

The Siemens logo is displayed in a white rectangular box in the upper left corner of the page. The logo itself is the word "SIEMENS" in a bold, teal, sans-serif font. The background of the entire page is a low-angle photograph of a modern glass skyscraper, looking up towards a blue sky with scattered white clouds. The glass panels of the building reflect the sky and each other, creating a complex grid of lines and reflections.

SIEMENS

Simcenter 3D 2020.1 Release Notes



Welcome to Simcenter 3D

December 2019

Dear Customer:

Product engineering teams need a unified, shared platform for all simulation disciplines, with leading-edge analysis tools that are easy to use, incorporate more productive workflows and produce consistent results. As such, we are proud to introduce the latest release of Simcenter 3D. Our investments in Simcenter 3D 2020.1 are aimed at meeting complex engineering challenges.

Enhancements in this release are focused on these differentiating strengths of Simcenter 3D:

- Multidiscipline Integration
- Faster CAE Processes
- Openness and scalability
- Ties to the digital thread

Multidiscipline integration

The Simcenter 3D 2020.1 release offers new simulation methods that increase realism and deliver better insight into your product's performance.

In this release, we are introducing an extended and industrially validated **rotor dynamics simulation solution**. Understanding the critical speeds in rotating machinery is important for engineers to avoid potential catastrophic failures. In previous versions of Simcenter Nastran, rotor dynamics simulation was restricted to linear analysis, but in this release, we have extended the solution to cover nonlinear connection elements. This means rotor dynamics analysis in Simcenter 3D allows you to minimize rotational unbalance and unnecessary external forces in applications such as aircraft engines, gas turbines, automotive engines, industrial equipment, and even electronics--such as the case of computer disk drives that spin at high rates.

Highlights of other new investments for multidiscipline integration include:

- Aeroelasticity flutter analysis for airframes
- Two-way fluid-structure interaction within Simcenter 3D using Simcenter 3D Flow and Simcenter Nastran
- High-frequency acoustics analysis using ray acoustics methods for faster simulations

Faster CAE processes

Faster CAE processes are another hallmark of Simcenter 3D. In this release, the **new NVH composer** helps engineers quickly create system-level finite-element (FE) models starting from subassembly models such as an automotive body-in-white, door, suspension, and more.

Previously, assembling and verifying a full vehicle model was an error-prone process that took weeks. Now with NVH Composer, you get a simplified interface to interactively define the full vehicle assembly layout as a 2D network diagram, including all typical automotive full vehicle connections. Once the full vehicle assembly layout is defined and verified, the NVH composer automates the creation of a ready-to-run full vehicle FE model--reducing human error.

Other highlights in this release for faster CAE processes include:

- Perform design space exploration in connection with aerostructure margin of safety simulation to quickly understand design tradeoffs and their impact to aerostructure performance
- Parameter tables for motion simulation that let users quickly switch between different parameter configurations

Tied to the digital thread

Simcenter 3D has always had seamless, out-of-the-box integration with data management to help keep simulation in sync with the latest design variations. But simulation also needs strong ties to the physical testing group. In this release, we have invested in **deepening Simcenter 3D's test/analysis correlation** capabilities, which increases confidence that your simulations are accurately predicting real-world results. Additionally, Simcenter 3D can help test engineers with pre-test planning, such as determining the best location to place sensors. Test teams can also share measurement data with the analysis team, and Simcenter 3D can compute loads from that measurement data to be used for NVH analyses.

Open and scalable

Simcenter 3D is not a closed environment, and engineers and designers can gain the benefits of faster CAE processes by using Simcenter 3D in connection with other CAE solvers. In this release, we have added **support for cyclic symmetry when using the Abaqus solver**. This will help engineers simplify the modeling and simulation process for components using cyclic symmetry.

We are confident that the new capabilities in this release will allow you to work more productively than ever before, and to achieve your product requirements while staying at the forefront of industry trends.

For a more complete list of what's new in this release, see *What's New in Simcenter 3D 2020.1*, which is included with the online Help.

Sincerely,

Your Simcenter 3D team

Contents

Welcome to Simcenter 3D 3

NX System Information

| | |
|---|------|
| Customer support | 1-1 |
| Platforms | 1-1 |
| NX central runtime directory | 1-1 |
| System requirements guidelines | 1-3 |
| Operating system requirements | 1-6 |
| Supported hardware and graphics | 1-11 |
| NX Open programs on Linux | 1-12 |
| Initializing the JVM | 1-13 |
| NX variables in the ugii_env.dat file | 1-15 |
| Browser requirements | 1-17 |
| Browser and plug-in requirements | 1-17 |
| Browser caveats | 1-19 |
| Licensing Caveats | 1-20 |
| General licensing caveats | 1-20 |
| Licensing caveats for Windows | 1-21 |
| Licensing caveats for Linux | 1-22 |
| Product compatibility - supported version combinations | 1-23 |
| NX compatibility with Spreadsheet | 1-26 |
| NX applications unsupported on specific platforms | 1-27 |
| Support for touch enabled devices | 1-28 |

Simcenter 3D Caveats and Product Notes

| | |
|--|------|
| Simcenter 3D supported platforms | 2-1 |
| Pre/Post caveats | 2-2 |
| Motion caveats | 2-12 |
| Simcenter Nastran 2020.1 caveats | 2-15 |
| PCB Exchange caveats | 2-19 |
| Finding software field bulletins (SFBs) | 2-20 |



1. NX System Information

Customer support

Customers covered by valid maintenance agreements are eligible to receive support from the Global Technical Access Center (GTAC). If you are a customer of one of our partners or resellers, please contact them first to determine your first line support provider.

GTAC has the following mission: To increase our customer's productive use of our software by providing responsive and specialized support. You can find your local support center contact phone numbers and additional information on support services by visiting our GTAC page at <http://www.siemens.com/gtac>.

Platforms

NX central runtime directory

Central runtime directory concept

To help you find executables and libraries, and distinguish them from configuration files more easily, a central runtime directory that contains DLLs (or so's, or dylib's), executables, and JAR files is now used. The central runtime directory will be updated as NX supports more and different applications.

Scripts that are used to wrap executables have not been moved and they are still in their original kit locations with the configuration files.

NXBIN directory

The central runtime directory, NXBIN, is created on all platforms at the **UGII_BASE_DIR\nxbin** location during the NX installation. Depending on what was selected to be installed, libraries and executables from different kits are consolidated into the central runtime directory during the install process.

The new NX runtime directory does not contain all binaries and executables. Only the most frequently used files from the following directories have been moved:

- UGII
- UGMANAGER
- STEP203UG
- STEP214UG
- PVTRANS

- MACH

Other files will also be moved over time. However, some applications, such as NX Nastran, will not be moved.

While NXBIN does not contain all of the executables and DLL's, it does contain a large quantity and is a prime location to search for an executable or library.

UGII_ROOT_DIR obsoleted

UGII_ROOT_DIR has historically been used to find the following in the UGII directory:

- Libraries and executables
- Configuration files

With the creation of the central runtime directory, there are two different locations for these files (**nxbin** and **ugii**), so the concept of UGII_ROOT_DIR is obsoleted. Use the UGII_BASE_DIR variable instead when you write custom application code and scripts.

While the NX install no longer sets UGII_ROOT_DIR, the definition on the system will remain to support earlier releases. If your code or scripts rely on UGII_ROOT_DIR, modify them to ensure they still work in this release.

Teamcenter code and scripts

To provide backward compatibility with released versions of Teamcenter, all executables called directly by Teamcenter code or scripts are wrapped.

The wrapper executables just correct the settings of the UGII_BASE_DIR, PATH, and LD_LIBRARY_PATH variables that are set by the Teamcenter scripts and code, and then start up the real executable from the NXBIN directory. This enables support for the new runtime concept, while allowing NX to run with existing versions of Teamcenter.

These new wrapper executables must remain in the **ugii** and **ugmanager** directories since that is where Teamcenter code expects to find them. Two processes are shown for executables invoked from the **ugii** and **ugmanager** directories.

Executables are still in the UGII, UGMANAGER, STEP203UG, STEP214UG, and PVTRANS kits.

Teamcenter code migration to the new central runtime directory structure is scheduled in a future Teamcenter release.

System requirements guidelines

Defining the minimum system requirements is difficult because key requirements, most notably memory, can vary dramatically from user to user. The following are general guidelines that you should consider before purchasing a system.

Processor performance

Although raw processor speed has a major impact on system performance, other factors also contribute to overall performance; for example, the type of disk drive (SCSI, ATA, or Serial ATA), disk speed, memory speed, graphics adapter, and bus speeds. The general rule is that "the faster the processor, the better the performance is," but this only applies when comparing like architectures. For example, it is difficult to arrive at performance expectations for an Intel processor when compared to an AMD processor just by looking at their respective processor speeds. There is also a general trend today to de-emphasize processor speeds and move to multi-core processors, which actually can have lower processor speeds.

NX takes advantage of modern processors, and if a processor does not have the required functionality, you will see the following error message and NX will not run on the installed CPU:

```
This processor is too old and not supported anymore
```

SMP

Symmetric Multiprocessing (SMP) is supported in NX mostly via Parasolid, although a small number of NX capabilities have some threading. In general, it is not possible to quote a figure for the general performance improvement achieved by using SMP, since this improvement depends on the nature of the operations you are performing. You need to evaluate your actual performance gains using your own models. Functional areas that are SMP enabled in Parasolid include:

- Validity checking
- Boolean operations
- Wireframe
- Rendering
- Hidden line rendering
- Closest approach
- Faceting
- Mass properties

SMP is enabled by default with the variable **UGII_SMP_ENABLE**, which is located in the *ugii_env_ug.dat* file.

