces
    - fuselage
    - duct
        - might use 2 ducts for high-bypass engine
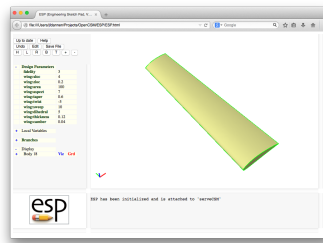   - pylon
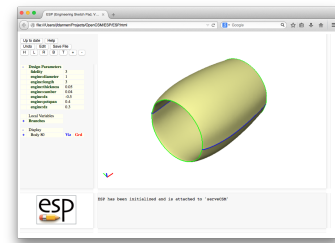   - connects ducts and wing

Aircraft UDCs

intent = 3

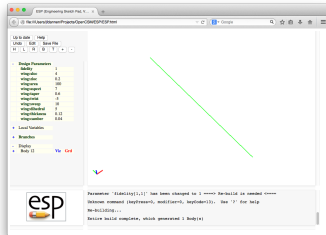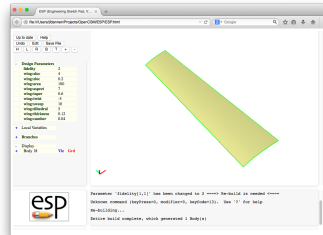| fuselage.udc	wing.udc	duct.udc
xloc (array)	area	diameter
zloc (array)	aspect	length
width (array)	taper	thickness
height (array)	twist	camber
noselist (8×1)	sweep	
taillist (8×1)	dihedral	
	thickness	
	camber	

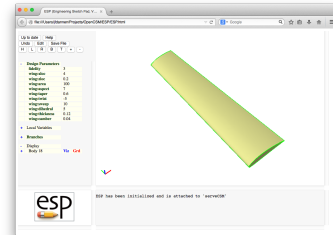# Transport Fuselage for 2 Intents
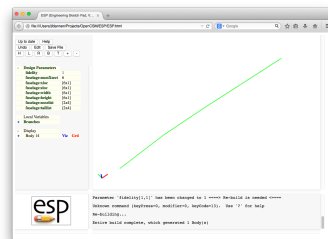
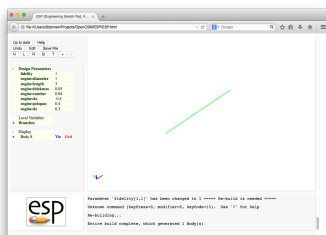intent = 1
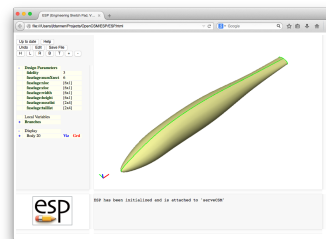
intent = 3

