

# SERVICE CATALOG



**GLOBAL  
ENGINEERING  
FOR SOCIETY**

Tokyo Densetsu Service Co., Ltd.

# Resolving client issues, and securing trust and loyalty.

Tokyo Densetsu Service Co., Ltd. (TDS) is a global engineering company for infrastructure facilities that support society, encompassing electrical and cable facilities, steel and concrete structures, and renewable energy facilities. TDS works side by side with its customers to provide optimal solutions to a broad range of issues.

## Technical prowess and extensive experience

TDS is a collection of professionals who have supported the electric power distribution facilities of TEPCO Power Grid, Inc., which boasts the world's highest level of quality. We possess the technical capabilities to deal with all kinds of manufacturers and a wealth of experience that enables us to resolve customer issues.

## One-stop problem solving

We provide a comprehensive range of services for facilities that support social infrastructure. Our service lineup includes everything from consulting to design, inspection and diagnosis, maintenance, monitoring and control, and human resource development.

## Collaboration and teamwork

Our team comprises experts on power substations, power grids, civil engineering, underground power transmission, and chemical analysis. They pool their knowledge and work cooperatively to deliver the best solutions to our customers.

## Proposing customized solutions

By utilizing its accumulated know-how, TDS provides customer-first services such as value-added maintenance and life cycle proposals.

### Human resource cultivation

We support the development of engineers through training that emphasizes hands-on experience using actual equipment.



### Monitoring and control

Utilizing the facility operation know-how of electric power companies, we can handle everything from monitoring to control, including operation.



### Maintenance

Effective measures aimed at reducing life cycle costs extend the service life of facilities.



### Inspection and diagnosis

TDS' vast technical capabilities and experience deliver high value-added maintenance services.

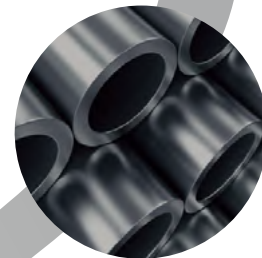
● **Consulting**

We leverage our knowledge and advanced diagnostic technologies in proposing optimal solutions.

● **Design**

We specialize in usability-oriented design based on our comprehensive know-how that helps optimize facility operation.

**Electrical and cable equipment**



**Renewable energy facilities**

**Infrastructure facilities**

● **Material procurement**

Through our unique procurement routes and cost reduction methods, we offer superior cost advantage.

● **Construction**

We provide flexible construction solutions to meet customer needs. This includes relay design to mitigate damage in the event of an accident or to minimize the time required to shut down equipment.

# GLOBAL ENGINEERING FOR SOCIETY

## Index

- **Electrical and cable equipment** ..... 4
  - Inspection of power collection and transforming equipment ..... 6
  - Renewal, renovation, and new installation of substation equipment ..... 8
  - Equipment monitoring solutions ..... 9
  - PCB detoxification treatment ..... 9
  - Comprehensive power system operation service ..... 9

- Comprehensive cable and conduit facility service ..... 10
- **Infrastructure facilities** ..... 14
  - Steel structure maintenance ..... 16
  - Concrete structure maintenance ..... 18
  - Wire rope maintenance ..... 19

- **Renewable energy facilities** .....20
  - Renewable energy power plant construction .....22
  - Renewable energy power plant maintenance .....23
- **Products** .....24
- **Training and seminars** .....26

# Electrical and cable equipment

<b>Electrical and cable equipment</b> .....	4
Inspection of power collection and transforming equipment .....	6
Renewal, renovation, and new installation of substation equipment .....	8
Equipment monitoring solutions .....	9
PCB detoxification treatment .....	9
Comprehensive power system operation service .....	9
Comprehensive cable and conduit facility service .....	10



# Providing ideal solutions with the technology and experience that have supported the world's highest quality power facilities.

TDS provides a host of services, including inspection, construction, monitoring, control, and consulting for power collection and transforming facilities, cable facilities, and their peripheral equipment. TDS is in tune with the varied needs of its customers. Viewing the issue from the perspective of a facility user, TDS proposes the optimal plan, such as a facility configuration that is easy to maintain after installation and a method that meets strict facility shutdown conditions.



## Spotlight on safety and security

We place a high priority on safety and security because we deal with electricity, which is invisible. And beyond operational safety, we propose a system to limit the spread of the impact of spillover accidents in the event of an emergency.



## Advanced technology and vast experience

Through our experience in maintaining about 1,600 substations, over 6,000 kilometers of underground transmission lines, and around 160 hydroelectric power plants for TEPCO Power Grid, Inc., we have accumulated a significant portfolio of technologies and a wealth of experience.



