

# **GEN** *Genius Engineering & Service Co., Ltd.*

**GENIUS ENGINEERING AND SERVICE COMPANY LIMITED.**

**จีเนียส เอ็นจิเนียริง แอนด์ เซอร์วิส จำกัด**

[www.genrayong.com](http://www.genrayong.com)

## **COMPANY PROFILE OF GENIUS ENGINEERING & SERVICE COMPANY LIMITED**



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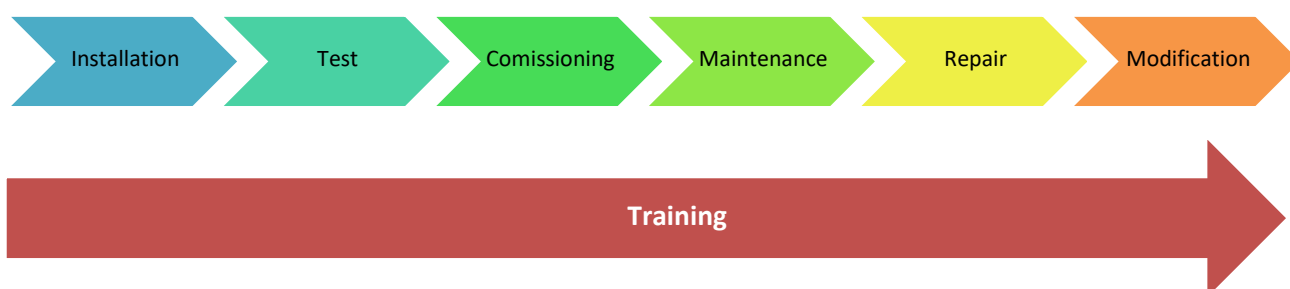


## WHO WE ARE

Genius Engineering and Service Co., Ltd. (**GEN**) we are established since 2013. We provide maintenance service for electrical equipment in power generating plants with capacity rating from 2 – 230 Megawatt, petrochemical and industry plants. Our service is offered for various equipment such as generator, exciter, motor, power transformer, switchyard, GIS, medium voltage switchgear, MCC, protection relay, AVR, current transformer, potential transformer, surge arrester, capacitor bank, voltage regulator, battery charger, station battery, power cable and grounding system as well as repairing and modification. In addition, our team is performed with high safety, high quality and high environmental concern.

## SCOPE OF SERVICES

Our team is composed of experts who had worked for Electricity Generating Authority of Thailand (EGAT) and international / local company over 15 years. We have provided maintenance service for well-known power generating plants, petrochemical plants, industry plants, biomass plants, Independent Power Producer (IPP) and Small Power Producer (SPP).



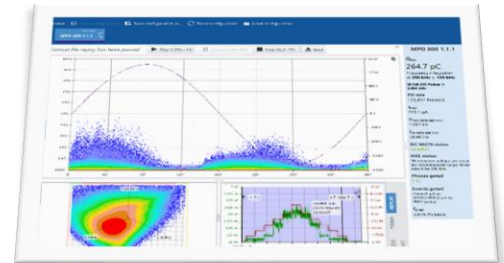
|   |  |   |
|---|--|---|
| <b>Power Plants</b> <ul style="list-style-type: none"><li>- GPSC Group</li><li>- Glow Group</li><li>- Gulf Power Group</li><li>- BGRIMM / Amata Power</li><li>- PTT Global Synergy Power</li><li>- Bangkok Cogeneration</li><li>- Carpet International (Thailand)</li><li>- Elite Kraft Paper factory</li><li>- Thai Oil (Utility &amp; IP)</li><li>- Tri Energy</li><li>- Laem Chabang Power</li><li>- Saha Cogeneration</li><li>- Rojana Cogeneration Power</li><li>- NPS/AA</li><li>- ETC.</li></ul> | <b>Petrochemical/Industry Plants</b> <ul style="list-style-type: none"><li>- PTT Asahi</li><li>- PTT (PUBLIC)</li><li>- PTT Glycol</li><li>- PTT HMC Polymer</li><li>- PTT Phenol</li><li>- PTT Global Chemical</li><li>- SCG Thai Polyethylene</li><li>- SCG Thai Polypropylene</li><li>- Siam Yama Moto Still</li></ul> <b>Biomass Plants</b> <ul style="list-style-type: none"><li>- Bioenergy sugar factory group</li><li>- NPS/AA</li></ul> | <b>Foreign Customers</b> <ul style="list-style-type: none"><li>- Philippine</li><li>- Myanmar</li><li>- Brunei</li><li>- Vietnam</li></ul> <b>Service Company</b> <ul style="list-style-type: none"><li>- ABB</li><li>- Siemens</li><li>- Fieldcore (GE)</li><li>- PTT ME</li><li>- Ethos</li></ul> |
|---|--|---|

Customer's satisfaction and trust are our concern therefore our service is performed by expertise with modern and high standard instrument tester.

