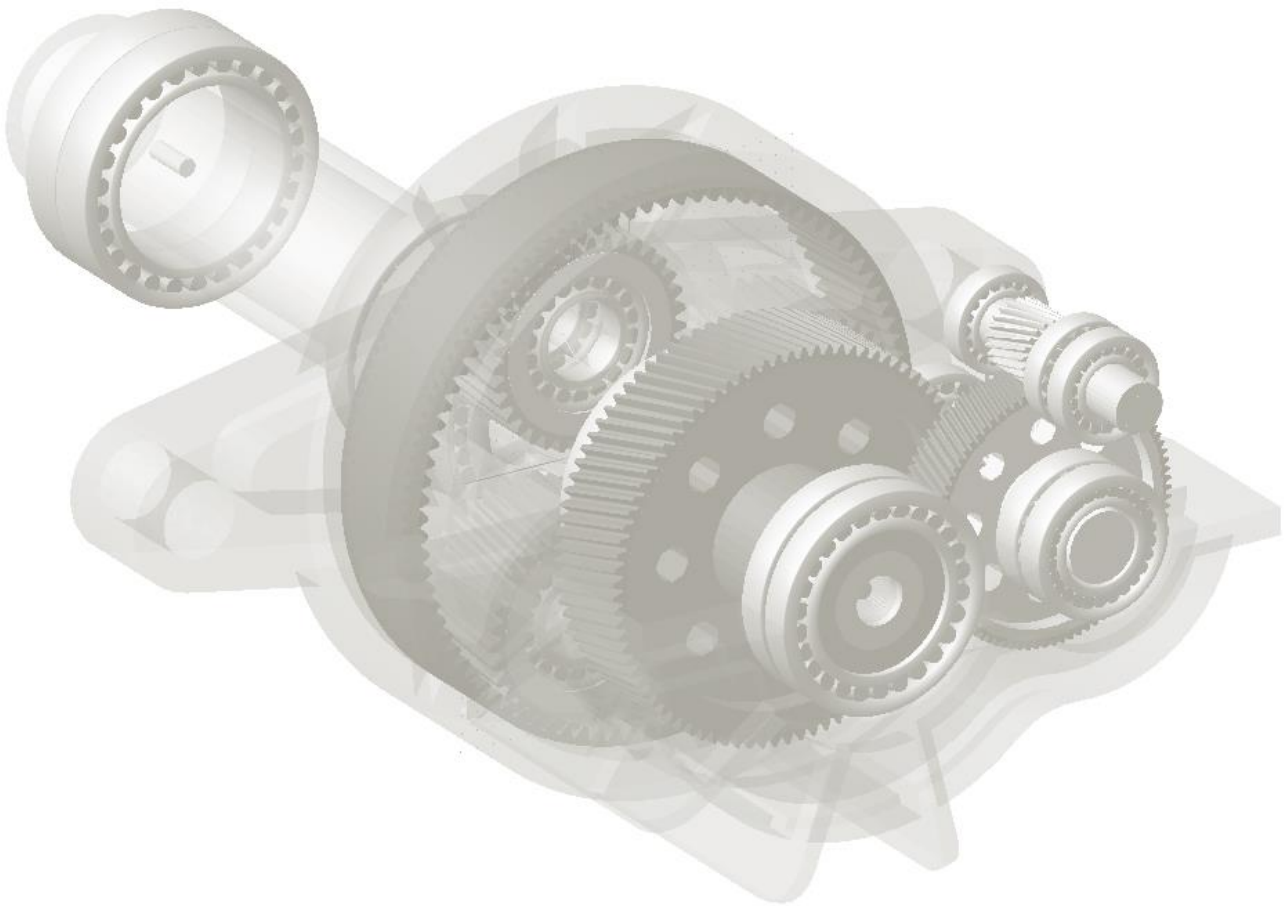


Gear AT Installation Guide

Revision 2019.0, May 2019



Disclaimer:

This documentation, as well as the software described in it, is furnished under license and may be used only in accordance with the terms of such license. MSC Software Corporation reserves the right to make changes in specifications and other information contained in this document without prior notice. The concepts, methods, and examples presented in this text are for illustrative and educational purposes only, and are not intended to be exhaustive or to apply to any particular engineering problem or design. MSC Software Corporation assumes no liability or responsibility to any person or company for direct or indirect damages resulting from the use of any information contained herein.

User Documentation: Copyright © 2019 MSC Software Corporation. All Rights Reserved.

This notice shall be marked on any reproduction of this documentation, in whole or in part. Any reproduction or distribution of this document, in whole or in part, without the prior written consent of MSC Software Corporation is prohibited.

This software may contain certain third-party software that is protected by copyright and licensed from MSC Software suppliers.

The MSC Software logo, MSC, Adams, and Gear AT are trademarks or registered trademarks of MSC Software Corporation or its subsidiaries in the United States and/or other countries. FLEXIm and FlexNet Publisher are trademarks or registered trademarks of Flexera Software. All other trademarks are the property of their respective owners.

Content

Adams and related SW specification	4
Installing Gear AT	5
1 Installing on Windows	5
2 Installing on Linux	12
Licensing	16
Running Gear AT	17
1 Launch Gear AT on Windows	17
2 Launch Gear AT on Linux	17
3 Loading Plugin	18
4 Getting Started with Gear AT	19
5 Gear AT initialization	19
Uninstalling the toolkit:	22
1 Uninstall Gear AT on Windows	22
2 Uninstall Gear AT on Linux	23
Special hints:	25
1 Previous installed versions of Gear AT	25

Adams and related SW specification

The Gear AT is installed as plugin to Adams/View. The table below outlines the software specifications for Gear AT toolkit.

Operating System	Adams version	Nastran version	Patran version
Windows 7 64-bit	2017.0	2017.0	2017
Windows 10 64-bit	2017.1	2017.1	2017 (Classic)
SuSE 11 SP3 Linux Enterprise Server (Kernel 3.0.76-0.11)	2017.2	2018.1	2018 (Classic)
Red Hat Enterprise Linux 7.3 x64 (Kernel 3.10.0-514)	2018.0	2018.2	
	2018.1	2019.0	
	2019.0		

You need Nastran or Adams ViewFlex to compute tooth stiffness matrix and gear wheel body flexibility. In case you do not have Nastran installation, make sure you have valid Adams ViewFlex license available. On Linux there is no support of Nastran as FE preprocessor, hence Adams ViewFlex has to be used only. Please note that currently there are supported i8 versions of Nastran only.

Patran is optional for the flex tooth FE model revision.

Installing Gear AT

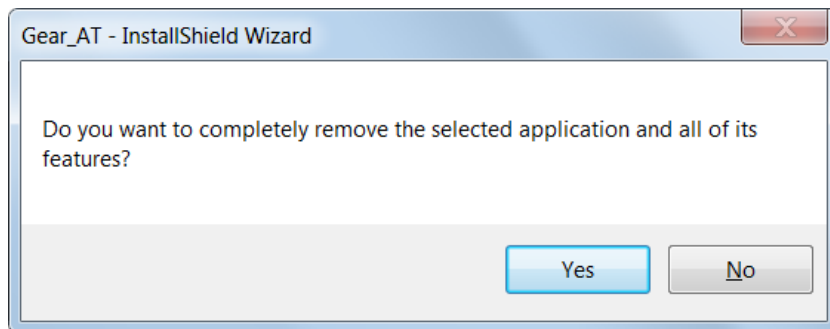
Following sections explain how to install Gear AT on Windows and Linux.

