VSP Design Files
&
XDDM for Cart3D Optimization

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AEROSPACE ENGINEERING
CAL POLY • SAN LUIS OBISPO

VSP Input Representations

- Input
  - Parametric geometry (vsp)
  - Background image (jpg)
  - Surface textures (tga, jpg)
  - Automation script (txt)
  - Airfoil definition (af)
  - Fuselage section definition (fxs)
  - Cabin definition (cab)
  - Wireframe as mesh (hrm)
  - Wireframe as surfaces (hrm)
  - Triangulated mesh (stl, NASCART)
  - Vorlax case file (cas)
  - Design file (des, XDDM)

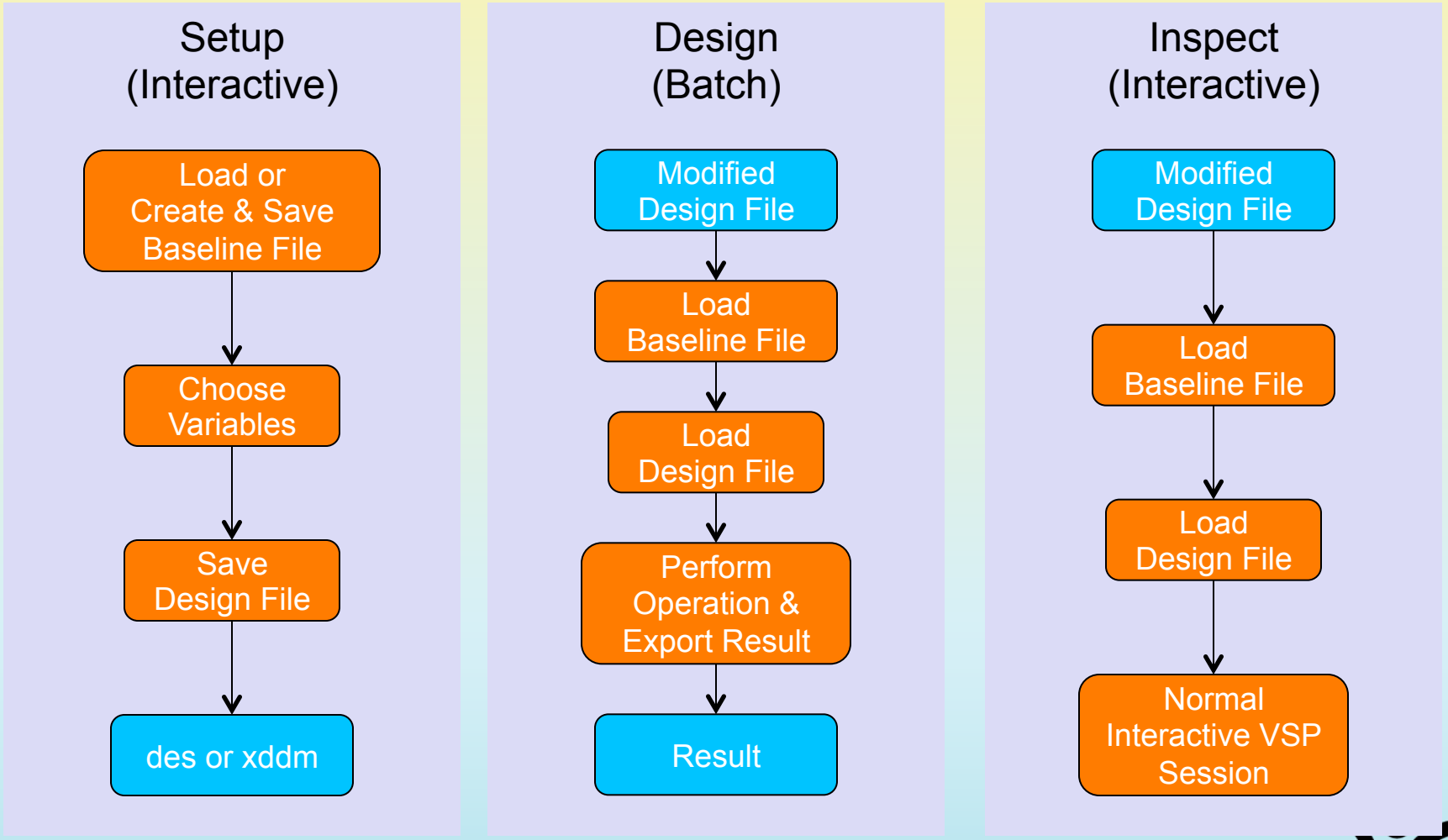
http://www.openvsp.org/wiki/doku.php?id=representations