Multi-Core

Multi-core processors are similar to SMP because there are two or more actual processor cores but they are delivered in single processor packages. Siemens PLM Software has found that multi-core performance characteristics are similar to SMP. The one advantage of multi-core processors over SMP is that this technology has proliferated much faster than SMP and is now common in workstations, servers, and laptops.

Multi-core technology is complex and, depending on the configuration, can actually have a negative impact on performance. This is due to the potential conflict of multiple cores sharing system resources, such as cache, memory, and bus bandwidth, as well the need for the system to manage and control an increasing number of cores. Increasing the number of cores does **not** always translate into better performance. Although additional cores can improve NX performance, processor speed is still a vital measurement of NX performance.

Many systems enable you to turn off cores via the bios, which can enable you to compare performance with a different number of cores that are active. Some users may find that turning off some cores will actually improve performance. One micro-architecture (Intel) even does this automatically, shutting down unused cores and increasing the clock speed of the others.

The hardware vendors continue to improve their processor micro-architectures to better address the limitations of older multi-core technologies. New subsystems better integrate memory and other peripherals directly to the processors, resulting in major performance improvements. Buses are being eliminated, cores are better managed, and channel speeds continue to improve.

In summary:

- Turn SMP on only if you have an SMP system. Having it on in a single-processor system incurs a slight overhead.
- Turn SMP on if you have a multi-core system.
- Never assume that by simply adding more cores you will see better performance. Always test first.

Memory

The minimum recommended amount of memory to run native NX is 8GB. If you are running NX with Teamcenter (Teamcenter Integration for NX), the minimum recommended is 12 GB. However, because NX is capable of handling large assemblies and very complex parts, many of our customers use workstations with 32GB of RAM, and some even use 64GB, 96GB, or more.

For the optimum user experience and application performance, we recommend that you install as much RAM as can be installed in the client workstation that is running NX.

As a guideline, so that you get the best possible performance when using NX, ensure that the amount of physical memory (RAM) in your workstations is always larger than the amount of memory consumed by NX, plus all the other applications that are running at the same time on the same machine. This can be done by using a tool such as **Windows Task Manager** or **Resource Monitor**.

The minimum memory requirements varies and depends on various factors including:

- Complexity of the geometry within individual parts
- Size of the assemblies that are loaded
 - Less memory is required if the assemblies contain multiple instances of the same components.
 - More memory is required when large assemblies contain lots of unique components with complex geometry.
- Use of Teamcenter in addition to NX
 - Some additional memory is required when using Teamcenter 4-tier.
 - A even greater amount of memory is required when using Teamcenter 2-tier.
- Fully loading exact assemblies versus using lightweight assemblies and partial loading
- Generating CAM toolpaths for very complex geometry, such as an automotive engine block or gearbox
- Updating large assembly drawings

Graphics adapters

All the NX certified systems contain graphics adapters that meet all Siemens PLM Software requirements and are fully supported by our hardware partners. The graphics adapters supported are carefully selected by working with our OEM partners as well as our graphics vendor partners. We do not recommend low-end, consumer, or game cards, since these graphics devices are developed for the DirectX market and are not well supported under OpenGL. Because a majority of platform/hardware problems are graphics related, it is critical that all the graphics adapters that NX supports are designed for OpenGL and have the highest level of support from our hardware vendors. We highly recommend that you only use supported graphics adapters and Siemens PLM Software certified drivers.

For the latest information on certified graphics cards and driver versions, please visit the [Customer Support \(GTAC\) Web site](#).

Multiple monitors

Siemens PLM Software supports multi-monitors but with limitations. These limitations were necessary due to the large number of possible configurations. Other combinations may work, but these conditions are tested and supported by Siemens PLM Software. These guidelines could be extended or relaxed in the future.

The following is a summary of findings for the support of multiple monitors.

- NX 6.0.1 or higher - no older releases are supported.
- Two monitors only.
- LCD monitors only
- Run with native resolution and aspect ratio.
- Laptops are tested without docking stations or port replicators (direct connection only).
- Horizontal Scan mode (not Vertical) and only with identical monitors.
- Dual View (Nvidia) or Extended View (ATI) modes, but the user must have the display window entirely in either the primary or secondary monitor.

You do not have to comply with the configurations mentioned above, but Siemens must be able to duplicate the problem on the configurations in our labs before being able to investigate your issues.

Operating system requirements

Operating system requirements

This section documents operating system and service pack requirements.

Minimum Operating Systems

The following operating systems are the minimum recommended for NX. Newer versions and service packs are available as they are released.

| O.S. | Version |
|----------------------------|--|
| Microsoft Windows (64-bit) | Microsoft Windows 10 Pro and Enterprise editions |
| Linux (64-bit) | SuSE Linux Enterprise Server/Desktop 12 SP1 |
| | Red Hat Enterprise Linux Server/Desktop 7.6 |

Linux

Starting in NX 1847, NX is no longer supported on the Linux operating system for interactive NX (NX running with UI), which includes graphics and XESS integration. It is only supported for running solvers and NX Open batch programs with no user interface calls.

Contact GTAC for the new NX Linux product.

Mac OS X

Starting in NX 1847, the Mac OS X operating system is no longer supported.

Windows 10

Windows 10 is the minimum supported release for NX 1899. The supported versions of Windows 10 are the Pro and Enterprise editions utilizing Semi-Annual Channel (SAC) updates.

Windows 10 is also available for NX 10.0.3 and later versions up to NX 1899. Any caveats or special instructions are provided in the SFB announcing support.

Windows 7 and 8.1

Windows 7 has reached the end of life and mainstream support has ended. Windows 8.1 is still supported by Microsoft, but was rarely deployed. These two versions of Windows are no longer supported by NX 1899. Siemens PLM Software has not performed testing on these versions and cannot resolve any issues related to NX 1899 running on these operating systems. If NX 1899 is deployed on these versions of Windows, any issues will have to be replicated on Windows 10 before filing an incident report with GTAC.

Windows XP and Vista

Windows XP support from Microsoft has ended and Vista was rarely deployed so these two versions of Windows are not supported by NX 1899. Siemens PLM Software has not performed testing on these versions and cannot resolve any issues related to NX 1899 running on these operating systems. If NX 1899 is deployed on these versions of Windows, any issues will have to be replicated on Windows 10 before filing an incident report with GTAC.

System error when running NX

If you receive the following system error when launching NX, the problem is generally that the operating system is not up-to-date for the required and optional updates. This error can occur with Windows 7 and Windows 8.1.

```
The program can't start because api-ms-win-crt-heap-l1-1-0.dll is missing from your computer.
```

The error occurs when there are missing Visual C++ libraries due to a dependency on the Universal CRT libraries in Visual C++ 2015. To fix the problem, install the **Visual C++ 2015 update 3 redistributable** from Microsoft. The 64-bit redistributable (vc_redist.x64.exe) is available in the INSTALL folder of the NX runtime environment after installation, or you can download the redistributable from Microsoft.

If you still have a problem, contact GTAC support.

Linux Distributions

NX is developed using Linux standards and accepted Linux development conventions. Quality assurance testing is performed on the two versions of Linux listed in the table above. Siemens PLM Software cannot guarantee operation, performance, compatibility, or support on any other distributions.

The following is a list of information about the development environment (for reference only):

| | |
|--------------------------|------------------------------|
| Kernel | kernel 3.10.0-957.el7.x86_64 |
| C, C++ Compiler | gcc 4.8.5 |
| Java Development version | 1.8.0_45 |

Considerations and caveats

Linux Requirements

NX supports SuSE Linux and Red Hat Linux, both 64-bit only. The minimum supported version of SuSE Enterprise (Desktop/Server) is 12 SP1 and Red Hat Enterprise (Desktop/Server) is 7.6. Newer versions will be supported via certification.

Visit the [Customer Support \(GTAC\) Web site](#) for details of supported hardware configurations as well as for the latest graphics drivers.

Java Runtime Environment

The Java Runtime Environment (JRE) is not shipped with NX, but NX does require JRE 8 for certain products. To install the JRE, visit the **Oracle** download site at <http://java.com/en/download/index.jsp>, or the **AdoptOpenJDK** site at <https://adoptopenjdk.net/>.

Java is used for the following products:

- NX Relations Browser
- Manufacturing – Process Studio Author
- Command line version of the following translators:
 - CATIA V4

- CATIA V5
- Dxfdwg
- IGES
- NX Pro E
- Step AP203
- Step AP214
- Knowledge Fusion ICE
- Quality Dashboard
- Validation Rule Editor
- Simcenter 3D Batch Mesher
- Simcenter 3D Response Analysis Function Tools
- Simcenter 3D Report Writer
- Customer written NX Open Java programs

Java requirements for NX Open

NX Open for Java is designed to be used with Java version 1.8.0_45 or higher.

Post Processing of Abaqus ODB format results

In the NX release, NX uses Abaqus version 6.12 libraries to process ODB results files. For NX to use these libraries, you must first install Visual C++ 2008 X64 Runtime – v9.0.30729.4967.

Note:

If you have Abaqus version 6.12 installed on your system, the required Visual C++ runtime should already be installed.

You can download this runtime from the Simulia customer support website: <http://www.3ds.com/products-services/simulia/support/>

For more information on the system requirements for ODB version 6.12 files, see: <http://www.3ds.com/support/certified-hardware/simulia-system-information/abaqus-612/system-requirements-for-abaqus-612-products>

Running Samcef in parallel

On Windows, when you run parallel computations with the built-in Samcef solver, Python 2.7 is required. In NX 1899, that version of Python is not present. Install Python 2.7 on your disk and ensure that the Python directory is named **Python27** (default name) and is included on your PATH variable.