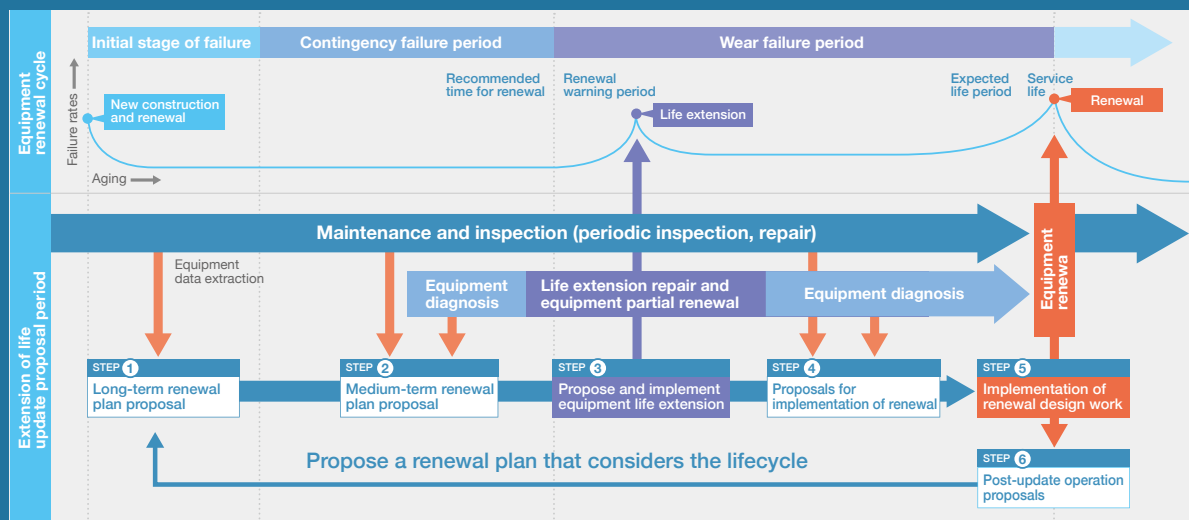
## High value-added solutions

Our objective is to provide maintenance services that preclude breakdowns and malfunctions, maximizing equipment uptime. We achieve this by customizing maintenance plans taking into account customer needs and the surrounding environment, and by proposing updates that consider the lifecycle of the equipment.



## Introduction of new technologies

We constantly adopt new technologies to help resolve customer issues. Examples include partial discharge measurement technology that makes possible diagnosis without power interruption, remote monitoring and control of electrical equipment, and chemical analysis-based investigation and diagnosis technology.



Facility management cycle

## Inspection of power collection and transforming equipment



## Supporting stable operations with high-quality inspections, and over 95% repeat customers.

TDS provides high-quality inspections for all types of manufacturers, particularly for special high voltage power collection transforming equipment. We can also perform inspections on both special high-voltage and high-voltage facilities at once, which has the advantages of simplifying ordering procedures and reducing costs.

### Why choose TDS?

#### High value-added inspection

Our inspections that take into account equipment lifecycles—including careful inspection and data-based trend management—are highly regarded, as evidenced by our customer repeat rate of over 95%.



#### Customized construction methods

We offer flexible construction methods to suit our customers' requirements. This includes minimizing facility shutdowns and short-term inspections of large-scale facilities.



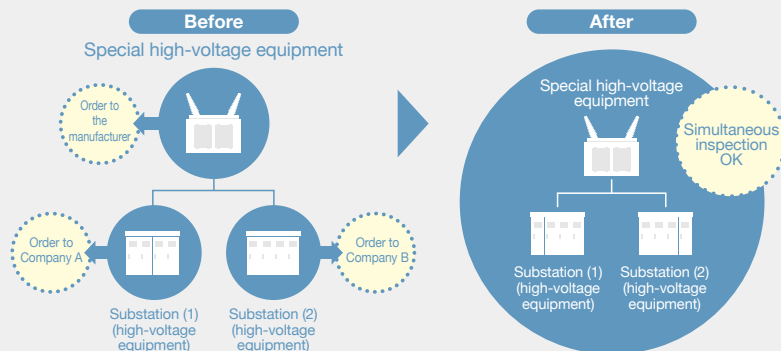
#### Extensive experience and superior technological capability

Our technicians, who benefit from technical guidance from manufacturers and rigorous in-house certification, provide unwavering support with rich experience and reliable technology.



### Simultaneous inspection of special high-voltage and high-voltage power transforming equipment

This service is available for any manufacturer and can be used to inspect multiple pieces of equipment at once. Consolidating inspections that were traditionally ordered separately brings advantages such as reductions in workload and costs.



#### Applicable facilities and equipment

- Special high-voltage power collection and transforming equipment (22kV to 154kV)
- Simultaneous inspection of special high-voltage power collection and transforming equipment to high-voltage power collection and transforming equipment

#### Main service menu

- Gas insulated switchgear inspection
- Transformer inspection
- Circuit breaker inspection
- Cubicle inspection
- Protective relay inspection
- DC power supply inspection
- Sequence test

**TDS diagnosis and repair technology**

TDS specializes in special high-voltage power collection and transforming equipment. The company supports the safe, secure operation of its customers' facilities with high value-added technologies developed from on-site needs.

**Insulation diagnosis using partial discharge measurement**

This is Japan's first practical technology for diagnosing insulation performance and preventing accidents by detecting the phenomenon of partial discharge. Partial discharge is a localized faint discharge that occurs when defects are present in insulation. TDS' proprietary technology reliably detects indications of equipment abnormalities. And equipment diagnosis is possible while in use, without power stoppage.



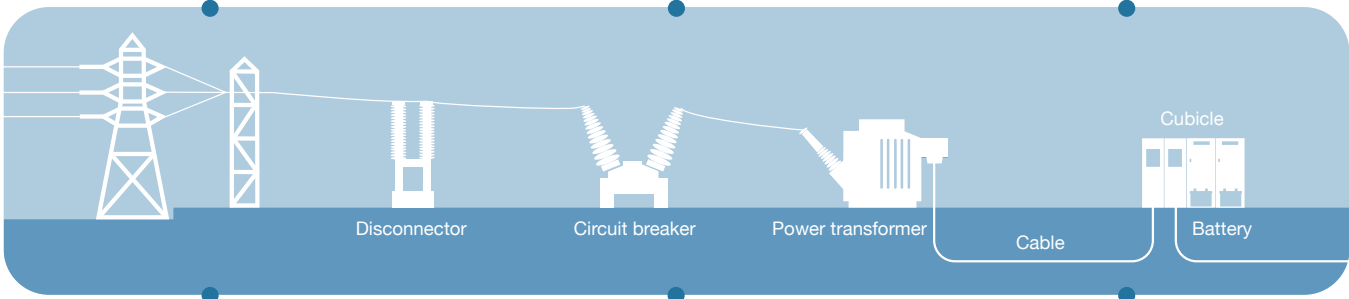
**Transforming equipment external diagnosis**

This technology enables the external diagnosis of various types of equipment using a method that does not involve monitoring the condition of the equipment during operation or disassembling the equipment. It is effective when there are restrictions on stopping the equipment. It can quickly and effortlessly identify signs of equipment abnormalities, mainly for gas-insulated switchgear, disconnectors, and bushings.



