

# Knowledge Base

Information



## VCCT for Abaqus plug-in utility

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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

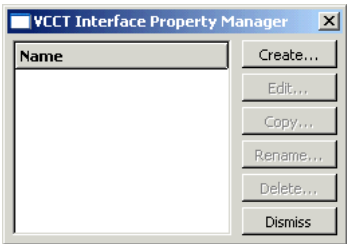
current\_dir\abaqus\_plugins where current\_dir is the current directory

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'

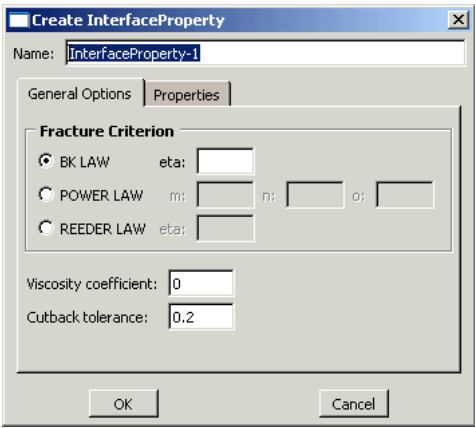
On Windows platforms, right click on the archive file and select WinZip → Extract to here. On Linux platforms, type unzip VCCT\_Plugin.zip at the command prompt. Folders named abq\_Vcct and abq\_CaeManagerTemplate, and a file named vcct\_plugin.py will be extracted. Note that the plug-in will not function 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:

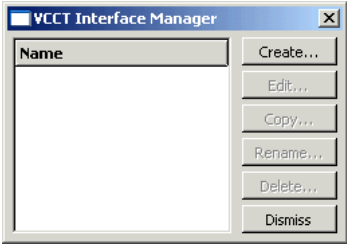


Selecting Create... brings up the following dialog:

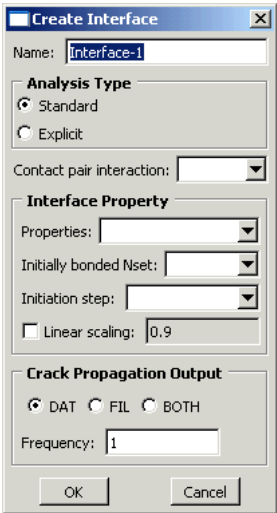


Select the fracture criterion and enter the necessary properties. If the critical energy release rates vary spatially, select the **Spatially dependent** button in the **Properties** tab and enter the critical energy release rates for one or more nodes.

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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