Siemens PTI Software and Consulting Solutions for IPPs
Siemens PTI Provides a Full Spectrum of Support for IPP Projects

- **Full support for IPP projects**

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<th>Topic</th>
<th>Siemens PTI Offering</th>
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<td>Strategic Consulting</td>
<td>Energy Business Advisory</td>
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<tr>
<td>Technical Consulting</td>
<td>Power System Consulting</td>
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<tr>
<td>Modeling, Analysis, and Simulation Tools</td>
<td>PSS® Software Suite</td>
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</table>

- **Strategic advantage** due to direct interaction between Siemens PTI consulting and software experts

- **Close link to Siemens experts in power generation and power transmission**
  - Dynamic models of turbines and generators
  - Dynamic models of FACTS devices (where required)
  - Detailed models of substation equipment

- **Broad experience** in studies on system integration of power plants and related network expansion requirements
Siemens PTI Support for IPP Projects

Typical studies for system integration of power plants and related network expansion requirements:

- Grid connection studies (focus on power plant / grid connection)
- System integration studies (focus on transmission network)
- Power evacuation studies
- Transmission system development studies

Addressing all relevant aspects:

- Design and configuration of network interface and network modifications
- Steady-state performance: Equipment loading, voltage profile, reactive power balance
- Dynamic performance: Generator stability, voltage stability, load-frequency control, inter / intra area oscillations
- Transient performance: Insulation coordination, breaker performance, sub-synchronous interactions
- Protection system performance
Siemens PTI Support for IPP Projects

Typical first step: High-level grid connection study

• Compilation of basic transmission network model

• Steady-state studies
  ▪ For power plant integration into the transmission network
  ▪ Analyzing the impact of the new power plant on the transmission network performance
  ▪ Power flow study
  ▪ Short circuit study
  ▪ Contingency study (with respect to power evacuation)

• Generator stability study (i.e. critical fault clearing time in the network)
Siemens PTI Supports IPPs with PSS®E
The “industry standard” for transmission analysis & planning

Description
Cutting-edge electric transmission system analysis and planning

Scope
• Fast powerful, and real-world tested system models up to 200,000 buses
• Modern graphical user interface
• Balanced and unbalanced fault analysis, contingency analysis (deterministic and probabilistic)
• Extensive automation and customization capability with BAT commands, Python™
• Comprehensive power flow and dynamics model library including emerging technologies as well as graphical construction of user-defined controller models
• Small signal and Eigenvalue analysis

Customer benefits
• Comprehensive modeling capabilities enabling sophisticated analyses and accuracy while saving time
• Improved system reliability and lower infrastructure costs
• Improved work processes and efficiency
• Integration into a client’s workflow through built-in Python™ APIs
**PSS®E - The “Industry Standard” Since 1972**

**History – “Pioneers”**
- **Developed in 1972** by seven consultant engineers for own use
- First version of PSS®E on an HP 2020 supporting only one user
- Quickly growing interest of utilities: Between 1978-1979, the customer base grew by 50%
- 100th copy installed in 1986

**Present – “Market Leader”**
- PSS®E is the most widely used global tool for transmission planning
- Over 12,000 licenses across 900 utilities, consultancies, universities and research labs around the world
- “Industry standard” status - global market share of 40% and US share of 65%

**Future – “Renaissance & Go Beyond”**
- Portfolio has grown to over six products
- Currently integrating all products into one single PSS® Platform
- To address the next generation of challenges for our customers in a highly efficient way
- Building a “Digital Twin” for power grids…

1972

- Original computer room at Siemens PTI in the 1970’s. In the foreground is Ted Kostyniak, one of the founding members.

TODAY

- A small, but important portion of the PSS® team. Ted Kostyniak (front, 2nd from right) has been on the team since 1972.

2017+

- On the way to building a “Digital Twin” for power grids...
# PSS®E Licensing Options

## Individual Machines
- Two options:
  - Software Lock (tied to single machine)
  - USB Dongle

## Network
- Standard network lock
  - Single-site, single legal entity
  - Unrestricted site option
  - Same as above, but allows multi-site

## Hourly
- Available in multiple pre-configured packages (base SW + different module combinations)
- 200- and 500-hour buckets
**PSS® Maintenance & Support (M&S)**
Provides users with a wide spectrum of benefits

