



Formerly known as Siemens Westinghouse Technical Services



# ENGINEERING AND SOLUTIONS SERVICES

## TRANSFORMER SERVICES

More than just servicing transformer, we make your transformer like new.

Nothing is impossible when it is known that SWTS, a former **Westinghouse** company, has been servicing power transformers for decades.

Proudly, we are into the fourth decade of providing on-site service with quick repair turnaround to eliminate the high logistical cost associated with working on Transformer.



### REPAIR & TESTING SERVICES

- ♦ Commissioning and acceptance testing of new transformer
- ♦ On-site replacement of gasket, bushing and other repair
- ♦ Oil sampling, analysis and result interpretation
- ♦ On-load tap changer overhaul and service
- ♦ Complete winding and insulation testing
- ♦ On-site radiator repair and replacement
- ♦ Bushing repair, overhaul and testing
- ♦ Factory and field inspection

### SPECIALISED SERVICE

Trailer mounted, self contained, 6,000 liters per hour vacuum oil purifier unit for:

- ♦ Oil Dehydration, Degassification & Reclamation
- ♦ Transformer Insulation System Dehydration
- ♦ Vacuum Oil Filling of EHV Transformer
- ♦ 6,500 Gallon On-Board Storage Tank
- ♦ 15,000 Gallon Storage Tank

### OVERHAUL & REWINDING SERVICES

Age, accident, overheating and any other unforeseeable circumstances can cause failures. A scheduled program of preventive maintenance will significantly extend the life of your transformers and minimize the possibility of serious breakdowns and production down time.

Our comprehensive overhaul and rewinding workscope include:

- ♦ Coil and Core Cleaning & Inspection
- ♦ Coil Replacement (Rewinding only)
- ♦ Tank & Accessory Inspection
- ♦ Final Inspection & Test
- ♦ Accessory Cleaning
- ♦ Tank Cleaning
- ♦ Re-Assembly
- ♦ Coil Removal
- ♦ Oil Filtering
- ♦ Re-Painting
- ♦ Un-Tanking
- ♦ Pre-Testing
- ♦ Oil Filling

## TRANSMISSION & DISTRIBUTION EQUIPMENT SERVICES

We provide:-

- ♦ Upgrading and Modernization
- ♦ Maintenance
- ♦ Installation
- ♦ Inspection
- ♦ Testing

services for all makes of equipment

Equipment servicing includes the following:

- ♦ Protective Relays including Frequency Relay and Complex Distance Protective Relay
- ♦ AC & DC Variable Speed Drives System
- ♦ Programmable Logic Controllers (PLC)
- ♦ Power and Distribution Transformer
- ♦ Uninterrupted Power Supply (UPS)
- ♦ Automatic Transfer Switch
- ♦ Battery Charger and Bank
- ♦ Substation Equipment
- ♦ Power Circuit Breaker



- ♦ Motor Control Centre
- ♦ Current Transformer
- ♦ Switchgear
- ♦ Transducer
- ♦ Contactor
- ♦ Generator
- ♦ Bus Duct
- ♦ Cable
- ♦ Motor

## LICENSED ELECTRICAL WORKER SERVICES

Licensed Electrical Worker (L.E.W.) or Professional Engineer (P.E.) Services to Energy Market Authority (EMA) requirement.

### LICENSING OF ELECTRICAL INSTALLATION

- Commercial and Industrial Plants

- ♦ New Project
- ♦ Existing Low Voltage System
- ♦ Existing High Voltage System up to 66kV

### PROFESSIONAL ENGINEER CONSULTING SERVICE

- ♦ Endorsement of Reports
- ♦ Consultancy
- ♦ Design
- ♦ High Voltage Testing
- ♦ Switching up to 66kV
- ♦ Inspection
- ♦ Breakdown Attendance
- ♦ Servicing
- ♦ Repair
- ♦ Advisory
  - Maintenance
  - Modification
  - Refurbishment

REPUBLIC OF SINGAPORE  
PROFESSIONAL ENGINEERS BOARD

PROFESSIONAL ENGINEERS ACT  
(CHAPTER 253)

LICENCE TO SUPPLY PROFESSIONAL ENGINEERING SERVICES

SWTS Consulting Engineers Pte Ltd  
having its principal place of business at  
10 Gul Avenue, Singapore 629654

is issued a licence to supply professional engineering services in Singapore subject to the following conditions as stipulated in section 21 of the Professional Engineers Act:

1) The licensee shall supply professional engineering services in Singapore through a professional engineer—

(a) who shall be responsible for the professional engineering works;

(b) who has in force a practising certificate authorising him to engage in professional engineering work to which those services relate; and

(c) who is—

(i) in the case of a corporation, a director or an employee of the corporation;

(ii) in the case of a partnership, a partner or an employee of the partnership; or

(iii) in the case of a limited liability partnership, a partner or an employee of the limited liability partnership.