VSP Output Representations

- Output
  - Parametric geometry (vsp)
  - Screen capture (jpg)
  - Automation script (txt)
  - Wetted area/volume report (txt, csv)
  - Drag buildup report (tsv)
  - Area ruling report (txt)
  - Mass properties report (txt)
  - Wireframe (hrm)
  - X3D 3D Web model (x3d)
  - Felisa (fel)
  - Untrimmed surfaces (3dm)
  - Design file (des, XDDM)
  - Trimmed surfaces (srf)
  - Unintersected triangulated components (tri, possibly others)
  - Intersected triangulated components (stl, NASCART, tri, msh, pov)
  - Isotropic triangulated surface mesh (stl, poly, tri, obj, msh, NASCART)
  - Structural mesh (stl, NASTRAN, Calculix)
  - Vorlax case file (cas)
  - Vorlax geometry & input (inp)

http://www.openvsp.org/wiki/doku.php?id=representations

‘Design’ Workflow

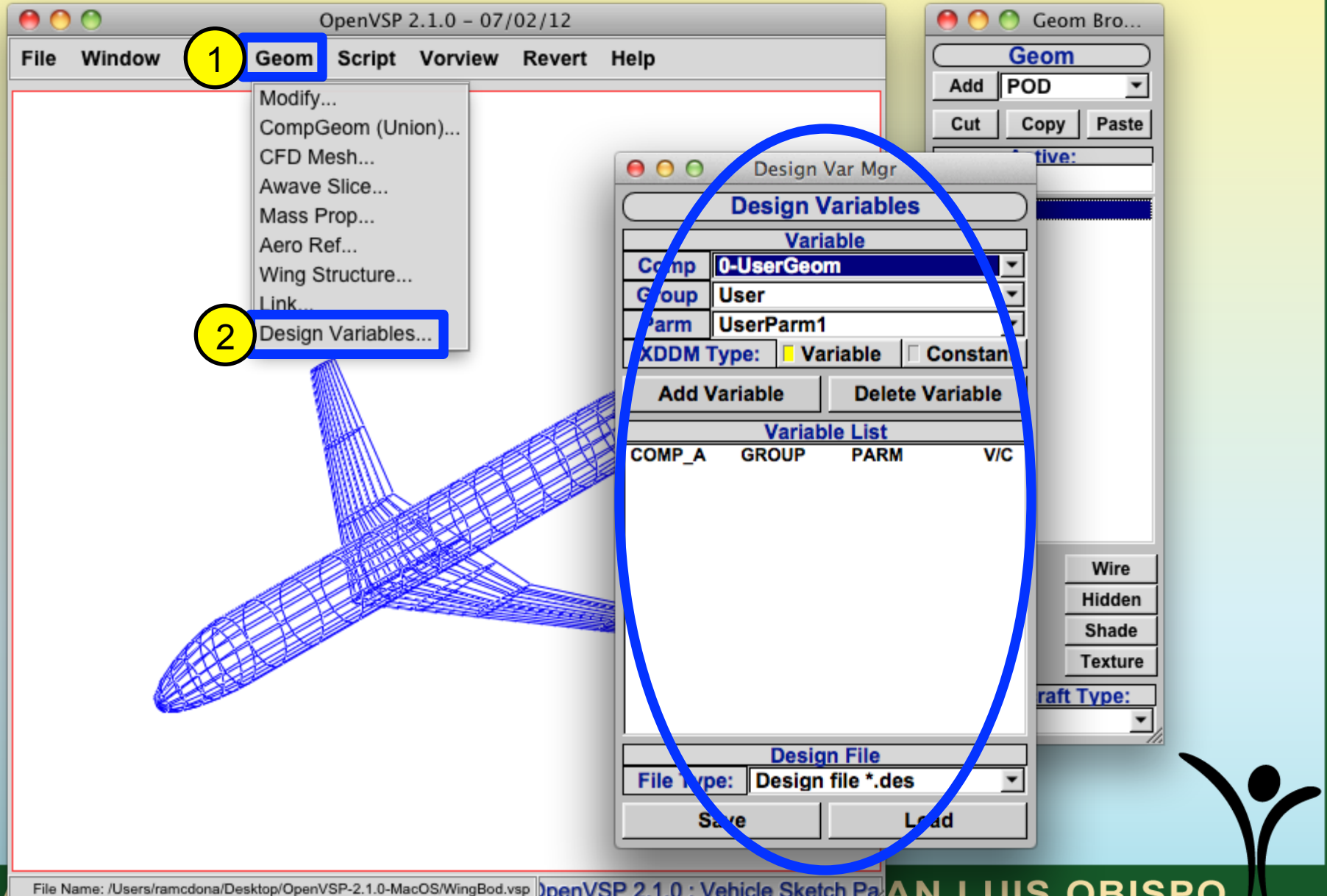


XDDM & Cart3D

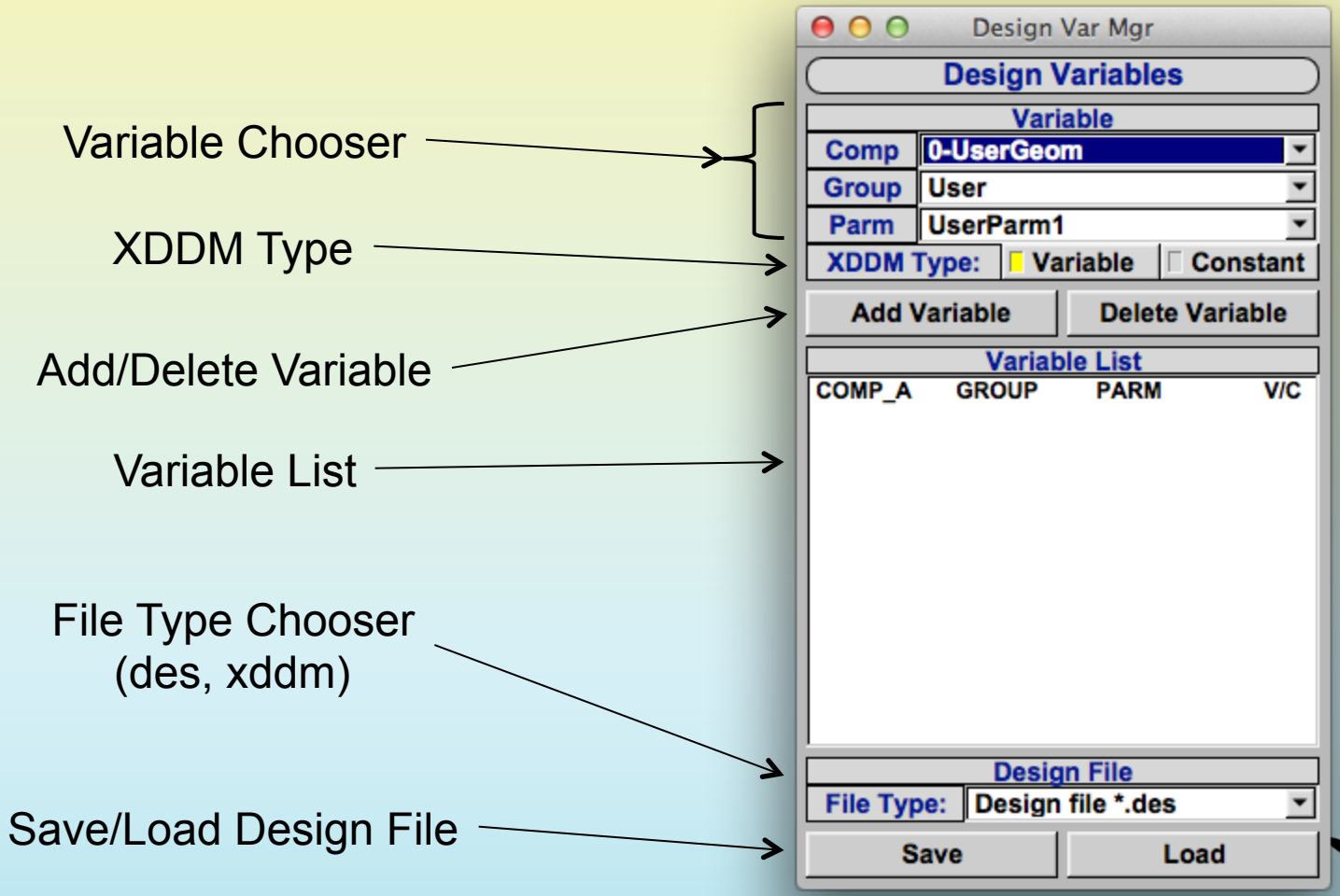
- Cart3D (Marian Nemec) defined file to describe design problems.
  - Extensible Design Description Markup
  - XML File
  - Basic Elements
    - Variable, Constant, Analysis, Function, Sum, Objective, Constraint, Configure
  - Framework Elements
    - Geometry Modeling, Flow Analysis, Module Synthesis

