



Practice Improvement Cooperation Innovation

Company Overview

Power System Stability Expert

NR Electric Co., Ltd.

- Global leading solution-provider to improve power safety, reliability, efficiency & environmental-friendly
 - Leading in the world on digital substation solution
 - One of the world largest protection & control manufacturers
 - Main supplier in the world on power electronics application
- Solid products & services on control and protection for:
 - HVAC Transmission (500kV to 1,000kV)
 - HVDC Transmission ($\pm 500\text{kV}$ to $\pm 800\text{kV}$)
 - Thermal/Nuclear/Hydro Generators (1000MW/thermal, 1000MW/nuclear, 800MW/hydro)
 - Largest power stability system (250+ stations with 220-500kV)

Technology-Oriented



- A technology-oriented company with own creative technologies, know-how and innovative patents

Human Resource

- Staff of NR: >3000
 - R&D Engineers: >500
 - Design Engineers: >150
 - Application Engineers: >800

CMMI-5

- Assured R&D quality control
- Timely release of reliable products

Patents

- Technical Patents: >250





Integrated Secondary System



Protection & Control



Automation



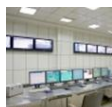
Digital Substation



Phasor Measurement



Disturbance Recorder



Power Stability Control



EMS/DMS

FACTS & HVDC



SVC



STATCOM



CSR



DC De-Icer



Series Compensator



VSC-HVDC



LCC-HVDC

Renewable Energy



Renewable Energy SCADA



Generation Forecaster



PV Inverter



Wind Power Converter



PCS for BESS & EV Charger



SFC

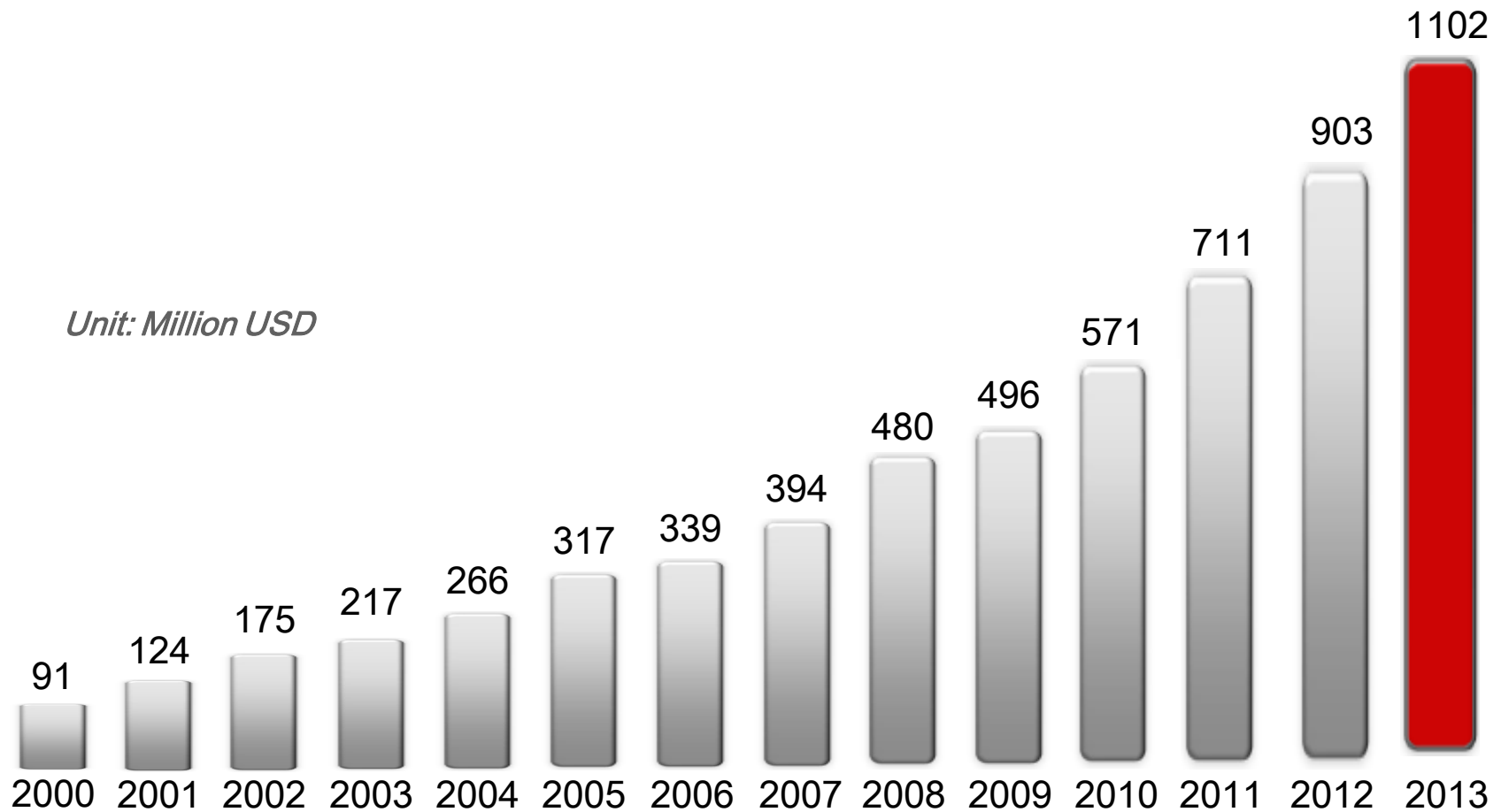


Generator Excitation

Organic Growth in Sales



- Sales in 2013: **\$1.1 Billion** with **22%** annual growth



NR In Globe: Key Data



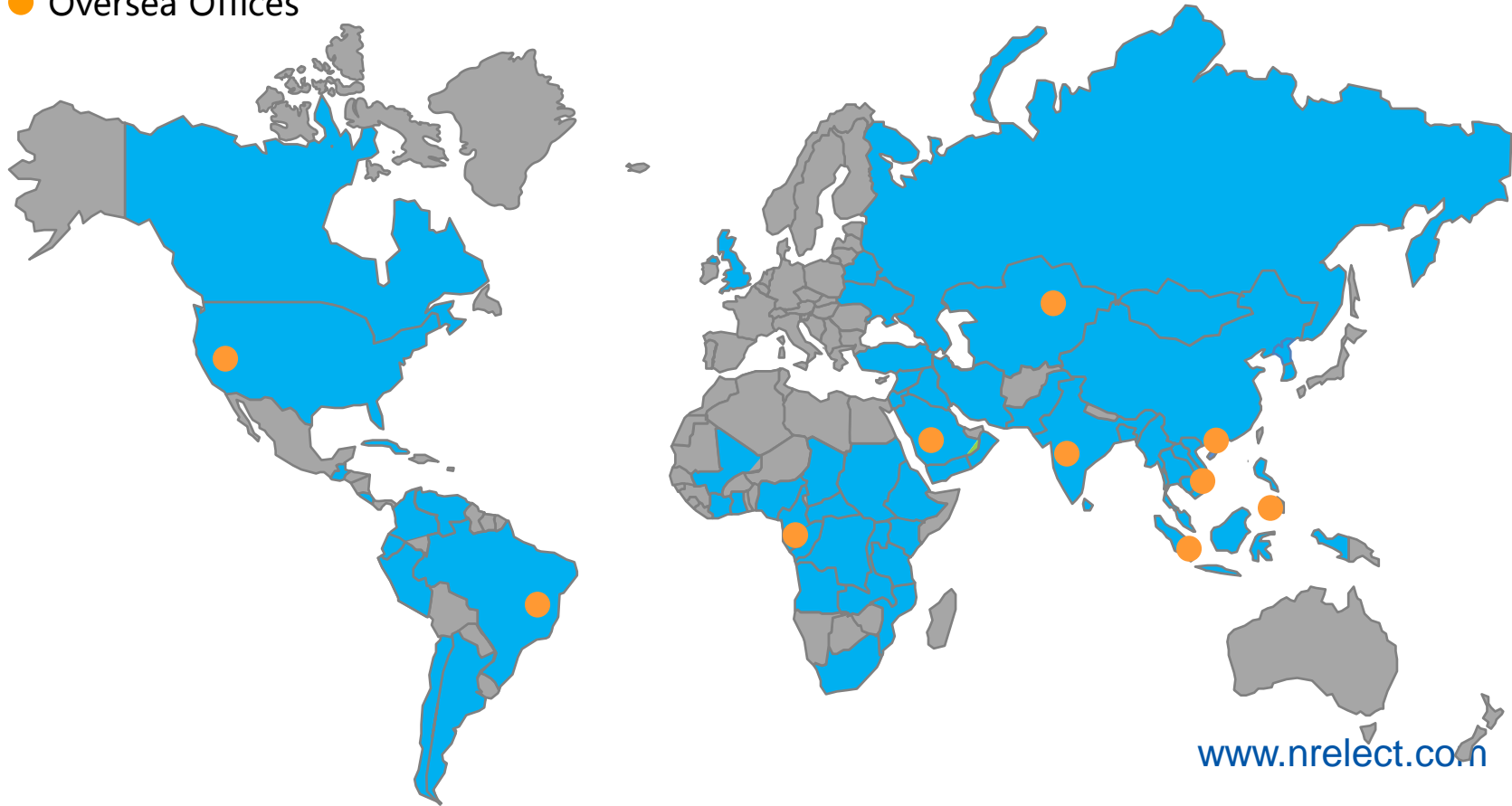
11 Offices
Subsidiary & TSC

71 Countries
Marketing & Sales

World Top 1
Digital Substation
Stability Control

World Top 5
Protection & Control
HVDC & FACTS

- Marketing & Sales