**Storage battery deterioration diagnosis**

This diagnostic technology makes possible the instant evaluation of the internal resistance, electromotive force, and actual capacity of each cell and identifies degraded cells without interrupting equipment operation. Since only the cells whose actual capacity has decreased can be replaced, this contributes to extending the life of the entire facility, reducing costs, and enhancing reliability.



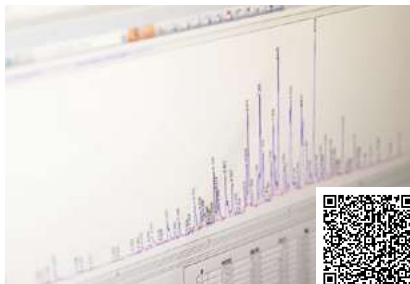
**Oil leak repair - Seam Coat**

This reliable, long-lasting oil leak repair technology boasts an oil leak prevention rate of 96% or more and a service life in excess of 15 years. It incorporates a proprietary method as well as Seam Coat, an ultra-thin coating material featuring superior resistance to oil, water, heat, and weather. It is effective not only for oil leaks but also for leaks in transformers and other equipment used as SF6 gas-insulated equipment.



**Investigation and diagnosis using chemical analysis**

TDS conducts chemical analysis from a third-party perspective to investigate the cause of accidents, diagnose power cable deterioration, and present fair and impartial diagnosis results. We can accurately determine the cause of accidents from both chemical and field points of view derived from our accumulated experience and know-how.



**Diagnosis of high-voltage cable deterioration**

High-voltage cables are often the cause of spillover accidents, so regular maintenance is essential. Inspecting the equipment together with power collection and transforming equipment has the merit of simplifying adjustments made during shutdown and reducing on-site management costs. In addition to the DC leakage current method, we also offer the AC superimposing method, which allows for diagnosis on an active line.



Renewal, renovation, and new installation of power collection and transforming equipment



## Leveraging specialized know-how and comprehensive capabilities to realize the facilities that customers envision.

Power collection and transforming equipment construction requires specialized knowledge and comprehensive capabilities in various fields, such as large equipment installation and removal, and the construction of power cables, overhead lines, and protection and control equipment. TDS provides a one-stop service for a wide range of power collection and transforming equipment work, focusing on special high-voltage electrical equipment for factories and buildings.

### Why choose TDS?

#### Selection of the best equipment

We can work with any manufacturer. Combining the most suitable equipment for the customer's facility type, we can achieve efficient facility construction.



#### Extensive design engineering capabilities

Our engineers, who have supported the world's highest quality electric power facilities, will propose an optimal construction plan that takes into account the customer's facility configuration and operation.



#### Support for peripherals

In addition to the renewal of power collection and transforming equipment, we also provide one-stop services for peripheral equipment such as power cables, protection relays, and steel mounts.



- Applicable facilities and equipment**
- From special high-voltage power collection and transforming equipment to high-voltage power collection and transforming equipment (6.6kV to 154kV)
  - Power cables for electric power (6.6kV to 66kV)
  - Other peripheral equipment such as protective relays
- 
- Main service menu**
- Renewal, repair, and installation of special high-voltage and high-voltage power collection and transforming equipment
  - Replacement of power cables
  - Renewal, repair, and installation of protective relays
  - Renewal, repair, and installation of various types of power equipment



Equipment monitoring solutions

PCB detoxification treatment

Comprehensive power system operation service



## Equipment monitoring solutions

### Next-generation equipment operation saves labor.

Strict monitoring and control of customer facilities at a monitoring center with advanced security measures.\* In addition to 24/7/365 monitoring of facilities, the system can also remotely control a variety of devices, thereby addressing issues such as alleviating personnel shortages and reducing workload.

\*Meets Japan Electrotechnical Standards and Codes (JESC) Z004 (2019) "Guidelines for Power Control System Security".

Equipment monitoring solutions page



## PCB detoxification treatment (natural circulation cleaning treatment)

### TDS handles everything, and the equipment is back online in only two days!

A transformer containing trace amounts of PCBs in use can be rendered harmless with a single cleaning.<sup>1</sup> Since the facility is only offline for two days, it is possible to implement the project on holidays.<sup>2</sup> We provide end-to-end support from planning to cleaning processes and support for application procedures to government agencies.

NOTE: This is applicable to transformers with a name plate insulating oil volume of 2,000 liters or more and a PCB concentration between 0.5 mg/kg and 10 mg/kg.

- 1 Depending on the transformer, flushing may be performed.
- 2 The shutdown period may be longer if the oil volume exceeds 10,000 liters, or depending on the conditions at the facility.

PCB detoxification treatment page



## Comprehensive power system operation service

### Protecting the quality of invisible electricity to the maximum extent possible.

We respond to a wide range of customer issues related to power systems. The services we provide – from grid analysis to technical consulting and engineer training – enable the mitigation of the scope of accidents and the achievement of smooth grid interconnection. TDS' experienced power system operation professionals provide comprehensive support to ensure stable, high-quality power system operation and enhanced supply reliability.

Comprehensive power system operation service page



## Comprehensive cable and conduit facility service



## Comprehensive maintenance that keeps out-of-sight equipment safe and secure.

Among electric power facilities, power cables, conduits, and underground tunnels (utility tunnels) are not easily visible to the public, so their status is not always evident. TDS supports the safe and reliable operation of cable and conduit facilities by performing systematic repair and renewal work on such facilities and providing high-quality maintenance to prevent serious accidents.

