

Getting Started

Q: How should I get started using NPSS?

A: We recommend that you get started by playing with an existing model. You can explore the models in EMI if you don't have any of your own. The EMI examples are also a great way to see examples of how to do specific tasks in NPSS, such as run a transient case, develop an encrypted model, or switch to off-design.

Q: Are there any example models?

A: There are example models in the EMI directory. The burner model is the simplest, so you will want to start there.

Q: Does NPSS support 32-bit?

A: No, NPSS only supports 64-bit.

Q: What are the system requirements for NPSS?

A: NPSS is available for both Windows and Linux operating systems. It will work on all modern computers, and does not require any special system requirements.

Q: I have an old version of NPSS. Is it still supported?

A: We do not support versions of NPSS older than v2.8. We only support NPSS version 2.8+

Q: Do you offer any training courses to learn NPSS?

A: Yes, we offer an annual training course. More information about the course is available on our website. We also offer individualized and custom training courses. Please contact us for more information.

Q: Is there any documentation for using NPSS? If so, can I get a copy?

A: NPSS is distributed with an extensive User Guide. The User Guide comes with all versions of the NPSS License, so if you want a copy of the User Guide, we encourage you submit either an Academic or Evaluation license request.

Q: I found a feature that I believe is working incorrectly. Can I submit a bug request to get it fixed?

A: Yes, please contact us to report a bug.

Q: I understand that NPSS is a Consortium. Can my company join the Consortium? If so, what are the benefits, and how much does it cost?

A: Consortium membership is reserved for companies that have extensive experience using NPSS and are able to contribute meaningfully to the NPSS Consortium. Consortium Members have unlimited NPSS licenses, and since Members are heavy users, the cost per license is cheaper than purchasing individual licenses.

General Modeling and Capabilities

Q: Can I output results in CSV format?

A: By default, the NPSS viewers do not have the ability to output results in a CSV format. However, we have a custom viewer that is capable of outputting results in CSV format. Please reach out if you are interested to receive a free copy of this tool.

Q: Is it possible to match my NPSS model to experimental data?

A: Yes. This is typically achieved by adjusting assumptions and performance maps, but really depends on the specific. Please reach out to us if you would like to discuss further.

Q: Can I use to NPSS to identify if specific components in the system have degraded? For example, can I compare the performance of an actual engine to a baseline model and identify if the Fan, LPC, HPC, HPT, or LPT performance is degraded?

A: Definitely. This is common use-case for digital twin models developed in NPSS. If would like help developing your baseline model or engine performance report, please contact us, and we'll be glad to assist

Q: Is optimization possible with the NPSS Solver? How can you optimize an engine cycle in NPSS?

A: The NPSS Solver is capable of handling constraints, but not optimization. Users typically wrap an optimization algorithm around their NPSS model, such as Hooke-Jeeves, or program the optimization algorithm directly into NPSS.

Q: Can NPSS execute in real-time?

A: Yes, it is possible to use NPSS to execute real-time simulations. Depending on the complexity of the model and the demands of the real-time environment, you may need to make some tweaks to the solver configuration or interfaces.

Q: Can NPSS be used to model sCO₂ (supercritical carbon dioxide) cycles?

A: Yes. We use NPSS here at SwRI to develop nearly all of our sCO₂ models. The implementation differs from that of standard airbreathing engines, and we would be happy to discuss the specifics with you.

Q: Can NPSS be used to model hypersonic propulsion systems?

A: Yes. We developed a turbine-based combined cycle (TBCC) here, and we would love to discuss the details with you. Furthermore, we are in the process of validating several components for hypersonic systems, such as the inlet, isolator, and combustor.

Q: Can compressor and turbine bleeds be modeled in NPSS?

A: Yes. There is standard "Bleed" Element to do this. Interstage bleeds can also be modeled.

Q: Is it possible to run transient simulations?

A: Yes, transient simulations are discussed in Chapter 6 of the NPSS User Guide. Also, see the EMI example model, CDM01_Turbofans/TF00, for an actual implementation of a transient simulation.

Q: How can I create an encrypted model?