- Oversea Offices



NR In Globe : Oversea Offices



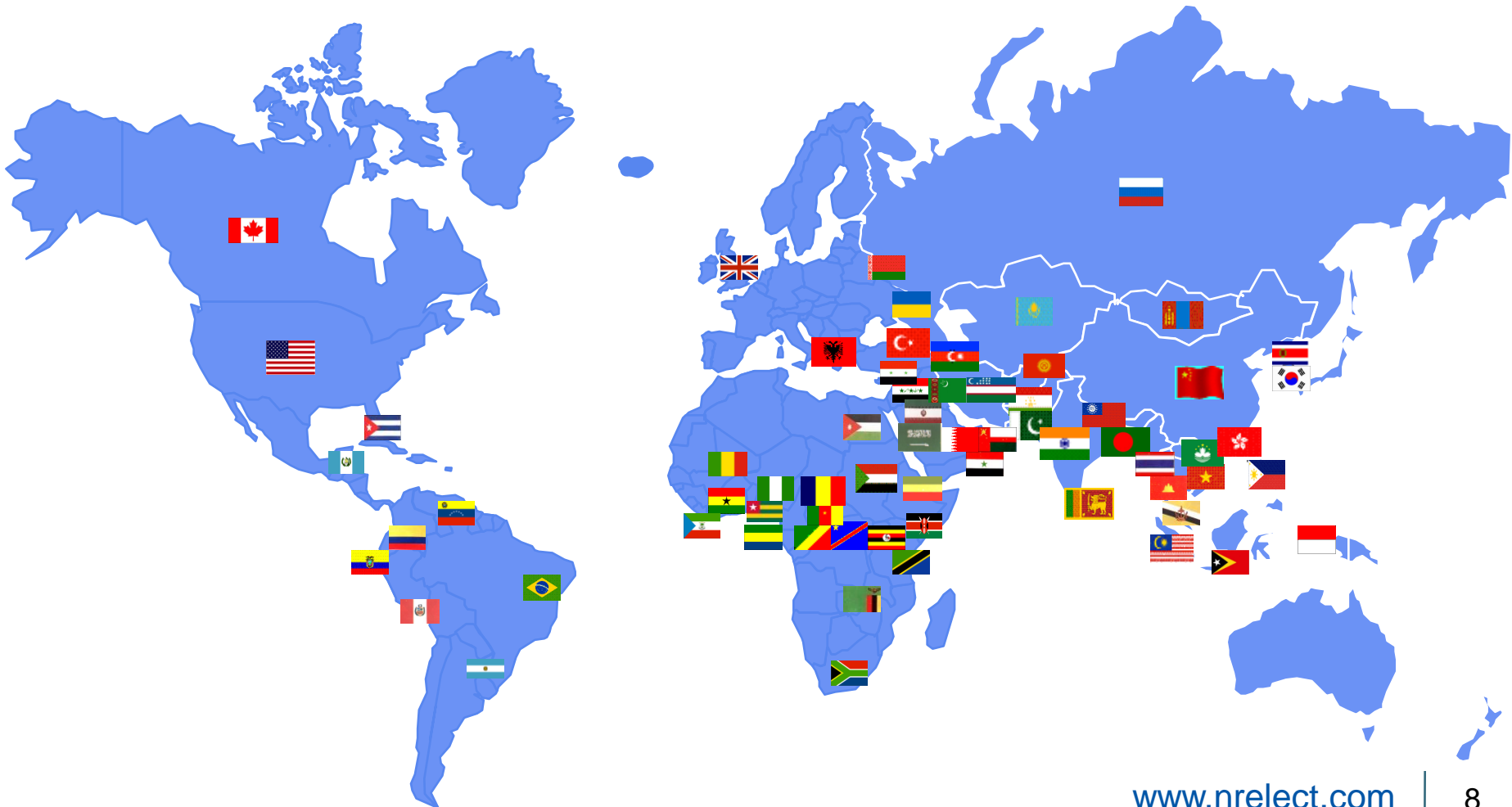
- Subsidiaries at United States, India, Indonesia, Brazil, Nigeria and Hong Kong
- Technical Service Centers (TSC) at Saudi Arabia, Philippines, Vietnam and Kazakhstan



NR In Globe : Sold to Countries



- 71 countries & regions using NR solutions, products & services (ex. China)



Subsidiaries



NR Electric Co., Ltd.

NR Electric
Engineering
Co., Ltd.

Project Implementation

NR Electric
Power
Electronics
Co., Ltd.

HV Equipment Factory

NR Electric International Co., Ltd.

NR Electric Nigeria Co., Ltd.

NR Electric USA LLC.

NR Electric Brazil Co.