### Why choose TDS?

#### Compatible with any type or manufacturer

We support all types and manufacturers of cables. We will make the most suitable selections for your facility configuration to facilitate a trouble-free facility renewal.



#### Design engineering to meet customer needs

Our engineers, who have experience with a variety of construction designs for electric power companies, will apply their accumulated expertise to propose designs and cost-reducing measures that fulfill your requirements.



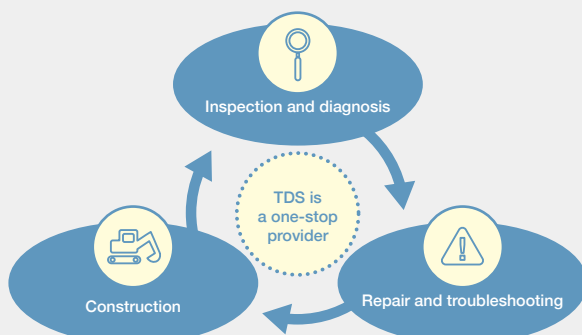
#### Peace of mind in the event of trouble

In the unlikely event of an accident, TDS supports customers toward the quickest possible recovery. From fault point identification to restoration work and investigation of the cause of the accident to prevent recurrence, TDS is there.



#### One-stop service

Our services range from inspections and repairs to new expansion and renewal work, as well as emergency response. We also handle repair work for power collection and transforming equipment and other peripheral facilities.



#### Applicable facilities and equipment

- High-voltage to extra-high-voltage cables (oil-filled (OF) cables, CV (continuous vulcanization) cables)
- Conduit facilities, underground tunnels, bridges

#### Main service menu

- New installation, replacement, and renewal of cables
- Diagnosis of deterioration of high-voltage cables
- Comprehensive maintenance of oil-filled (OF) cables
- Investigation of causes of cable accidents and failures
- Pipe laying and excavation

## New cable installation, replacement, and renewal work

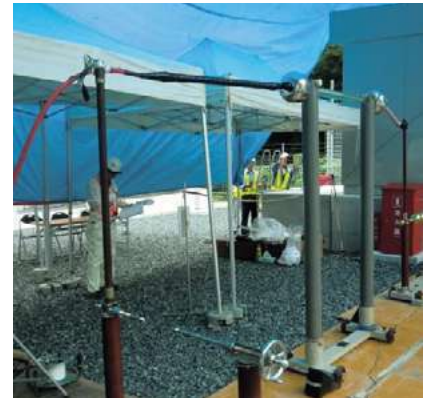
We provide support from the design stage with the technology and know-how cultivated through maintenance for power companies, including route selection that considers customer needs and trouble-resistant equipment configuration. TDS also offers soil-specific thermal resistance measurement for selecting the optimum cable size for underground power transmission design.



Cable replacement



Cable connection



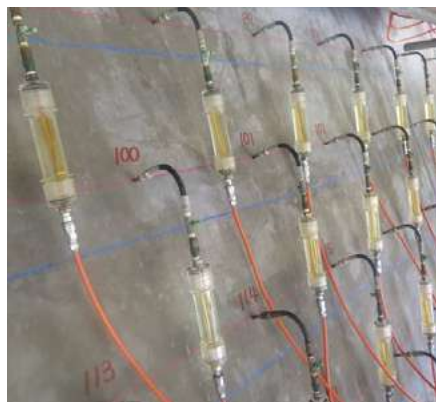
DC withstand voltage testing

## Pipe laying and excavation work

We provide one-stop support for pipeline facility construction by reducing risk and effort through various types of coordination and consultation, as well as application and notification support. We also utilize our expertise in concrete structures to offer maintenance services for underground tunnels such as utility tunnels that house cables.



Pipe laying



Concrete structure maintenance  
(rehabilitation methods)



Concrete structure maintenance  
(STTG method)

## High-voltage cable degradation diagnosis (DC leak current method, AC superimposing method)

There are two methods – the DC leakage current method and the AC superimposing method – that TDS can employ to diagnose deterioration in CV cables, which are commonly used in special high-voltage and high-voltage distribution lines, including the main lines of high-voltage power collection and transforming facilities. The methods indicated above enable the diagnosis to be performed while the equipment is online, thereby reducing the risk of accidents occurring.



DC leak current method



AC superimposing method

## Comprehensive oil-filled cable maintenance

Oil-filled (OF) cables are largely considered obsolete, and as such, the number of companies that can perform maintenance is decreasing. TDS can provide maintenance and troubleshooting services for all OF equipment, including the oil-filled cable itself as well as ancillary equipment. We can also replace oil-filled cables with CV cables.

Comprehensive oil-filled cable maintenance page



OF cable insulation oil sampling



OF cable oil refill



OF cable oil leak repair

## Troubleshooting of cable accidents and failures

In the unlikely event of an accident or failure of a cable facility, TDS supports swift recovery by locating the point of failure (identifying the ground fault point), investigating and analyzing the cause of the failure to prevent a recurrence, and even performing replacement work. Our engineers with advanced knowledge of electric power companies and our special survey vehicles that can handle special high-voltage cables enable us to respond quickly and precisely.

Fault isolation page



Fault isolation



Withstand voltage testing



Cable withstand voltage test vehicle

## Chemical analysis-based investigation of causes of accidents and failures

The insulator material of power cables is a chemical product. To determine the root cause of accidents, analysis from both chemical and electrical perspectives is essential. At TDS, engineers with experience in the maintenance of electrical equipment are involved in chemical analysis to determine the cause of the accident from both points of view. We can also propose preventive maintenance measures afterward.