You can download the software from the Python website: <https://www.python.org/downloads/>

Note:

The Python requirement does not apply if you have Samcef installed separately from NX.

Configuration files

Starting with NX 12, the NX configuration files on Windows are written to `C:\users\\AppData\Local\Siemens`.

Installing the .NET Framework

The NXOpen for .NET API is a Windows-specific project that leverages the Microsoft .NET Framework component. Before you can execute a custom .NET application, you must install the .NET Framework 4.6.2. In addition, to replay a .NET journal, the .NET Framework 4.6.2 must be installed.

To download the .NET Framework 4.6.2, use the links on this page: [Microsoft .NET Framework 4.6 \(Web Installer\)](#).

Visual Studio runtime redistributable

To run NX 1899, the MS Visual Studio 2017 runtime redistributable is required. In addition, the MS Visual Studio 2013 runtime redistributable is required to properly setup some system **dll** files for some of the older executables.

You can download the Visual Studio 2017 redistributable [here](#).

You can download the Visual Studio 2013 redistributable [here](#).

Note:

If you have MS Visual Studio 2017 and 2013 installed, you don't need to download and install the redistributable.

Supported hardware and graphics

The list of currently supported hardware and graphics cards can be found on the GTAC support page [Customer Support \(GTAC\) Web site](#) at **Hardware and Software Certification**→**Hardware (Graphics Card) Certifications**. This opens a spreadsheet that has tabs for supported systems and graphics.

NX Open programs on Linux

If you try to link an external NX Open C++ program using the **ufmenu** and **uflink** scripts with NX 1899 on SLES 12 SP1, Linux may fail with an error message such as:

```
/usr/x86_64-suse-linux/bin/ld: cannot find -lelf
```

For NX to properly build an NX Open program, you must have the correct RPM kits installed.

For NX 1899 and SUSE 12 SP1, the following packages are required:

```
elfutils-0.158-6.1.x86_64.rpm  
libelf1-0.158-6.1.x86_64.rpm  
libelf-devel-0.158-6.1.x86_64.rpm
```

For NX 1899 and RedHat 7.6, the following packages are required:

```
elfutils-libelf-0.172-2.el7.x86_64.rpm  
elfutils-libelf-devel-0.172-2.el7.x86_64.rpm  
elfutils-devel-0.172-2.el7.x86_64.rpm  
elfutils-libelf-0.172-2.el7.x86_64.rpm  
elfutils-libs-0.172-2.el7.x86_64.rpm
```

Note:

For SUSE, the *devel* packages are available from the optional SLE 12 SP1 SDK DVD/ISO.

Initializing the JVM

In some cases, NX is not able to create the Java Virtual Machine (JVM) properly on Windows. The root cause in these scenarios is insufficient memory to start the JVM. In most cases of insufficient memory Java is able to report back an error code indicating this problem. However, in some cases Java reports a generic error message that NX then displays. The typical error message is:

```
Can't initialize the Java Virtual Machine (JVM)
```

When running a Java application, such as the Wave Browser or Interactive Class Editor, NX may give an unexpected error due to this problem.

If NX detects that there is not enough memory available for the JVM, an error message is given and information is provided in the syslog. The following is an example of the syslog information:

```
The JVM could not be created due to not enough memory.
The Java heap size must be contiguous and the largest contiguous block
available is outputted below.
Windows largest block free
=====
Maximum block 267Mb
=====
Please note, this number is to be used as suggestion for setting the
heap size. It
is unlikely that you will be able to utilize the full amount.
If you need a heap size larger than what is possible you can try to use
the /3GB
switch or its equivalent, if available for the Operating System you are
on.
Otherwise your other option is to use Remoting. Please consult the NX
Open
Programmer's Guide for more information on this topic.
```

Reset the size of the Java heap

To remedy this problem, you can reset the size of the Java heap that NX uses. Choose **File**→**Execute**→**Override Java Parameters** to open the dialog box and set UGII_JVM_OPTIONS to the size of the Java heap. You can experiment with the size of heap that you need, but if the JVM is already started then you cannot change the UGII_JVM_OPTIONS setting.

It is recommended that you use both the **-Xmx** and **-Xms** options together. Both of these are needed as Java may determine default values for the heap size that are not possible with the machine's current memory load. For example:

```
UGII_JVM_OPTIONS=-Xmx50M -Xms50M
```

When trying to determine the size of the heap, keep in mind that if the heap size is too small, a Java program you are trying to run may not run. This could be due to the amount of memory available on the machine, or due to multiple Java processes running. This can be the case with the Wave Browser where there is a client and server process.

Once you find a value that works, you can modify the `UGII_JVM_OPTIONS` value in the `ugii_env.dat` file so you don't have to reset it in the **NX Open Java Parameters** dialog box each time you start an NX session.

NX variables in the `ugii_env.dat` file

Standard and modified environment variables

The `ugii_env_ug.dat` file contains the standard environment variables for NX. You can override these variables with the `ugii_env.dat` file. This file is essentially empty when delivered. You can define new values for the environment variables in this file and they take precedence over the values defined in the `ugii_env_ug.dat` file.

The `ugii_env.dat` file should be used to modify any standard NX environment variables or add new ones.

Both the `ugii_env_ug.dat` and `ugii_env.dat` files are located at `<UGII_BASE_DIR>\ugii`.

Note:

You can make all, some, or none of the changes to the variables in the `ugii_env_ug.dat` file. However, it is recommended that you use the `ugii_env.dat` file to define all of the values in use at your site.

Using the `ugii_env.dat` file

The following apply when using the `ugii_env.dat` file:

- Define the variables before the `#include` statement.
- The first variable defined is used. If you have the variable defined twice in the file, only the first one is used.

Note:

This also applies to the `ugii_env_ug.dat` file.

- You cannot have spaces in the variable names.

Designate a single `ugii_env.dat` file for all users

You can place the `ugii_env.dat` file in a central location for all users to access.

For each user, set the environment variable `UGII_ENV_FILE` to the location of the file. For example:

```
UGII_ENV_FILE=G:\common\version_env_vars.corp_standards
```

Note:

The file can have any name but must be a fully qualified path.

Statements you can use in the `ugii_env.dat` file

The statements that you can use in the `ugii_env.dat` file are shown below with examples:

- `#if/#else/#endif`
Used to check for specific conditions and then to define variables based on those conditions. Conditions that can be checked are:

- FILE - Check for the existence of a file

```
#if FILE ${UGII_BASE_DIR}\UGII\html_files\start_${UGII_LANG}.html
UGII_CAST_HOME=${UGII_BASE_DIR}\UGII\html_files\start_${
{UGII_LANG}.html
#else
UGII_CAST_HOME=${UGII_BASE_DIR}\UGII\html_files\start_english.html
#endif
```

- platform - Check for a specific platform. Possible values:

x64wnt

lnx64

macosx

```
#if lnx64
UGII_CAM_THREAD_MILL=${UGII_CAM_THREAD_MILL_DIR}thrm.so
#endif
```

- `$variable = "value"` - Check for a specific value for a previously defined environment variable

```
#if $UGII_LANG = "simpl_chinese"
UGII_COUNTRY=prc
UGII_COUNTRY_TEMPLATES=${UGII_BASE_DIR}\localization\${UGII_COUNTRY
\simpl_chinese
#endif
```

- `$variable != "value"` - Check for a previously defined environment variable that does not have the specified value.

```
#if ${UGII_PACKAGE_DIRECTORY} != ""
#if FILE $UGII_PACKAGE_DIRECTORY\ugii_package_env.dat
```

```
#include $UGII_PACKAGE_DIRECTORY\ugii_package_env.dat
#endif
#endif
```

- #include
Used to include a specified environment file at the current location

```
#include $UGII_PACKAGE_DIRECTORY\ugii_package_env.dat
```

Enabling context sensitive help in local languages for customer defaults and KF

When using localized language versions of the NX Help, to get context sensitive help to work for Customer Defaults or Knowledge Fusion you need to edit the following two environment variables to point to the localized help:

- UGII_CSHELP_DEFAULTS_DOCS
- UGII_CSHELP_FUSION_DOCS

For example, to enable context sensitive help for Japanese Customer Defaults help you would set:

```
UGII_CSHELP_DEFAULTS_DOCS=${UGII_UGDOC_BASE}/data_services/resources/nx/${UGII_MAJOR_VERSION}/nx_help/ja_JP/graphics/fileLibrary/nx/cust_defaults
```

Browser requirements

Browser and plug-in requirements

The NX suite of documentation (Help, What's new Guide, and Release Notes) is provided in an HTML format that is displayed in your local Web browser.

The documentation requires a web server. You can install the Siemens PLM Documentation Server, which sets up a local web server on each workstation, or install the documentation into an existing company-wide server.

The latest versions of web browsers are recommended to comply with the latest browser security updates.

Windows browser support

- Internet Explorer
- Microsoft Edge

- Mozilla Firefox
- Google Chrome

Downloading browsers

These browsers are free and can be downloaded from the following Web sites:

Internet Explorer and Edge — <http://www.microsoft.com>

Firefox — <http://www.mozilla.org>

Chrome — <http://www.google.com/chrome>

Windows .chm files

Some parts of the Help are delivered in Microsoft Compiled Help format (.chm). Windows security enhancements prohibit opening .chm Help files across a network, so you must install those files on your computer. If you install .chm Help files on a server, you cannot read the Help across the network.