1 Installing on Windows

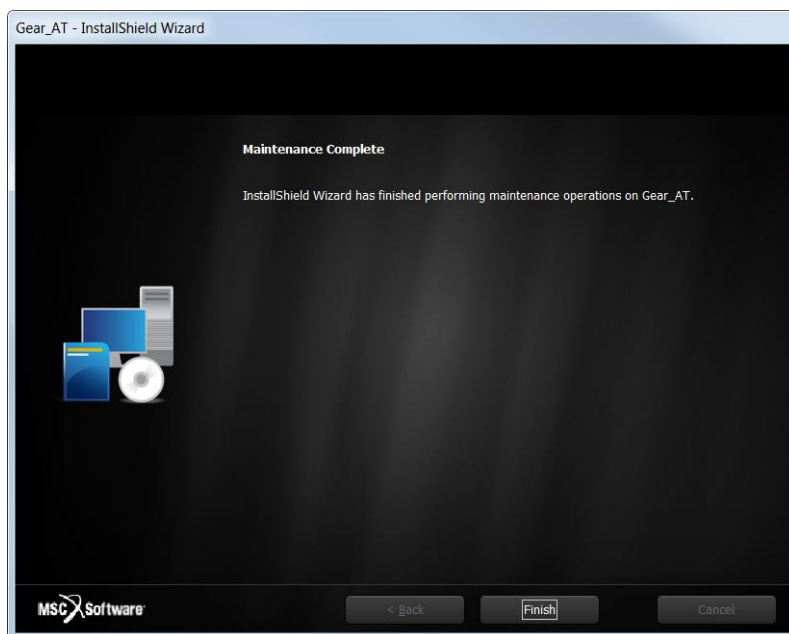
Open Windows Explorer, browse to your Gear AT file location and run (double click) the executable file **Gearat-2019.0-win64.exe**.

Updating

If an instance of current Gear AT version is already installed, remove the old instance first.

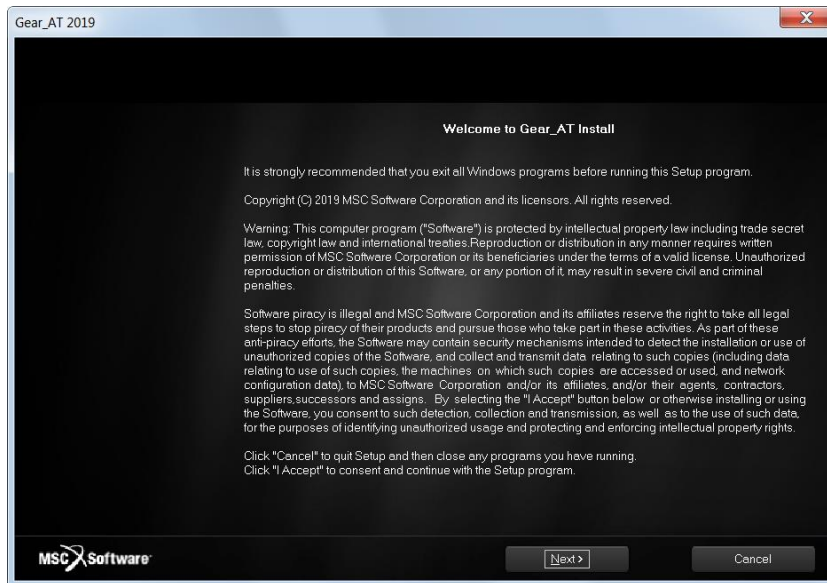


Select **Finish** to complete the process and run the **Gearat-2019.0-win64.exe** again.



Welcome page

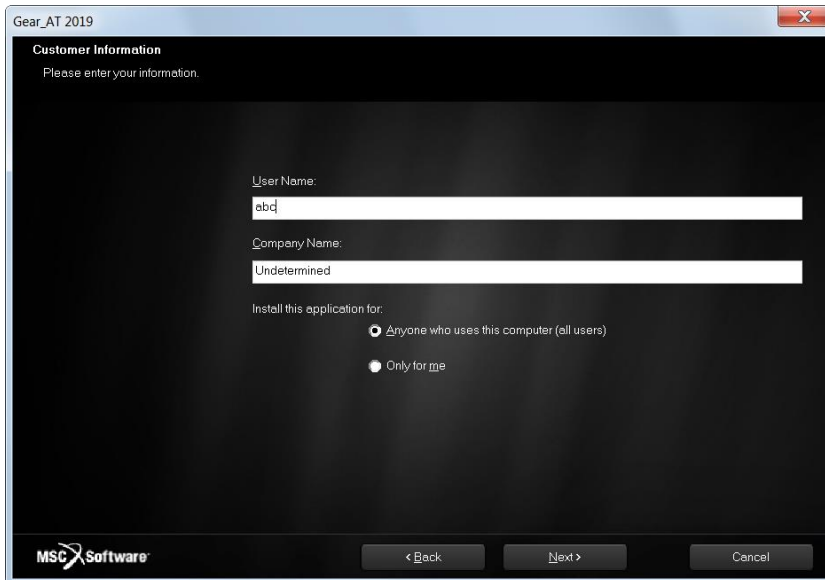
Next screen shows the Welcome page. Select **I Accept >** button to continue, or **Cancel** button to exit without installing.



Customer info

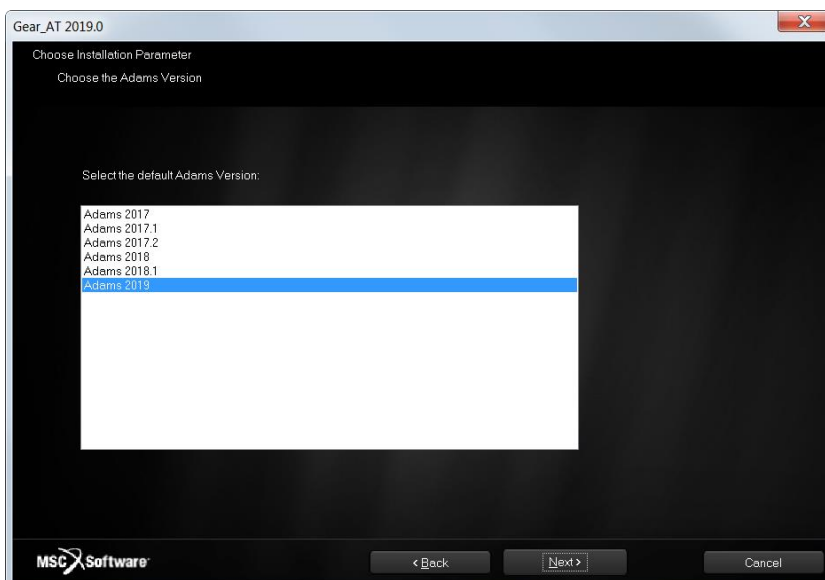
In the Customer Information window, enter your user and company name, and then select one of the following:

- **Anyone who uses this computer (all users)** - Anyone logged on to this machine can run Gear AT
- **Only for me** - A user must be logged on using the user name and password that was used at the time of installation.



