

Altair HVVH Tutorials 2019

HVVH-3000: Design Tab

altairhyperworks.com

In this tutorial, you will learn how to:

- Check run a solver deck generated with Altair Inspire
- OUT file comparison of Altair OptiStruct-written result file after the check run

These additional options are available for the check run of the solver

- 1. Two OUT files generated from an Altair Inspire (Altair OptiStruct solver) run can be compared.
- 2. A current solver run OUT file can be compared with a reference OUT file.
- 3. Two OUT files generated from same solver deck using two different Altair Inspire (Altair OptiStruct solver) versions can be compared.
- 4. Solver version result comparison for Altair OptiStruct results for a model generated in Inspire
  - If the result files are not available, the solver run can be done in the background; result generated are used in the result comparison.

# Step 1: Check run a model built in Altair Inspire (Altair OptiStruct deck).

- 1. From the **Start** menu, select **All Programs > Altair HyperWorks 2017 > Tools > HyperWorks Verification and Validation Harness**.
- 2. Select the **Design** tab, followed by the **Check Run** tab.
- 3. Select the *Check run* button.



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rsign CAD FE Model Solution Result Manufacturing solution	
nspire	
Check Run. Solver version result comparison	
File type : Inspire  Current Version : 2017_2017  Reference Version : 2017_140.00  Current Version : C	C Out Ref. compare
C-\Altan/2017.0.0.14\demon/hwh\Design\insoine\Check-Run\hat.fem	3
Reference OUT file :	3
output orrectory:	1
Prove Automation.	
	Check Run
Result file	Run status
C:/HVVH/OutDir/Inspire_CheckRun/Current_hat.out	2011
Html Report	
Messages 🧪	

- 4. For File type, select *Inspire* (default).
- 5. For **Current version**, select 2017\_2017 (referring to Altair Inspire and Altair HyperWorks versions).
- 6. Under the **Input file** field, click the open file icon, it is search for and load additional input files. Load the hat.fem file, located in ...\tutorials\hvvh\Design\Inspire\Check-Run.
- 7. For the **Output directory** field, use the open file icon,  $\smile$ , to select an output directory.
- 8. Click Check Run.
- 9. In the **Messages** window, the run details are displayed along with the log file location.
- 10. Errors are indicated as Fail otherwise, they are shown to Pass.
- 11. Click HTML Report to generate a check run report.



## **HyperWorks Verification and Validation Harness**

### Inspire - Check Run Report

 File Type : Inspire HW Versio	n : <b>2017_</b> 2	2017	
Result file		Run status	
C:/HVVH/OutDir/Inspire_CheckRun/Curre	nt_hat.out	Pass	

### Step 2: Compare two OUT files (out files comparison).

Out files generated from an Altair OptiStruct solver check run can be directly compared.

1. From the **Design** tab > **Check Run** tab, select the **Out compare** button.



A HVVH - HyperWorks Verification and Validation Harness (v2017)		
File Edit Help		
Design CAD FE Model Solution Result Manufacturing solution		
Inspire		
Check Run Solver version result comparison		
File type :     Inspire     Current Version :     2017_2017     Reference Version :     2017_140.00     *	<ul> <li>Check run</li> <li>Out compare</li> </ul>	<ul> <li>Out Ref. compare</li> <li>Out file comparison</li> </ul>
Input OUT file :		
C:/Altair/2017.0.0.14/demos/hvvh/Design/Inspire/Check-Run/Current_hat.out		<b>2</b>
Reference OUT file :		
C:/Altair/2017.0.0.14/demos/hvvh/Design/Inspire/Check-Run/Reference_hat.out		<u>i</u>
Internet exceedenced and on the seafford and and and and an		
Output directory :		
C:\HVVH\OutDir		
		Check Run
Result file	Run status	OUT comparison
C:/HVVH/OutDir/Inspire_CheckRun_3/Reference_Reference_hat.out	Pass	Fail
Html Report		
🗹 Messages 🛷		
Please refer logfile for status : C:/HVVH/OutDir/Inspire_CheckRun_3/logfile_CheckRun.txt		
Comparing C:/Altair/2017.0.0.14/demos/hvvh/Design/Inspire/Check-Run/Current_hat.out & C:/Altair/2017.0.0.1	4/demos/hvvh/De	sign/Inspire/Check-Run/Referen
Jompieted check run.		