## OPERATION GUIDELINE

### Special Electrical Service

- On-line and Off-line PD on generator, motor, cable etc.
- Frequency resonance (Bump) test on generator stator winding
- ELCID test on generator stator core
- High Potential Test (HIPOT)
- Recurrent Surge Oscillograph (RSO) on rotor field winding
- Protective relay testing
- Automatic Voltage Regulator (AVR) testing
- Battery load test
- Stator wedge tightness tapping and mapping
- Replace stator wedge
- Repair Partial Discharge (PD) on generator / motor winding



### Generator (Stator & Rotor) & Exciter

- Visual inspection: to find corona disorder, insulation discoloration, cracks, spacer block damage, laminate sheet of stator and rotor core damage, flexible lead and terminal bus bar problem, and checking tightness of through bolt and Footing bolt as well as for Stator-Rotor slot wedge, including solving each problem with proper and qualified spare parts and methods
- Electrical test: to detect any disorder by electric used method namely

#### STATOR

- Electromagnetic Core Imperfection Detection ELCID test
- Stator wedge tightness test and mapping
- Offline Partial Discharge test
- Insulation resistance and polarization index test
- Insulation power factor test
- Winding resistance measurement
- Winding impedance measurement
- Winding capacitance measurement



#### ROTOR

- Insulation resistance and polarization index test
- Pole balance test
- Winding resistance measurement
- Winding impedance measurement
- Winding capacitance measurement
- Recurrent Surge Oscillograph (RSO)



### Power Transformer

- Insulation resistance and polarization index test
- Insulation power factor test
- Turn Ratio
- Winding resistance measurement
- Winding impedance measurement
- Exciting current test
- Dielectric breakdown





### Current Transformer

- Visual Inspection, Clean
- Insulation resistance test
- Resistance test
- Turn ratio test
- Exciting current test
- Loop circuit

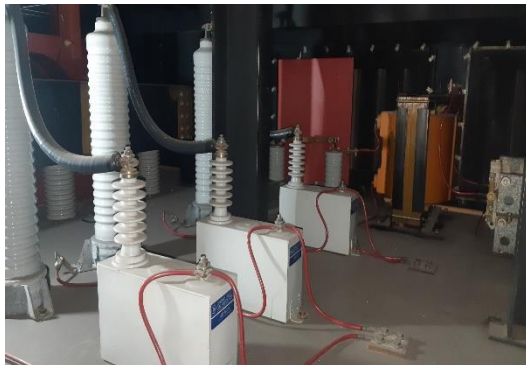


### Potential Transformer

- Visual Inspection, Clean
- Insulation resistance test
- Resistance test
- Turn ratio test
- Insulation power factor test
- Loop circuit

### Power Circuit breaker

- Visual Inspection, Clean
- Insulation resistance test
- Insulation power factor test
- Contact resistance test
- Timing test
- Function test



### Surge Arrester, Surge Capacitor

- Visual Inspection, Clean
- Insulation resistance test
- Insulation power factor test
- Capacitance Measurement

### LV/MV Circuit Breaker

- Visual Inspection, Clean
- Insulation Resistance Test
- Trip Unit Trip Test
- Contact Resistance Test
- Function test



## CLIENT REFERENCE LIST

- Inspection SCG's Steam Turbine Generator Saraburi Aug 2013  
Electrical test of Generator Stator & Rotor  
Repair of partial discharge at end winding
- Inspection MV, LV Switchgear at RITC. at AMATA Industry Rayong Dec 2013
- Glow Energy Repair & Overhaul ACB. 380 Volt 2,000 Amp Feb 2014
- Repair oil leak of Hydraulic oil tank of IGV system (20TV) at GPSC Feb 2014
- Inspection & Electrical Test of Remote Substation Apr 2014  
At AMATA Power, Bank Pakong
- Electrical Test for Investigation Power Transformer Fault at Apr 2014  
AMATA Power, Bang Pakong
- Commissioning Test of 115 Kv. CVT. at EGCO Cogeneration Mar 2014
- Siam Yama Moto Still Co, Ltd. Electrical test for Investigate May 2014  
3.3 kV. Synchronous Motor Ground
- Glow Spp2, Repair Air Circuit Breaker, 400Volt,1,200 Amp May 2014
- Glow Spp2, Black Start Emergency Diesel Generator Inspection May 2014
- Glow Spp3, Repair Vacuum Circuit Breaker 6.9 Kv 'COAL CRUSHER 1' May 2014
- Glow Spp3, Electrical Test of CTG-1B for confirmation of Protective June 2014  
relay operated in case of Power Reverse Flow Back to Generator
- AMATA Power Plant 1, GT-12 Generator Inspection & Electrical Test for June 2014  
investigated Gas turbine vibration high
- Glow Energy, Repair and Overhaul Air circuit breaker 4,000A, 380Volt June 2014
- Thai Nox, Overhaul High Speed Circuit Breaker 1,500 VDC, 3,150 Am July 2014
- PTT ME, Manpower supply for Turnaround Heavy Equipment at June 2014  
Caprolactam Plant UBE. Group (Thailand)
- Granite Inc., Manpower supply at BCC. For Major Overhaul GT1 Aug 2014
  - Generator Stator Re-wedges,
  - Generator Rotor Re-Insulation
  - Upgrade Gas turbine control
- Granite Inc., Manpower supply for Major Overhaul Dec 2014  
Gas Turbine Frame 9 at Phu My Power Plant in Vietnam
- EthosEnergy (Thailand): Manpower supply for Major Overhaul Dec 2014  
Gas Turbine Frame 6 at Gardong Power Plant in Brunei.
- Elite Kraft Paper Co.,: Electrical Test Generator for Investigation Jan 2015  
Generator Trip by Protective relay "Power Reverse" operated.
- Gulf Cogeneration Co., Ltd: Overhaul Gas Turbine Generator Under GE Jan 2015
- Glow Energy Co., Ltd: Electrical test for Investigation Mar 2015  
Generator GT-1A Ground fault on
- POSCO THAI NOX (Thailand) June 2015  
Overhaul & Repair High Speed Circuit Breaker AEG 2,000A.
- PTT GC Utility Plant HG GN3901E on June 2015
- GPSC GTG-3 Generator Stator ELCID & TIP UP Test July 2015