Investigation of causes of cable accidents  
and failures page



Investigation of causes of accidents  
and failures



Damaged cable



Water tree



## Infrastructure facilities – steel and concrete structures

<b>Infrastructure facilities</b> .....	14
Steel structure maintenance .....	16
Concrete structure maintenance .....	18
Wire rope maintenance .....	19



Infrastructure facilities page

# Preventive maintenance solutions that ensure both safety and longevity.

The safety of social infrastructure facilities that support our daily lives, such as bridges, highways, dams, and steel towers, is of utmost importance. It is just as crucial to ensure that they are properly maintained and can be used for an extended period. TDS delivers diagnosis and maintenance solutions that ensure both the safety and longevity of steel and concrete structures. It leverages the advanced maintenance technologies it has cultivated through its experience with electric power facilities to support these structures, which are the foundation of infrastructure.



## Ensuring safety and reliability

By practicing preventive maintenance, in which the condition of the equipment is continuously and correctly monitored and maintenance is performed according to the condition, it is possible to not only maintain the equipment for a long time, but also ensure it remains safe and reliable.



## Reducing lifecycle costs

Preventive maintenance can help level out renewal costs and reduce lifecycle costs. TDS proposes a sustainable, systematic maintenance cycle from a long-term perspective.



## Proactively introducing new technologies

TDS actively adopts new technologies, such as the introduction of inspection robots and patented construction methods. And we are doing our best to solve customers' problems, such as visualizing difficult-to-access areas and reducing costs.

## TDS comprehensive maintenance service



Comprehensive one-stop, safe, and reliable support, including precise equipment condition monitoring, maintenance cycle optimization, and high value-added maintenance.

## Steel structure maintenance



## Sustainable maintenance in response to the urgency of structural aging.

Steel structures require a great deal of time and money for renewal, and sustainable and planned maintenance is essential for their safe and extended use. TDS employs proprietary methods and technologies to lengthening equipment service life through optimal diagnosis and maintenance based on the state of deterioration.

### Why choose TDS?

#### Integrating proprietary technologies

We respond precisely to the needs of our customers with high value-added maintenance services that integrate new construction methods and robot technologies developed in-house.



#### Leveraging extensive know-how

Based on our expertise cultivated through the maintenance of large-scale facilities for electric power companies, we provide optimal solutions to protect the life and safety of steel structures.



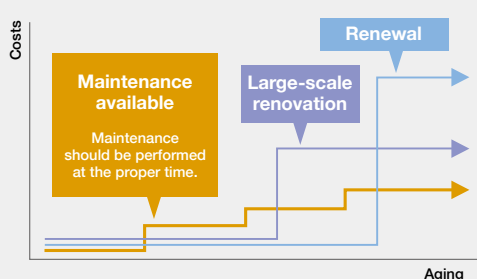
#### Applying collective technological power

We have a large number of employees with Japanese certified qualifications, including Steel Infrastructure Diagnosis Engineer and First-Class Civil Engineering Works Execution Managing Engineer. Our professionals have a wealth of experience and knowledge, enabling them to respond effectively in a host of situations.



### Benefits of preventive maintenance

By correctly assessing the condition of equipment and repairing it at the optimal time, TDS can not only extend equipment service life but also reduce lifecycle costs.



#### Applicable facilities and equipment

- Power transmission towers
- Communication towers
- Power collection station steel structures
- Bridges
- Hydraulic steel pipes
- Water pipe bridges and piping
- Tanks
- Steel chimneys
- Steel poles
- Anchor bolts
- Steel structures in general

#### Main service menu

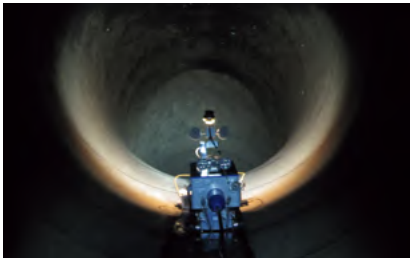
- Steel structure diagnosis and consulting
- Various repairs and replacement of steel pipes
- Rust prevention (painting, replacement of deteriorated steel, antirust thermal spray method)



## Diagnosis – inspection, survey, and measurement

Engineers with extensive field experience investigate and diagnose the condition of steel structure equipment from multiple perspectives. A variety of measurement methods, such as the use of robots for areas that are difficult to enter, allow us to see problems in all areas of the facility and correctly determine the condition.

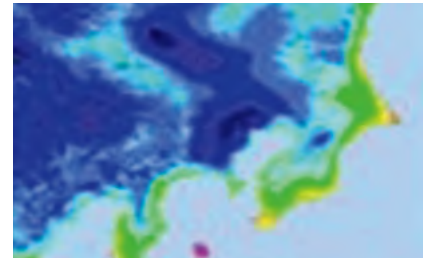
Robot diagnosis technology page



Internal robot inspection



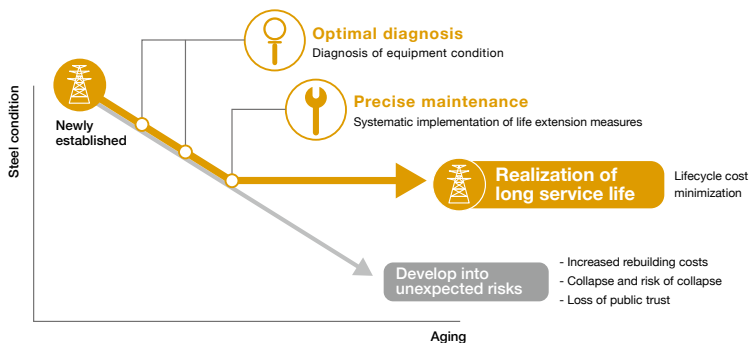
Ultrasonic thickness measurement



Zinc corrosion rate map for evaluating remaining life  
Developed by the TEPCO Research Institute

## Consulting

Based on the know-how accumulated over the past 40 years since the founding of the company, TDS' experienced, knowledgeable engineers comprehensively evaluate the various data obtained from the diagnosis. We propose a plan that maximizes the life of the equipment while minimizing lifecycle costs.



