



FACTS Solutions



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Company Introduction

As a large-scale electric power and electronics industry corporation, CEPRI, a CET International company is a high and new technology enterprise exclusively invested and established by the State Grid Corporation of China, and it is a first-class research and development base of power and electronics technology as well as a manufacturing and system integration base.

For quite a long time, CEPRI has always been adhering to the management tenet of human orientation. Emphasizing on the talent introduction and training, it has formed a professional technology group comprising academicians of the Chinese Academy of Sciences and China Academy of Engineering, senior professors and experts in fields of electrical power system and power electronics, research and development staff with strong power and engineering technical personnel with rich experience. It's employee number is over 500, among which the engineering technical personnel occupies about 80% and staff with bachelor degrees or above occupies 75%.

Our company owns internationally advanced research & development, manufacturing and testing equipment. The power electronics industrial base of our company is located in Zhongguancun Science and Technology Park, with a total floor area of 100,000 square meters, being the largest power electronics technology research and development base, core equipment manufacturing and system integration base and power electronics talents training base in China.

39 Laboratories includes 5 National Key Labs:

- National Power Transmission & Distribution Engineering Research and Electricity Saving Center
- The International First-Class High-power Electronics Laboratory
- National Engineering Laboratory on Ultra High Voltage Engineering Technology (Beijing)
- National Key Laboratory on Power Grid Safety and Energy Conservation
- National Engineering Laboratory on Power System Simulation

It is a large-scale simulation laboratory with advanced international level in 1990s. Currently, it has the largest scale of simulation equipment in Asia and integrates power system simulator and off-line calculation software together.

- R&D Center for National Energy Large Wind Power Merging Into The Power System Net
- CEPRI is an organisation with the attached units of 15 standardization committees of electricity
- Two publications in China, which are indexed by EI

In the coming years, with the goal of establishing a national comprehensive power electronics industry base with strongest influence power, CEPRI will form three pillar industries representing by FACTS industry, medium and low voltage distribution industry and full controlled power electronics components. We are making unremitting efforts to surpass and pursue excellence to provide powerful technical supports for constructing strong electricity grid.



