

# VSP Design Files & XDDM for Cart3D Optimization

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VSP Workshop  
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# 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)
  - Vorlay case file (cas)
  - Design file (des, XDDM)

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



# VSP Output Representations

- Output

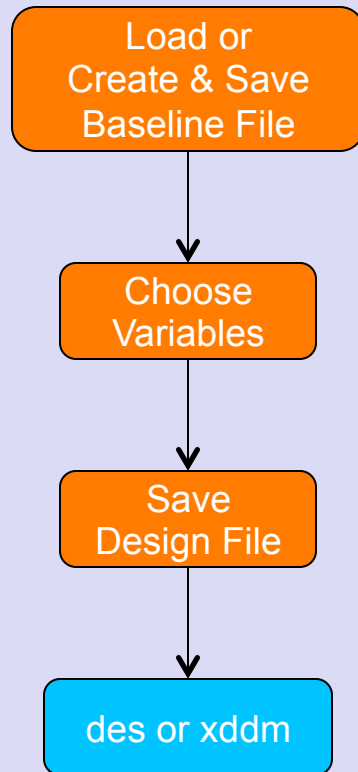
- Parametric geometry (vsp)
- Screen capture (jpg)
- Automation script (txt)
- Wetted area/volume report (txt, csv)
- Drag buildup report (tsv)
- Area ruling report (txt)
- Mass properties report (txt)
- Wireframe (hrm)
- X3D 3D Web model (x3d)
- Felisa (fel)
- Untrimmed surfaces (3dm)
- Design file (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>

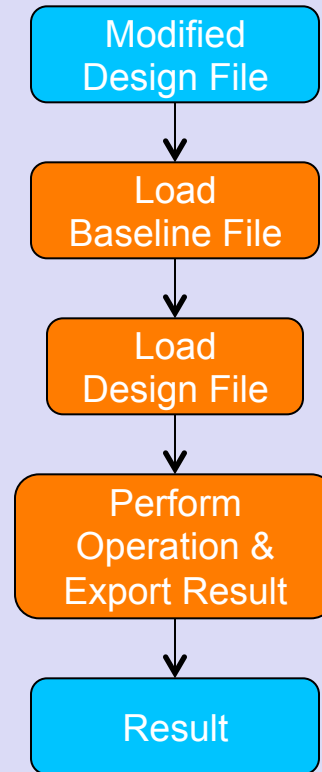


# 'Design' Workflow

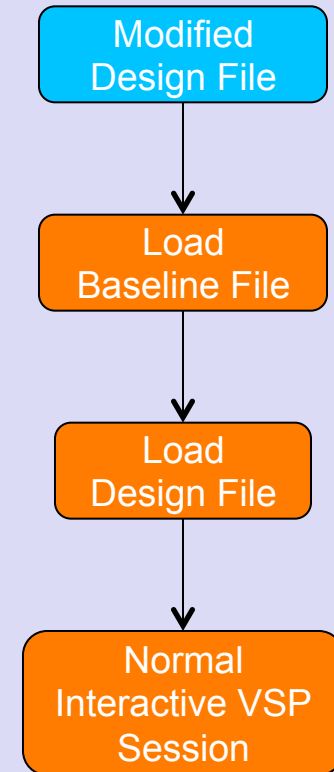
## Setup (Interactive)



## Design (Batch)



## Inspect (Interactive)



# 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

OpenVSP 2.1.0 - 07/02/12

File Window **1** **Geom** Script Vorview Revert Help

- Modify...
- CompGeom (Union)...
- CFD Mesh...
- Awave Slice...
- Mass Prop...
- Aero Ref...
- Wing Structure...
- Link...
- 2** Design Variables...

**Design Var Mgr**

**Design Variables**

Variable

Comp: 0-UserGeom  
Group: User  
Parm: UserParm1  
XDDM Type:  Variable  Constant

Add Variable Delete Variable

**Variable List**

COMP_A	GROUP	PARM	VIC
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Design File

File type: Design file \*.des

Save Load

Geom Bro...

Geom

Add: POD

Cut Copy Paste

Wire Hidden Shade Texture

raft Type:

File Name: /Users/ramcdona/Desktop/OpenVSP-2.1.0-MacOS/WingBod.vsp

OpenVSP 2.1.0 : Vehicle Sketch Pa



# Design Variable Manager

The image shows a screenshot of the 'Design Var Mgr' dialog box. On the left, there are six text labels with arrows pointing to specific parts of the dialog:

- Variable Chooser**: Points to the 'Comp' dropdown menu.
- XDDM Type**: Points to the 'XDDM Type' section, which includes 'Variable' and 'Constant' radio buttons.
- Add/Delete Variable**: Points to the 'Add Variable' and 'Delete Variable' buttons.
- Variable List**: Points to the 'Variable List' table.
- File Type Chooser (des, xddm)**: Points to the 'File Type' dropdown menu.
- Save/Load Design File**: Points to the 'Save' and 'Load' buttons.

The dialog box itself contains the following elements:

- Design Variables** (Section Header)
- Variable** (Section Header)
- Comp**: 0-UserGeom
- Group**: User
- Parm**: UserParm1
- XDDM Type**:  Variable  Constant
- Add Variable** and **Delete Variable** buttons
- Variable List** (Section Header)
- Table**:

COMP_A	GROUP	PARM	V/C
--------	-------	------	-----
- Design File** (Section Header)
- File Type**: Design file \*.des
- Save** and **Load** buttons

# \*.des Design File

Number of Variables

```
4
42539520:Wing:Sect_0:Sweep: 35
42539520:Wing:Sect_1:Sweep: 35
42539520:Wing:Sect_1:Twist: 0
42504192:HTail:Sect_0:Area: 11.7679
```

Unique  
Component ID

Component  
Name

Group

Parameter

Value





# \*.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