|  |           |
|--|-----------|
| • SIPCO: Cooperation with PTT ME to Minor Inspection ST Generator                | Nov 2015  |
| • GPSC MO GT-14  | Feb 2016  |
| • PTT GC Utility Plant HG GN3901D on   | May 2016  |
| • AMATA 115/22KV Switchyard Block1 Inspection                                    | Apr 2016  |
| • Glow CFB-2C Service for Generator Stator Full Re-wedges                        | May 2016  |
| • PTT GC MINOR INSPECTION GAS TURBINE – GENERATOR GN3901F                        | July 2016 |
| • PTT GC MINOR INSPECTION GAS TURBINE – GENERATOR GN3901H                        | Dec 2016  |
| • Glow CFB-3 STG. Generator and Accessory Yearly Inspection                      | Oct 2016  |
| • AMATA 115/22KV Switchyard Block1 Preventive Maintenance                        | Jan 2017  |
| • Global Power Synergy Co. Major Overhaul .GT-16                                 | Dec 2016  |
| • Bangkok Cogeneration Co.,Ltd. Inspection Steam Turbine Generator               | May 2017  |
| • PTT Global Power Synergies Major Overhaul GT Generator GT-16                   | Jan 2017  |
| • AMATA RAYONG 115Kv. SWY Yearly inspection                                      | Apr 2017  |
| • Glow CTG-1A, 1B Generator inspection   | June 2017 |
| • IRPC Major Overhaul Gas Turbine Generator                                      | June 2017 |
| • SIAM POWER Co., Ltd. Major GTG and STG   | July 2017 |
| • PTT GC Utility Plant MO GN3901A  | Dec 2017  |
| • PPTC GT-1 and STG1, 115kV GI, 22Kv, 6.9Kv and 416 Volt Switchgear Inspection   | May 2017  |
| • Glow Energy Phase4 CTG3A and CTG3B, Repair Partial Discharge on Stator winding | July 2017 |
| • Glow SPP3 CFB2 Major Inspection Generator, Rotor and accessory                 | Nov 2017  |
| • Service to ABB for EL CID test of Stator Generator at SAHA COGEN,              | Nov 2017  |
| • Glow 11 Major Inspection Generator GT200, STG300                               | Jan 2018  |
| • Glow 11 GT100 Re-wedge stator generator 20%                                    | Jan 2018  |
| • Glow Energy GT3B Major Overhaul Generator                                      | Feb 2018  |
| • B. Grimm Power Lam Chabang Major Overhaul Generator GT2                        | Mar 2018  |
| • Glow Energy CFB3 Overhaul 12Kv Generator breaker                               | May 2018  |
| • Glow Energy CTG2A Re consolidate Generator stator winding                      | June 2018 |
| • MO Gas Turbine Generator GT-1 B Grimm Power Lam Chabang                        | Aug 2018  |
| • PM ST-20 an GT22 115kV Equipment   | Oct 2018  |
| • ELCID test at BIP2 unit STG-2  | Oct 2018  |
| • Re consolidate stator at Glow CTG-1A   | Oct 2018  |
| • Major Overhaul Steam Turbine Generator 3902 (PTT GC2)                          | Feb 2019  |
| • Major Overhaul Gas Turbine Generator 3901H (PTT GC2)                           | July 2019 |
| • ELCID test of Gas Turbine Generator at SSUT, GT-21                             | Nov 2020  |
| • ELCID test of Gas Turbine Generator 3901H (PTT GC2)                            | Nov 2020  |
| • ELCID test of Gas Turbine Generator at SSUT, GT-12                             | Aug 2020  |
| • RSO test and ELCID test at Glow CTG2   | Sep 2020  |
| • Major Overhaul at Glow SPP2 MO CTG2  | Oct 2020  |
| • Major Overhaul at Glow SPP2 MO CTG1  | Feb 2021  |
| • ELCID & Wedge Tightness at NPP9  | Mar 2021  |
| • Major Overhaul Gas Turbine Generator at Glow Energy GT-2B                      | May 2021  |



|  |           |
|--|-----------|
| • Major Overhaul at Gas Turbine Generator at GPSC, GT-2B           | May 2021  |
| • PM 115kV SWY at NPS  | Apr 2021  |
| • ELCID Test MV Motor 6.6Kv at AMC work shop                       | July 2021 |
| • Electrical test Steam Turbine Generator at Lumpoon               | Oct 2021  |
| • Electrical test STG-12 at AMATA B Grimm Power                    | Oct 2021  |
| • Electrical test STG-12 at AMATA B Grimm Power                    | Oct 2021  |
| • Electrical test STG at Bang pain COGENERATION                    | Jan 2022  |
| • Electrical test STG-20 at AMATA B Grimm Power                    | Feb 2022  |
| • Electrical test STG-23 at AMATA B Grimm Power                    | Feb 2022  |
| • Inspection and electrical test of Aux Transformer at SIPCO       | Apr 2022  |
| • Remove and clean MV Cell at Bang pain COGENERATION GT-1          | Jun 2022  |
| • ELCID Test Generator 11kV 154.8MVA at GPSC CFB3                  | Feb 2023  |
| • Off-line PD test Generator 11kV 154.8MVA at GPSC CFB3            | Feb 2023  |
| • HIPOT test Generator 11kV 154.8MVA at GPSC CFB3                  | Feb 2023  |
| • Major Overhaul Steam Turbine Generator at NPS/NPP4               | Mar 2023  |
| • Electrical test Gas Turbine Generator at IRPC GT14               | Mar 2023  |
| • Electrical test Gas Turbine Generator at IRPC GT11               | Mar 2023  |
| • Minor Inspection Steam Turbine Generator at PTT GC               | Mar 2023  |
| • Repair Partial Discharge (PD) Gas Turbine Generator GPSC Glow 11 | Apr 2023  |
| • Electrical test on Power Cable at Ratchaburi Power Plant         | Apr 2023  |