The Largest High-power Electronics Laboratory in the World



The Biggest Ultra High Voltage Trial Base in Asia



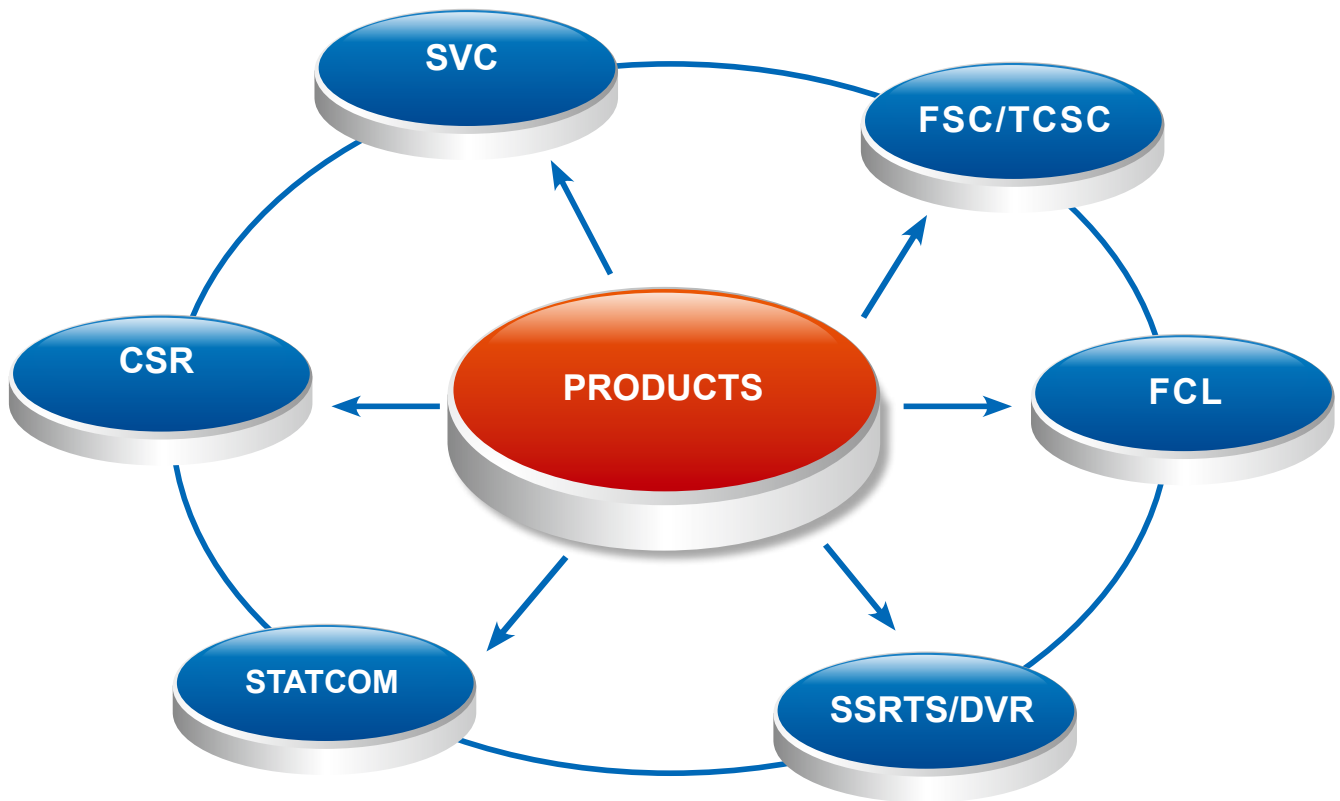
Power System Simulation Lab



Certification for Large Power Electronics Lab

Products

The business scale of CEPRI company covers high and new technology fields like FACTS technology, electric power quality technology and custom power technology, etc. It has been consistently providing electricity grid and industrial customers with good-quality products and technical services for resource-conserving and environment-friendly society construction, and providing customers with a whole set of solutions integrating product developing, manufacturing, technical services and project implementation. The main products in electric power and electronics field include FSC/TCSC, SVC(RSVC), CSR, TSF(FC) and low-voltage thyristor automatic cut-in TSF, etc. In the technical power of customer power, the SSTS and DVR of independent research and development have helped many customers solve the problems of voltage sag and short interruption, etc. In the aspect of electric power quality control, our company provides a whole set of technical solutions for power quality analysis, test and control.





Static Var Compensator (SVC)

Static Var Compensator (SVC) is a typical installation of flexible AC transmission system (FACTS). With application of SVC, the power transmission capability of electric network can be increased, system voltage can be stabilized, low frequency oscillation of system can be damped, and sub-synchronous oscillation can be suppressed. With application of SVC in power distribution network, voltage fluctuation, flicker, negative sequence and harmonic interference caused by nonlinear loads and impact loads can be reduced, power quality can be improved, productivity and power factor can be increased, reactive tide can be decreased, and net loss can be reduced.

FUNCTIONS

SVC functions in Transmission System

- Increase the power transmission capacity, reduce or remove the need of new transmission lines;
- Stabilize system voltage;
- Enhance system damping, mitigate potential oscillations;
- Reduce secondary net loss;
- Increase system stability and security, etc.

SVC functions in Distribution System

- Increase power factor;
- Reduce network loss;
- Suppress harmonic interference caused by nonlinear loads;
- Balance three phase load;
- Reduce negative sequence, voltage fluctuation and light flicker;
- Improve power quality;
- Decrease harmonic distortion;
- Enable better use of equipment, etc.



RSVC

- Relocatable Static Var Compensator (RSVC) can provide flexible technical solutions. By making an SVC mobile, dynamic voltage support can be obtained where it is needed in the power grid to meet current demands for network stability.