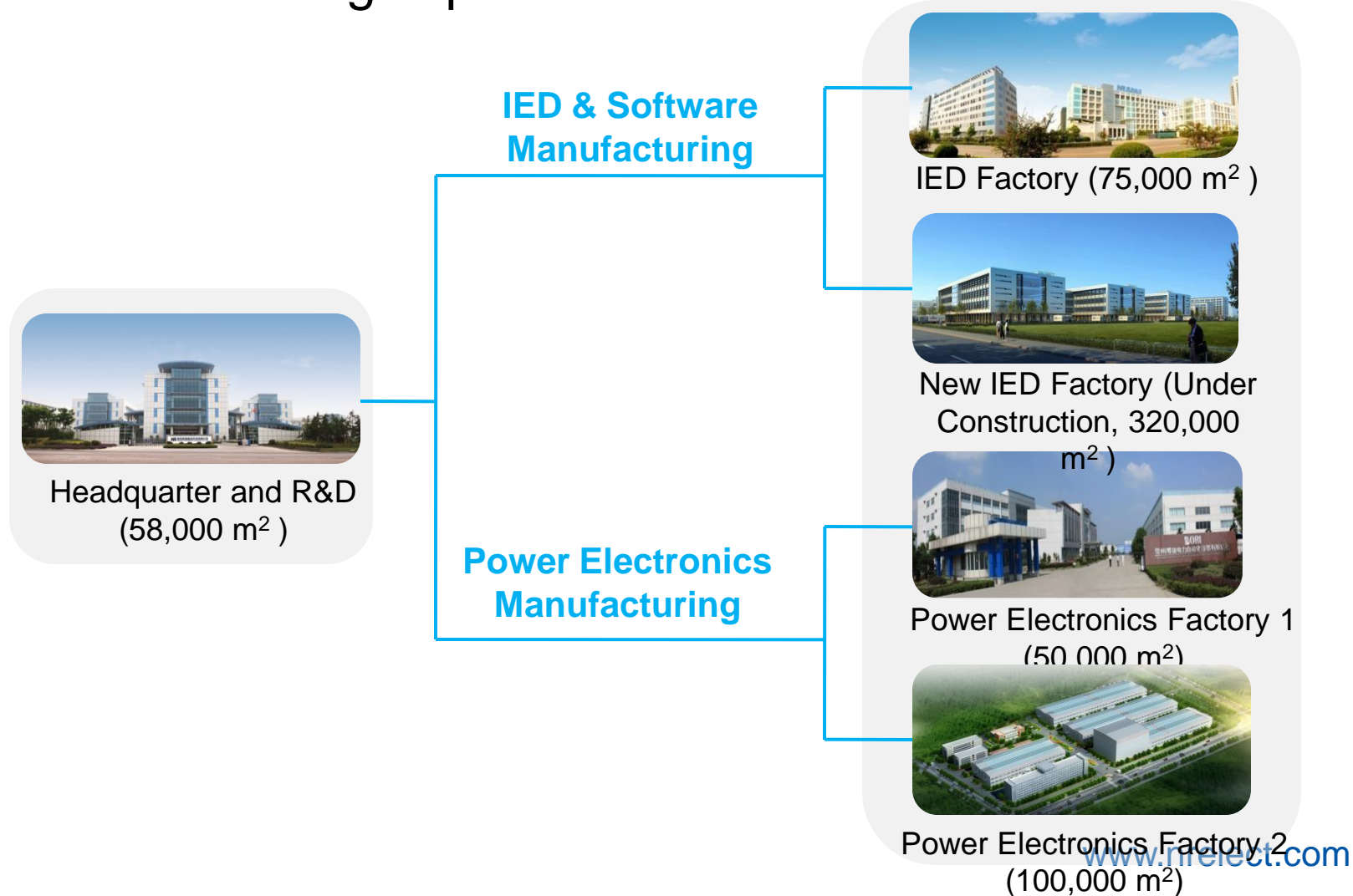
NR Energy Solutions India Pvt Ltd.

PT NR Electric Indonesia

Marketing, Sales & Service

www.nrelect.com

- Five bases providing substantial R&D, testing and manufacturing capabilities with world-class facilities



- Annual Production Capacity:
 - 150,000 IEDs
 - 30,000 Panels
 - 500 sets of Power Electronics Product
 - 1,500 Electronic/Optical CT/VTs
- Automatic test for every module and unit
- Digital simulation test for every panel
- Integrated system test for each project