These tests are conducted by engineer and skill technician with high experience in electrical maintenance service to create trust to customers. Our test instrument comes from well-known brand which high reliable and high accuracy.



## TOOLS AND EQUIPMENT



Electromagnetic Core Imperfection Detection (ELCID)



Partial Discharge Tester



Generator/Motor Stator Wedge Tightness Tester



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Frequency Resonance / Bump Tester



Recurrent Surge Oscillograph (RSO)



Multi Injection Tester OMICRON CPC-100



Insulation Power Factor Tester CP TD1



Compensating Reactor OMICRON CR-500



Insulation Resistance Tester







Insulation Resistance Tester



EGIL Circuit Breaker Analyzer



Battery Load Tester



Micro-Ohms Meter



Borescope Camera



High Potential Tester (HIPOT)





Earth Tester



Oil Breakdown Tester



LCR Meter



Variable Auto Transformer 0-500 V



CT/PT Ratio Analyzer



Multimeter Fluke 287







Flux Meter



Power Quality Meter



Infrared Thermo Meter



Temperature Calibrator



Recorder

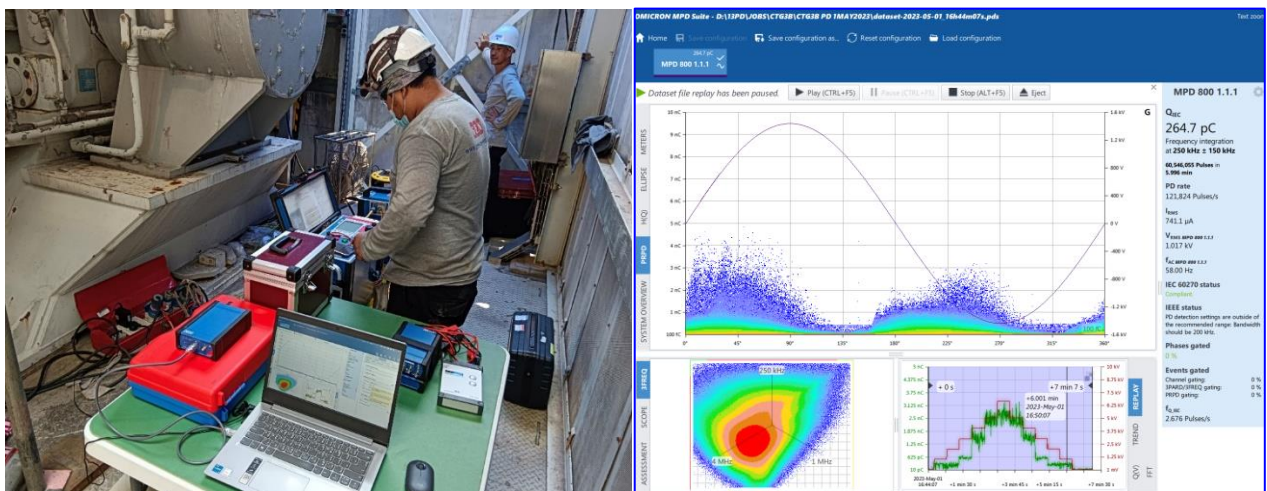


Voltage Tester



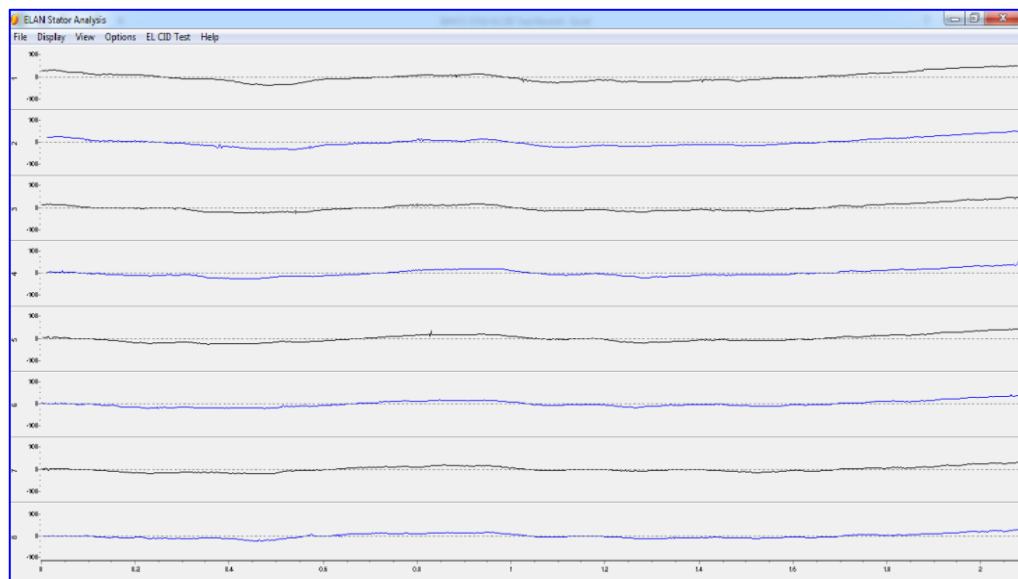
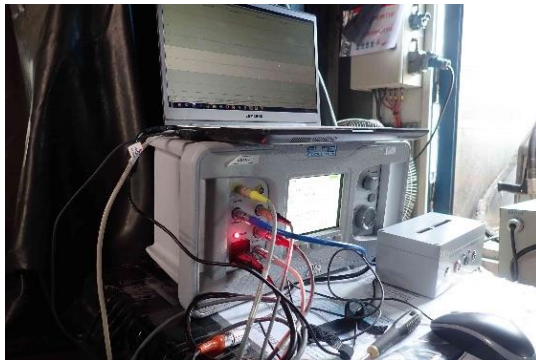
## WORK PROFILES