## Construction - various types of repair, rust prevention

Based on the results of the consultation, TDS develops and implements the optimal renovation and life extension plan, from design to construction. We offer high-quality construction services backed by our extensive experience, including the antirust thermal spray method. This method restores the rust-preventive power of new construction, as well as paint and coating technologies that have proven their long-term durability on TEPCO Power Grid's steel towers.

Antirust thermal spray method page



Antirust thermal spray method



Painting



Replacement of deteriorated steel

## Concrete structure maintenance



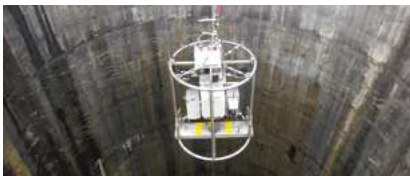
# Controlling deterioration through surveys and diagnosis with cutting-edge technology and proprietary repair techniques.

Although concrete is generally regarded as strong and durable, the aging of facilities, especially those constructed during the period of rapid economic growth, is progressing. Extending the life of existing facilities while maintaining safety has become an urgent issue. TDS proposes effective measures for extending the service life of buildings with its unique technologies, including robot-based surveys and diagnoses and patented construction methods.

## Why choose TDS?

### Various inspection and diagnosis technologies

By using robots to inspect and diagnose areas that are difficult to enter, as well as employing technology to diagnose fractures, we can help to accurately assess facility deterioration and reflect that in countermeasures.



### Propose the optimum repair method

We gauge the deterioration of facilities due to carbonation and salt damage, and use a variety of technologies to resolve the issue with the most appropriate repair method.



### Highly skilled technicians

We have a large number of employees with national qualifications, including Concrete Diagnosis Engineer, First-Class Civil Engineering Works Execution Managing Engineer, and registered surveyors. We respond with reliable technology backed by experience.



### Robot inspection and survey

A robot equipped with a CCD camera can automatically and safely inspect the walls of large structures and other difficult-to-access areas with high precision.



Robot diagnosis technology page

### Water leakage prevention technology (STTG method)

This patented method reliably stops a large amount of water leakage and helps ensure water sealing for an extended period. It also contributes to reduced lifecycle costs.



STTG method page

### Comprehensive concrete repair (rehabilitation methods)

We assess the deterioration of concrete structures and perform repair and reinforcement from a holistic perspective, including rust prevention for reinforcing bars and restoration of concrete strength.



Rehabilitation methods page

### Applicable facilities and equipment

- Dam retaining walls
- Chimneys
- Surge tanks
- Tunnels
- Underground pits
- Underground tunnels and other concrete structures in general

### Main service menu

- Diagnosis and consulting for concrete structures
- Various repair services
- Water leakage countermeasures
- Salt damage countermeasures, salt content measurement, and concrete strength testing

## Wire rope maintenance



## Safe, environmentally friendly, fully automated robot maintenance.

Wire rope plays a major role in facility safety. Depending on the usage conditions and environment, the durability and lifespan of the product can vary greatly. TDS provides high-quality maintenance at low cost with its fully automated robot that completely removes old grease, diagnoses the degree of deterioration, and performs lubrication.

### Why choose TDS?

#### Short construction period and low cost

The work is accomplished remotely and automatically using robots, ensuring safety and security. And, since there is no need for gondolas or large scaffolding, the construction period can be greatly shortened, contributing to cost savings.



#### All abnormalities detected

Since old grease is completely removed, wire abnormalities can be precisely diagnosed. New grease is applied under pressure to the core of the wire, preventing wire breakage and extending the life of the wire.



#### No discharge of wastewater

All wastewater after cleaning is collected, filtered through an oily water separator, and reused as water for cleaning. This environmentally friendly operation precludes the pollution of rivers and the surrounding area.

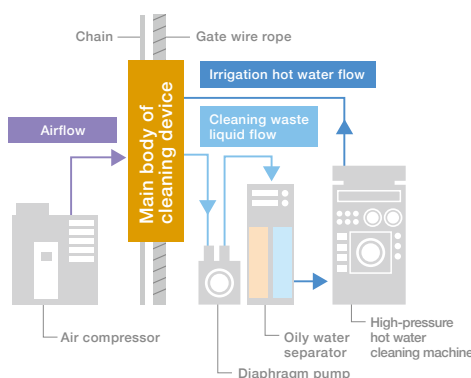


### Automatic high-pressure wire rope cleaning, inspection, and lubrication

Since the old grease is completely removed, the corrosion, damage, deformation, wear, and tapering of the main unit can be comprehensively diagnosed, enabling a highly accurate health evaluation.



Robot diagnosis technology page



### Repair of hanger rope anchorage

This is a service that extends the life of the hanger ropes of long-span suspension bridges by mitigating the progress of internal rust semi-permanently through the use of a unique rust preventative indentation method.



