

# Knowledge Base

Information



## Abaqus/CAE plug-in for creating landing gear models

**Portfolio / Domain:** SIMULIA Abaqus Unified FEA / SIMULIA Abaqus Unified FEA  
**Product:** SIMULIA Abaqus/CAE

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**Rating:** Not Rated  
**Views:** 558

QUESTION

**How can I facilitate the creation of rigid body landing gear models in Abaqus/CAE?**

ANSWER

(The following applies to Abaqus 6.9 and higher.)

An Abaqus/CAE plug-in that facilitates the creation of rigid body landing gear models is attached. The plug-in contains a parameterized landing gear model. When you fill in the coordinates of the reference points and relative lengths between joint points, the plug-in automatically creates the display part, connection points, connection joints, and landing gear system of the aircraft. A template airplane model is used as basis.

**Installation**

To install the plug-in, save the attached archive file 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 LGS.zip** at the command prompt. A folder named `abq_SumRF` and a file named `lgs_plugin.py` will be extracted. Note that the plug-in will not function properly if this procedure is not followed

**General Information**

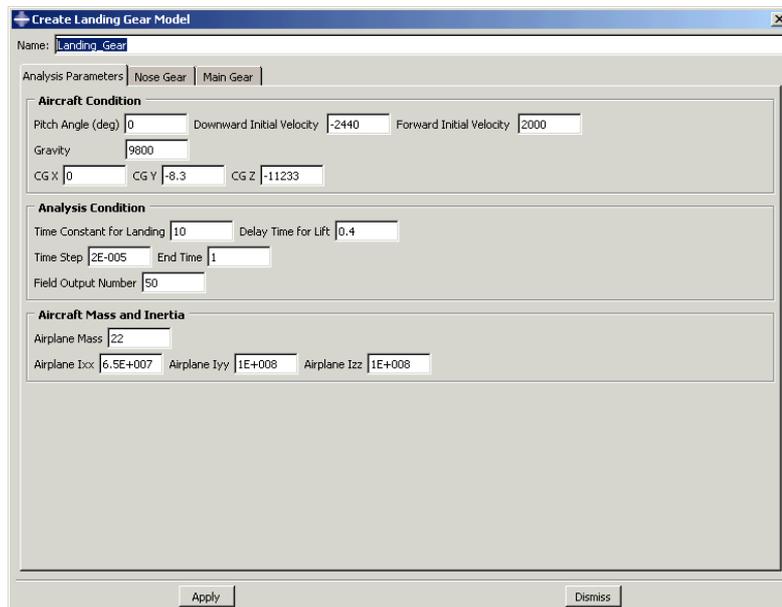
The plug-in creates the aircraft rigid body, nose landing (NLG) gear system, and main landing gear (MLG) system in Abaqus/CAE. The attached file `Airplane.inp` and property files must be available in the working directory; see the notes below. The nose gear system consists of folding gear, main fitting, piston, axle, and tire. The main gear system consists of folding gear, main fitting, tailing gear, shock absorber, axle, and tire. It is assumed that the folding gear is not folded.

Each system consists of rigid body which is represented by display body with beam element. Each rigid body has own mass and inertia properties, which must be assigned in the GUI. Each rigid body is joined with connector elements. The nonlinear spring and damper properties for the tire and shock absorber are imported from the external text file. The schematic view of the landing gear system can be found in the attached `LandingGear-Model-Info.pdf` file.

For the analysis, you can define the gravity and lift force, which is assumed to have the same magnitude of the aircraft weight. The initial landing velocities, the pitch angle of the aircraft, and total simulation time can also be controlled.