Advantages

The latest world-leading SVC platform

Full digital control system based on DSP

With the adoption of photoelectric triggering and measuring mode

Adopting the integrated workstation in the supervisory control system, user-friendly human-machine interface;

Adopt horizontal design for thyristor valve, and the system is compact.

Adopting effective enclosed pure water cooling system.

International leading high power electric and electronics lab

AC&DC voltage test equipments

Impulse voltage test equipments

Temperature rise test equipments

Overcurrent test equipments

Equivalent full operation test equipments



Power Electronics Lab

Domestic leading in design, production, monitoring and testing solutions

The largest Power System Simulation Center in Asia, which can simulate testing research for TCR and TSC controller;

The national largest dynamic simulation laboratory, which can simulate dynamic simulation test for equipment model.

The domestic leading high power electric & electronics lab, in which all model tests and normal tests necessary for thyristor valve can be carried out according to IEC and ANSI/IEEE standard.

Imported Electromagnetic compatibility testing equipment, so the EMC testing for TCR, TSC valve and controller can be carried out.

The state-of-the-art EMTP electromagnetic transient computer analyzing program from U.S.A.

Top of the line CHP power harmonic analyzing program from Canada

Various imported power quality test and analyzing equipments;

Foreign imported SMT production lines, and Flying Probe test table;

Adhering to ISO9001-2000 quality assurance system

Powerful and experienced professional technical team

Two Academicians of Academy of science and Engineering of China

Senior professor and expert in power system and power electronics

Knowledgeable researchers

Experienced engineers and technicians

Good customer service and technical support

Power quality data measurement and analysis

Technical consultation for Power quality

System design for Power quality regulating project

General contract for Power quality improving projects (set of equipments, installation and adjustment)

Technical training for users in power quality improving project

Field technical service for Power quality improving project

TCSC

Constructing the conservation-oriented and environment friendly electrical network is an important factor in human sustainable development. Worldwide urbanization and rapid industrialization are putting utilities under increasing pressure. Long transmission distances and large power plants are resulting in an increased demand for economic and reliable operation of transmission system. Environmental and regulatory concerns restrict expansion of electric power transmission facilities.

With series compensation, it is possible to increase the transfer capability of the power transmission system at a favorable investment cost and with short installation time compared to the expansion of new transmission lines. Likewise it makes Greenfield power transmission projects more cost effective and more environmentally acceptable by reducing the number of lines required.

More than 80% series compensation projects in China are provided by CEPRI. Series compensation employs capacitors to compensate the inductive reactance of long transmission lines. It is highly effective and economical means of improving power transfer. Suitable for both new and existing lines, series compensation increase power transfer capability by raising the transient stability limit as well as improving the voltage stability.

The cost of a series compensation is approximately 10% of the cost of a new transmission line. Thus, the payback time for the series compensation investment will only be one or two years.



FUNCTIONS

The capacitor banks are series connected to the transmission line. The electric distance of the transmission line is compensated. Consequently, such benefits can be obtained as improvement of power transmission and power system stability, reduction of system losses, saving of investment, etc.

TCSC can control its impedance continuously and quickly. TCSC has the ability to control the power flow, to damp low frequency power oscillations, to mitigate the risk of the synchronous resonance (SSR) and to improve the first-swing stability.

Qualifications

CEPRI owns 49 patents, among which 30 are patents for invention and have obtained national and industrial science & technology advancement medals for many times, as well as state torch plan prizes twice. CEPRI also has taken the work of setting national and power industrial standards for various products like SC, SVC and controlled highly resistance, etc.

Currently, our company has passed the security system certification of quality, environment and occupational health, realized institutionalized, normalized and standardized management to ensure the quality of products and projects.

CEPRI has attained the certification of ISO9001 quality system

AWARDS & PATENTS

CEPRI has been awarded 1,503 prizes of scientific and technological achievement, including 55 state-level awards. We have obtained 49 national patents, one of which won Chinese Patent Gold Award.