Adobe Flash Player required for videos

To watch videos and simulations, you must have the Adobe Flash Player installed as a plug-in to your browser. You can download the Flash Player (free) at the [Adobe Flash Player site](#).

Adobe Acrobat Reader

Some portions of the Help may be delivered as PDF, which requires the Adobe Acrobat Reader. You can download the free reader from <http://get.adobe.com/reader/>.

Browser caveats

Browser caveats for Firefox

- Mozilla recommends that you upgrade to the latest version of Firefox due to security issues surrounding Java. They do not recommend using older versions of Firefox. For more information, see <http://support.mozilla.org/en-US/kb/latest-firefox-issues>.
- The default behavior in Firefox 3.0.5 is for new pages to be opened in a new tab. This affects the behavior of the global search since new links will open in a tab instead of a new window. You can configure Firefox to open a new window instead of a new tab by selecting **Tools**→**Options**→**Tabs**.
- Typically, you install and launch the Help from the `http://` protocol which is fully supported. However, if you want to launch from a UNC path (`file:///`), Firefox has a default security setting that prevents the Help from launching correctly. To enable this, you need to change the value of the **security.fileuri.strict_origin_policy** preference:
 1. In the address bar, type `about:config`.
 2. In the **Filter** field, type `security.fileuri`. If the value of the **security.fileuri.strict_origin_policy** preference is set to `TRUE`, set the value to `FALSE`. Double-click on the value to toggle it.
 3. Restart the browser.
- If you are trying to open a `.chm` file that you have accessed from a web server (not from a local install), you may not be able to open the file as it is blocked. To unblock, right-click on the file and choose **Properties**, then select the unblock option.

Browser caveats for Chrome

Typically, you install and launch the Help from the `http://` protocol which is fully supported. However, if you installed with the `file://` protocol, you have to run Help from the command line. To fix this, see <http://code.google.com/p/chromium/issues/detail?id=39767>.

Browser caveats for Internet Explorer

If you do not see a video in Internet Explorer, it may be a cache issue. Try clearing your cache, or using a different browser.

Browser caveats for Adobe Flash Player

The following is applicable for the Adobe Flash Player:

- Chrome blocks Flash.

- Firefox blocks Flash by default. However, you can manually enable the Flash plugin for the Windows 64 bit browser.
- Internet Explorer blocks Flash by default. However, you can manually enable the plugin.
- Microsoft Edge blocks Flash.

Licensing Caveats

General licensing caveats

License files and license server

The following are applicable to license files and the license server:

- Merging of license files is not supported.

Example:

You can not merge a pre-TC 2007 MP3 or pre-NX 5 license file, which uses the **uglmd** license daemon, with a TC 2007 MP3, NX 5, or NX 6 license file, which uses the **ugslmd** daemon.

NX requires and tests for the latest version of the **ugslmd** vendor daemon. This vendor daemon is supplied with NX and must be installed and initiated prior to starting NX. If an older daemon is utilized, a generic NX License Error dialog box is displayed during start-up. In addition, the syslog will contain an error message that the daemon version is older than the client.

NX Borrowing is version specific

NX license borrowing is version specific due to dependencies within the third party licensing software used by Siemens PLM Software. To ensure that NX works on a borrowed license, you should always utilize the borrow tool supplied with that NX version. For example, a license borrowed using the NX 1847 borrowing tool will work for NX 1847 but cannot be used to run NX 12. In addition, you cannot borrow licenses for two NX versions simultaneously on the same workstation.

Licensing caveats for Windows

The following caveats are applicable to Windows platforms only.

License Option tool

The **License Option** tool should only be used to borrow NX licenses, even though it may display other licenses. The **License Option** tool does not filter features in the license file that are of an earlier version than NX, such as Teamcenter lifecycle visualization, so these licenses are displayed in the tool. If you try to borrow a license for an application other than NX, you get an error when you launch the non-NX application.

Licensing caveats for Linux

Additional software to support licensing

SuSE and Red Hat require the following to be installed:

- LSB 4.0

Product compatibility - supported version combinations

Teamcenter and NX

The following table lists the version combinations of Teamcenter, Active Workspace, and NX that are supported.

Note:

- TC is Teamcenter
- AW is Active Workspace
- The Teamcenter release that is compatible with NX is identified in the table. If no patch is specified in the table cell, then the base release is the minimum required.
If a patch is required, then the Teamcenter patch level specified in a table cell is the minimum required for that Teamcenter release. Later patch levels in that release are also applicable, unless otherwise specified. For example, *TC 11.4.0_patch_5* is the minimum patch level in the Teamcenter 11.4.0 release, and also includes *patch_6*, *patch_7* and so on, that is, *TC 11.4.0_patch_5 or higher*.
- The NX release identifies the minimum update in that series, where applicable. For example, the NX 1847 series specifies the NX 1851 update as the minimum.

| | NX 12.0.2 | NX 1847 Series | NX 1872 Series | NX 1899 Series |
|---------------------------|--|----------------|----------------|----------------|
| Teamcenter UA 10.1 | ☑ TC 10.1.7 AW 3.3.1 AW 3.4 | | | |
| Teamcenter UA 11.2 | | | | |
| Teamcenter UA 11.3 | ☑ TC 11.3.0.1_a0 1_patch_5 AW 3.3.1 AW 3.4 AW 4.0.4 AW 4.1 | | | |
| Teamcenter UA 11.4 | ☑ | ☑ | ☑ | |

| | | | | |
|-------------------------------|---|--|--|---|
| | TC 11.4.0_patc h_5 AW 3.4 AW 4.0.4 AW 4.1 AW 4.2 | TC 11.4.0_patc h_5 AW 4.0.4 AW 4.1 AW 4.2 | TC 11.4.0_patc h_15 AW 4.0.4 AW 4.1 AW 4.2 | |
| Teamcenter UA 11.5 | <input checked="" type="checkbox"/> AW 4.0.4 AW 4.1 AW 4.2 | <input checked="" type="checkbox"/> AW 4.0.4 AW 4.1 AW 4.2 | <input checked="" type="checkbox"/> TC 11.5.0_patc h_10 AW 4.0.4 AW 4.1 AW 4.2 AW 4.3 | <input checked="" type="checkbox"/> TC 11.5.0_patch_10 AW 4.0.4 AW 4.1 AW 4.2 AW 4.3 |
| Teamcenter UA 11.6 | <input checked="" type="checkbox"/> NX 12.0.2 MP5 TC 11.6.0_patc h_1 AW 4.1 AW 4.2 | <input checked="" type="checkbox"/> NX 1851 update TC 11.6.0_patc h_1 AW 4.1 AW 4.2 | <input checked="" type="checkbox"/> TC 11.6.0_patc h_4 AW 4.1 AW 4.2 AW 4.3 | <input checked="" type="checkbox"/> TC 11.6.0_patch_4 AW 4.1 AW 4.2 AW 4.3 |
| Teamcenter UA 12.0 | <input checked="" type="checkbox"/> AW 4.1 AW 4.2 | | | |
| Teamcenter UA 12.1 | <input checked="" type="checkbox"/> NX 12.0.2 MP5 TC 12.1.0_patc h_1 AW 4.1 AW 4.2 | <input checked="" type="checkbox"/> NX 1851 update TC 12.1.0_patc h_1 AW 4.1 AW 4.2 | <input checked="" type="checkbox"/> TC 12.1.0_patc h_4 AW 4.1 AW 4.2 AW 4.3 | <input checked="" type="checkbox"/> TC 12.1.0_patch_4 AW 4.1 AW 4.2 AW 4.3 |
| Teamcenter UA 12.2 | <input checked="" type="checkbox"/> NX 12.0.2 MP5 AW 4.2 | <input checked="" type="checkbox"/> NX 1851 update AW 4.2 | <input checked="" type="checkbox"/> AW 4.2 AW 4.3 | <input checked="" type="checkbox"/> AW 4.2 AW 4.3 |
| Teamcenter UA 12.3 | | | <input checked="" type="checkbox"/> AW 4.3 | <input checked="" type="checkbox"/> AW 4.3 |

| | NX 12 | NX 12.0.1 | NX 12.0.1 MP1 |
|------------------------------|---|---|--|
| Teamcenter UA 10.1 | <input checked="" type="checkbox"/> TC 10.1.7 AW 3.3.1 | <input checked="" type="checkbox"/> TC 10.1.7 AW 3.3.1 | <input checked="" type="checkbox"/> TC 10.1.7 AW 3.3.1 AW 3.4 |
| Teamcenter UA 11.2 | | | |
| Teamcenter UA 11.3 | <input checked="" type="checkbox"/> TC 11.3.0.1_a0 1_patch_1 AW 3.3.1 | <input checked="" type="checkbox"/> TC 11.3.0.1_a0 1_patch_1 AW 3.3.1 | <input checked="" type="checkbox"/> TC 11.3.0.1_a01_patch_1 AW 3.3.1 AW 3.4 AW 4.0.4 |
| Teamcenter UA 11.4 | | | <input checked="" type="checkbox"/> AW 3.4 AW 4.0.4 |
| Teamcenter UA 11.5 | | | <input checked="" type="checkbox"/> AW 4.0.4 |

Note:

For information on version compatibility for Teamcenter and Teamcenter lifecycle visualization, see the Teamcenter documentation.

