

Knowledge Base

Information

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VCCT for Abaqus plug-in utility

Portfolio / Domain: SIMULIA Abaqus Unified FEA / SIMULIA Abaqus Unified FEA
 Product: n/a

QUESTION

I am using VCCT for Abaqus. How can I make use of Abaqus/CAE to generate the necessary model definitions?

ANSWER

Abaqus/CAE 6.13 and higher directly support the VCCT capability for Abaqus/Standard only.

(The following applies to Abaqus/CAE 6.10 and higher. For previous releases, see attached files.)

For the releases mentioned immediately above, Abaqus/CAE does not directly support the VCCT capability. However, a plug-in utility that extends the functionality of Abaqus/CAE is attached to this Answer. This utility works for Abaqus/Standard and Abaqus/Explicit.

For both native geometries and orphan meshes, the VCCT plug-in allows you to interactively:

- define debond interface(s), and
- create interface properties, and
- contact clearance(s)

from within Abaqus/CAE. This eliminates the need for input file editing to complete the VCCT model definition and makes it easier for you to edit existing interfaces.

Supported Keywords

The following keyword options, required for both Standard and Explicit VCCT analyses, are supported by the plug-in:

- *FRACTURE CRITERION, TOLERANCE=*tol*, TYPE=*vcct*, MIXED MODE BEHAVIOUR=[*bk* | *power* | *reeder*]
- *NODAL ENERGY RATE

The following keyword options, required for Standard VCCT analyses, are supported by the plug-in:

- *DEBOND, SLAVE=*slave_surf*, MASTER=*master_surf*, FREQUENCY=*freq*, OUTPUT=[*fil* | *dat* | *both*], VISCOSITY=*visc_coeff*

The following keyword options, required for Explicit VCCT analyses, are supported by the plug-in:

- *CONTACT CLEARANCE, NAME=*name*, ADJUST=*yes*, CLEARANCE=*0.0*, SEARCH NSET=*nset_surf*
- *CONTACT CLEARANCE ASSIGNMENT

The following keyword are already supported by Abaqus/CAE, but are modified by the plug-in to work in conjunction with VCCT-related keywords (Standard only):

- *INITIAL CONDITIONS, TYPE=CONTACT
- *CONTROLS, TYPE=*vcct_linear_scaling*

Installation

The plug-in should be used with Abaqus Version 6.9-EF or higher. For earlier versions, see the instructions attached below.

To install the plug-in, save the attached archive file VCCT_Plugin.zip to one of the following directories:

abaqus_dir\abaqus_plugins where *abaqus_dir* is the Abaqus parent directory

home_dir\abaqus_plugins where *home_dir* is your home directory

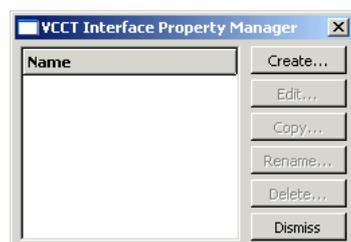
current_dir\abaqus_plugins where *current_dir* is the current directory

Note that if the *abaqus_plugins* directory does not exist in the desired path, it must be created. The *plugin_dir* directory can also be used, where *plugin_dir* is a directory specified in the *abaqus_v6.env* file by the environment variable *plugin_central_dir*. You can store plug-ins in a central location that can be accessed by all users at your site if the directory to which *plugin_central_dir* refers is mounted on a file system that all users can access. For example, *plugin_central_dir* = r'\\fileServer\sharedDirectory'

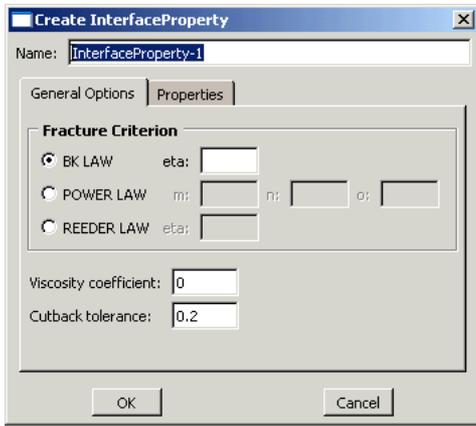
On Windows platforms, right click on the archive file and select WinZip → Extract to here. On Linux platforms, type `unzip VCCT_Plugin.zip` at the command prompt. Folders named *abq_Vcct* and *abq_CaeManagerTemplate*, and a file named *vcct_plugin.py* will be extracted. Note that the plug-in will not function properly if this procedure is not followed.