Management Certification

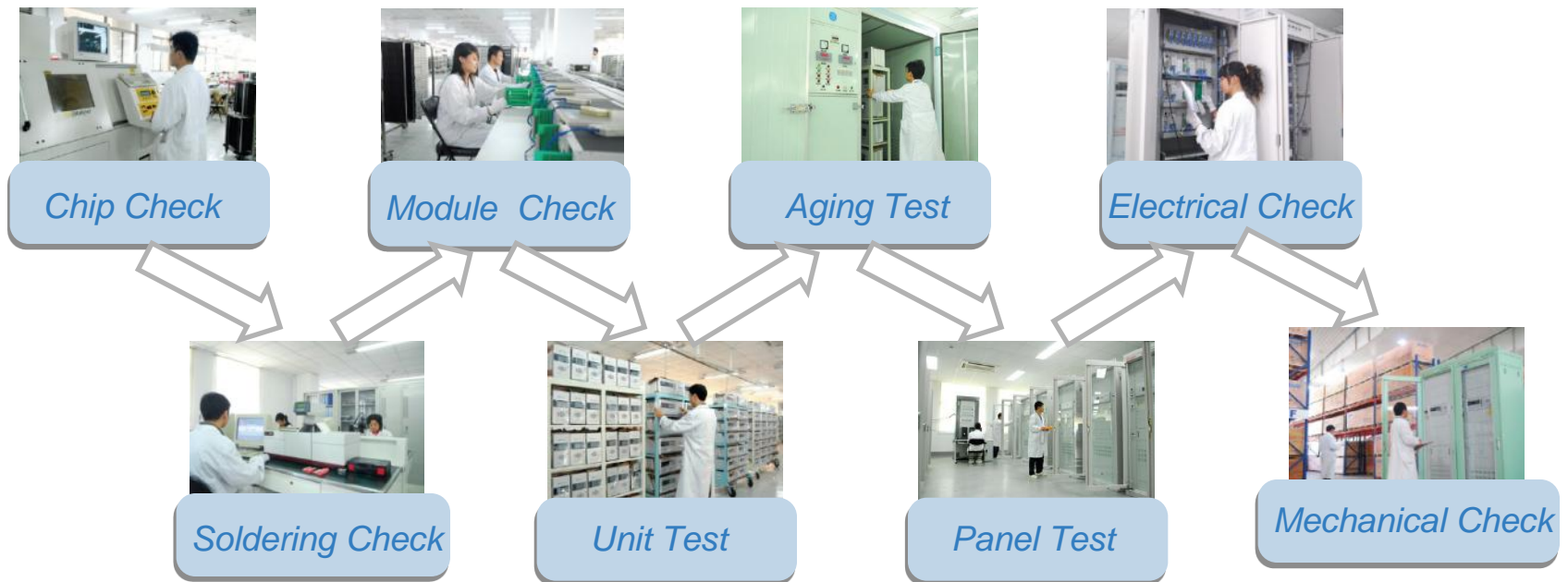


ISO-9001:2008
Quality Management System

ISO-14001:2004
Environment Management System

OHSAS-18001:1999
Occupational Health and Safety Management System

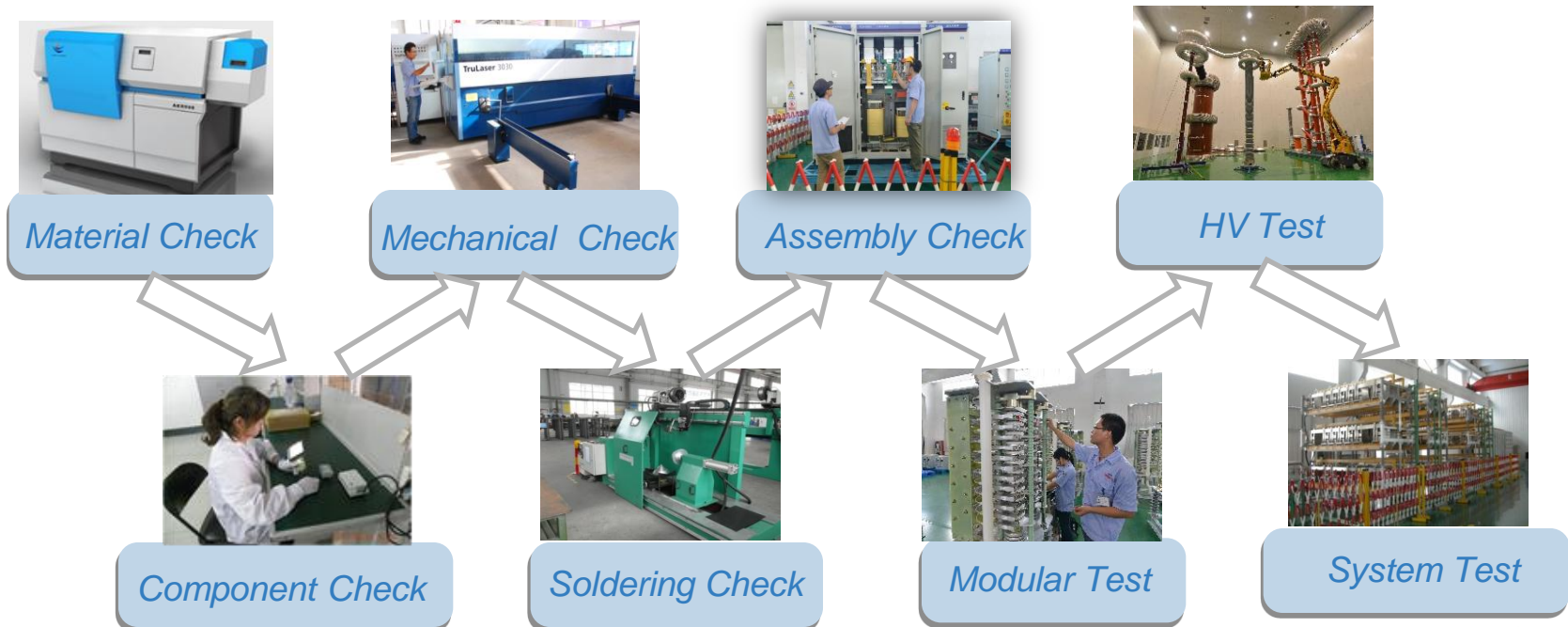
- Automatic test for EVERY module
- Automatic test for EVERY unit
- Digital simulation test for EVERY panel
- Integrated system test for EVERY project



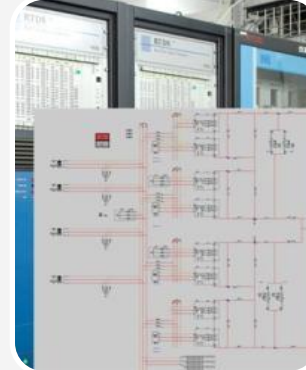
QC for Power Electronics Products



- “Receiving Check – Process Check – Delivery Check” for raw material, component, modular and system
- Dedicated test laboratory for HV test, accuracy test, physical material test and mechanics test
- Integrated system-level test before delivery



Simulation Test



HVAC
Analog
Model

HVAC
Digital
Simulator

HVDC
Analog
Model

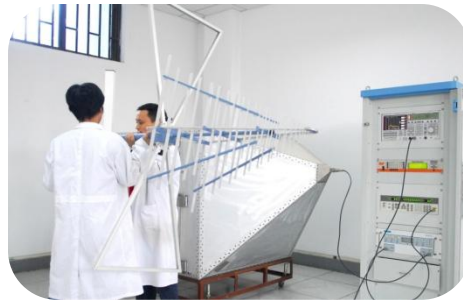
HVDC
Digital
Simulator

Combined
HVAC &
HVDC
Analog
Model, First
in World

Type Test & Protocol Test



- Type Test Laboratory Certified by **ILAC** & **CNAS** for EMC test, environmental test, mechanical test & safety test
- IEC 61850 Level B Test Certified by **UCAug**



High Voltage Test



- AC High Voltage Test: up to 1500kV
- DC High Voltage Test: up to ± 1600 kV
- Lightning Surge Test: up to 3600kV