NX compatibility with Spreadsheet

| NX version ▼ | Platform ► | | | Windows | | | |
|--------------------|------------------------------|-----------------------------------|---|------------------------------|------------------------------|------------------------------|------------------------------|
| | Spreadsheet Platform ▼ | Software Operating System ▼ | version ► Operating System version ▼ | MS Excel 2016 (32-bit) | MS Excel 2013 (32-bit) | MS Excel 2010 (32-bit) | MS Excel 2007 (32-bit) |
| NX 1899 | Windows | Windows 10 64-bit | 10 Pro & Enterprise | Certified & supported | Certified & supported | Certified & supported | Not supported |

Note:

- The 64-bit versions of Microsoft Excel are supported starting in NX 12. The 32-bit version of Excel is installed by default on the Windows 64-bit Operating Systems.
- Microsoft Starter Edition is not supported by NX due to lack of support for Add-in's, Macro's, Math and Equation Editing.
- If you open a part with Excel 2003 data or older and then save the spreadsheet, NX updates the data to Excel 2007 or later (to the Excel version currently running with NX).
- If you launch a spreadsheet command such as **Spreadsheet** or **Part Family** on a system having Excel 2003 or older version as the default spreadsheet application, NX displays an error message and does not proceed with the launched command.

NX support for the currently supported versions of Microsoft Office will be discontinued as per the following dates:

| Microsoft Office version | End of support |
|--------------------------|------------------|
| 2007 | October 11, 2017 |
| 2010 | October 13, 2020 |
| 2013 | April 11, 2023 |
| 2016 | October 14, 2025 |

NX applications unsupported on specific platforms

The applications listed are not supported on the specified platforms.

| Application | Functionality | Platform not supported on: |
|-----------------------------|--|----------------------------|
| Tooling & Fixture Design | NX EasyFill Analysis - Advanced | Linux |
| NX Translators & Open Tools | NX Open Python Author | Linux |
| Electro-Mechanical Design | Mechatronics Concept Designer | Linux |
| Mechanical Design | NX Drafting | Linux |
| Mechanical Design | NX Additive Design with Convergent | Linux |
| Mechanical Design | NX Layout | Linux |
| NX Translators & Open Tools | Content Migration Manager for SolidWorks | Linux |
| NX Translators & Open Tools | CMM Drawing Repair Assistant | Linux |
| Electro-Mechanical Design | ELMA | Linux |
| Electro-Mechanical Design | NX Piping Fabrication Drawings & PMI | Linux |
| Mechanical Design | NX Lattice Structures Design | Linux |
| Mechanical Design | NX Ship Structure PMI Creation | Linux |
| Mechanical Design | NX Ship Dimensions & Adv Annotation | Linux |
| Mechanical Design | Drawing Automation for NX (version 10 and later) | Linux |
| Mechanical Design | Layout for NX | Linux |
| Mechanical Design | NX Aerospace Design | Linux |
| Mechanical Design | NX Lattice Structures Design | Linux |
| Gateway | Advanced Studio Rendering Style Mode | Linux |
| Pre/Post | Abaqus OBD result file reading | Linux |
| Pre/Post | Topology Optimization and Shape Optimization | Linux Redhat |
| Motion | Motion Mechatronics co-simulation | Linux |

Support for touch enabled devices

In NX 1899, you can interact and manipulate 3D models and control the overall user interface using touch screen and stylus. The support for touch enabled hardware follows a slightly different support model than what is provided through the NX certification program. We have tested NX on a number of Windows based touch screen laptops, monitors, and tablets. However, support for these devices and other comparable systems is limited as they are not true workstations and do not qualify for our full certification program. Support for these devices is limited as follows:

- Graphics performance issues are not supported as most of these devices do not offer the level of driver support available on workstations.
- Graphics quality and display issues are not supported unless they can be duplicated on a certified workstation.
- Any issue determined to be caused by the graphics driver is not supported.
- Performance issues with NX are not supported on these systems unless reproducible on certified workstations.

Caveats aside, we have tested and used for development a variety of touch based systems from HP, Dell, Microsoft, and others and have found them acceptable for general usage of NX.

Additional Notes

- NX supports touch devices on the Windows operating system.
- Only stylus configurations support pre-highlighting. The most commonly used devices supporting stylus are the Surface Pros.

2. Simcenter 3D Caveats and Product Notes

Simcenter 3D supported platforms

For information about operating system platforms supported by Simcenter 3D, see Operating system requirements.

Note:

Simcenter 3D does not support the Mac OS X.

Pre/Post caveats

Selection recipes

You can use the **Filter Elements** adapter to filter out elements from a selection recipe that have a particular physical property table ID or thickness value. If you change the thickness value or physical property table ID in the **Element Associated Data Manager** dialog box for an element, these changes will not modify the content of selection recipes that have a **Filter Elements** adapter defined.

Note:

If you change the thickness value or physical property table ID in the **Element Associated Data** dialog box or use the **Modify Associated Data** command, this issue does not occur.

Edge Separation command

(PR 9157743) Currently, you cannot use the **Edge Separation Condition** command to select a set of edges that form a closed loop. The current work around for this issue is for you to perform the operation in two steps.

Isotropic and Anisotropic materials

In the **Isotropic Material** and **Anisotropic Material** dialog boxes, properties on the **Electromagnetic** page, except for electrical **Resistivity**, are currently unsupported. These properties are used by electromagnetic solutions that will be available in a future release.

Universal connections

- (PR 8382376) The software currently runs slowly when you change options within the **Seam Weld** dialog box.
- (PR 8397606) If you created a **Bolt Connection** in Simcenter 3D 12 and used a selection recipe with the **Set of Curves** option (**Location** tab) to define the bolt's centerline, the bolt may not be created correctly when you open the file in this release. To work around this issue, edit the **Bolt Connection** and redefine the **Set of Curves** by removing and then reselecting the selection recipe.
- (ER 8415220) Currently, the extended master connection file (xMCF) format that the software exports is not fully compliant with the industry standard file format. The standard specifies that a connection group should contain all the involved connections. The current functionality writes each connection as a separate connection group entry.
- (PR 8434594) In certain models, if you use the **Assembly Label Manager** dialog box to resolve ID conflicts, and the model contains nodal connections (spring, damper, rigid, bushing, kinematic) or lumped mass connections that were defined with a spider target and the **Use Mean Coordinates of Leg Locations** check box selected, the renumbering of IDs may cause the software to update the connection mesh. During this update, the software recreates the connection elements and their

associated nodes with new ID values. In some cases, these new ID values could, in turn, introduce new ID conflicts and result in a recurring and unresolvable loop of issues. This unresolvable loop of issues may also be triggered by the renumbering of IDs to resolve label conflicts for models that contain spot weld, adhesive, seam weld, sealing, rivet, clinch or crimp connections that reference FE entities to define their locations.

Delete Unreferenced Entities command

In the Simulation file, the **Delete Unreferenced Entities** command is currently available in the user interface but does not yet work. While you can use the **Delete Unreferenced Entities** dialog box to select unused entities to delete, for example, when you click **OK** or **Apply**, the software currently issues an error message.

Post-processing

- (PR 9597058) The results calculated by the **Nodal Force Report** command are currently incorrect if you specify a cylindrical or spherical output coordinate system. The results are correct if you specify a Cartesian output coordinate system.
- (PR 9622841) Post-processing currently displays incorrect results for 2D and 3D bolt pre-loads in Solutions 401 and 402. The software applies an incorrect unit scaling factor to the result components. For metric results in scientific notation terms, the significant (mantissa) is correct while the order of magnitude for many part unit – formatted unit combinations is incorrect. For English unit results, the numerical values for these combinations is incorrect. The correction of this issue is targeted to be delivered in the 1903 maintenance update release.

Scenario Based Post-processing

When you post-process an ANSYS or Samcef file that contains engineering strain through the **Scenario Based Data-Visualization Navigator**, the software converts the engineering strain data to tensorial strain and plots the data as tensorial strain.

Simcenter 3D Results Viewer

The **Extraction** command currently displays options that are not available in Simcenter 3D Results Viewer. In the **Results Extraction** dialog box, the **Type** list displays four options. However, only the **Full Result Model** option is available in Simcenter 3D Results Viewer. This issue is fixed in the Simcenter 2020.2 release.

Simcenter Nastran FEM Acoustics and Simcenter 3D Acoustics BEM

- (PR 8409135) When **Simcenter 3D Acoustics BEM** is the specified solver, **Indirect Acoustic** is the specified analysis type, and the **Indirect Acoustic Model Formulation** option is set to **Fast Multipole** or **H-Matrix**, and the solution includes one-way, weak coupling, the software does not store vibrations in the results (displacement, velocities, or accelerations) when you request the output in SORT2 format.

- (PR 9426475 and PR 8413414) The sum of each panel's contribution to acoustic pressure does not match the total acoustic pressure in solutions when **Simcenter 3D Acoustics Transient BEM** is the specified solver or when **Simcenter 3D Acoustics BEM** is the specified solver, **Indirect Acoustic** or **Indirect Vibro-Acoustic** is the specified analysis type, and the **Indirect Acoustic Model Formulation** option is set to **Fast Multipole** or **H-Matrix**. This issue occurs when some of the nodes in the structural mesh are included in of two or more **Panel** simulation objects.
- (PR 7936548 and PR 8414353) The Simcenter Nastran FEM Acoustics and Simcenter 3D Acoustics BEM solvers do not allow the file names or paths that contain spaces, special characters, or very long file names. If you encounter issues, try shortening the file or path name or removing any spaces or special characters.
- Double-clicking the **Results** node for solutions that use .sc_h5 files to store the results does not load the correct post-processing scenarios. To work around this issue, right-click the **Results** node and select the appropriate scenario, or manually add the .sc_h5 file into the **Data Sources** list.
- For the **Load Identification** solution, the option to ground nodes (with the **Direct Stiffness** method) is missing. To work around this issue, set the Active or Passive node to 0.
- For the **Load Identification** solution, the option to set a vibration node with missing data (with the **Inverse Stiffness** method) is missing. To work around this issue, set 0 for the vibrations that are missing.
- There are missing validations and checks for **Load Identification** and **MATV Response** solutions.
- BEM Acoustic Transfer Vectors are not supported in **MATV Response** calculations.
- For **MATV Response** calculations, the mode participation factors (MPFs) should be perfectly aligned with the modes. Scenarios where there are a different number of MPFs and modes is not supported. Additionally you currently cannot fix this issue by editing the **Mode Set** and activating or deactivating the modes.