2) The licensee, if it is a corporation, other than an unlimited corporation, or a limited liability partnership, shall not supply professional engineering services in Singapore unless the licensee is insured in respect of professional liability in accordance with section 24 of the Professional Engineers Act and the rules made thereunder.

This licence shall be valid for the following period -  
1 October 2007 to 31 December 2007

Licence issued on: 17 September 2007  
Licence No: PE2007/2006-L



  
Registrar  
Professional Engineers Board  
Singapore

Licence Fee received: \$300.00

## TESTING SERVICES

Quality Service and Quick Turnaround are  
The Keys to Our Success



## TESTING SERVICES

- ◆ Power Quality Measurement including Harmonics and Waveform Capture
- ◆ Partial Discharge Measurement - PDM03 & Robinson Test Set
- ◆ Variable Phase Angle for Voltage and Current Injection
- ◆ Insulation Tangent Delta/Loss Angle Measurement
- ◆ Phase Angle Measurement of Voltage and Current
- ◆ Low Frequency AC High Potential Test for Cable
- ◆ Megger Test & Polarization Index Measurement
- ◆ Circuit Breaker Operation Timing Measurement
- ◆ Primary Current Injection Test up to 60,000A
- ◆ Insulation Capacitance Measurement
- ◆ Infrared/Thermographic Detection
- ◆ Contact Resistance Measurement
- ◆ Variable Frequency Injection
- ◆ Secondary Current Injection
- ◆ Transformer Turns Ratio
- ◆ Transformer Oil Testing
- ◆ Cable Fault Location
- ◆ Winding Resistance
- ◆ High Potential (AC)
  - 0-75kV AC, 0-10A AC output
  - 0-50kV AC, 0-20A AC output
  - 0-100kV AC, 0-100mA AC output



## GENERATION & MOTOR CONTROLLER SERVICES

### SCOPE OF SERVICE

- ♦ Testing and Commissioning
- ♦ Troubleshooting
- ♦ Modernisation
- ♦ Specification
- ♦ Procurement
- ♦ Engineering
- ♦ Installation
- ♦ Upgrading
- ♦ Designing
- ♦ Repairing



### EQUIPMENT & SYSTEM

We are able to perform the above for all makes of:

- ♦ Ward Leonard Motor Generator DC Variable Speed Drive Control System
- ♦ Synchronous Motor Controller including Field Excitation System
- ♦ Full Voltage Motor Starter (Direct-On-Line Motor Starter)
- ♦ Slip Ring and Wound Rotor Induction Motor Starter
- ♦ Reduced Voltage Primary Reactor Motor Starter
- ♦ Reduced Voltage Autotransformer Motor Starter
- ♦ AC and DC Motor Variable Speed Drive System
- ♦ Synchronous Generator Control System
- ♦ Automatic Synchronization System
- ♦ Automatic Voltage Regulator (AVR)
- ♦ Automatic Load Shedding System
- ♦ Automatic Load Sharing System
- ♦ Import / Export Control System
- ♦ Winch Motor Control System
- ♦ Part Winding Motor Starter
- ♦ Reactive Power Controller
- ♦ Governor Control System
- ♦ Power Factor Controller
- ♦ Crane Control System
- ♦ Peak Loading System
- ♦ Soft Starter



## ELECTRONIC & DRIVE SERVICES

### SCOPE OF SERVICE

Modernizing, Installation, Testing, Commissioning, Maintenance, Repair and Upgrading

- ♦ Synchronous Motor and Generator Field Excitation Controller
- ♦ Draw-Works, Rotary Table and Mud Pump SCR Drive System
- ♦ Mining and Heavy Haulage Control Equipment
- ♦ Programmable Logic Controller (PLC)
- ♦ Uninterrupted Power Supply (UPS)
- ♦ Automatic Voltage Regulator (AVR)
- ♦ AC & DC Variable Speed Drive
- ♦ Induction Heating Equipment
- ♦ Plating Rectifiers System
- ♦ Data Acquisition System
- ♦ Soft Starter for Motor
- ♦ Printed Circuit Board
- ♦ Machine Controller
- ♦ Battery Charger
- ♦ Analyzer



## POWER SYSTEM STUDIES

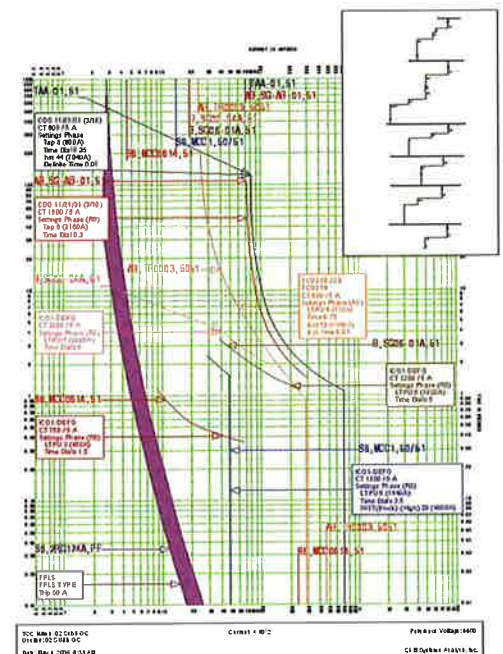
State-of-the-art software program, studies on existing or designing new electrical power system ensure elimination of unplanned down time to your operation.