### Online & Offline Partial Discharge Test





## Electromagnetic Core Imperfection Detection (ELCID) Test

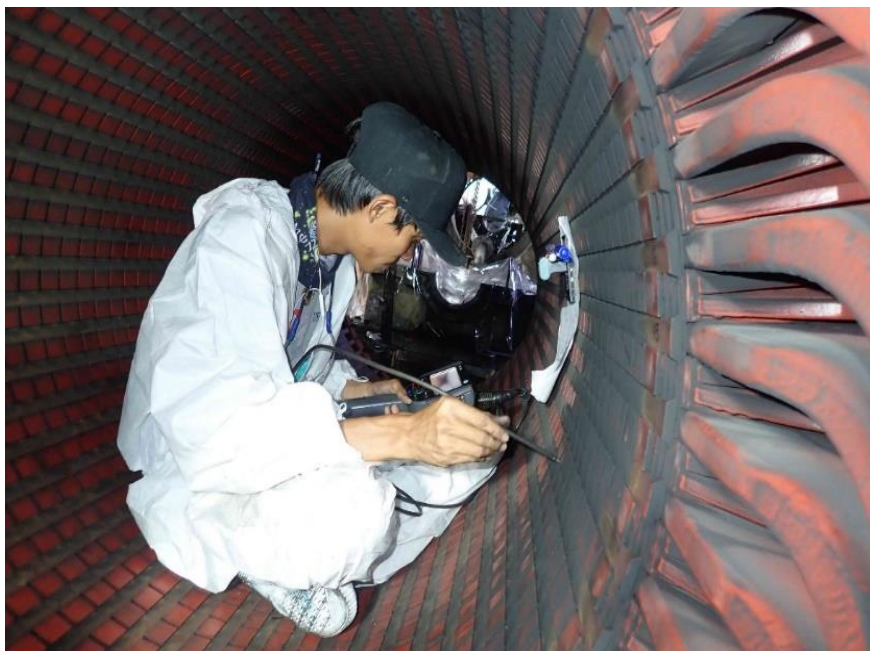


## Stator Wedge Tightness Test and Mapping



| SLOT/<br>WEDGE | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 40             | 694 | 727 | 591 | 543 | 581 | 513 | 550 | 639 | 607 | 686 |
| 41             | 708 | 732 | 681 | 594 | 480 | 525 | 430 | 549 | 773 | 767 |
| 42             | 764 | 796 | 613 | 538 | 485 | 438 | 535 | 711 | 776 | 754 |
| 39             | 685 | 659 | 513 | 524 | 576 | 664 | 428 | 591 | 796 | 786 |
| 38             | 697 | 686 | 508 | 488 | 486 | 526 | 421 | 547 | 522 | 757 |
| 37             | 708 | 545 | 526 | 450 | 339 | 354 | 385 | 489 | 566 | 791 |
| 36             | 703 | 548 | 538 | 377 | 305 | 469 | 383 | 643 | 702 | 728 |
| 35             | 722 | 686 | 483 | 388 | 674 | 387 | 427 | 751 | 588 | 763 |
| 34             | 688 | 633 | 514 | 608 | 686 | 436 | 446 | 794 | 569 | 765 |
| 33             | 711 | 742 | 479 | 526 | 644 | 412 | 528 | 715 | 744 | 786 |
| 32             | 789 | 676 | 525 | 761 | 787 | 462 | 424 | 712 | 712 | 775 |
| 31             | 751 | 595 | 439 | 234 | 694 | 487 | 304 | 212 | 434 | 806 |
| 30             | 881 | 721 | 431 | 346 | 488 | 388 | 561 | 436 | 424 | 786 |
| 29             | 758 | 575 | 384 | 688 | 640 | 359 | 619 | 711 | 474 | 807 |
| 28             | 703 | 738 | 591 | 603 | 452 | 348 | 424 | 577 | 706 | 707 |
| 27             | 771 | 734 | 615 | 458 | 371 | 453 | 458 | 739 | 688 | 763 |
| 26             | 642 | 738 | 622 | 452 | 801 | 623 | 521 | 607 | 640 | 748 |
| 25             | 705 | 619 | 631 | 548 | 648 | 738 | 438 | 508 | 705 | 765 |
| 24             | 712 | 643 | 555 | 587 | 718 | 582 | 543 | 685 | 718 | 796 |
| 23             | 794 | 561 | 481 | 456 | 488 | 573 | 524 | 551 | 642 | 807 |
| 22             | 735 | 644 | 446 | 551 | 651 | 484 | 488 | 484 | 711 | 801 |