Specialist Durability

Simcenter 3D Specialist Durability currently has the following limitations and known issues:

- Currently, in the **Computation Location** dialog box, you can select the **Nodes of Elements** and **Center of Element** options in the **Result Output Location** list only if the stresses are available on elements or nodes of elements. The software currently cannot convert nodal stresses to element stresses.
- For ANSYS .rst results, the software cannot automatically detect seam welds. As a workaround, in the **Edit FEM** dialog box, change the solver environment to **Simcenter Nastran**. The software can then automatically detect seam welds.
- For ABAQUS .obd results, force-based spot weld and force-based seam weld solutions are not yet supported.

- Currently, error messages that occur because the solution is not set up correctly do not provide information on how to correct the problem.
- Currently, you cannot define **Function Definition Locations** using node and element IDs.
- A function definition location that uses strain gages can process gages defined on nodes or gages defined on elements, but not both together: In that case, you must use the **Function Definition** command to define two function definitions.
- For seam welds and spot welds:
 - Stress-based spot welds that have only spider elements at the weld location and no 2D elements are not currently supported
 - Selecting the top **Element Result Location** when you process seam weld results in a 3D Specialist Durability Scenario may exclude elements on the base sheet.
- (PR9629308) If you solve a durability solution with an event that has a data source from a Simcenter Nastran SOL402 op2 result file with the ILP-64 format, the software may crash. As a workaround you can use the LP-64 format when you create the op2-file
- Results from Simcenter Nastran SOL129 are not supported in a transient event.

Laminate Composites

- Post reporting
 - The advanced op2 reader does not process results from SOL 401 and SOL 402.
 - The advanced op2 reader does not process 64 bit op2 files.
 - The advanced op2 reader does not correctly handle result files with non-FEM units.
 - Von Mises ply stresses and strains are not displayed in the **Graphical Post Report**.
 - Non-enveloped ply strain tensor components are labeled as XX, YY, etc instead of 11, 22, etc in the **Post Processing Navigator**.
- **Laminate Modeler** and **Solid Laminate Modeler** dialog boxes
 - It is not possible to assign a progressive failure theory to a laminate definition or a ply while in the Simcenter Nastran solver environment.
 - Settings for **Failure Theories** and **Stress or Strain Output Request** cannot be exported to a CSV file, or imported from a CSV file.

- Values for the solid laminate **Ply Direction** and **Stack Direction** options are correctly exported to the PCOMPS card in the Simcenter Nastran input file. However, the fiber orientations are not updated as per the user selection and always reflect the default values of **Ply Direction** and **Stack Direction** options.
- The **Properties** group in the **Element Associated Data** is ignored by Laminate Composites, except when the laminate definition is queried from **Margins of Safety**.
- Multiple zones may be created with the same laminate definitions.

FE Model Correlation: Pre-test

- Test analysis reference solutions
 - When you export a **Test Analysis Reference Solution** with exciter selection configurations using the NMIF method and containing DOFs defined using nodes with normal DOFs, the directions of these DOFs are incorrectly written.
 - When you export a **Test Analysis Reference Solution** created using a combination of a solver normal modes solution and a **DOF Set**, spurious exciter selection configuration data is written. The workaround is to delete any existing exciter selection configurations.
 - When you export a **Test Analysis Reference Solution** to a universal file, the coordinate trace dataset 1802 does not contain the sensor DOFs. As a workaround, in the **Simulation Navigator**, right-click the pre-test node and choose **Export to UNV**, which has been temporarily exposed.
 - When you export a **Test Analysis Reference Solution** to a universal file, a coordinate trace dataset 1802 is always written for exciter DOFs, even if you did not select an exciter selection configuration.
- Sensor selection configurations using the MODMAC algorithm are not saved with their results: When you open a Simulation file, existing MODMAC configurations have an out-of-date status and hence must be solved.
- The complex algebra behind the NMIF transfer functions contains an error, such that the NMIF values are incorrectly calculated. When fixed, optimal node IDs and exciter numbers may change.
- When the Simulation file has an assembly FEM, the wireframe created using the **Create Wireframe Elements** command from a DOF set may be incorrectly located.

FE Model Correlation

- In Simcenter 3D 2019.1, in the **Mode Pairing** dialog box, there was a spurious relationship between the **Frequency Tolerance (%)**, **Frequency Tolerance (Hz)**, and **Track Mode Pairs** check box settings. This erroneous behavior has been fixed in Simcenter 3D 2019.2, however when you open a 2019.1 model, the software may give unexpected **Frequency Tolerance** and **Track Mode Pairs** settings.

- There can be missing mode combinations in the **Correlation Details View** subpanel when **Pair Tracking** is turned off and the number of reference and work modes are different: the code restricts the number of combinations to the minimum number of reference or work modes. This restriction will be removed.
- Resetting a **Test Model** alignment in a Simulation that was migrated from Simcenter 3D 2019.1 or earlier results in an incorrect initial position.
- An intermittent units issue causes nodes of analysis reference solutions created from solutions not using Simulation units (for example, in N-M instead of the Simulation units of mN-mm) to be improperly scaled, resulting in a mapping failure with the work solution nodes.
- FRF pair filters do not update when the correlation node map is updated: create a new filter.
- UNV files associated to test reference solutions using the **None** option for complex conversion were incorrectly written in Simcenter 3D 2019.2 or earlier. It is therefore recommended to create a new test reference solution.
- When the Simulation file has an assembly FEM, the wireframe created using the **Create Wireframe Elements** command from a DOF set may be incorrectly located.

Thermal/Flow, Electronic Systems Cooling, Space Systems Thermal, Multiphysics

- In Multiphysics, for one-way and two-way fluid-structure interaction (FSI) analyses, add the entire fluid mesh to a **Structural Deactivation Set** type of the **Deactivation Set Advanced** simulation object to disable the writing of the fluid mesh to the Simcenter Nastran .dat file. Including fluid mesh in the .dat file severely impacts solve time of FSI runs.
- Running a coupled thermal-flow analysis in parallel is not reliable. Workaround: use GPARAM 0 40 0 to run the flow solver in parallel and the thermal solver in serial.
- When your model has non-uniform layers that have a layer radiating from the top side and you define it with an advanced thermo-optical property, you can get wrong results. The correction of this issue is targeted to be delivered in the 1903 maintenance update release.

Abaqus environment

Beginning in this release, Pre/Post supports the import of coordinate system definitions from Abaqus .odb files. Currently Pre/Post only imports datum coordinate systems from Abaqus .odb files. However, it does not import the orientation definition from the Abaqus .odb file.

Beginning in the 2019.2 release, Pre/Post supports the import of node and element definitions from Abaqus .odb files. Currently:

- Pre/Post does not correctly import a mesh that was originally defined as rigid link coupling connection in the Abaqus environment in Pre/Post. The rigid link coupling connection mesh is defined by a group of nodes with the `*KINEMATIC COUPLING` keyword using the **Automatic Coupling** command. Pre/

Post imports the nodes from the .odb file, but it does not currently import the rigid link defined by the *KINEMATIC COUPLING keyword.

- If the .odb file was generated from an assembly model, Pre/Post imports only a flattened model. The software offsets the node and element labels in the imported model to new label values and reports this change in the .lis file during the import process. However, the software does not apply this change in node and element labels to results data. Because of this potential difference in labels, querying result data by node and element label after import may not work.

ANSYS environment

When you import an ANSYS input file that contains a supported KEYOPT number but an unsupported KEYOPT value, Pre/Post resets the KEYOPT value to its default value. Additionally, Pre/Post imports the KEYOPT into a KEYOPT modeling object instead of a table of user-defined KEYOPTs.

LS-DYNA environment

- When you import an LS-DYNA input file, the software does not import the material orientation for the *ELEMENT_TSHHELL_COMPOSITE keyword when the first ply material keyword has a negative AOPT parameter, which means that its absolute value is Material Orientation Coordinate System Label. After the import, only the first element in the mesh collector has a defined **Material Orientation** value. Other elements do not have **Material Orientation** value, and the software places them into a different element collector.
- LS-DYNA version R10.0 and up no longer supports variable LCF (the curve ID that specifies the failure strain as a function of the strain rate) in Card2 of *MAT_024 (*MAT_PIECEWISE_LINEAR_PLASTICITY keyword). However, Pre/Post still supports this variable in the *MAT_PIECEWISE_LINEAR_PLASTICITY **Additional Properties** modeling object. When you import a legacy LS-DYNA keyword file that contains *MAT_024 defined with the LCF (the load Curve ID = LCF) variable, Pre/Post correctly imports the keyword and variable, but the variable may be unreferenced by *MAT_24 materials in some cases.