### STUDY

- ♦ Protective Device Co-Ordination Study
- ♦ Electrical Energy Conservation Study
- ♦ Power Factor Correction Study
- ♦ Transient Motor Starting Study
- ♦ Reactor Application Study
- ♦ Grounding System Study
- ♦ Transient Stability Study
- ♦ Device Evaluation Study
- ♦ Short Circuit Analysis
- ♦ Load Shedding Study
- ♦ Harmonics Analysis
- ♦ Load Flow Analysis

### MEASUREMENT

- ♦ Motor Starting Current
- ♦ Transient and Impulse
- ♦ Waveform Capture
- ♦ Event Recording
- ♦ Fault Recording
- ♦ Apparent Power
- ♦ Reactive Power
- ♦ Power Quality
- ♦ Voltage Swell
- ♦ Power Factor
- ♦ Phase Angle
- ♦ Capacitance
- ♦ Disturbance
- ♦ Voltage Sag
- ♦ Real Power
- ♦ Harmonics
- ♦ Frequency
- ♦ Current
- ♦ Voltage

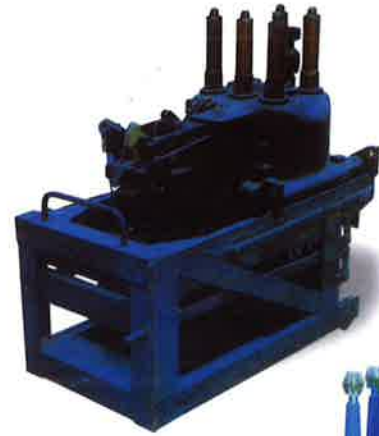


## UPGRADE & MODERNIZATION

A Heritage of **Westinghouse** Engineering Service Division (ESD).

### AUTOMATIC VOLTAGE REGULATOR (AVR)

- ♦ Retrofit old or obsolete Automatic Voltage Regulator (AVR) into modern Solid State Electronic AVR.
- ♦ Retrofit old Rotary Excitation System to modern Static Excitation System.



### VOLTAGE REGULATOR

- ♦ Retrofit old or obsolete Magnetic Amplifier Type Voltage Regulator to modern Electronic Automatic Voltage Regulator for Generator.



### PROTECTIVE RELAY

- ♦ Retrofit old or obsolete Protective Relay to modern Microprocessor Based Protective Relay System with optional upgrade to Bus Auto Transfer Scheme.



### SCR DRIVE RETROFIT

From existing DC and SCR Drive and DC Motor to AC VFD Drive and AC Motor

#### REASONS

- ♦ Electrical and Electromagnetic Interference (EMI)
- ♦ Obsolete and expensive spare parts
- ♦ Frequent Failure
- ♦ High Harmonics
- ♦ Unreliable

#### SOLUTIONS

- ♦ Engineering Design of VFD and AC Motor to suit existing mechanically driven load
- ♦ Engineering study of existing DC Drive and Motor
- ♦ Retrofit to state of the art VFD and AC Motor

#### BENEFITS

- ♦ Eliminate Breakdown and Down Time
- ♦ Maximise Production Time
- ♦ Lower Harmonics Content
- ♦ Eliminate EMI
- ♦ More Reliable
- ♦ Lower Losses
- ♦ Cost Savings

## CIRCUIT BREAKER AND MOTOR STARTER

- ♦ Retrofit of bulk oil circuit breaker, minimum oil circuit breaker, air circuit breaker and contactor to vacuum circuit breaker and contactor.

### BENEFITS

- ♦ Protection and control system can be upgraded to include state-of-the-art technology using automatic transfer scheme and microprocessor based protective relays
- ♦ Progressive retrofits generate a valuable source of spare parts for breakers and mechanism retained in service
- ♦ In the case of frequently switcher circuit, vacuum contactor can be used in place of circuit breaker
- ♦ Cost is only a fraction of the price of a complete switchgear and cable replacement
- ♦ Retrofits can be carried out with minimum downtime and disruption to load
- ♦ Circuit breaker life can be extended for another 20 to 30 years
- ♦ Modern switching devices are virtually maintenance free
- ♦ Prevent sudden failure of old circuit breaker
- ♦ Eliminate stocking of obsolete parts

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Certificate SG99/16831



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*Siemens Westinghouse*...  
to **SWTS**