Usage

Usually, the interface property will be created first. From Interaction module, select Plug-ins → VCCT → Interface Property Manager... to open the following dialog:



Selecting **Create...** brings up the following dialog:

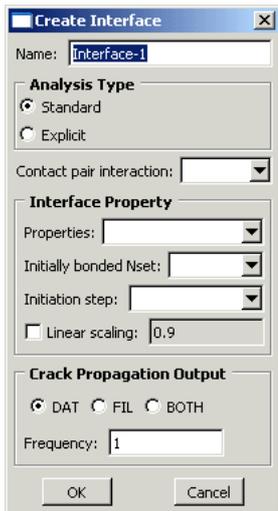


Select the fracture criterion and enter the necessary properties. If the critical energy release rates vary spatially, select the **Spatially dependent** button in the **Properties** tab and enter the critical energy release rates for one or more nodes.

To create an interface, from the Interaction module select **Plug-ins** → **VCCT** → **Interface Manager...** to open the following dialog:



Selecting **Create...** opens the following dialog:



Depending on the analysis type, select **Standard** or **Explicit**. Some menus will change to reflect differences between Standard and Explicit analysis.

Select an existing contact interaction under **Contact pair interaction/Contact Interaction** (note, only interactions created in the 'Initial' step will be available). Select a VCCT interface property under **Properties**.

For Standard analysis, select a set for the initially bonded region under **Initially bonded Nset**. For Explicit analysis, select a contact clearance under **Contact Clearance**.

Set the starting step under **Initiation step**.

For Standard analyses, if **Linear scaling** is checked, then the ***CONTROLS** keyword will be written out with the value entered. When multiple interfaces are created, the **Linear scaling** specified in the first interface will be written to the input file. If **Linear scaling** of the first interface is unchecked then the **Linear scaling** specified in a subsequent interface will be written to the input file. Finally, select the value of the output parameter for ***DEBOND** under **Crack Propagation Output**.

Notes

- The following existing keywords *INITIAL CONDITIONS, TYPE=CONTACT, *FRACTURE CRITERION, *CONTROLS, TYPE=VCCT, *CONTACT CLEARANCE, *CONTACT CLEARANCE ASSIGNMENT, *NODAL ENERGY RATE are not written to the input file if the VCCT plug-in is being used. These keywords must be manually added to the input file before running the analysis.
- The plug-in will overwrite the keywords during job submission. If the user manually edits the keywords and then submits a job with the plug-in installed, the input deck will reflect the VCCT objects found by the plug-in. The keywords are overwritten in the input file even if the plug-in is not launched but installed in the abaqus_plugins folder.

Revision History

13 Feb 07	Release of Release 1.1-1
22 Feb	Release of Release 1.2-1 to correct the following bug: If an Abaqus/CAE model has only

07	materials, and a material evaluation is performed, the error message Error: The callback procedure did not return a model name is produced.
05 Jul 07	Attached compiled Version 6.7 files. No changes to plug-in functionality. Plug-in Release 1.2-1.
07 Feb 08	Attached compiled Version 6.7-EF files. No changes to plug-in functionality. Plug-in Release 1.3-1.
07 Jul 08	Support for Version 6.8. Plug-in fundamentally modified to support VCCT within Abaqus/Standard. Plug-in Release 2.1-1.
25 Aug 08	Adding check for not interfaces or interface properties. Plug-in Release 2.1-2.
30 Aug 08	Updated manager template. Added check for additional models. Plug-in Release 2.1-3.
13 Jan 09	Fix changeKey callback through API calls. Plug-in Release 2.1-4.
14 Apr 09	Fix *Contact Pair limitation. Plug-in Release 2.1-5.
22 Apr 09	Add additional check if any model in database does not contain VCCT information. Plug-in Release 2.1-6.
24 Nov 09	Fixed version typo for 6.8 and 6.9. Plug-in Release 2.1-7.
25 Nov 09	Abaqus/Explicit support. Plug-in Release 2.2-1.
28 Jun 10	Plug-in Release 2.3-2.
21 Oct 10	Fix upgrade from version older than 6.9EF to 6.10. Plug-in Release 2.3-3.
20 Oct 11	Fixed bugs related to *Debond not written for multiple interfaces. Plug-in Release 2.3-4.
10 May 13	Plug-in issues a warning message about the keywords that are overwritten. Plug-in Release 2.3-5

VCCT plug-in and Abaqus/CAE Version Compatibility Matrix

Below is the information related to VCCT plug-in releases. Note that only the latest increment of each version is shown.

VCCT plug-in Release	Abaqus/CAE Release	File name
2.1-7	6.8	VCCT_Plugin_68.zip
2.1-7	6.9	VCCT_Plugin_69.zip
2.2-1	6.9-EF	VCCT_Plugin_69EF.zip
2.3-5	6.10 and up	VCCT_Plugin.zip

Disclaimer

The attachments to this article are subject to certain usage conditions. Please [click here](#) for details.

KEYWORDS **plugin, plug-in, composite, delamination**

ATTACHMENT

vcct_plugin_68.zip

answer_3235_fig3_new.png

answer_3235_fig4_new.png

answer_3235_fig2_new.png

vcct_plugin_69ef.zip

vcct_plugin_69.zip

answer_3235_fig1_new.png

VCCT_Plugin.zip

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