Simcenter Samcef environment

- (PR 8394509) The **Solid Properties Check** command does not work on composite elements.
- The following issues currently occur when you import a Samcef model into Simcenter 3D:
 - (PR 8429946) The import of MDS rigid surface contact data fails if the rigid surface orientation is defined with Euler angles.
 - (PR 9498966) The Samcef import tool issues a fatal error when you import a Samcef model in which some names (of groups, functions, ..) contain non pure ASCII characters, like for instance french accentuated (extended ASCII) characters.
- The following issues currently occur when you export a model from the Simcenter Samcef environment:

- The software does not export beam element offsets that are defined using **Element Associated Data**.
- In subcases of a **Nonlinear** solution, you cannot enable or disable a **Surface-To-Surface Contact** simulation object if this contact is a bidirectional one.

Model and Load Pre-Processing

With the **Waterfall of Frequency to Order Cut** command, if the data from which you want to extract order cut data is time-dependent, then you must perform additional operations on the data before you can use the **Waterfall of Frequency to Order Cut** command.

- If your data is comprised of a time signal, you may need to first:
 - Use the **Time to Waterfall of Time** command, if the external data is not split.
 - Use the **Time Signal Processing** command to convert the time data to the frequency domain.
- If your data is comprised of a waterfall of time signal, use the **Time Signal Processing** command to convert the data to the frequency domain.

Margin of Safety

- The following **Margin of Safety** features are currently available in English only:
 - The Simcenter 3D Aerostructures Standard Methods documentation that is available in Simcenter 3D and accessible when you create an aero calculation.
 - The calculation method input parameter names and the output type names.
- (PR# 9615971) In the **Calculation Manager** dialog box, the software may interpret scalar values entered in the dialog box in the wrong units. This issue can occur when the preferred data entry units specified in the **Units Manager** dialog box differ from the base units of the part.
- (PR# 9624013) The software does not correctly compute the margin of safety (*MS*) of the **Plate Buckling Flat Longitudinal Bending Combined** method. Instead of computing $MS = Rccr/Rc - 1$ as stated in the documentation, the software computes *MS* as $MS = Rc/Rccr - 1$, which is incorrect. Currently, the software incorrectly computes the results of all margin calculations that are based on the **Plate Buckling Flat Longitudinal Bending Combined** method.

Flexible Pipe

- While you can undo the creation of Flexible Pipe features, you cannot redo them.

- To access a subpanel from a tree item in any definition panel, you must double-click the item rather than press the **Enter** key. To close a subpanel of a definition panel, you must click the **OK** or **Cancel** button. You cannot press the **Enter** key to close a subpanel
- (PR 9555751, 9566679, 9617464) A fatal error may occur when you use the **Generate Routing** command to update stock with overstocks.
- (PR 9617544) If you add a new material database, the materials from that database do not appear in pipes already in session.

Additive Manufacturing Process Simulation

- When you set the **Mode** option in the **Mechanical Slicing** dialog box to **Solver**, and you are running this application on a localized language version of Simcenter 3D that is not English, French, or German, the software cannot automatically open the **Post Processing Navigator** and select and display a result at a particular time step. To work around this issue, you must manually open the **Post Processing Navigator** and browse to the results that you want to display.
- Compensation is the process of using the results from an Additive Manufacturing Process Simulation analysis to create a pre-deformed additive manufacturing part that is suitable for printing.
 - You cannot automatically generate compensated/deformed geometry from computed deformations for models created with convergent geometry.
 - When you compensate a patterned part, the software only compensates the first occurrence of the part.
 - For a part with multiple bodies:
 - The software performs the compensation with all bodies, but Additive Manufacturing Process Simulation does not allow the replacement step
 - In some cases, the compensation does not produce a single compensated body but instead produces multiple sheet bodies.
- You cannot view or edit the solid supports materials in old format .xml files.
- For relatively complex models, when you select the **Immersed Support Meshing** option, some meshes may not be created and the software may issue the following message that indicates that meshing failed.

"Use Solid from Shell on the 2d meshes to find the failing triangles and replace the failing triangles by a suitable local patch until Solid from Shell generates tetrahedral meshes. In a Thermal FEM part where mesh slicing is required, use Thermal Mesh Slicing to finalize the meshes."

 - Please report any meshing failures of this kind when they occur.

- When you simulate the powder, if all meshes in a thermal FEM file were successfully created except for the powder mesh, the workaround suggested by this error message does not work. In this case, you should use the **3D Tetrahedral Mesh** command again and specify different parameter values.

Motion caveats

The following issues currently exist in Motion.

Road visualization

If you enable visualization for an RSM2000 file and use a small grid density (such as 10 mm), you might experience performance issues.

Position override

(PR 9380482) The couplers icon does not update automatically after performing a position override. To work around this issue, hide and then show the coupler.

Teamcenter Integration and Simcenter 3D Motion

You cannot upload external files in flexible bodies to Teamcenter when you import a motion part that was created before Simcenter 3D Motion 2019.1. To work around this issue, open a previous version motion part in the current version of Simcenter 3D and save it. Then, import the saved motion part to Teamcenter.

Virtual.Lab-to-Simcenter 3D Motion translation

Units are not preserved when translating math functions that refer to expressions, other math functions, or profile elements. To work around this issue, use a consistent unit set for all data definitions to avoid unit conversion issues. In addition, when translating an LMS Virtual.Lab Motion model using the migration tool (**VL2SCMigrationTool.exe**), expressions are translated into math functions. To improve consistency, the migration tool always migrates spline curves to profiles instead of a combination of profiles and AFU tables.

(PR 8558128) CATParts with commas in their name can cause the migration to fail.

(PR 9560837) Functions (LMS Virtual.Lab expressions) defined in the main mechanism using functions from other submechanisms (VL eval_expr_submech) are not migrated to Simcenter 3D.

(PR 8432171) In rare cases, flexible body connection points are not translated properly. In LMS Virtual.Lab, when FE nodes are assigned to the interface points (that is, points where the flexible body is connected to the mechanism) by defining the exact FE node IDs or using the nearest FE nodes to the connection points, neither the definition method nor the exact FE node IDs used are written to the ***.LMSMotionDefinition** file during the model translation process. Therefore, in Simcenter 3D Motion the FE node closest to the interface point is always used to connect the flexible body with the rest of the mechanism, regardless of the definition method used in Virtual.Lab Motion. In some cases, the nearest FE node in Simcenter 3D Motion is not the same as the user-defined FE node in Virtual.Lab Motion.

When translating animation cameras, the **.LMSMotionDefinition** file is missing some of the attachment information. As a result, the camera point is set to the center of gravity of Body1 and the target point is set to the center of gravity of Body2.

Simcenter 3D Motion-TWR

All coordinate systems that are to be used with Simcenter 3D Motion-TWR must reside in the Simulation file (not in part files) and must have a name.

Simcenter 3D Motion Transmission Builder

Simcenter 3D Motion Transmission Builder does not display a warning message when you close it without saving the configuration.

If you create a gear object using the Gear Contact Manager and don't create a simulation in the same Transmission Builder instance, the planet positions are not set correctly.

Simcenter 3D Motion Real-Time export

When creating a Simcenter 3D mechatronics element for export to a real-time platform, the gain and bias values are always set to one and zero, respectively. To work around this issue, use other control elements to scale values going in to the mechatronics. This restriction is only for real-time solutions. The gain and bias values work as expected in standard solutions.

Model definition files (MDF)

(PR 8425723) If you change the inactive status of a submechanism object in the parent, the object retains its original status when solved using the Simcenter 3D Motion Definition File Toolkit.

Solutions and solving

(PR 9380011) If your model contains many analytical contacts, performing a model check may take a lot of time.

(PR 9633638) Expressions that are referenced by a force element and contain generic force sensors may cause solutions to perform poorly or fail.

Submechanisms

(PR 9572741) If you override the **Mass Properties Option** option in a submechanism motion body and set it to **Automatic**, the calculated values are not correctly exported to the model definition file when using the Simcenter 3D Motion Definition File Toolkit. To work around this issue, override the mass and inertia values individually.

(PR 9572815) If you override an open connection in a tire, when exporting the model to MDF and reimporting it, the import fails because open connections are not supported by MDF.

General

(PR 9182872, PR 9180895) The mass calculation functionality is providing different inertia directions on body occurrences. This is a numerical tolerance issue and only happens in simple symmetric models, such as a cube.

(PR 8380201, PR 9170607) Marker position is reported as marker's initial position transformed with rigid body transformation. The flex body transformation is not considered.

(PR 9619045) When using the Simcenter 3D Motion Solver, the **IF Function Tolerance** Motion preference is not working correctly. Instead of the specified value, the software always uses 1e-8.

(PR 9612264) The motion results file is not read correctly when **Advanced Results** is set to **Yes** in the **Gear Contact** dialog box.

Simcenter Nastran 2020.1 caveats

Simcenter Nastran - General issues

- The directory containing C files example for User Material is incomplete. A separate download is made available on GTAC. Fortran directory is complete.
- (PR 9562643) In linear solution sequences, if the boundary nodes of the defined bolt cut are part of a glue pair, the axial preload is not correctly applied. This can be determined by summing the reaction forces at the bolt head which should equal the full preload value. Using a contact definition instead of glue, when possible, will resolve the issue.
- (PR 9343915) For SOL 144 analyses that calculate aerodynamic hinge moments using MONPNT1, some loads may be incorrect.
- (PR 9598270) RDMODES gives the wrong set of eigenvalues when SWAP RDQSOL is selected either manually or automatically, and F1, F2, and ND are all specified. A workaround is using 'LANC' for RDQSOL.
- (PR 9472874) For buckling problems, when a large ratio on the factor diagonal is indicated via user warning message in F06, the Lanczos procedure may fail due to a very large shift.
- (PR 9095229) For eigenvalue computations using Lanczos procedure, specifying a negative value for F1 may result in a failure if there are also large ratios on the factor diagonal. The workaround is to either not specify lower frequency F1, or specify zero.
- (PR 9533340) In dynamic analysis, the modal data generated by SDR1 and SDR2 are formed into a data matrix by DDRMM. For large models, Nastran may run out of scratch disk space in SDR2 module. Using PARAM, DDRMM, -1 will use less disk and let the solution continue.