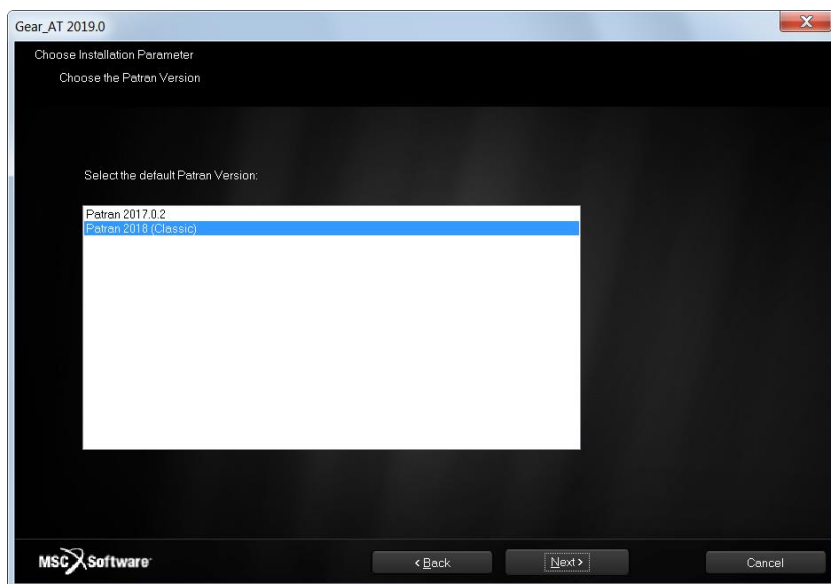
Adams Version

In this step you choose one of the valid Adams versions, the list is based by the installed ones. If the list is empty, please cancel the installation of Gear AT and install the most recent Adams version first. Make sure you select the same Adams version during Bearing AT installation in case you plan to use both toolkits. The list of currently supported Adams versions is shown on the figure below.



Patran version

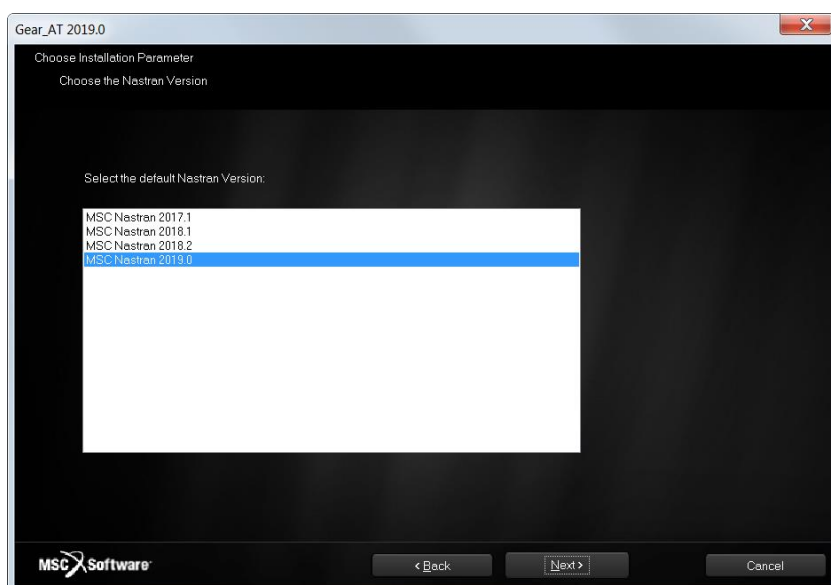
Next step is to make choice of Patran version if installed.



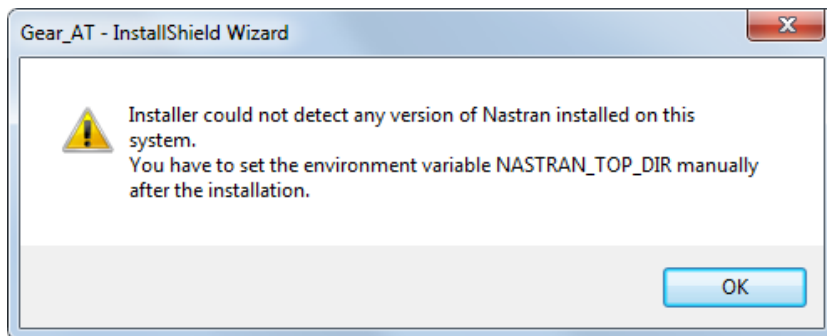
Eventually you can use arbitrary version of MSC.Apex. To make your preference of the FE mesh viewer, after the installation go to the *Gear_AT_Install_Dir/gear_at_plg* (as defined later during installation) and edit the value of the **mesh_viewer** variable in the *gear_at_ini.cmd* configuration file – for more information, please read section [Gear AT initialization](#) in chapter [Running MSC.Gear AT](#).

Nastran version

Select preferred Nastran version to be used with Gear AT for FE preprocessing.

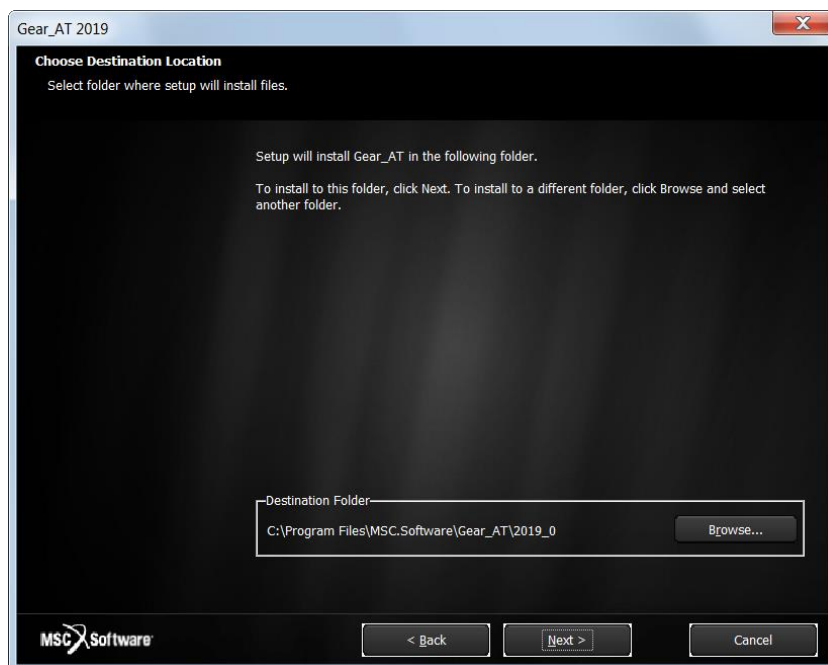


You can proceed with the installation of Gear AT without Nastran and install it later on but you have to set up NASTRAN_TOP_DIR environment variable manually. This variable should point to the Nastran installation directory, e. g. `c:\MSC.Software\MSC_Nastran\20181\`.