| 21             | 703 | 640 | 508 | 361 | 522 | 657 | 524 | 718 | 715 | 795 |
| 20             | 756 | 549 | 631 | 601 | 548 | 484 | 421 | 602 | 786 | 781 |
| 19             | 735 | 636 | 598 | 535 | 483 | 381 | 368 | 626 | 640 | 702 |
| 18             | 785 | 765 | 544 | 653 | 788 | 361 | 541 | 539 | 679 | 779 |
| 17             | 764 | 536 | 657 | 625 | 475 | 715 | 582 | 545 | 796 | 763 |
| 16             | 701 | 521 | 585 | 575 | 671 | 626 | 619 | 641 | 715 | 788 |
| 15             | 682 | 524 | 588 | 550 | 580 | 529 | 629 | 649 | 634 | 768 |
| 14             | 774 | 589 | 534 | 589 | 536 | 486 | 536 | 614 | 718 | 778 |
| 13             | 769 | 761 | 482 | 594 | 511 | 670 | 626 | 671 | 526 | 761 |
| 12             | 775 | 674 | 535 | 560 | 630 | 647 | 565 | 629 | 719 | 767 |
| 11             | 748 | 705 | 448 | 560 | 459 | 459 | 457 | 632 | 708 | 779 |
| 10             | 735 | 429 | 609 | 759 | 719 | 664 | 477 | 751 | 707 | 733 |
| 9              | 770 | 785 | 503 | 544 | 540 | 514 | 552 | 586 | 686 | 780 |
| 8              | 757 | 570 | 589 | 455 | 717 | 488 | 442 | 654 | 680 | 764 |
| 7              | 761 | 767 | 644 | 688 | 486 | 611 | 597 | 615 | 712 | 781 |
| 6              | 757 | 646 | 531 | 607 | 667 | 458 | 486 | 555 | 699 | 761 |
| 5              | 705 | 623 | 453 | 424 | 512 | 729 | 294 | 216 | 708 | 778 |
| 4              | 704 | 567 | 472 | 287 | 338 | 254 | 381 | 485 | 759 | 765 |
| 3              | 694 | 587 | 601 | 454 | 453 | 440 | 444 | 757 | 728 | 774 |
| 2              | 686 | 554 | 602 | 443 | 606 | 742 | 373 | 640 | 773 | 677 |
| 1              | 688 | 707 | 389 | 363 | 644 | 523 | 383 | 503 | 717 | 760 |
| SLOT/<br>WEDGE | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |

## Borescope Inspection on Generator Stator Core Ventilation Duct and Exit Slot



PD on Exit Slot

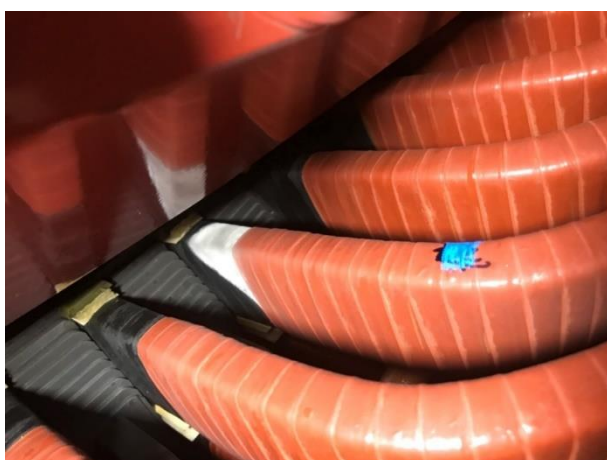
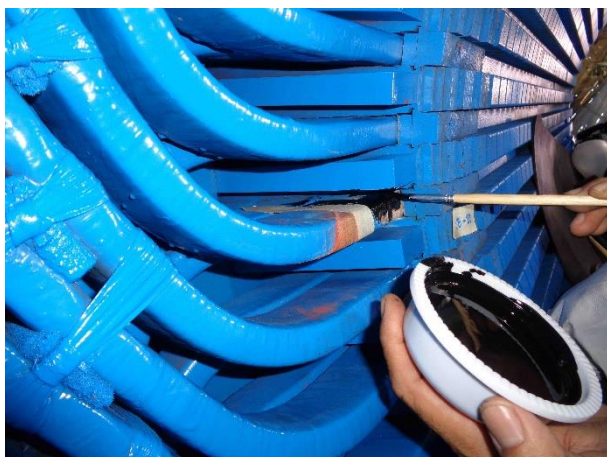