- VSP natively supports
  - 'Variable' & 'Constant' elements. 'Analysis' support in development.
  - Will ignore everything else on 'Load'
    - Exactly what you want VSP to do.
  - Writes modified file with Analysis result.

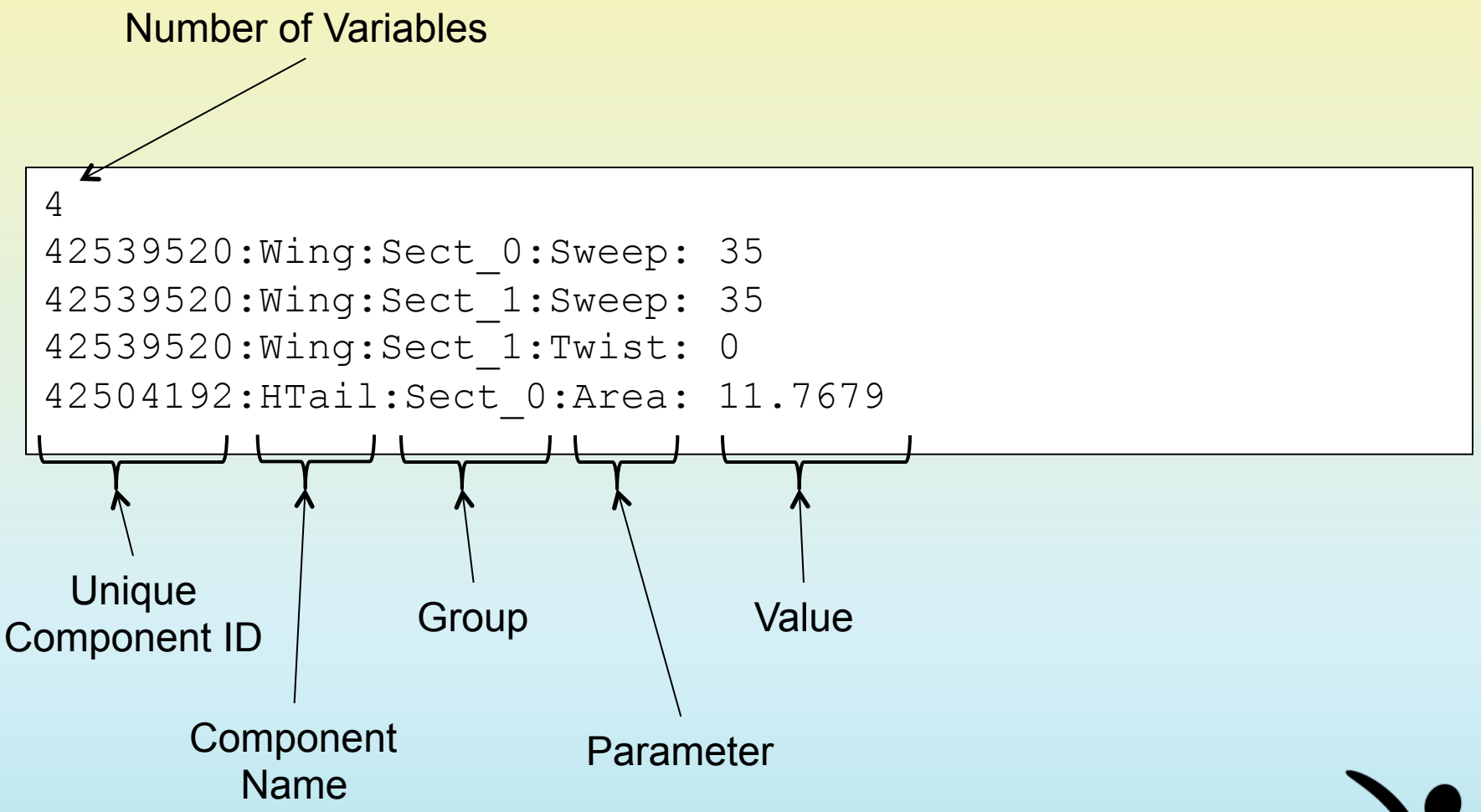
Accessing Design Variable Manager



Design Variable Manager



*.des Design File



*.xddm Design File

```
<?xml version="1.0"?>
<Model ID="/Users/ramcdona/Documents/OpenVSP/build/VSPeclipse/WingBod.vsp" Modeler="OpenVSP" Wrapper="wrap_vsp.csh">
  <Variable ID="42539520:Wing:Sect_0:Sweep" Value="35.0" Min="-85.0" Max="85.0" VSPVarName="42539520:Wing:Sect_0:Sweep"/>
  <Variable ID="42539520:Wing:Sect_1:Sweep" Value="35.0" Min="-85.0" Max="85.0" VSPVarName="42539520:Wing:Sect_1:Sweep"/>
  <Variable ID="42539520:Wing:Sect_1:Twist" Value="0.0" Min="-45.0" Max="45.0" VSPVarName="42539520:Wing:Sect_1:Twist"/>
  <Variable ID="42504192:HTail:Sect_0:Area" Value="11.767910" Min="0.0001" Max="1000000.0" VSPVarName="42504192:HTail:Sect_0:Area"/>
</Model>
```

XDDM ID
(Change as needed)

VSPVarName
(Do not change)

Command Line

des:

vsp -batch airplane.vsp -des airplane.des ###

xddm (Cart3D Optimization):

vsp -batch airplane.vsp -xddm airplane.xddm ###

Where ### stands for any ‘normal’ batch mode command.

Demo Session

- Setup
  - Open baseline model
  - Choose variables
  - Save design files (des, xddm)
- Simulated Design
  - Change files
- Inspect
  - Load design files with changes