Simcenter Nastran - Vibroacoustic analysis issues

- (PR 9619265) For SOL 108 vibroacoustic analyses that request grid contribution output, contributions may be ordered incorrectly if distributed memory parallel (DMP) processing is used.
- (PR 9614164) SOL 111 vibroacoustic models using RLOADEX to specify loads can fail for very large numbers of loads. Specifically, this may occur when the associated SC_H5 load file is more than 100 GB.
- (PR 9612495) FEMAO quality check will output incorrect results when DMP processing is used and initial quality check is turned off.
- (PR 9557338) In vibroacoustic analyses using HFEM, when GFL is applied the solution is slower than in 2019.1. A workaround is to switch to previous version by using SYS714=1.

- (PR 8422803) For vibroacoustic analyses using FEMAO (ACADAPT) and DMP processing, there may not be enough memory assigned to NASTRAN by default. This can result in an error, and an incorrect error message that does not indicate memory shortage. A workaround may be to increase Nastran memory using the `memorydefault` keyword.
- (PR 8559234) For vibroacoustic analyses using HFEM, processing may be slow compared to Virtual Lab.

Simcenter Nastran - Solution 200 Design Optimization

- (PR 8434468) For SOL 200 topology and topometry optimization jobs, stress sensitivities might be inaccurate if several stress responses (e.g. with different item codes) are defined on the same elements.
- (PR 8434471) For SOL 200 topology optimization jobs including maximum size manufacturing constraint, best design selection might be incorrect. It is advised to use `PARAM,NASPRT,1` such that all iterations are output to `op2` file and to manually inspect the results.

Simcenter Nastran - Solution 401

- (PR 9591525, PR 9586230) After performing SOL 401 large strain analyses, strain/stress results are incorrectly shown as having zero value in contour plots in Simcenter Post. In order for this to work, Post needs TRMBD data block (table of Euler Angles for transformation from material to basic coordinate system in the deformed configuration) to plot the strain/stress results in the basic coordinate system. But SOL 401 large strain analysis does not generate the correct TRMBD data block. The work-around is to select the Native coordinate system in Post to show the results correctly.
- (PR 9618559) In SOL 402, the equivalent stress for cast iron plasticity is correctly evaluated as the effective (von Mises) stress of the stress tensor for all material types, whereas SOL 401 is not consistent. For a large strain analysis in SOL 401, the equivalent stress is incorrectly output as the yield stress either under compression or tension.
- (PR 9553417) In a SOL 401 multi-physics input file which contains SPCD and individual loads (FORCE, MOMENT, PLOAD4, etc.) with same SID for these cards, the SPCD contribution is not applied, resulting in an incorrect solution. A workaround is to apply the individual loads using a LOAD combination bulk data card with SID same as that of the SPCD. This is not an issue with non-multi-physics input files.
- (PR 9615244) In SOL 401, when an ANALYSIS=DYNAMICS subcase follows a ANALYSIS=PRELOAD subcase, the effect of the preload is not carried through correctly. The workaround is to use ANALYSIS=STATICS when applicable.
- Following limitations exist in SOL 401 when PLOADFP is used in a model:
 - Forces on SPC degrees of freedom are not part of OLOAD output.
 - In defining a WETID region, BCPROP and BCPROPS are not supported. Only BSURF, BSURFS and BEDGE are supported.

- Following limitations exist in SOL 401 when a model containing contact definition is used in a restart analysis:
 - When contact region adjustment (BCTPARAM, ADJUST >=0.0) is requested, the adjusted coordinates are not considered in the restart subcase. The model check will fail in the restart solution. The following DMAP ALTER may be used as a work around to fix this issue:

```
compile ifps,list $
alter 'IF (ISYS709\>=1 AND ISYS710=SBCNO) RST401 = TRUE' $
RST401 = FALSE $
endalter $
```

- The restart solution with small sliding formulation (BCTPARAM, DISP=1) may fail to converge because of incorrect initialization of contact parameters in the restart solution. The following DMAP ALTER may be used as a work around to fix this issue:

```
compile nonlin,list $
alter 'cntupdtr' $
cntupdtr=1 $
endalter $
```

- (PR 9609676) In a SOL 401 cyclic symmetric analysis (ANALYSIS=CYCMODES), when user defined cylindrical and cartesian coordinate systems are specified, the cartesian coordinate systems need to have a larger coordinate system ID than that of the cylindrical coordinate system.
- When NLCNTL, RFVAR=FORCE is used in a SOL 401 input file, any TABLEDn associated with the corresponding RFORCE load will not support EXTRAP=2; only EXTRAP=0 and EXTRAP=1 are supported.

Simcenter Nastran - Solution 402

- (PR 8434017) In SOL402, the bolt results bending moments are not accurate if the bolt mesh is not symmetric because they are evaluated around the average of the nodes of the bolt cut instead of its center of area. However, this is just a post processing issue and does not the accuracy of other results.
- (PR 8434030) In SOL402 model using MAT9, if G1Z and G2Z are not specified, a value of 0 is used instead of infinite as stated in the documentation. This can lead to singular stiffness matrix. As a workaround, use 1000 times the value of G12.
- (PR 9620442) In SOL 402, the NLCNTL2 parameters:
 - CREEP and PLASTIC cannot be enabled locally (in a subcase) if they were disabled globally,
 - AUTOTIM cannot be disabled locally (in a subcase) if it was enabled globally, which is the default.

As a workaround, do not disable CREEP or PLASTIC globally, but instead, do it in each subcase where necessary. Also, disable AUTOTIM globally and enable it in each subcase where necessary.

- (PR 8433148) With SOL402, when PLOAD2 bulk cards are referenced by a global DLOAD case control card or DLOAD case control cards in several subcases, the load is multiplied by the number of subcases in which it is used. As a workaround, use different PLOAD2 bulk card in each subcase or use LOAD instead of DLOAD.
- (PR 9610335) In SOL402, it is not allowed to have multiple RFORCE1 on the same element or a combination of RFORCE and RFORCE1 but this was not trapped.
- (PR.8431853) In SOL402, when using a large number of subcases and several DLOAD, an error can occur during computation leading to the error message: forrtl: error (65): floating invalid. As a workaround, reduce the number of subcases or replace DLOAD by LOAD.
- (PR 9594936) With SOL402, contact with a rigid surface was not producing accurate results. As a workaround, use a flexible surface with large stiffness.
- (PR 9589796) With SOL402, SHLTHK parameter does not work for composite shell contact pair.
- (PR 8429058) With SOL402, BCTPAR2 INIPENE 12 (UN3 2) parameter doesn't apply only on penetration but behaves similarly to INIPENE 11 (penetrations and gaps).
- (PR 9582065) In SOL402 shell contact, when considering shell thickness automatically (BCTPAR2 SHLTHK=0 or blank), the size of an internal array was incorrect, leading to a fatal error. This happens more often with parabolic shells but not exclusively. There is no workaround.
- (PR 8428237) With SOL402, the total and incremental sliding results are incorrect if the model contains shells or offsets. Those results are computed as if contact happened on the meshed surface.

Simcenter Nastran – Rotor Dynamics – Solution 414

- The user can define a PreLoad subcase before a rotor dynamics subcase in a Frequency response analysis. If the Preload contains a combination of forces (using the LOAD card), or if different pressure loads PLOAD1, PLOAD2, or PLOAD4 are applied on the same elements with the same SID, the different loads or pressure are not taken into account properly.

PCB Exchange caveats

- The **PCB Exchange** command to start the PCB Exchange application is missing from the **Application** tab on the ribbon bar. To access PCB Exchange in Simcenter 3D, choose **File** tab→**Start** group→**PCB Exchange**.
- The other PCB Exchange caveats are located in *NX Caveats and Product Notes*.

Finding software field bulletins (SFBs)

You can find all software field bulletins (SFBs) for a given release using the following page:

<https://solutions.industrysoftware.automation.siemens.com/result.php?sort=desc&q=SFB&dt=sfb>

Siemens Industry Software

Headquarters

Granite Park One
5800 Granite Parkway
Suite 600
Plano, TX 75024
USA
+1 972 987 3000

Americas

Granite Park One
5800 Granite Parkway
Suite 600
Plano, TX 75024
USA
+1 314 264 8499

Europe

Stephenson House
Sir William Siemens Square
Frimley, Camberley
Surrey, GU16 8QD
+44 (0) 1276 413200

Asia-Pacific

Suites 4301-4302, 43/F
AIA Kowloon Tower, Landmark East
100 How Ming Street
Kwun Tong, Kowloon
Hong Kong
+852 2230 3308

About Siemens PLM Software

Siemens PLM Software is a leading global provider of product lifecycle management (PLM) software and services with 7 million licensed seats and 71,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software works collaboratively with companies to deliver open solutions that help them turn more ideas into successful products. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

© 2019 Siemens. Siemens, the Siemens logo and SIMATIC IT are registered trademarks of Siemens AG. Camstar, D-Cubed, Femap, Fibersim, Geolus, I-deas, JT, NX, Omneo, Parasolid, Solid Edge, Syncrofit, Teamcenter and Tecnomatix are trademarks or registered trademarks of Siemens Industry Software Inc. or its subsidiaries in the United States and in other countries. All other trademarks, registered trademarks or service marks belong to their respective holders.