## Generator Stator Wedge Replacement

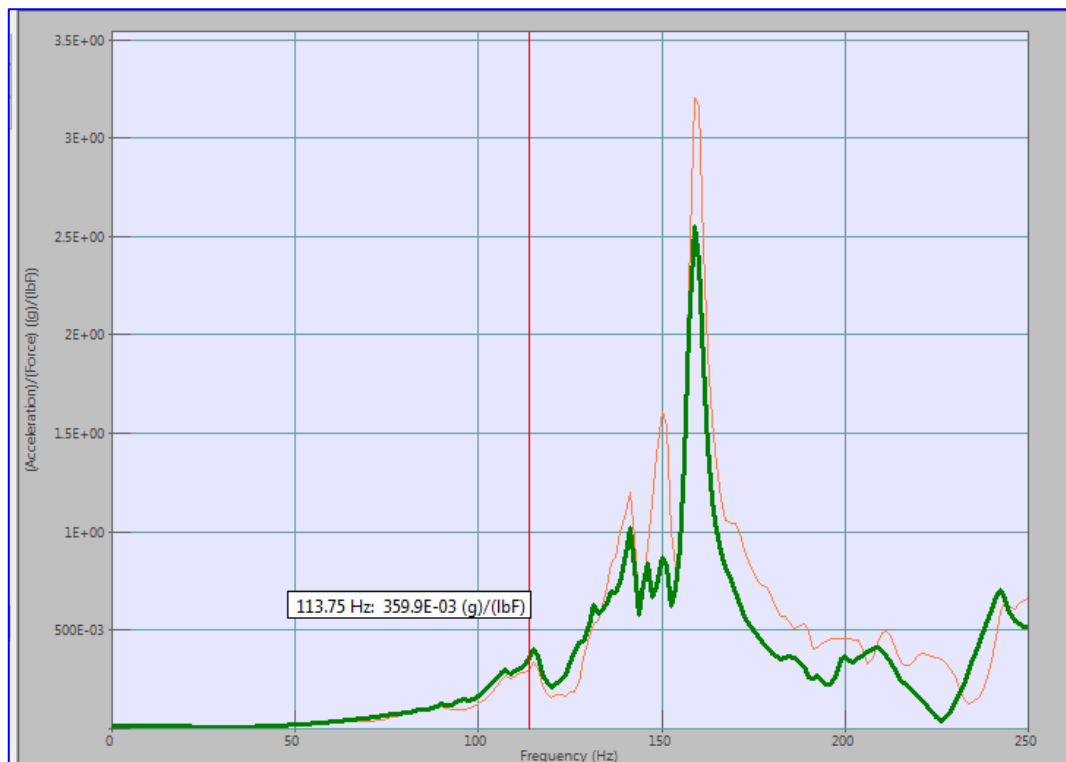


## Repair Partial Discharge





## Frequency Resonance / Bump Test on Generator Stator Winding

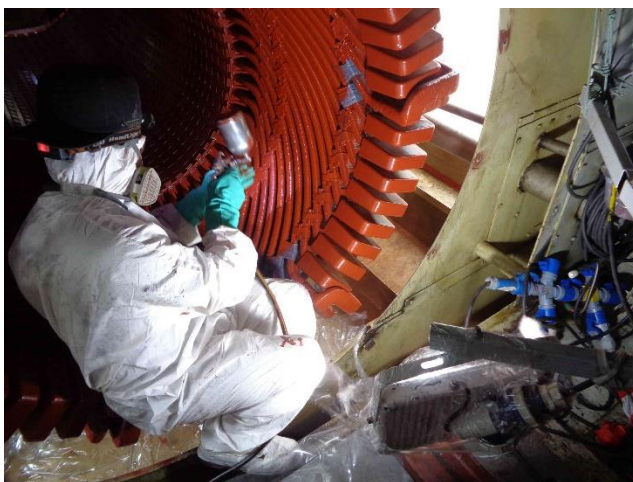
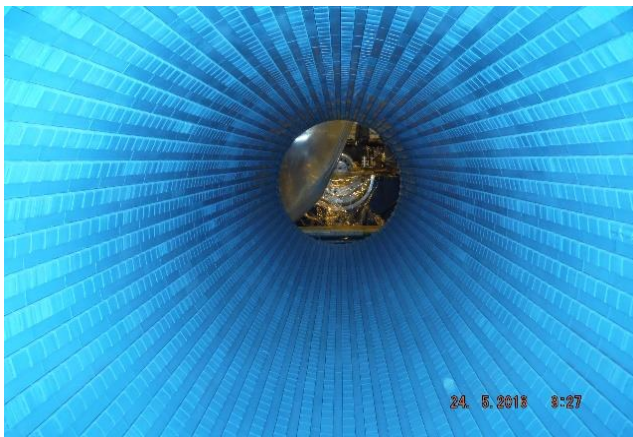


## Generator Stator Endwinding Consolidation / Reinforcement





## Clean & Revarnish on Generator





Modify Equipment to Remove Dry Type Transformer  
and Improve Power Breaker Closing Time