A: The process to create an encrypted model, aka a customer deck, is detailed in the EMI example, CDM07_Model_Delivery.

Q: Is it possible to interface NPSS with external programs such as python or Matlab?

A: Yes, this is one of the features that makes NPSS an exception tool, in our opinion. NPSS has APIs to Fortran and C++, as well as an interface to Matlab Simulink, file I/O capabilities, and subprocess communication capabilities. In the next NPSS release, we will also have APIs for python and Java, and in future releases, we will also have FMI and FFI capabilities. These are in progress right now.

Q: Is there a way to plot my results?

A: Not directly in NPSS. NPSS is typically regarded as a number crunching tool. However, during our standard NPSS training course, we share an example of how to do plotting in the IDE by developing an interface to python matplotlib.

Q: How do I run a design point simulation?

A: First, you will need to switch to DESIGN mode in NPSS by using the `setOption("switchDes", "DESIGN")` function. Then, configure the solver and run. See the CDM01_Turbofans\TF00 model in EMI for an example.

Q: How do I run an off-design point simulation?

A: First, you will need to switch to OFFDESIGN mode in NPSS by using the `setOption("switchDes", "OFFDESIGN")` function. Then, configure the solver and run. See the CDM01_Turbofans\TF00 model in EMI for an example.

Q: Does NPSS come with any compressor and turbine performance maps? Can I add my own performance maps to NPSS?

A: NPSS comes with some standard performance maps from the NASA E3 project. They can be found in the EMI\Data directory. These maps can be scaled or modified as needed. It is also relatively easy to create your own custom performance maps.

Q: What level of fidelity does NPSS have in analyzing engine performance?

A: NPSS is inherently a 1D design tool, that is excellent at doing rapid physics-based thermodynamic calculations. It is not a 2D FEA or 3D CFD tool. Although NPSS doesn't capture 2D and 3D effects through FEA or CFD, the performance of individual components, such as compressors and turbines, can be calculated using performance maps. Performance maps and tables enable NPSS to precisely match experimental data and have a high level of fidelity. For higher-fidelity simulations, NPSS can interface with 2D or 3D tools.

Q: What are compressor R-lines? I see R-lines referenced in the Compressor Element and the NPSS Solver.

A: Compressor R-lines are simply a mathematic construct used to help NPSS solve for the compressor performance during off-design simulations. Compressor performance maps relate parameters such as corrected flow rate, pressure ratio, efficiency, and speed. In regions of low corrected flow rate, compressor pressure ratio is nearly constant, and similarly in regions of the highest corrected flow rate, the compressor the flow rate is nearly constant. Therefore, R-lines are used to solve for performance is regions of the compressor performance map where performance parameters are horizontally or vertically tangent. R-lines in NPSS are analogous to beta-lines in other gas turbine simulation programs.

Q: What is the WAR parameter in the example burner model?

A: WAR is the water-to-air ratio by mass. However, it only accounts for evaporated water, not liquid water droplets. For modeling liquid water injection, NPSS does not have any built-in capabilities. Therefore, you will need to develop your own custom methods for modeling liquid water injection.

Q: I want to run a multiple design point (MDP) simulation. How can I do this in NPSS?

A: This is a challenging question to answer in a Q&A forum, since it depends on the specific model. Please reach out to SwRI's NPSS team to discuss possible solutions. Also, a good reference to get started is the thesis, "Simultaneous Multi-Design Point Approach to Gas Turbine On-Design Cycle Analysis for Aircraft Engines" published by Jeffrey Scott Schutte.

Q: I keep getting an error that my model fails to converge in 50 iterations. How do I troubleshoot this?

A: If your model is not converging, the first thing to do is increase the allowable number of iterations by increasing the `solver.maxIterations` variable. You can also increase the solver tolerance by increasing the `solver.defaultTolerance` variable. If these simple fixes do not work, then you should check your initial guesses and assumptions. Do these all make sense? Sometimes plotting specific parameters in the model will also help identify the parameter that is diverging or unreasonable. Also, our team is available to provide engineering support, if needed.

Q: Can you help my company develop a performance model of our system?