- 2. For File type, select Inspire (default).
- 3. Under the Input file field, click the open file icon, is to search for and load additional input files. Load the hat.fem file, located in ...\tutorials\hvvh\Design\Inspire\Check-Run.
- 4. Use the open file icon, it open file browser and load the Input OUT file Current\_hat.out, located in ...\tutorials\hvvh\Design\Inspire\Check-Run.
- 5. Use the open file icon, to open the file browser and load the Altair OptiStruct Reference OUT file Reference\_hat.out, located in ..\tutorials\hvvh\Design\Inspire\Check-Run.

This file is used to compare the first OUT file.



- 6. For the **Output directory** field, use the open file icon, it is select an output directory.
- 7. Click Check Run.

The two OUT files selected are compared. Some of the important blocks in the OUT files are compared. More blocks will be added in other versions.

- 8. After the Check run [OUT file comparison] the status of the comparison is displayed in the **Messages** window. In the Messages window, the run details are displayed along with the log file location.
- 9. Errors are indicated as Fail otherwise, they are shown to Pass.
- 10. Click *HTML Report*. Comparisons of different blocks of results are shown line-by-line. Warnings are in light orange and errors are in dark orange.

### **HyperWorks Verification and Validation Harness**

### **Inspire - Check Run Report**

 File Type : Inspire
 Current Version : 2017\_2017
 Reference Version : 2017\_140.00

 Result file
 Run status
 OUT comparison

 C:/HVVH/OutDir/Inspire
 CheckRun 3/Reference
 Reference
 hat.out

#### Step 3: OUT file comparison with a reference file.

Out files generated from an Altair OptiStruct solver check run can be compared with a precertified or reference OUT file.



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Manufacturing solution	
arison	
arrent Version : 2017_2017 • Reference Version : 2017_140.00 • Check run G Out Ref. compare	m
sian\Insoire\Check-Run\hat.fem	6
and a second	-
iign/inspire/Check-Run/Reference_hat.out	4
Check Run	
Result file Run status OUT compariso	m
VH/OutDir/Inspire_CheckRun_2/Reference_hat.out Pass Fail	
Html Report	

- 1. From the **Design** tab > **Check Run** tab, select the **Out Ref. compare** button.
- 2. For **File type**, select **Inspire** (default).
- 3. For Current Version, select 2017.
- 4. Under the *Input file* field, click the open file icon,  $\smile$ , to load the hat.fem file, located in ..\tutorials\hvvh\Design\Inspire\Check-Run. This is used for Inspire to run in the background.
- 5. Use the open file icon,  $\triangleright$ , to open file browser and load the Reference OUT file Reference\_hat.out, located in ...\tutorials\hvvh\Design\Inspire\Check-Run. This is used to compare the first generation OUT file.
- 6. For the **Output directory** field, use the open file icon,  $\stackrel{\frown}{\rightarrowtail}$ , to select an output directory.
- 7. Click Check Run.



The two OUT files selected are compared. Some of the important blocks in the OUT files are compared. More blocks will be added in other versions.

- 8. After the Check run [OUT file comparison] the status of the comparison is displayed in the **Messages** window. In the Messages window, the run details are displayed along with the log file location.
- 9. Errors are indicated as Fail otherwise, they are shown to Pass
- 10. Click *HTML Report*. Comparisons of different blocks of results are shown line-by-line. Warnings are in light orange and errors are in dark orange.

### **HyperWorks Verification and Validation Harness**

### Inspire - Check Run Report

File Type : Inspire	Current Version : 2017_2017	Reference Ve	ersion : 2017_140.00	
	Result file	Run status	OUT comparison	
C:/HVVH/OutDir/Ins	pire_CheckRun_2/Reference_hat.out	Pass	Fail	

### **Step 4: Out file comparison from solver check runs.**

Out files generated from different Inspire versions can be directly compared.