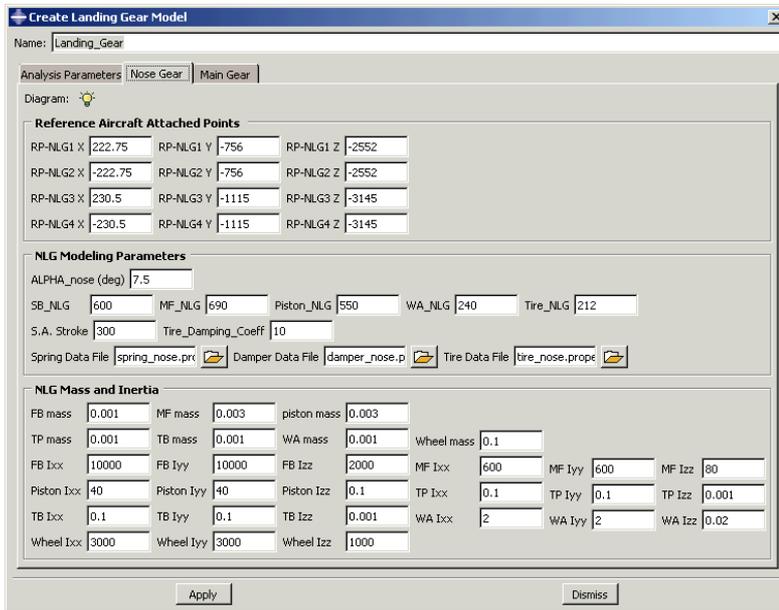
**Usage**

Launch the plug-in by selecting **Plug-ins** → **Create Landing Gear Model...** from the **Assembly** module, and the following dialog is shown for the primary analysis parameters:

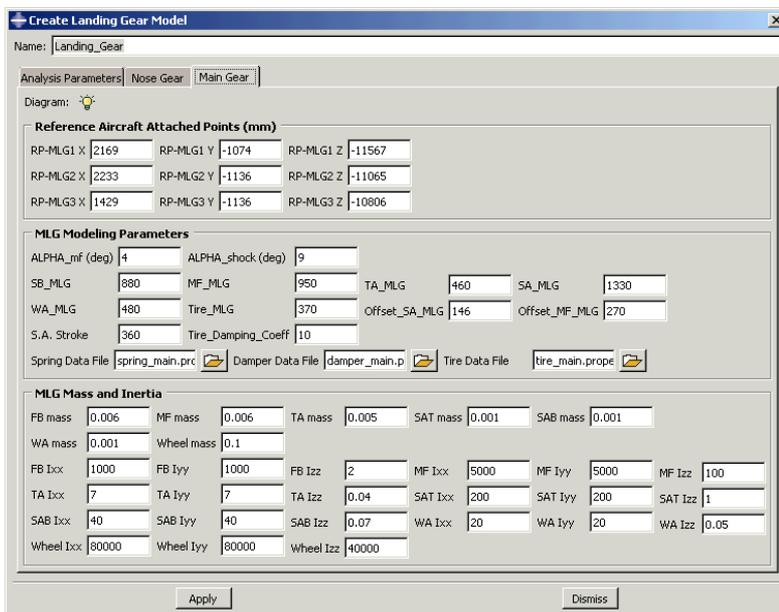


Select the **Nose Gear** tab to specify the attachment points and physical parameters:

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Similarly select the **Main Gear** tab to specify the properties of the main landing gear:



Preset values are entered in each text field. The plug-in creates the landing gear model using the default values if you do not modify them. Each parameter in the GUI is described in the attached LandingGear-Model-Info.pdf file.

After clicking **Apply** the landing gear rigid body model is created.

**Notes**

1. The elements created by the plug-in are used in a display body, which is not deformable.
2. The aircraft mesh is not changed by the plug-in.
3. Once the model is created, the display body mesh is not changed even if one of reference points is changed.
4. The input file and property files listed below are available in the attached files.zip file
  - o The property files for shock absorber are required for NLG and MLG in your working directory (nonlinear spring and damper data: spring\_nose.property, spring\_main.property, damper\_nose.property, and damper\_main.property).
  - o The property files for the tire are required for NLG and MLG in your working directory (nonlinear spring data: tire\_nose.property and tire\_main.property).
  - o The airplane input file Airplane.inp must be in your working directory.
5. Once the input file is generated, it should be run with double precision in Abaqus/Explicit.

**Disclaimer**

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

**Acknowledgement**

Dassault Systemes SIMULIA would like to acknowledge FOKKER Landing Gear for their contributions.

KEYWORDS **plug-in, plugin, 4509**

ATTACHMENT

<a href="#">LandingGear-Model-Info.pdf</a>	<a href="#">files.zip</a>	<a href="#">answer_4509_fig3.png</a>	<a href="#">answer_4509_fig2.png</a>
<a href="#">answer_4509_fig1.png</a>	<a href="#">answer_4509_fig4.png</a>	<a href="#">LGS.zip</a>	

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