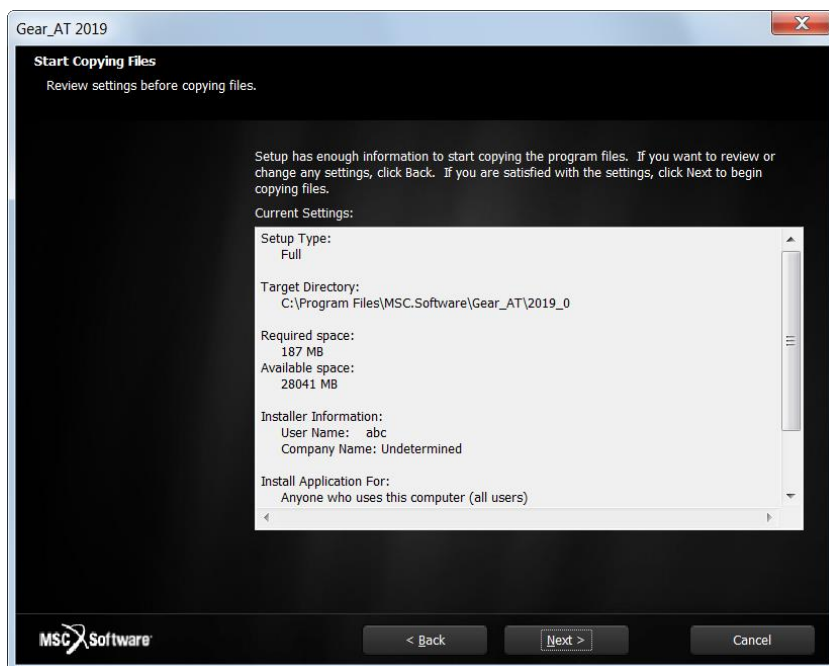
Installation Folder

In the install location window select the destination folder. This folder is referred to as *Gear_AT_Install_Dir* throughout this manual.



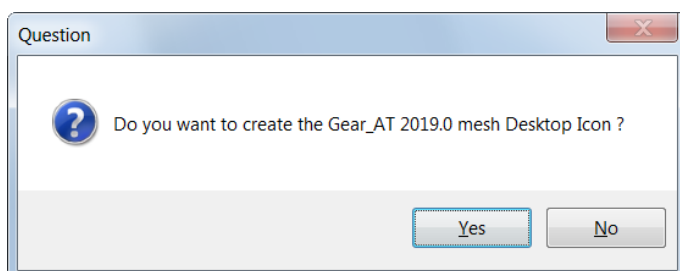
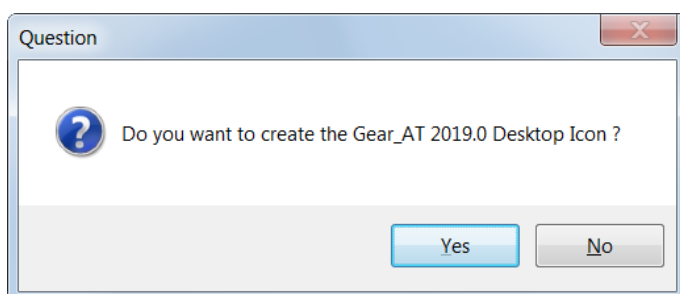
Review Settings

Confirm the installation settings and then select Next to begin the installation.

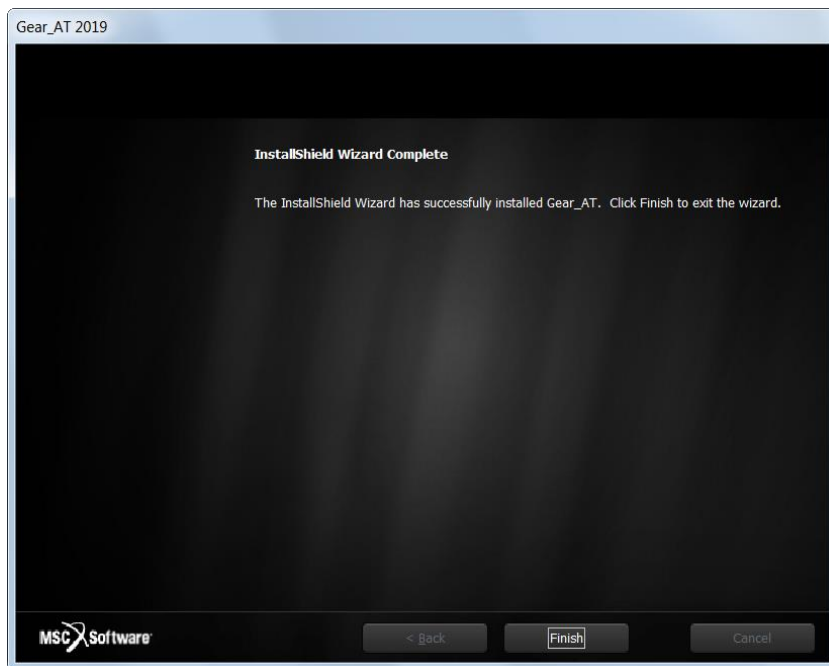


Completion

Before the Setup is complete you are prompted to create a desktop icon.



Setup completion window appears as shown below. Select **Finish**.



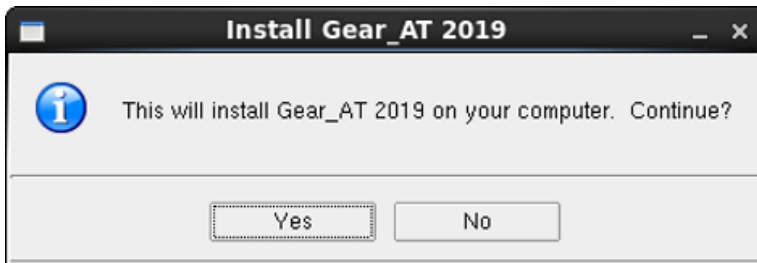
2 Installing on Linux

Go to the directory of the Gear AT installer location and open the terminal. Start the installation program **Gear_AT_2019.0.0_linux64.bin**. For example:

```
./Gear_AT_2019.0.0_linux64.bin
```

