PSS®E Parallel Dynamics Module

Run dynamic simulations up to 24 times faster on a single workstation

At a glance
PSS®E Parallel Dynamics is an optional add-on module for PSS®E that provides up to 24x speedup of dynamics simulations on a single workstation. It allows the user to run multiple simulations in parallel by deploying a single simulation on each CPU core/thread of their workstation.

- Accomplish in minutes what normally takes hours

- Easy to deploy – simple installation with no IT burden

- Easy to use – immediate benefits, without a big learning curve

- Provides tools for automatically generating common fault scenerios for many buses/machines at a time

The challenge
A distinctive capability of PSS®E is its ability to provide high-fidelity transient stability simulation of very large power networks (hundreds of thousands of nodes) with many dynamic models (thousands of machine and control models).

There is an industry need to perform very fast dynamics simulation. Unfortunately, most tools achieve the required speedup through undesireable compromises, such as: penalization, model simplification (lower-fidelity models), network model reduction (electrical equivalence), or a prohibitively high IT burden.

The challenge is to:
- Provide the necessary speeds, without the sacrifices of model simplification, network model reduction, or excessive IT overhead

- Obtain more results in less time, and be able to scale up computation capacity with time

- Improve the work processes while leveraging existing assets such as libraries of simulation scripts and pre/post-processing scripts.

Our solution
PSS®E Parallel Dynamics addresses the speedup and productivity challenges faced by today's transmission planners.

Ready-to-use today – instant deployment
The PSS®E Parallel Dynamics add-on module is available starting with PSS®E Version 34.1 (for users of the PSS®E 34 series), and PSS®E Version 33.8 (for users of the PSS®E 33 series). Since the module is installed with PSS®E, all the user has to do is purchase a license, and the module will be unlocked and instantly ready for use.

No new hardware, no scripting, no training required

PSS®E Parallel Dynamics offers its users a simple graphical user interface to run multiple instances of PSS®E simulations in parallel, taking full advantage of today's multicore laptops, workstations, and servers. The user does not need a new computer or dedicated server, nor do they need to learn special scripting to use PSS®E Parallel Dynamics.

Linear speedup

By default, PSS®E runs on one core only. Depending on how many processor cores the computer has, PSS®E Parallel Dynamics is designed to automatically manage parallel execution of PSS®E, allowing the user to run many simulations in parallel, optimally distributed to every core. Because of this, the user can achieve near-linear speedup of their simulations. In other words, if they have a 16 core machine, they will be able to run their batch dynamic simulations almost 16 times faster (neglecting a very small computational overhead for the parallelization process).

For a 24 core machine, a study that used to take 6 hours can now be completed in roughly 15 minutes. In other words, a formerly overnight process can now be done by PSS®E Parallel Dynamics during a coffee break.

Fault tolerance

One of the most difficult challenges in complex dynamics simulation is the reality that some simulations will fail. This could be due to modeling or computer software/hardware issues. Currently, running many back-to-back dynamic simulations programmatically often results in a single failed simulation stopping the entire run, requiring a restart of the study from the beginning. This can be very time-consuming for long runs that take several hours or more. To help save hours of wasted time and effort, PSS®E Parallel Dynamics provides:

- Real-time reporting of simulation status, so the user can immediately see when a problem is encountered

- Complete isolation of problematic simulations, allowing all other simulations to run unaffected

- Detailed error reporting for problem simulations, helping the user to quickly determine and fix the issues

Higher productivity

The advanced queue management capabilities of PSS®E Parallel Dynamics give the user seamless control over hundreds of studies and thousands of simulations, offering many advantages over a simple batch-driven process. For example:

- No need to develop and maintain batch scripts to launch and control simulations

- No need to actively monitor and control the program execution – simply "queue and forget," and let PSS®E Parallel Dynamics manage the program execution

- Simulations can be prioritized at will, and easily re-started or re-run without affecting other simulations already queued

- Per-simulation visibility and control eliminates the need to restart a whole study due to individual simulation failures

- Built-in error handling and fault tolerance

- Extensive logging and reporting functions provide visibility into machine performance and utilization

- Easy to customize workflows by incorporating the user's own pre/post-processing scripts.

Built to scale

Using the same user interface and workflow, a user can begin with the workstation edition today, to gain speed and productivity advantages on any multicore computer. Once the user has started with PSS®E Parallel Dynamics, they can scale up to more powerful workstations and servers, scale out to adding dedicated servers, or even to the cloud by simply adding more hardware. Speed and productivity gain will increase accordingly.

How to get started

For further information or to purchase the PSS®E Parallel Dynamics Module, please contact Siemens PTI software sales at *pti-software-sales.ptd@siemens.com* or +1 518 395 5000.