AC High Voltage Test



DC High Voltage Test



Lightning Surge Test

HVDC Projects



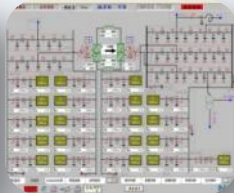
3 George-Shanghai
HVDC



Northwest-Central
China BTB



Gezhouba-Shanghai
HVDC



China-Russia BTB



Luchaogang-Shengsi
HVDC



Korea Jeju Wind Farm
HVDC

References in Integrated Secondary System



1000kV HVAC Transmission
Protection & Automation



$\pm 800\text{kV}$ HVDC Transmission
Protection & Control



Three-George Hydro Generation
Protection & Control



100+ 110kV-750kV Smart
Substations



← Largest PSCS for CSG with
250+ 220kV-500kV Stations

References in HVDC/FACTS



VSC-HVDC for 5-terminal & 3-terminal projects



2*360 MVA SVCs & 2*390 MVA CSRs in 750kV Substation



460 MVA & 540 MVA FSCs in 500kV Substations



STATCOM for Offshore Wind Farm & Industrials



← ±500kV HVDC Electronic CT/VTs

Power Grid

- 10,000+ HVAC substations in transmission system
 - 30 substations with 750-1000kV
 - 1,000+ substations with 345-500kV
 - 9,000+ substations with 110-230kV
- 15 HVDC/BTB/VSC-HVDC transmission projects with 30+ GW transfer capacity
- Highest AC&DC voltage level in the world
 - 3 UHVAC 1000kV substations
 - 2 UHVDC ± 800 kV transmission projects

Power Generation

- 900+ large generators with 300-1000MW unit capacity
 - 35 sets of 1000MW generators
 - 300+ sets of 600-1000MW generators
 - 600+ sets of 300-600MWW generators
- Largest thermal/nuclear/hydro generators
 - 1000MW thermal generators
 - 1000MW nuclear generators
 - 800MW hydro generators
- Renewable Energy
 - Up to 200MW solar energy generation
 - VSC-HVDC interconnection for offshore wind farm

Industrials

- 100+ oil, gas & petrochemical industrial enterprises
- 200+ mining industrial enterprises
- 400+ metal industrial enterprises
- 300km/hour high-speed railways & city metros

Social Events

- 2008 Olympic Game (30 out of 31 Stadiums)
- 2010 World Expo

Reference Projects



Highest AC Voltage Level
3 UHVAC 1000kV Substations



Highest DC Voltage
2 UVDC ±800kV Transmission



Over 100 110kV-750kV
Lanxi Smart Substation



Largest Hydro Generation
Three-Gorge Dam Power Plant



2008 Olympic Games



2010 World Expo



Shenzhou Manned
Satellite LaunchCenter



International Projects
in 62 Countries



Largest Power Stability Control System
(PSCS) for China Southern Grid (CSG)



11 Nuclear Power Plants



Two 500kV Series Compensation Projects



200MW Solar Energy Generation



35 Sets of 1000MW Generators
300+ Sets of 600-1000MW Generators



80+ SVC/STATCOM for
Utilities and Industrials



700+ Industrial Projects in Oil, Mining
& Metal and Petrochemical



300km/h High-Speed Railway

- Projects in **71** countries outside China
- **650,000+** IEDs in service worldwide
- **10,000+** substations from 110kV to 1000kV
- **30** out of 31 stadiums for 2008 Olympic Game

- Power Grid
 - Integrated Secondary System for R.Congo, including IEDs in 5*220kV S/S, 3*110kV S/S and 18*30kV S/S, EMS, TMR in remote control center
 - SCADA, protection & automation of 2*500kV S/S and 2*220kV S/S for Tajikistan
 - Smart Substations for National Grid, UK and CLP, Hongkong
- Generation
 - Protection and automation system of 5*660MW APL power plant for India
- Industrials
 - SCADA, protection and control system of 2.2 MTPA steel project for EIL, India

Thanks for Your Attention!

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