Long-span suspension bridge rope repair page

#### Applicable facilities and equipment

- Dam gate wire
- Estuary weir gate wire
- Long-span suspension bridge

#### Main service menu

- Cleaning, inspection, diagnosis, lubrication, and repair of wire ropes
- Inspection, diagnosis, antirust treatment, and hanger rope anchorage repair

## Renewable energy facilities

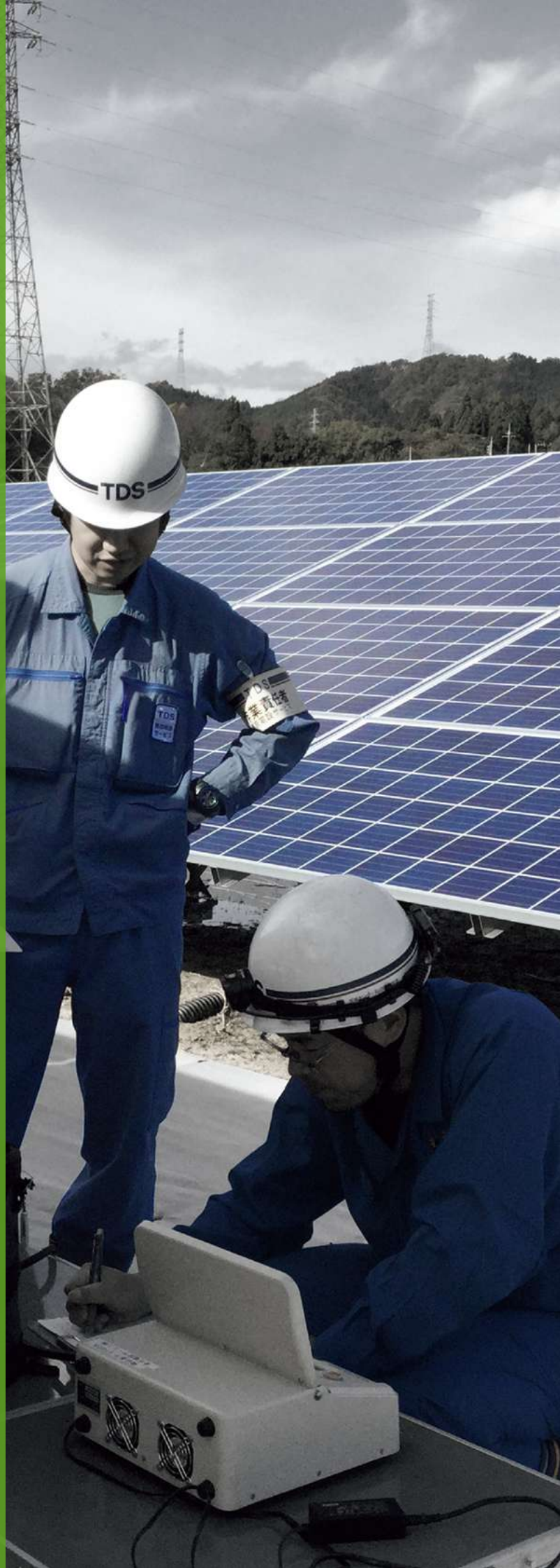
Renewable energy facilities ..... 20

Renewable energy power plant construction ... 22

Renewable energy power plant maintenance .. 23



Renewable energy page



# Keeping renewable energy projects secure and sustainable through measures that anticipate risk.

Renewable energy power plants are subjected to a series of extreme operations in short cycles, with current flowing close to design limits during the daytime while remaining unused at night. It is important to fully account for these factors in the quality of the design and construction work. Moreover, even after the plant is in operation, risks such as natural disasters and equipment malfunctions, as well as reduced power generation efficiency, exist. This makes proper facility maintenance essential. TDS provides one-stop support for stable, sustainable renewable energy power generation projects, including construction and maintenance of power plant facilities, grid connection, and operation and maintenance.



## Emphasizing electricity quality

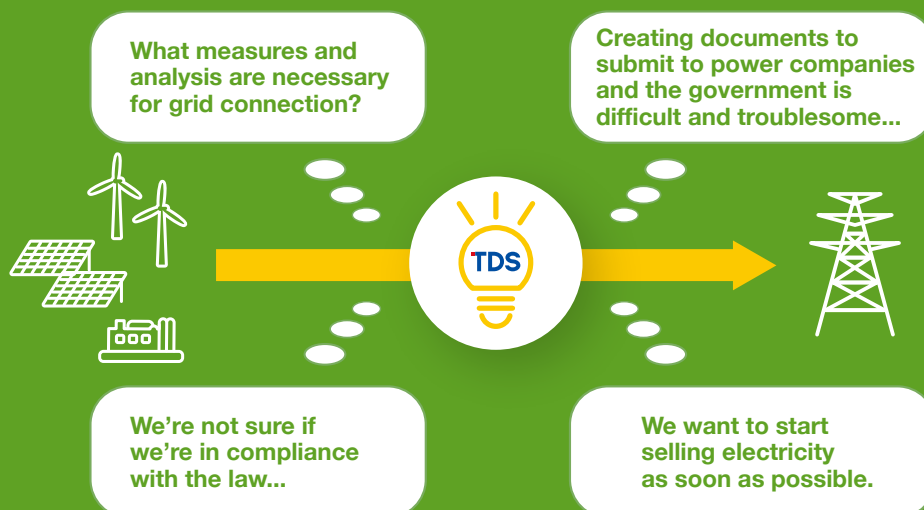
To achieve both stable operation of renewable energy power plants and stabilization of the power system, TDS engineers with extensive experience in grid connection on the power company side will provide the optimal facility design. We also provide smooth support for grid connection.



## Achieving true performance

We strongly support stable operation with our vast experience and knowledge, including regular maintenance and 24-hour monitoring systems to ensure that the facilities perform at their full potential.

**TDS provides full support from consulting to construction.**



TDS leverages the experience and know-how it has accumulated through its involvement in numerous power facilities, and delivers smooth solutions to customers' problems.

## Renewable energy power plant construction



## Design that contributes to maintaining the security and sustainability of renewable energy projects.

Solar power generation must be designed to generate electricity efficiently, minimize transmission losses, and take into account maintenance after operation has begun. Furthermore, knowledge of and familiarity with the relevant laws and regulations are also essential for grid connection and licensing procedures. TDS provides comprehensive support from consulting to installation, solving customers' problems with technical power and comprehensive capabilities cultivated through the maintenance of electric power facilities.