A: Absolutely. We have developed performance models and digital twin models for clients in a variety of different industries, including: power generation engines, combined cycles, refrigeration cycles, hypersonic propulsion systems, liquid rocket propulsions systems, sCO₂ power generation cycles, turbofan engines, turbojet engines, mobile power generation, and more.

Licenses and Installation

Q: Can I get a quote to purchase a NPSS license?

A: Yes, please contact us to get a quote.

Q: I want to be able to use remote desktop to run NPSS and/or access the NPSS license remotely. What license should I use?

A: You will need a server license to use NPSS remotely. There is an Academic Server License for academic purposes and a Commercial Server License setup for commercial purposes.

Q: I have an Academic license, but I don't see the NPSS IDE?

A: Unfortunately, the NPSS IDE is only available with the Commercial Licenses as a beta release. We hope to make it available to Evaluation and Academic licenses soon.

Q: I have a node-locked license, but I need to run NPSS on a different computer. What should I do?

A: If you have an Academic license, please submit a new Single Academic License request. If you have a Commercial license, please speak to your NPSS license POC and have them email us the computer information that you wish to transfer the license to. If you need NPSS on both computers then another single license can be purchased, or the license can be upgraded to a floating server license.

Q: I cannot find the "c4868" and "f4868" directories that are referred to in the EMI User Guide. Are they accidentally missing in my Academic license package?

A: These directories are only provided for the paid licenses, such as the Commercial License.

ERROR: Error: Cannot checkout an uncounted license within a Windows Terminal Services guest session.

A: This usually means that the user is trying to checkout a node-locked license over remote desktop. A node-locked license cannot be used over remote desktop. To use remote desktop, you will need to upgrade your license to a server floating license.

ERROR: Networking Error(11010): Server <...> not responding. Please contact System Administrator for assistance.

A: Update the FlexLM license information in the Registry Editor. Follow these steps:

1. In the Start menu, search for "Registry Editor" and open it
2. Find the FLEXlm License Manager directory probably at this path:
"Computer\HKEY_CURRENT_USER\SOFTWARE\FLEXlm License Manager"
 - a. If "FLEXlm License Manager" is not there, then you will need to add it under SOFTWARE at the location above.
 - i. Right-click on SOFTWARE -> New -> key
 - ii. Add FLEXlm License Manager as the key
 - iii. Select the FLEXlm License Manager directory folder there now
 - iv. Now add a New String Value for "NPSS_LICENSE_FILE" as the Name and the value for Data needs to match the Server Name
3. The value Name should be NPSS_LICENSE_FILE
4. The value for Data needs to match the Server Name that you are using for the license

These updates should solve the problem.

ERROR: NPSS exited with status 53 (incorrect value for the environment variable LM_BINDING_AGENT)

No feature will be served

Exiting due to signal 1

A: Reorder the Imgrd argument to put the log argument first. This ordering is important to get the correct logging.

1. Run something like this in a command prompt:
 - `Imgrd -l <path to logfile> -c <path to license> -s -z`
 - Example: `Imgrd -l C:\Program Files\NPSS\NPSS.log -c C:\Program Files\NPSS\npss_v28_ce_server_FTT.lic -s -z`
2. You will then get an error similar to this:

```
NPSS.exe - System Error
The program can't start because MSVCR100.dll is missing from your
computer. Try reinstalling the program to fix this error.
```

 - This means you need to download and install MS Visual C++ 2010 SP1 x64
 - Look up which dll you're missing to find out which redistributable you need.

ERROR: Unable to execute file. CreateProcess failed. Code 5 Access denied.

A: This is a software Installation error, meaning users can't install certain software. This is usually due to your account permissions. You may need to contact your IT Department about your permissions or have them install it on your computer for you.

ERROR: Error when running license manager for a Commercial Server license:

```
=== Host Info ===
```

```
Host used in license file: <Host_Network_ID_provided_in_license>
```

```
HostID node-locked in license file:<Host_ID_provided_in_license>
```

```
HostID of the License Server: <Actual_Host_ID_needed_in_license>
```

A: The wrong Server Host ID was used in the license. Please request a new server license and provide the "Host used in license file" and the "HostID of the License Server".