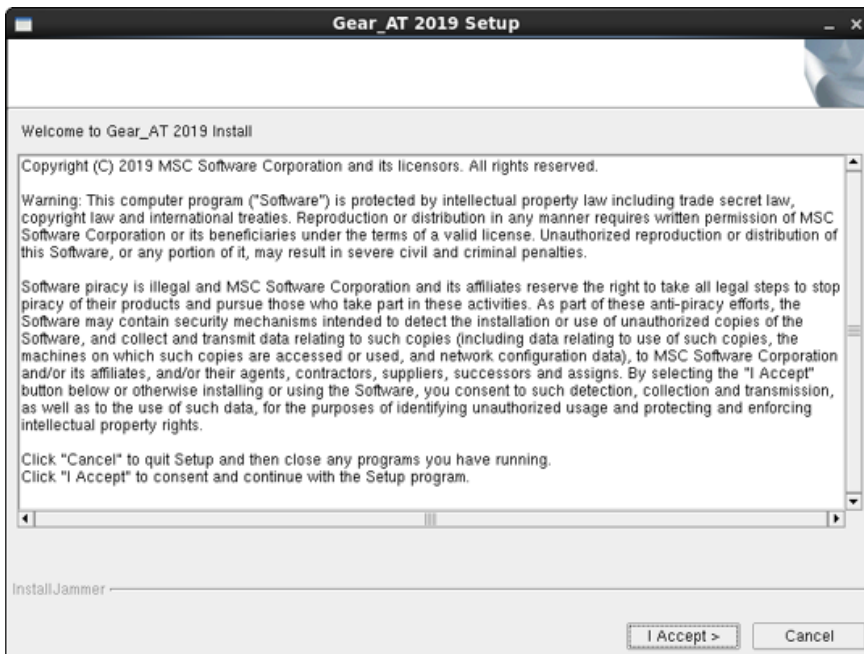
Installing

You will see a confirmation dialog box. Select **Yes** button to begin the installation.



Welcome page

Next screen shows the Welcome page. Select **I Accept >** button to continue, or **Cancel** button to exit without installing.



Destination Location

In the install location window select the destination folder. This folder is referred to as *Gear_AT_Install_Dir* throughout this manual. The default path is set to **/msc/Gear_AT/2019_0**



Review Settings

Confirm the installation settings and then select **Next** to begin the installation.



Adams Version

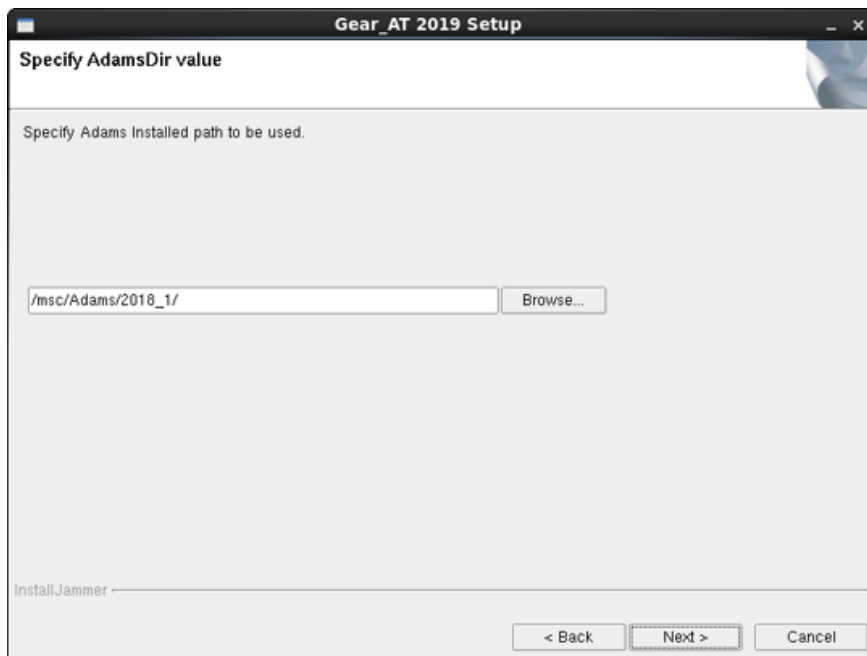
In this step specify Adams Version to be used with Gear AT.
For example:

- **2017** for Adams 2017.0
- **2017.1** for Adams 2017.1
- **2017.2** for Adams 2017.2
- **2018** for Adams 2018.0
- **2018.1** for Adams 2018.1
- **2019** for Adams 2019.0



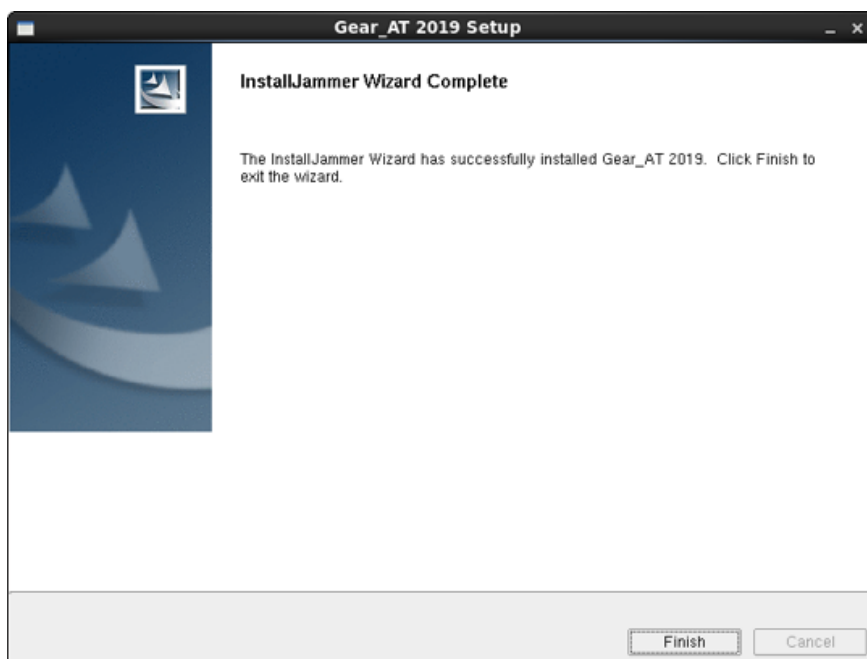
Adams Installation Path

Specify installation path to Adams version.



Completion

Setup completion window appears as shown below. Select **Finish**.