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pire		
heck Run Solver version result comparison		
File type : Inspine   Current Version : 2017_2017   Reference Version : 2017_140.00	C Check run	○ Out Ref. compare
	C Out compare	Out file comparison
input hie (solver deck) :		
[C:\Altair\2017.0.0.14\demos\hvvh\Design\Inspire\Check-Run\hat.fem		<u> </u>
Reference OUT file :		
		¢.
Output directory :		
C:\HVVH\OutDir		<b>2</b>
		Check Run
Result file	Run status	OUT comparison
Result file C:/HVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out	Run status Pass	OUT companison
Result file C:/WVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out Html Report	Run status Pass	OUT comparison
Besuit file C:/HVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out Html Report	Run status Pass	OUT comparison
Result file C:/HVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out Html Report	Run status Pilos	OUT comparison
Result file C:/WVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out Html Report	Run status Pass	OUT comparison
Result file C:/HVVH/OutDir/Inspine_CheckRun_1/Reference_hat.out Html Report	Run status Pasa	OUT comparison
Result file C:/HVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out Html Report	Run status Pasa	OUT comparison
Result file C:/WVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out Html Report	Run status Pasa	OUT comparison
Result file C:/WVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out Html Report	Run status Pasa	OUT comparison
Result file C:/HVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out Html Report	Run status Pasa	OUT comparison
Result file C:/HVVH/OutDir/Inspire_CheckRun_1/Reference_hat.out Html Report	Run status Pasa	OUT comparison

- 1. From the **Design** tab > **Check Run** tab, select the **OUT file comparison** radio button.
- 2. For **File type**, select **Inspire** (default).
- 3. For Current version, select 2017\_2017 (referring to the Altair Inspire and Altair HyperWorks versions).
- 4. For **Reference version**, select 2017\_14.0.0.
- 4. Under Input file, click and load the hat.fem file, located in .. \tutorials \hvvh \Design \Inspire \Check-Run.

This is the solver file that will be used to run the solver for the Check run. An OUT file is created in the output directory.

5. For the **Output directory** field, click  $\stackrel{\bigcirc}{\vdash}$  to select an output directory.

6. Click Check Run.

From the same input file, the current version OUT file and reference version OUT file are generated and compared. Some of the important blocks in the OUT files are compared.



- After the *Check run* (OUT file comparison), the status of the comparison is displayed in the **Messages** window. In the Messages window, the run details are displayed along with the log file location.
- 8. Errors are indicated as **Fail** otherwise, they are shown to **Pass**.
- 9. Click *HTML Report*. Comparisons of different blocks of results are shown line-by-line. Warnings are in light orange and errors are in dark orange.

### **HyperWorks Verification and Validation Harness**

### **Inspire - Check Run Report**

File Type : Inspire	Current Version : 2017_2017	Reference Version : 2017_140.00
	Result file	Run status OUT comparison

### Step 5: Solver version result comparison.

This step illustrates solver version result comparison for Altair OptiStruct results for a model generated in Inspire. If the result files are not available, the solver run can be done in the background. The results generated are used in result comparison.

1. From the **Design** tab, select the **Solver version result comparison** tab.

C:/HVVH/OutDir/Inspire CheckRun 1/Reference hat.out

nspire			
Check Run Solver version resu	ult comparison		
Solver Type : Inspire	Tolerance : default	1e-6 Apply Result: OP2	HTML Report
Current		Reference H3D	
Version 2017_2017 *	Run solver	Version 2016_14.13 CRun solver	
Load Model	<b>ä</b>	Load Model	ĕ
Load Result	i i i i i i i i i i i i i i i i i i i	Load Result	ĕ
Output directory :			2
		HyperView Run Solver	Apply
Subcase	Simulation	Result type	
	^	^ [	^
			~
		Tolerance	Apply
Compare result :			
	Current file	Reference file	Report
			Report
F			

