

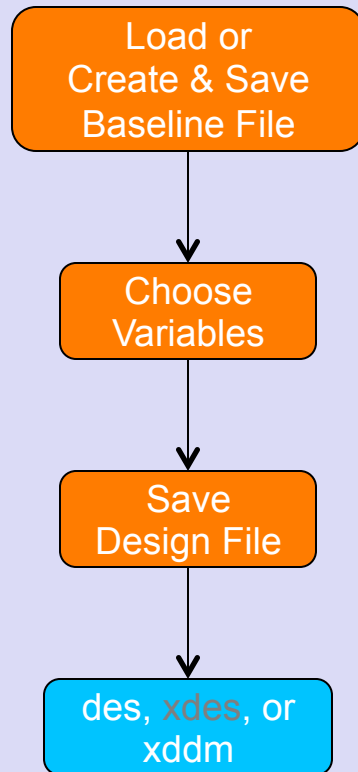
# VSP Design Files & XDDM for Cart3D Optimization

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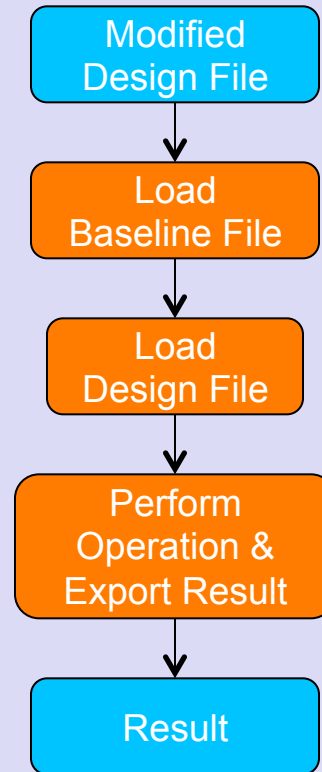
VSP Workshop

# 'Design' Workflow

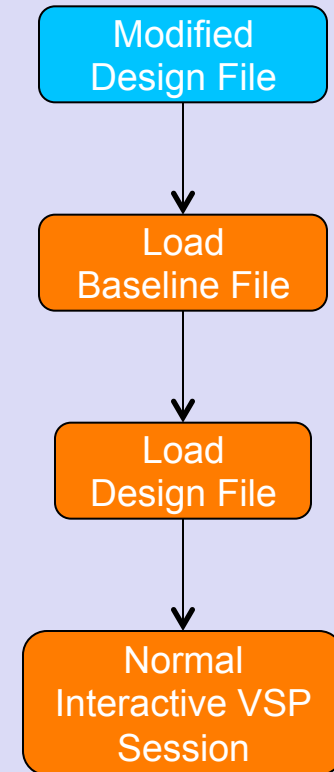
## Setup (Interactive)



## Design (Batch)



## Inspect (Interactive)



# XDDM & Cart3D

- Cart3D (Marian Nemeč) 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

The screenshot shows the OpenVSP 3.2.1 interface. The 'Model' menu is open, and 'Design Variables...' is highlighted. The Design Variables dialog box is open, showing a table of variables for 'User\_Group'. The table has columns for COMP\_A, GROUP, PARM, and V/C. The variables listed are XSec\_1, Root\_Chord, Span, Sweep, and Tip\_Chord.

COMP_A	GROUP	PARM	V/C
WingGeom	XSec_1	Root_Chord	V
WingGeom	XSec_1	Span	V
WingGeom	XSec_1	Sweep	V
WingGeom	XSec_1	Tip_Chord	V