Reference

Up to now, CEPRI has accomplished more than 120 sets of SVC and 36 sets of SC/TCSC in the world.

Some Main Projects Worldwide

SVC of Power Grid

| No. | Customer-Project | System Voltage /kV | Rated Power Controlled Mvar/Mvar | Complete Time |
|-----|---|--------------------|----------------------------------|---------------|
| 1 | Sichuan Power Grid-Longquanyi Substation | 500 | 600*2 | 2010 |
| 2 | Gansu Power Grid-Yumen Wind Substation | 220 | 76 | 2010 |
| 3 | Fujian Power Grid-Guifeng Substation (RSVC) | 220 | 50 | 2010 |
| 4 | Xinjiang Power Grid-Taiyuan Substation (RSVC) | 220 | 110 | 2009 |
| 5 | Huazhong Power Grid-Fenghuangshan Substation | 500 | 180 | 2008 |
| 6 | Sichuan Power Grid-Yongchuan Substation | 500 | 480 | 2008 |
| 7 | Henan Power Grid-Xiaoliu Substation | 500 | 240 | 2007 |
| 8 | Sino-Russia BtB Substation | 500 | 176 | 2007 |
| 9 | Vietnam Viet Tri Substation | 220 | 100 | 2007 |
| 10 | Sichuan Power Grid-Wanxian Substation | 500 | 390 | 2006 |
| 11 | Sichuan Power Grid-Chenjiaqiao Substation | 500 | 435 | 2006 |
| 12 | Sichuan Power Grid-Honggou Substation | 500 | 455 | 2006 |
| 13 | Liaoning Power Grid-Anshan Hongyi Substation | 220 | 168 | 2005 |

SVC of Industry

| No. | Customer-Project | Voltage Level /kV | Rated Power Controlled Mvar/Mvar | Complete Time |
|-----|-------------------------------|-------------------|----------------------------------|---------------|
| 1 | China First Heavy Industries | 35 | 160 | 2009 |
| 2 | Korea Nuclear Fusion | 23 | 33 | 2009 |
| 3 | Lianzhong Guangzhou Stainless | 35 | 180 | 2006 |
| 4 | Tianjin Steel Tube | 33 | 125 | 2005 |

SC/TCSC

| No. | Customer-Project | System Voltage /kV | Total capacity /Mvar | Compensation level (%) | Sets | Complete Time |
|-----|---|--------------------|----------------------|----------------------------|------|---------------|
| 1 | Shangchengjiang 500kV FSC Project | 500 | 956.6 | 45 | 2 | In process |
| 2 | Xindu 500kV FSC Project | 500 | 1653.4 | 35 | 5 | In process |
| 3 | Reformation for Secondary System of Sanbao East-3 I and II SC | 500 | 1000 | 40 | 2 | 2008 |
| 4 | Hunyuan 500kV FSC Project | 500 | 3663.36 | 34.9% (min) 46.6% (max) | 8 | 2008 |
| 5 | Vietnam Laojie 220kV FSC Project | 220 | 194 | 70 | 2 | 2007 |
| 6 | Yifeng 500kV TCSC Project | 500 | 1088.6+653.2 | 30+15 | 4 | 2007 |
| 7 | Xuzhou Sanbao 500kV FSC Project | 500 | 529 | 41.4 | 1 | 2006 |
| 8 | Baise 500kV FSC System Adjustment Project | 500 | 670 | 50 | 2 | 2005 |
| 9 | Gansu Chengbi 220kV TCSC Project | 220 | 95.4 | 50 | 1 | 2004 |
| 10 | Pingguo 500kV TCSC System Adjustment Project | 500 | 350+55 | 35+5 | 2 | 2003 |
| 11 | Hechi 500kV FSC System Adjustment Project | 500 | 762 | 50 | 2 | 2003 |



We are Ready to Share



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