- 2. For the **Solver Type**, select *Inspire* (default).
- 3. For the **Tolerance**, select default and leave 1e-06 as the value. You can set any tolerance for the **Scalar**, **Vector** or **Tensor** data types.
- 4. For **Result**, select *H3D*.
- 5. Click *HTML report*.
- 6. Under Current/Load Model, click and load the hat.fem file, located in ...\tutorials\hvvh\Design\Inspire\Solver-version-result-comparison.
- 7. Under Reference/Load Model, click and load the hat.fem file, located in ...\tutorials\hvvh\Design\Inspire\Solver-version-result-comparison.
- 8. For the **Output directory** field, click  $\stackrel{\frown}{\vdash}$  to select an output directory.



HVVH - HyperWorks Verification and Validation Harness (v2017)	
le Edit Help	
esign CAD FE Model Solution Result Manufacturing solution	
Inspire	
Check Run Solver version result comparison	
Solver Type : Inspire Tolerance : default	1e-6 Apply Result: H3D HTMLReport ¢
Current	Reference
Version 2017_2017 Version 2017_2017	Version 2017_140.0( Version Run solver
Load Model hvvh/Design/Inspire/Solver-version-result-comparison/hat.fem	Load Model vvh/Design/Inspire/Solver-version-result-comparison/hat.fem
Load Result	Load Result
Output Lawrence	نة ا
directory :	

- 9. Activate the *Run solver* option.
- 10. Click the **Run Solver** button. This runs the solver in different versions of Altair Inspire and loads the results in the **Load Result** box.

HVVH - HyperWorks Verification and Validation Harness (v2017)	
le Edit Help	
Design CAD FE Model Solution Result Manufacturing solution	
Inspire	
Check Run Solver version result comparison	
Solver Type : Inspire Tolerance : default	1e-6 Apply Result: H3D ▼ HTMLReport ↓
Current	Reference
Version 2017_2017 📩 🗷 Run solver	Version 2017_140.0( VER Run solver
Load Model hvvh/Design/Inspire/Solver-version-result-comparison/hat.fem	Load Model vvh/Design/Inspire/Solver-version-result-comparison/hat.fem
Load Result C:/HVVH/OutDir/Solution_RunSolver/Current/hat_des.h3d	Load Result C:/HVVH/OutDir/Solution_RunSolver/Reference/hat_des.h3d
Output C:/HVVH/OutDir directory :	ತೆ
	HyperView Run Solver Apply

#### 11. Click **Apply**.

The results available (Subcase, Simulation, and Result type) in the result file are loaded in the corresponding windows.

Subcase	Simulation	Result type	
Design	Iteration 0     Iteration 1     Iteration 2     Iteration 3	Shape Change	Ĵ
🗆 Ali	II All	E All	
		Tolerance App	ly



- 12. Activate each **All** option beneath the result windows and click the second **Apply** button.
- 13. You can also select any combination of the Subcase, Simulation, and Result types to compare fewer results.

Result comparisons of the current results and reference results are generated.

- 14. In the **Messages** window, the run details are displayed along with the log file location.
- 15. If **difference > tolerance**, it is indicated as **Fail** otherwise, they are shown to **Pass**.
- 16. Click *HTML Report*. Comparisons of different data types are available. For example, for a vector (Displacement), all the components Magnitude, X-displacement, Y-displacement, and Z-displacement are compared for the whole model and the results are shown.



17. Click on **Pass/Fail** in the HTML report to open a detailed comparison report.

18. If **difference > tolerance**, it is indicated as **Fail** otherwise, they are shown to **Pass**.



19. In the above report, the left window displays the diff contour (Current-Reference) and the right window displays the diff plot in Altair HyperGraph.



- 20. Click the left window to open the diff-values H3D in HyperView Player. You can view the difference in the contour and view the area where there are differences in case of failure.
- 21. Click the right window to maximize/minimize the plot. The difference values for each step are calculated and the min/max values of difference are plotted.
- 22. For following two options, please refer to the Solution tab > Solver version result comparison section:
  - Solver version result comparison (Altair HyperView option)
  - Solver version result comparison (Run solver option)