# Design Variable Manager

Variable Chooser →

XDDM Type →

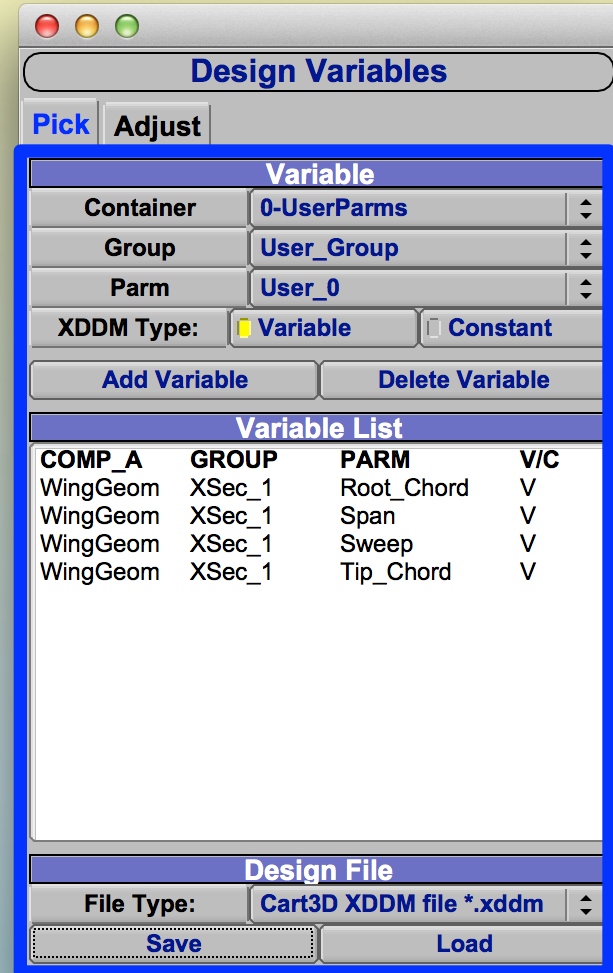
Add/Delete Variable →

Variable List →

File Type Chooser  
(des, xddm) →

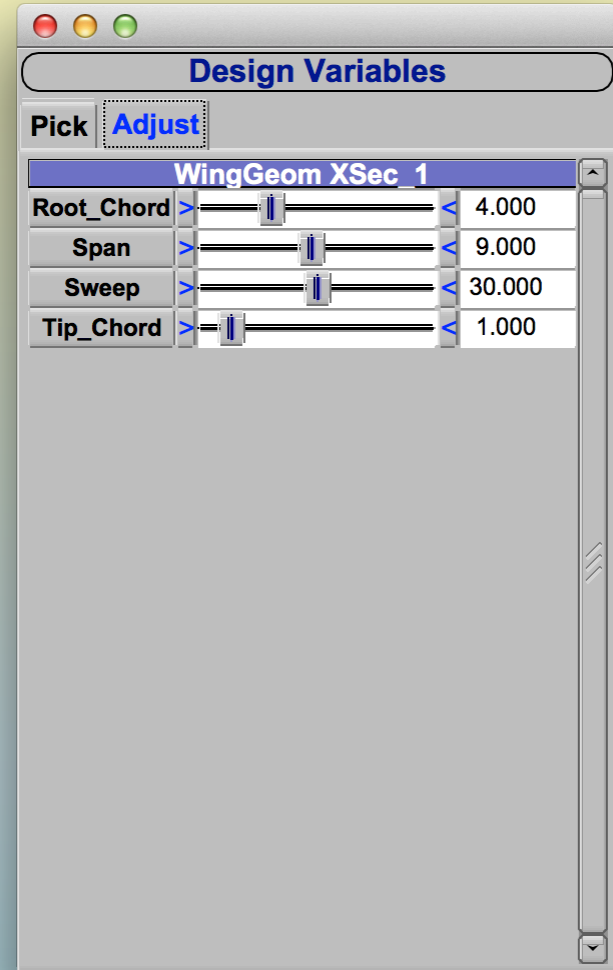
Save/Load Design File →

Drop Zone →



# Adjust Design Variables

Variable Adjust Sliders



# \*.des Design File

Number of Variables

```
4  
MLFQSHONZTV:WingGeom:XSec_1:Root_Chord: 4  
RYNXCVVQEEQ:WingGeom:XSec_1:Span: 9  
HZRFSUHEBEK:WingGeom:XSec_1:Sweep: 30  
YHCHOQAWLQJ:WingGeom:XSec_1:Tip_Chord: 1
```

Unique  
Component ID

Component  
Name

Group

Parameter

Value



# \*.xddm Design File

```
<?xml version="1.0"?>
<Model ID="Unnamed.vsp3" Modeler="OpenVSP" Wrapper="wrap_vsp.csh">
  <Variable ID="WingGeom:XSec_1:Root_Chord" Value="4.00e+00" Min="0.00e+00" Max="1.00e+06" VSPID="MLFQSHONZTV"/>
  <Variable ID="WingGeom:XSec_1:Span" Value="9.00e+00" Min="1.00e-06" Max="1.00e+06" VSPID="RYNXCVVQEEQ"/>
  <Variable ID="WingGeom:XSec_1:Sweep" Value="3.00e+01" Min="-8.90e+01" Max="8.90e+01" VSPID="HZRFSUHEBEK"/>
  <Variable ID="WingGeom:XSec_1:Tip_Chord" Value="1.00e+00" Min="0.00e+00" Max="1.00e+06" VSPID="YHCHOQAWLQJ"/>
</Model>
```

XDDM ID  
(Change as  
needed)

VSPVarName  
(Do not change)





# Command Line

```
vsp airplane.vsp3 -script myscript.vspscript

# -des airplane.des      # Apply design file
# -xddm airplane.xddm   # Apply Cart3D design framework file
# vspscript              # Batch only executable

// Script to export Unintersected Cart3D tri file
void main()
{
    ExportFile( "output.tri", 0, EXPORT_CART3D );
}

// Script to execute CompGeom and export Cart3D tri file
void main()
{
    ComputeCompGeom( 0, false, NO_FILE_TYPE );
    ExportFile( "output.tri", 0, EXPORT_CART3D );
}

// Script to execute CFDMesh and export Cart3D tri file
void main()
{
    ComputeCFDMesh( 0, EXPORT_CART3D );
}
```



# Demo Session

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