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<tr>
<th>Services</th>
<th>Included in M&amp;S</th>
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<tbody>
<tr>
<td><strong>Software Updates</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Access to the latest product releases, updates, and improvements</td>
<td>![Checkmark]</td>
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<tr>
<td>▪ Access to new product functionality</td>
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<tr>
<td>▪ Access to the “users-only” area of the Siemens PTI Website</td>
<td>![Checkmark]</td>
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<tr>
<td><strong>Technical Support</strong></td>
<td></td>
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<tr>
<td>▪ Application support offered by dedicated in-house Siemens PTI Customer Care team with direct access to subject matter experts</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td>▪ Access to user support system, issue reporting and case tracking related to warranty and support agreements</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td><strong>User Technical Conference (UTC)</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Free admittance to power-packed technical user conferences</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td>▪ Conferences have a regional focus, and serve to increase product roadmap awareness, and provide opportunities to meet with Siemens PTI experts and fellow users</td>
<td>![Checkmark]</td>
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<tr>
<td><strong>Customer Newsletter</strong></td>
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<tr>
<td>▪ Issued three times a year with the latest information available on new products, software releases and training programs</td>
<td>![Checkmark]</td>
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<tr>
<td><strong>Shape The Future Of Our Products</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Eligibility to be a beta tester – work closely with the product development team to help shape the future of the products</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td>▪ Access to the PSS® Ideas Portal – a platform for PSS® Product Suite users to submit, track, and vote on product ideas / enhancements</td>
<td>![Checkmark]</td>
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<tr>
<td><strong>Additional Access to Knowledge &amp; Community</strong></td>
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<tr>
<td>▪ Access to interactive online forums to facilitate knowledge sharing among the community of professionals</td>
<td>![Checkmark]</td>
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<tr>
<td>▪ Extensive knowledge database</td>
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</table>
About Siemens PTI
Siemens Power Technologies International Optimizes Technical System Performance and Maximizes Business Value

Opening doors to future value creation
- Infrastructure development
- Business transformation
- Market advisory
- Transaction advisory
- Solution engineering

Complete set of analysis, design & optimization studies
- Steady-state system studies
- Dynamic system studies
- Transient system studies
- Protection & control system studies
- Power quality & earthing studies

State-of-the-art system planning and data management
- Planning and simulation of power systems
- Planning and simulation of pipe networks
- Model and data management
- Dynamic and protection security assessments in operation
Energy Business Advisory: Unlocking Tomorrow
Opening doors to future value creation

Infrastructure Development

Technology advancements enable modern infrastructures, driving economic, social and environmental value for a sustainable future.

- Infrastructure strategies
- Community energy plans
- Integrated infrastructure resource plans
- IoT strategies (internet of things)

Business Transformation

Value-driven optimization of capabilities and technology infrastructure of a utility to create the industry leaders of tomorrow.

- Utility of the future strategies
- Business model transformation
- Managed transition programs
- Grid asset management concepts

Market Advisory

Adequate models, plans and strategies to enable clients to not only survive but thrive in challenging markets.

- Integrated resource plans
- Market entry strategy
- Market forecasting and analytics
- Regulatory strategies
- Expert witness services

Transaction Advisory

Holistic advisory driven by a deep understanding of the industry enables low risk, high value transactions for our clients.

- Target / investor identification
- Due diligence
- Contract structuring and negotiations
- Financing concepts
- Valuation services

Solution Engineering

Integrated solution blueprints on a conceptual level for an effective, efficient and secure Infrastructure.

- Technology reference architectures
- Data and event reference models
- IT-OT architecture management
- Cyber security consulting
Power System Consulting Provides the Complete Set of Analysis, Design & Optimization Studies

Steady-state System Studies

Practice-proven concepts that optimize system performance with respect to technical and economical requirements.
- Network analysis
- Network structure development
- Neutral grounding studies
- Earthing system measurement and design

Dynamic System Studies

Modeling, analysis and optimization of the dynamic system performance for stable and secure system operation.
- Dynamic system analysis
- Power electronics modeling and analysis
- Controller and machine measurement, modeling, and analysis

Transient System Studies

Modeling and analysis of transient aspects to minimize the risk of equipment damage and to increase system resilience.
- Transient studies
- Insulation coordination studies

Protection & Control System Studies

Sound concepts for protection & control and detailed coordination of devices ensure system safety and stability.
- Protection system design and coordination
- Instrument transformer analysis
- System control and automation concepts

Power Quality System Studies

Measurements, model development, performance assessment and solution design to ensure reliable system performance.
- Power quality measurements, analysis, and filter design
- Interference and electromagnetic field analysis

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Software Solutions for State-of-the-art System Planning and Data Management

Planning and Simulation

Extensive applications for the planning, simulation and analysis of power systems and pipe networks. Advanced algorithms for steady-state, dynamics, transients, harmonics, protection, power quality and more. Includes intuitive user interfaces, work-flow and automation management, as well as standard data exchange formats.

- PSS®E
- PSS®SINCAL platform

Model and Data Management

Sophisticated network model management including standards such as CIM and CGMES. Capable of time-based incremental models management across entire organizations. Enables data exchange with other IT applications, such as SCADA / EMS / DMS, GIS, and metering systems.

- PSS®ODMS
- PSS®MOD
- PSS®SINCAL platform

Operations

Innovative solutions for operations and operational planning that help ensure a reliable supply of energy at all times. The analysis of complex system data ahead of real time allows users to identify critical events and take suitable countermeasures.

- SIGUARD® DSA
- SIGUARD® PSA

Software solutions based on PSS® Product Suite applications
Siemens Power Technologies International Combines Global Expertise and Local Customer Intimacy

Did you know?

- Siemens PTI founded in 1956
- Headquarter (HQ) in Erlangen, Germany
- ~ 30 offices worldwide
- 2000+ customers
- 1000+ projects p.a.
- 200+ Consultants renowned experts
- Global leader in power systems planning

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