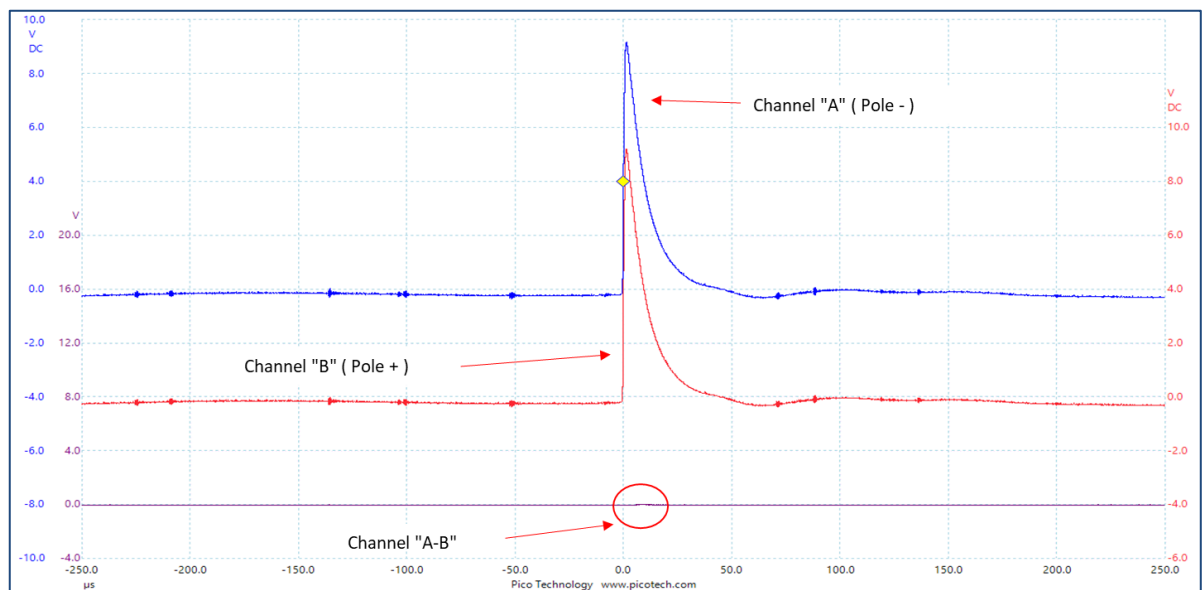
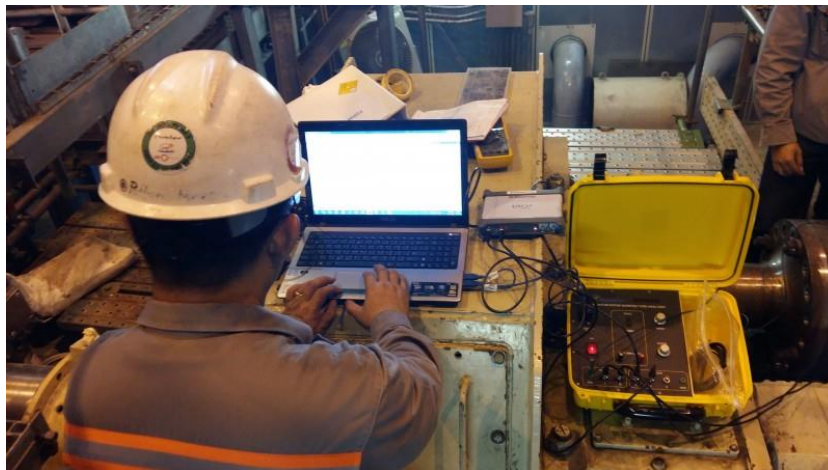
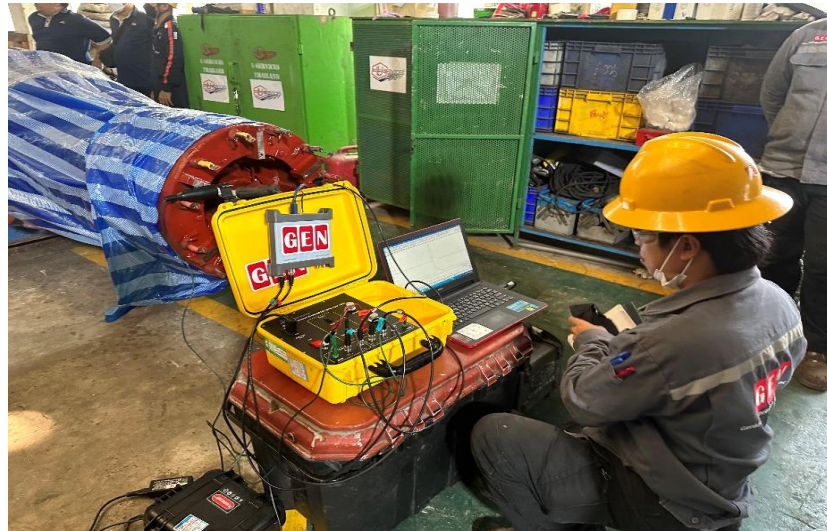




## Electrical Test on Generator & Accessory



## Rotor Test to Verify Short Turn by Recurrent Surge Oscillograph (RSO)





## Preventive Maintenance 115kV Switchyard



## Preventive Maintenance MV Switchgear





## Preventive Maintenance 115kV GIS



## Preventive Maintenance Transformer





## Preventive Maintenance Protective Relay



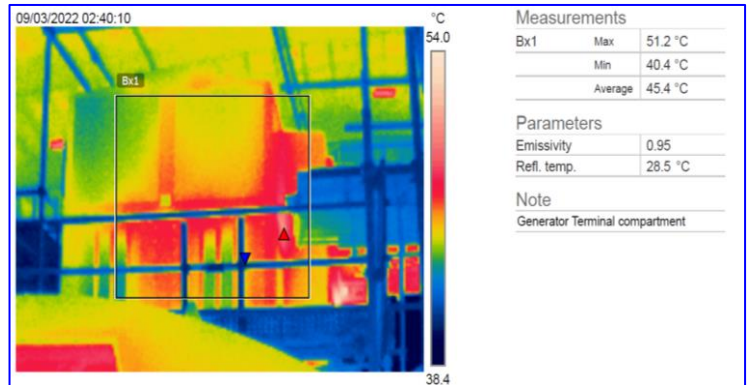
## Preventive Maintenance Automatic Voltage Regulator (AVR)



## PRISMIC A10 EXCITATION CONTROLLER



## Thermoscan



## Battery Load Test



## Preventive Maintenance Earth/Grounding System





**OUR HEART IS YOUR TRUST**



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