Licensing

Please copy the license features of Gear AT in your overall MSC license file.

```
FEATURE PA_CATDirect_U5 MSC 2016.0115 15-jan-2016 3 4BD6A00EB4EC \
ISSUED=19-dec-2013 ck=151 SN=1288214-7c91d2ae0686dfbdc66d-4d3e
FEATURE PA_Materials_Enterprise MSC 2016.0115 15-jan-2016 3 \
A7D5CD0C5F2F ISSUED=19-dec-2013 ck=222 \
SN=1174246-ccac818ab9689382023f-43f9
FEATURE PA_RandomAnalysis_Tool MSC 2016.0115 15-jan-2016 3 \
59009B5C656D ISSUED=19-dec-2013 ck=81 \
SN=1125067-8d822f1808ef461fbb1f-c91f
#
# MSC Toolkits
#
FEATURE TK_AdWiMo_BASE MSC 2016.0115 15-jan-2016 3 972C551C5C8E \
ISSUED=27-jan-2015 ck=98 SN=1187362-cf8d73fdb76564f60947-5812
FEATURE TK_AdWiMo_BASE_PRE MSC 2016.0115 15-jan-2016 3 A0D4B3350987 \
ISSUED=27-jan-2015 ck=130 SN=1293921-b74e92ecf3b4cc6660bc-743f
FEATURE TK_AdWiMo_BASE_SOLVER MSC 2016.0115 15-jan-2016 3 \
1B95AB62AAC6 ISSUED=27-jan-2015 ck=115 \
SN=1227345-b67a50db521132937f4c-465a
FEATURE TK_BearingAT_BASE MSC 2016.0115 15-jan-2016 3 27E818C22649 \
ISSUED=27-jan-2015 ck=153 SN=1356269-57bf094d6ac6c4aa66de-543e
FEATURE TK_BearingAT_BASE_PRE MSC 2016.0115 15-jan-2016 3 \
F730E0C5E6C8 ISSUED=27-jan-2015 ck=104 \
SN=1146504-a173703ccd528dd1ff65-e4c0
FEATURE TK_BearingAT_BASE_SOLVER MSC 2016.0115 15-jan-2016 3 \
0F2258ED9BF6 ISSUED=27-jan-2015 ck=129 \
SN=1017687-bfe6768fe1c0a0fe78a3-85a1
FEATURE TK_GearAT_BASE MSC 2016.0115 15-jan-2016 3 9F567BD87E46 \
ISSUED=27-jan-2015 ck=127 SN=988907-f675b4697108836e703b-5734
FEATURE TK_GearAT_BASE_PRE MSC 2016.0115 15-jan-2016 3 BADBF4255F5E \
ISSUED=27-jan-2015 ck=144 SN=1428005-4b9d8360414dea8b559f-fa55
FEATURE TK_GearAT_BASE_SOLVER MSC 2016.0115 15-jan-2016 3 \
FE59E5107D2E ISSUED=27-jan-2015 ck=99 \
SN=1223862-df7f55300ec7b7a1fb9e-880b
FEATURE TK_GearAT_Adanced MSC 2016.0115 15-jan-2016 3 ABC481F9266C \
ISSUED=27-jan-2015 ck=145 SN=1235180-1e2908a948719b627c84-1e87
FEATURE TK_GearAT_Adanced_PRE MSC 2016.0115 15-jan-2016 3 \
6A9825214AD8 ISSUED=27-jan-2015 ck=109 \
```

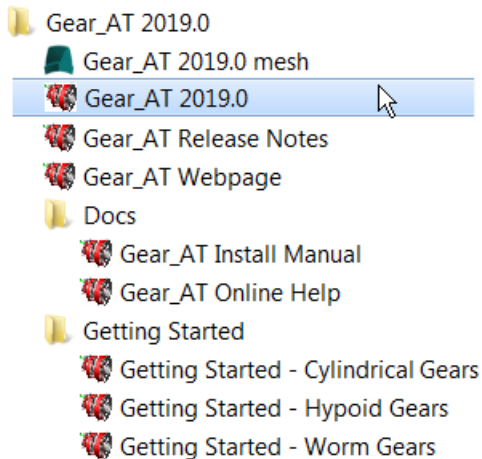
In addition to an Gear AT license, access to the Adams ViewFlex and Adams Flex license is required. This provides access to the finite element meshing and calculation technology used in the pre-processing setup. The ViewFlex license is consumed only while pre-processing in Adams View. During analysis only the Gear AT license and Adams Flex license is consumed in case of Full Flex Gear modeling option in addition to the usual Adams Solver license.

Running Gear AT

Following section explains how to load the **Gear AT plugin** on Windows and Linux.

1 Launch Gear AT on Windows

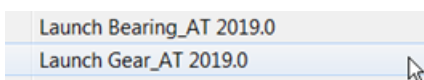
Go to the Windows **Start** menu and Select **All Programs**. Go to **Gear AT 2019** folder and select **Gear AT 2019 icon**; this will launch Adam/View.



You can use the desktop icon

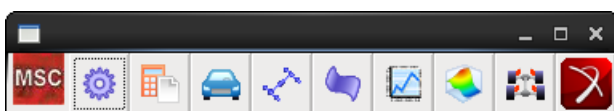


Or you can launch Gear AT via the context menu of the explorer in the working directory



2 Launch Gear AT on Linux

The Adams Toolbar is a starting point to using Adams products on Linux. Make sure to start Adams version which the Gear AT 2019 was installed to, thus assure that Gear AT plugin is compatible with Adams version. To learn how to start Adams on Linux read the **adams_20xx_doc_install.pdf** document provided with the Adams installation. The toolbar of Adams is shown below.

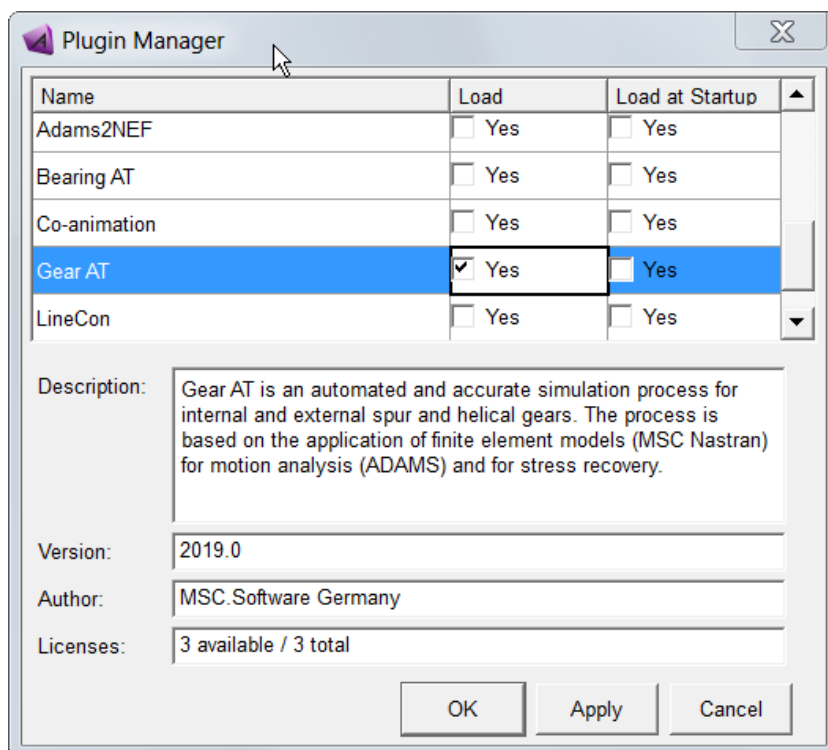


3 Loading Plugin

After Start Up from Adams/View open the plugin ribbon or go to **Tools -> Plugin Manager**. In the ribbon click on the Gear AT Button in the Gear AT tab.

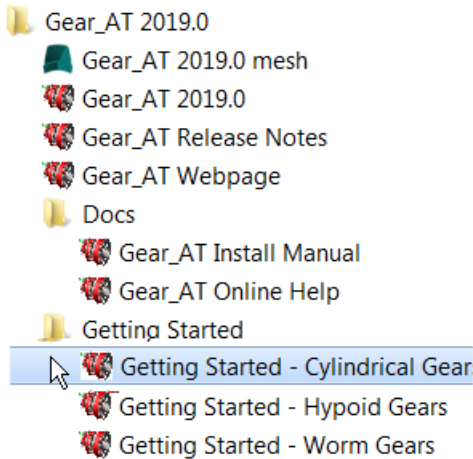


This opens the Plugin Manager if the plugin is not loaded so far. Check the plugin checkbox **Gear AT**. Specify if you want it to start every time you start ADAMS/View or just for a single session by clicking on **Load at Startup**. The **Gear AT** menu will be available in the Adams toolbar and in the ribbon plugin tab.