Wing for 3 Intents

intent = 1

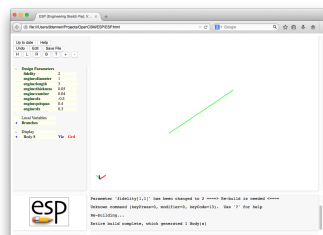intent = 2

intent = 3
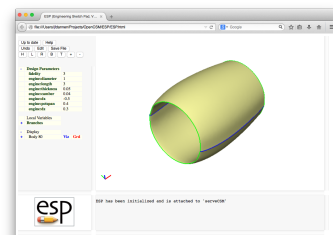
Duct for 3 Intents

intent = 1

intent = 2
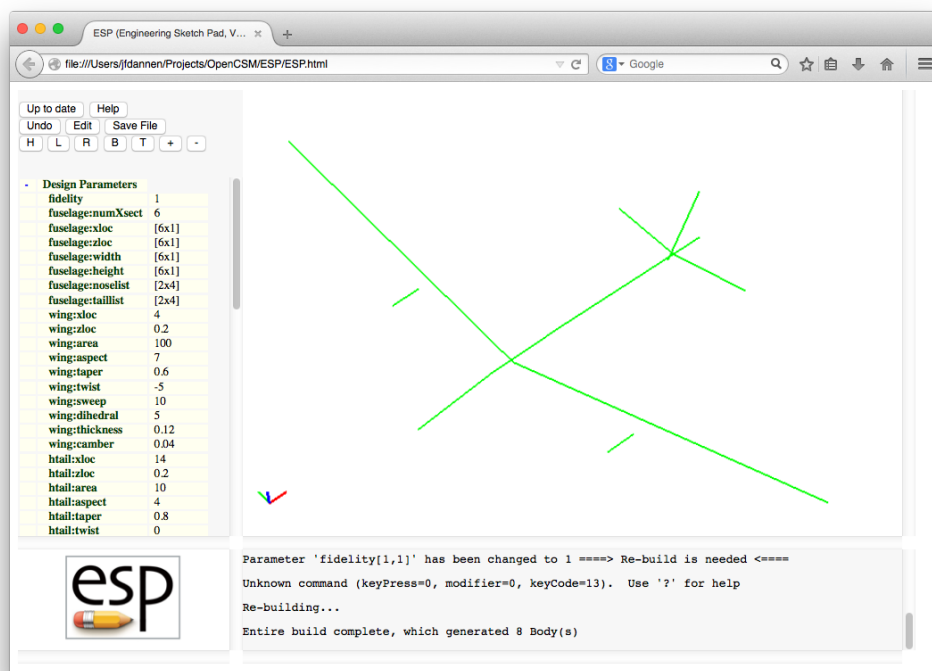

intent = 3

- Majors steps:
  - Set up global parameters
  - Set up parameters for, and position of, each component
  - Call each UDC (perhaps multiple times)
  - If not first component
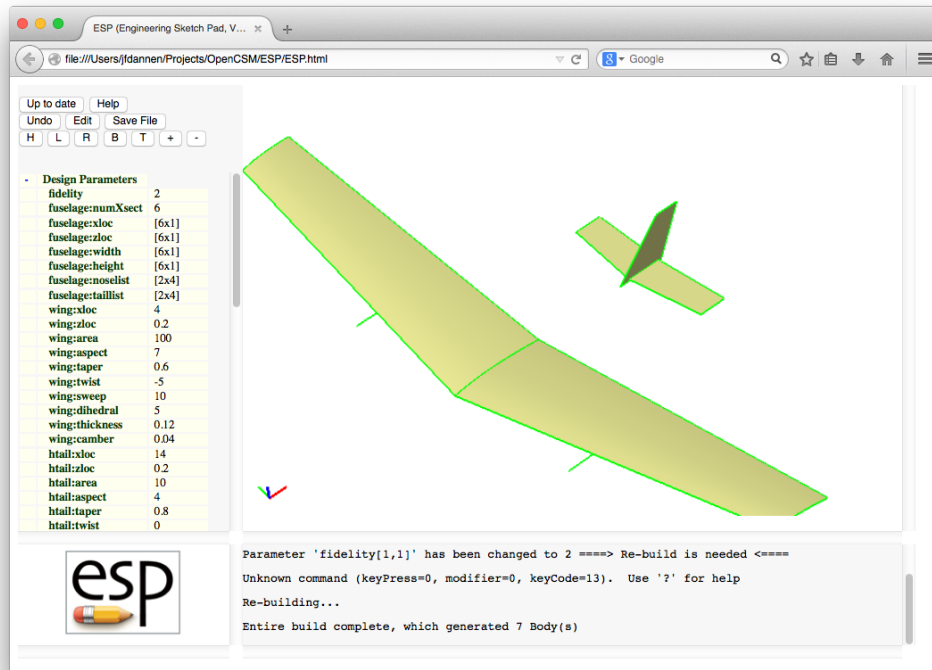   - combine with previous components

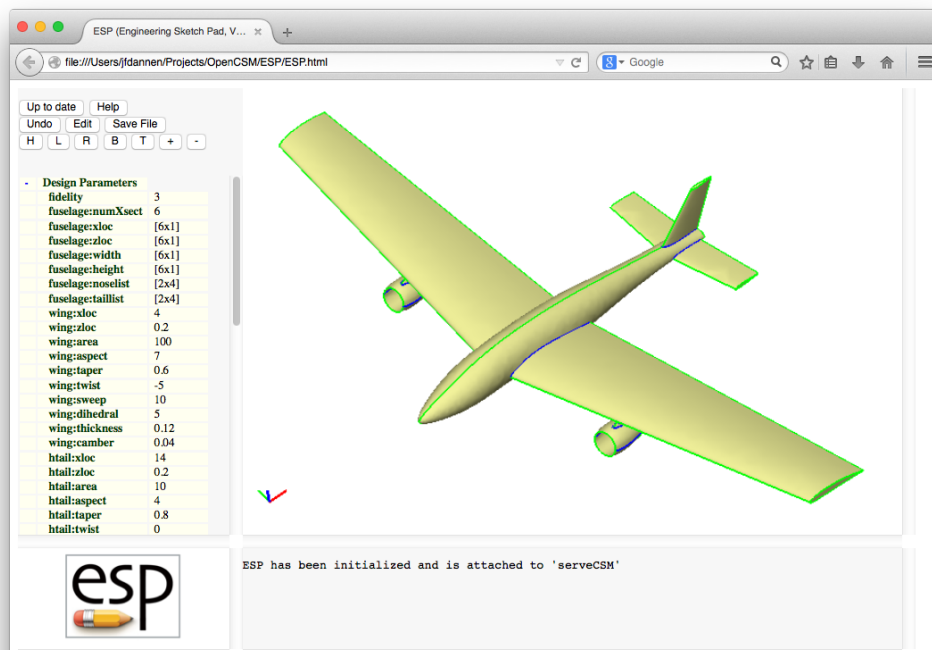# ![esp] myPlane at `intent=1`

myPlane at `intent=2`

myPlane at `intent=3`

Outer-mold line for CFD

Hands-on Exercises

- Run `data/CAPS/myPlane`
  - vary Design Parameters
  - vary `intent`
- Add a tip-mounted pod
  - use `fuselage.udc`

Muddy Cards

- Questions / suggestions about multi-disciplinary models
- Questions / suggestions about multi-intent modes
- Overall effectiveness of course