

Welcome to NPSS v2.8 and EMI v11.0.1

Southwest Research Institute® (SwRI®) is pleased to provide this latest release of the NPSS® software as well as our newly developed companion, EMI v11.0.1. NPSS is an object oriented simulation environment enabling development, collaboration and seamless integration of system models. The primary application areas for NPSS include aerospace propulsion systems and thermodynamic energy systems. However, since it is fundamentally a flow-network solver, it has also been applied to a variety of other fluid/thermal subjects such as multi-phase heat transfer systems, refrigeration cycles, variations of common power cycles (i.e. Brayton), and overall vehicle mission analyses.

EMI is a recently developed library of **Elements**, **Models** and **Interface** examples. A significant portion of the EMI content was previously provided within the main NPSS program, referred to as the Core. This separation of the EMI content from the Core enables more flexible development of the engineering elements and example models without waiting for a new release of the Core. SwRI will frequently update the EMI distribution package and these updates will be available to existing license holders. The updates can be installed without displacing the already installed version of EMI. In fact, multiple versions of EMI can be installed at the same time, allowing users to run multiple NPSS environments with different EMI versions for direct comparison. The following paragraphs provide more detail on the recent developments for both NPSS Core and EMI.

What's New in NPSS v2.8 Core

This latest version of the Core contains many bug fixes related to topics such as model security, error handling, table interactions, and build issues. This release of NPSS also includes improvements to overall program stability and a migration from 32-bit to 64-bit architecture. There are new features in v2.8 that enable the ongoing NPSS Graphical User Interface (GUI) development including an eventing mechanism and the ability to start and stop execution of a simulation. This addition facilitates the debugging capability of the new GUI. This version now includes file hierarchy functions that allow for tracking of loaded files, load order and loaded scope. This development is also partly in support of GUI development needs but can be of general use to NPSS modelers. This new functionality is fully described in Chapter 11 of the *NPSS Users Guide*.

One change in Core that can impact existing models is the removal of *switchDes* from the global scope. Previously, *switchDes* was already instantiated within the NPSS session and could be directly updated using *setOption()*. In v2.8, *switchDes* must be instantiated by the user in the top level assembly if it is to be set at the top level scope for all child objects. An example of this can be found in one of the sample models provided with EMI (`\\Models\CDM01_Turbofans\TF00\model\cdm01_tf00.mdl`).

As usual, the NPSS Core is typically installed in the root directory as `C:\NPSS.nt.ver28_VC11_64`. A full list of the change requests in this release is located in the *ReleaseNotes.txt* file.



What's New in EMI 11.0.1

It may seem odd that the first release of EMI is v11.0.1 but there is a reason. We have maintained the history of changes made to all of the engineering elements and models ever since the final NASA release of NPSS v1.6.5. These changes are maintained within a new configuration management system and result in about 9 major releases historically. SwRI EMI development started with v10.0.0 and some development work has occurred prior to this first commercial release of EMI.

There are several Element bug fixes in v11.0.1 including issues with many of the *Ambient switchMode* variations and removal of unused variables from the *Wall* element. There are also significant improvements to the example Models provided within EMI. The models are clean and well documented so that new users can use them for self-study and as an example for new models. Updated models include CDM01/TF00 and CDM01/TF02. Both are air-breathing gas turbine engines. TF00 originates from NASA and is informally referred to as the “fanjet” model. TF02 originates from Rolls-Royce and is an example of the modeling style used in their organization. There is also a mission analysis example which is referred to as CDM05.

Consistent with the collaborative nature of NPSS, EMI includes three examples of interfacing NPSS models with other third party tools. Two of the examples (C4868 and F4868) are compliant with the latest SAE S-15 ARP4868 document. The two examples show an NPSS interface with C++ and Fortran, respectively. There is also an example interface for working with MATLAB® Simulink®.

Since EMI is new, it is helpful to know that EMI is typically installed at the root directly as well, adjacent to the Core installation as `C:\NPSS.EMI.11.0.1`. A full list of the change requests in this release is located in the *ReleaseNotes.txt* file.

How to Get NPSS

For commercial and individual academic users, NPSS may be obtained from the Consortium website. Interested parties can download a trial version or purchase an annual license for either academic use or for commercial use. NPSS is export controlled such that sales of NPSS are restricted to countries not currently listed on the U.S. Department of Commerce Anti-Terrorism watch list.

Our licensing and pricing table is updated for NPSS v2.8. All licenses are now perpetual except for the evaluation license which is valid for 45 days. The updated pricing and associated features are shown in Table 1 below. Each license Purchase includes one year of support. Additional years of support can be purchased at the Renewal price. Support includes access to the latest release of the Core and EMI as well as NPSS bug fixes. Training and modeling support services can be purchased as well under a separate contract. Please see the contact details below for more information.



Table 1. NPSS v2.8 Purchase Options

| | Purchase Price (Renewal Price) | Development Planning | Source Code | Customer Model Development | Custom Component Development | Engineering Elements | Example Models | Interfaces | Delivery Method |
|--|-----------------------------------|-------------------------|----------------|----------------------------------|------------------------------------|--------------------------------|-------------------|------------|---------------------------|
| Evaluation License 45 days | Free | | | | | Interpreted Only | Partial | Partial | Installers |
| Academic Site License Perpetual | \$300 (\$300) | | | | | Interpreted Only | Partial | Partial | Installers |
| Academic Single License Perpetual | Free | | | | | Interpreted Only | Partial | Partial | Installers |
| Commercial Site License 12 Perpetual Seats | \$40,000 (\$8,000) | | | All | All | Compiled and Interpreted | Partial | Partial | Installers |
| Commercial Single License Perpetual | \$4000 (\$800) | | | All | All | Compiled and Interpreted | Partial | Partial | Installers |
| Consortium Members | Inquire for Pricing | Yes | All | All | All | Compiled and Interpreted | All | All | Installers & Zip Files |

The main distinctions between evaluation/academic and commercial versions of the software are the ability to have and develop compiled elements as well as customer models. Anyone can develop custom elements and can even modify the NPSS EMI elements as they desire. However, they will only have the ability to run them in interpreted mode. Commercial users have the added benefit of being able to compile the custom developed elements which improves speed for large models. Additionally, Commercial users have the ability to export a model in the form of a Customer Model which is often necessary for collaboration among engine and airframe manufacturers.

For users/companies with significant experience with NPSS and/or a large user base, it may be of interest to consider Consortium membership. SwRI manages the NPSS Consortium on behalf of the Consortium members. Members enjoy the additional benefits of access to the full source code (a significant value for building the source to fit your own computing resources), a large number of licenses for use by your company, input on the direction of development efforts for the future of NPSS, and the legal right to sub-license NPSS to your vendors for the purpose of model sharing.

Contact Information

For more information, please contact the Consortium Manager, David Ransom, by email (david.ransom@swri.org) or by phone, (210) 522-5281, or you can visit our Consortium web page for more information (www.npssconsortium.org).