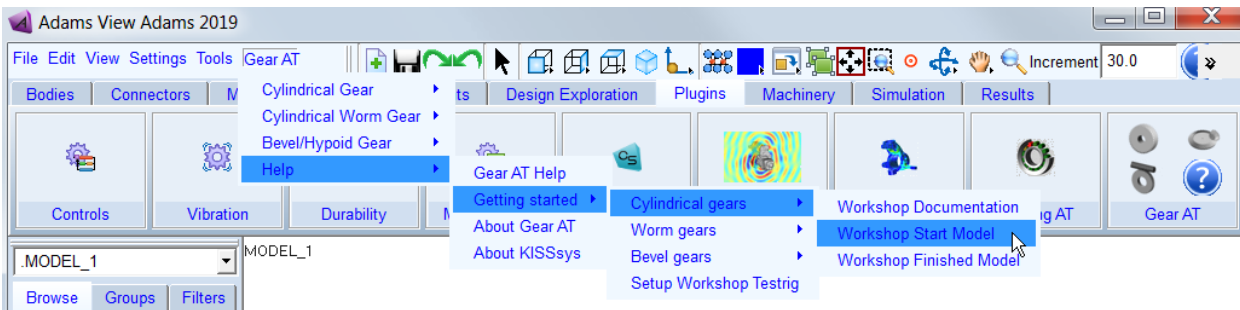


4 Getting Started with Gear AT

To help you get familiar with Gear AT plugin we provide the Getting Started document along with example model and files in the installation folder. You can access Getting started document either from windows Start menu



or from Gear AT menu in Adams.



5 Gear AT initialization

If you load the plugin the *Gear_AT_ini.cmd* file is automatically imported from the *Gear_AT_Install_Dir/gear_at_plg* directory. You can use this file to set your personal preferences like FE preprocessor, FE Mesh viewer, request activity, maximum number of gear elements, background color, solver settings or relative paths for property files or any other of your choice:

Adams/Gear AT Installation Guide

```
simulation set solver_preference= external
simulation set show_all_messages=yes
defaults solver compatibility_checking = "off"
color modify color=.colors.background red_component=0.72 green_component=0.72 blue_component=0.72

interface radio_box modify &
  radio_box_name = .gui.main.objecttable.radio_1 &
  choices = "Parts", "Markers", "Points", &
           "Joints", "Forces", "Motions", &
           "Variables", "Anything" &
  values = "Parts", "Markers", "Points", &
           "Joints", "Forces", "Motions", &
           "Variables", "Anything"

variable set variable=.gear_at.variables.z12_template_pair string=(eval(GET_GEAR_AT_PLG_DIR( .gear_at.build_version )//"/example/iso_calc/ks_Template_pair.Z12"))
variable set variable=.gear_at.variables.z12_template_planetary string=(eval(GET_GEAR_AT_PLG_DIR( .gear_at.build_version )//"/example/iso_calc/ks_Template_planetary.Z12"))

!defaults for meshing process during A/Machinery replace
variable set variable=.gear_at.variables.replace_root_radius_factor real=0.4 ! min 0.2 in this release root_radius=root_radius_factor*module_t
variable set variable=.gear_at.variables.replace_num_contact_planes string = "030" !opt1
variable set variable=.gear_at.variables.replace_mesh_density string = "03" !opt2
variable set variable=.gear_at.variables.replace_load_element_size string="02" !opt3
variable set variable=.gear_at.variables.replace_display_ratio_lead string = "03" !opt4
variable set variable=.gear_at.variables.replace_display_ratio_involute string = "02" !opt5
variable set variable=.gear_at.variables.replace_fgf string = "YES" !fgp file
variable set variable=.gear_at.variables.replace_fit string = "YES" !flex tooth
variable set variable=.gear_at.variables.replace_flank_points integer=90 !number points/flank 90<flank_points<100
variable set variable=.gear_at.variables.replace_root_points integer=16 !number points/root 16<root_points<50
!
!maximum number of gear pairs and gear elements only valid in Adams/View environment
!overwriting settings made in environment variable
!for solver run only edit Environment variables Gear_AT_max_pairs and Gear_AT_max_elem
!in a DOS Shell: set Gear_AT_max_pairs=16
!uncomment to use

!variable set variable=.gear_at.variables.Gear_AT_max_pairs integer=15
!variable set variable=.gear_at.variables.Gear_AT_max_elem integer=30

variable set variable=.gear_at.variables.color_list string=".colors.blue",".colors.red",".colors.aquamarine",".colors.green",".colors.maize",".colors.peach" &
comment="ring,no role,planet,sun,gear1,gear2"

variable set variable=.gear_at.variables.relative_path integer=1 &
comment="0-> do not use relative paths",&
      "1-> use relative paths"

variable set variable_name = .gear_at.variables.mesh_viewer &
string_value = "Apex" &
comment="Apex or Patran"

variable set variable_name = .gear_at.variables.preprocessor &
string_value = "Internal ViewFlex" &
comment="Internal ViewFlex, External ViewFlex, External Nastran, Mesher only"

variable set variable_name = .gear_at.variables.keep_fe_mesh &
string_value = "no" &
comment="yes or no"

! defaults for request activity
```

The file could be located in the:


- Plugin installation directory - *Gear_AT_Install_Dir/gear_at_plg*,
- Home directory,
- Working directory,

and is read in following that order.

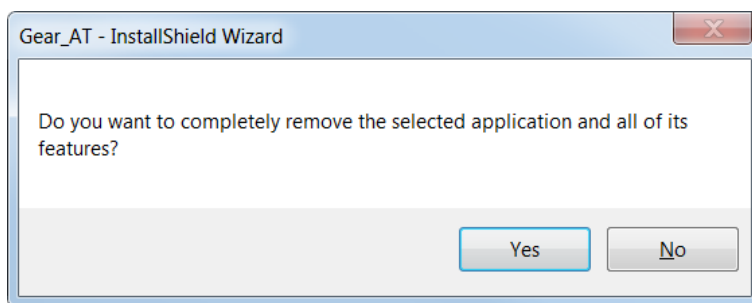
Uninstalling the toolkit:

1 Uninstall Gear AT on Windows

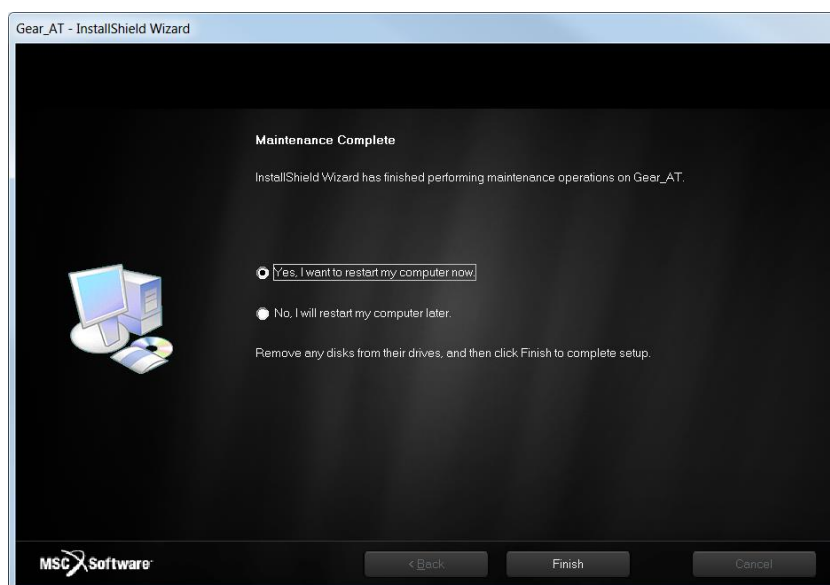
To uninstall the toolkit, go to **Start > Control Panel > Programs and Features** select **Gear_AT 2019** and **Uninstall**.

Organize ▾ Uninstall Change	
Name	Publisher
 Gear_AT 2019	MSC.Software Corporation

Confirm the removal operation to finish the process.



Select **Finish** to complete installation.



Please note you have to remove NASTRAN_TOP_DIR environment variable manually after uninstalling Gear AT. Be aware that this variable is shared with the Bearing AT installation.

After uninstall the installation folder is cleaned up but left for previously installed versions of Gear AT. For instance, if the *Gear_AT_Install_Dir* was *c:\MSC.Software\GEAR_AT\2019_0* there will remain following empty folder *c:\MSC.Software\GEAR_AT* after uninstallation.

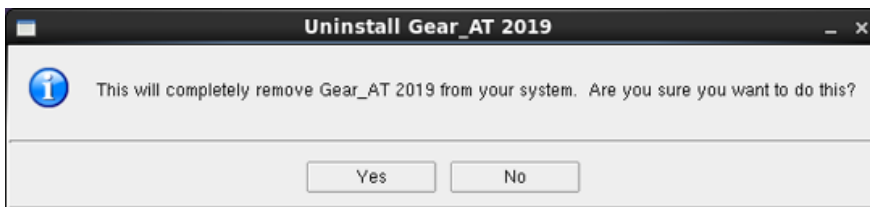
2 Uninstall Gear AT on Linux

To uninstall Gear AT plugin go to *Applications – MSC.Software – Gear AT 2019 – Uninstall Gear AT 2019*

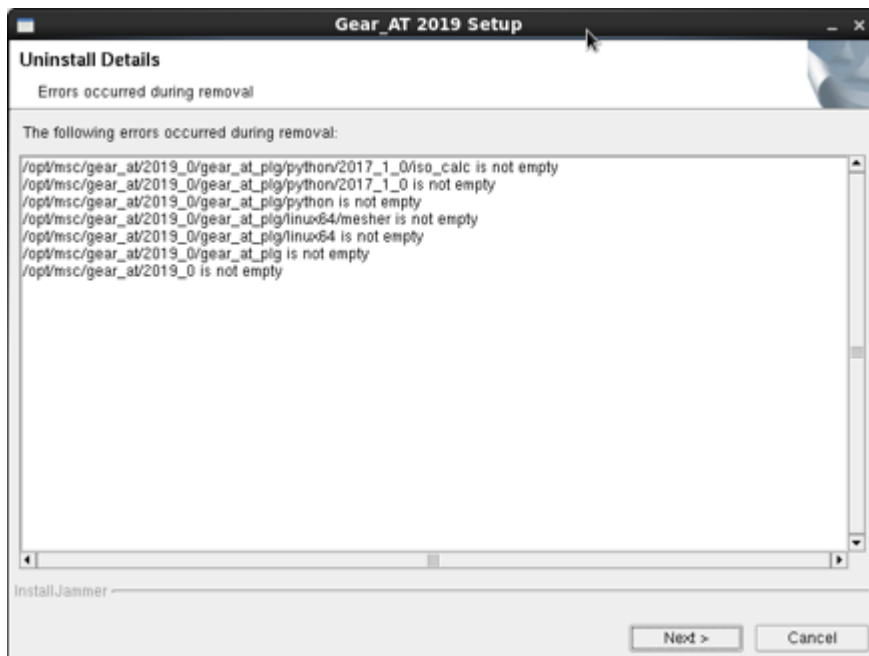


Or go to the *Gear_AT_Install_Dir* and execute *uninstall* program.

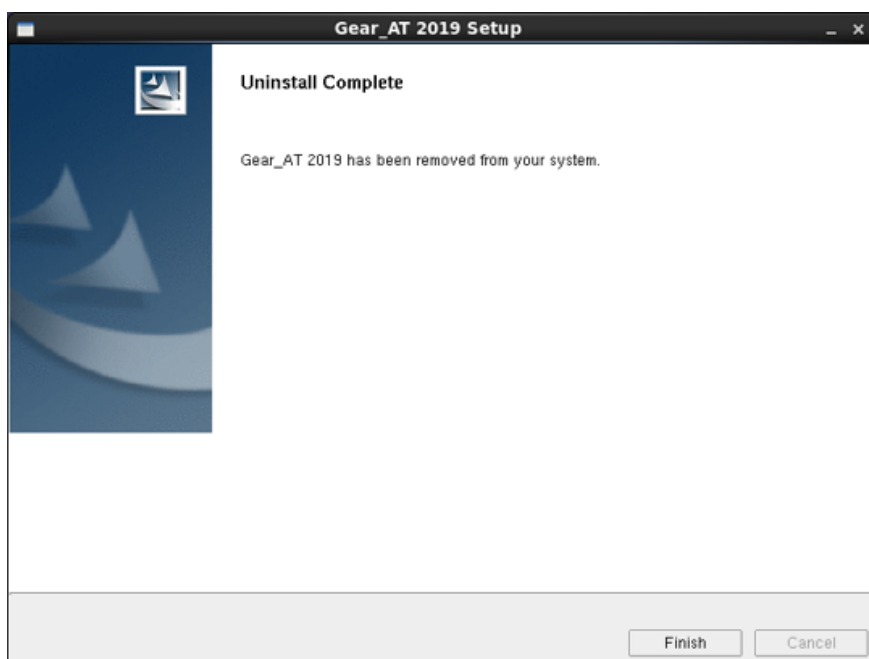
Confirm the removal operation to finish the process.



In case there is error message as shown below, please make sure the locations indicted are empty. Otherwise clean up the files manually.



A summary dialog box announces the completion of the uninstallation process. Selecting **Finish** will complete it.



After uninstall the installation folder is cleaned up but left for previously installed versions of Gear AT. For instance, if the *Gear_AT_Install_Dir* was **/opt/msc/gear_at/2019_0** this empty folder will remain after uninstallation.

Special hints:

1 Previous installed versions of Gear AT

It is recommend to uninstall previous versions of Gear AT but not mandatory. You can handle multiple versions of Gear AT with the environment variable `MSC_USER_PLUGIN_DIR`.

Just set the path to the Gear AT installation of your choice. Be aware that you can set this environment as `USER` or as `SYSTEM` variable. Make sure that a path to a Gear AT Plugin is only set once.