### Why choose TDS?

#### Design for high power generation efficiency

We propose the construction of facilities with high investment effectiveness. Examples include the design of facilities with high power generation efficiency in consideration of the site environment and the introduction of monitoring systems using intelligent electronic devices (IEDs).



#### Support for complicated application procedures

TDS assists customers with various licensing and approval procedures, from identifying the applicable laws and regulations to preparing application documents and being present during the application process. We can also provide support in the case of specialized procedures.



#### One-stop service

We have established a one-stop system that can handle everything from consulting to construction and safety management reviews. We also handle all the complicated management tasks for our customers.



#### Construction of solar power plants

We select the most suitable equipment from various manufacturers according to the purpose of use and the customer's requirements. We then perform the foundation work, installation of the equipment, and wiring work in an integrated manner.



#### Construction of privately owned transmission lines and interconnected substations

TDS offers construction services for interconnected substations associated with special high-voltage interconnection and the privately owned transmission lines connecting them. For the construction of privately owned lines, we also propose cost-effective routes.



#### Wide range of consulting services

We provide assistance from the planning and drafting stages to meet the needs of our customers. We also support specification design and grid connection consultation to ensure they proceed smoothly.



#### Applicable facilities and equipment

- Mega solar power plants
- Interconnected substations for various types of renewable energy power plants
- Privately owned transmission lines to various types of renewable energy power plants

#### Main service menu

- Consulting services
- Construction of power plants
- Privately owned transmission lines, interconnected substations

## Renewable energy power plant maintenance



## Rapidly performing precise and comprehensive diagnoses to maintain high performance.

In addition to the effects of the natural environment, various risks such as problems with electrical equipment can reduce the efficiency of solar power generation, so regular and accurate maintenance is essential. TDS leverages its technical prowess in providing support for power plants from periodic inspection to restoration to maintain high performance.

### Why choose TDS?

#### Maintain high performance

With many years of experience in the maintenance of electric power equipment, we have a thorough understanding of the appropriate inspection items for each piece of equipment. Through regular maintenance, we are able to detect and respond swiftly to indications of abnormalities.



#### 24-hour monitoring and quick response

The 24-hour remote monitoring system at the monitoring center allows for speedy response to unexpected power generation stoppages or problems, and swift recovery.



#### Reliable emergency service

Customers in remote locations can rest assured that, in the event of an emergency, a TDS specialist technician from a nearby office will immediately come to the site to check for abnormalities and perform restoration operations.



### Solar power plant operation and maintenance

From remote operation management to maintenance and troubleshooting using external diagnostic technology, TDS serves customers' needs. We can also handle the inspection of special high-voltage electrical equipment.



### Solar power plant security management

We offer outsourced security management services for solar power plants. Assuming the role of chief electrician for the customer's facilities, we take all possible measures to ensure electrical safety.



#### Applicable facilities and equipment

- Mega solar power plants

#### Main service menu

- Operation and maintenance management of solar power plants
- Security management of solar power plants

# Products



## General Electric (GE) -made IEDs

## Multifunctional, flexible, integrated protection and control devices.



GE-made IED page

An intelligent electronic device (IED) is a device that integrates protection, control, recording, and measurement functions. It can be set to function according to the user's application. GE's IEDs are suitable for a wide variety of system and environmental conditions around the world, and boast high reliability.

### TDS Benefit 1

#### 10-year warranty for peace of mind



The IEDs are covered by GE's 10 Year Worldwide Warranty system, providing a 10-year warranty for peace of mind in the event of a breakdown.

### TDS Benefit 2

#### Authorized distributor of GE products

We are the only authorized GE distributor in Japan that provides after-sales support.

### TDS Benefit 3

#### Award-winning relay replacement method reduces cost, time losses

This method, which earned the 63rd Shibusawa Award, shortens the construction period and reduces costs by using existing panels and cables and replacing only the aging relays.<sup>1</sup>

<sup>1</sup> The Shibusawa Award recognizes outstanding achievements in the field of electrical safety.

## Main features

### All in one

An all-in-one unit that integrates all protection, control, recording, and communication, measurement, and programmable functions.

### Achieve rapid recovery

The adoption of modularization facilitates a swift recovery even in the event of failure.



### Connectivity with different manufacturers

Our components support a variety of communication protocols and can be connected to products of different manufacturers. We can also replace only selected relays based on needs.

### Wide range of products

With the addition of IEDs produced by Alstom (company name prior to acquisition by GE), the lineup is even more diverse. We can respond to a wide range of needs.



### Full range of protection functions

Many relay elements are built into a single unit, making it suitable for almost any application. Customization allows our customers to achieve optimum protection.

### Remote control capability

A built-in communication function enables remote control. And it is possible to incorporate an interlock function.

### Quick analysis of accident causes

Our components are equipped with a recording function. The data is automatically saved in the event of an accident, facilitating rapid analysis of the cause.



Grid Solutions  
Value Added Reseller



## FITCAP

### A new concept bolt cap that prevents rusting and detachment.

FITCAP is a bolt cap that both prevents bolts from rusting and nuts from falling off. It reduces the time and cost of maintenance while maintaining equipment safety. It can be used repeatedly without adhesives. It is also ideal for equipment that needs to be inspected and retightened.



FITCAP page

#### Main features

##### Outstanding antirust performance

The special material containing antirust ingredients adheres perfectly to the object. It shuts out moisture and ultraviolet rays, and exhibits excellent antirust performance.

##### Repeated use possible

Hand-tightening is sufficient—no sealant or other tools are required. Immediate release is possible at fastening points that need to be opened and closed periodically for inspection and repair.

##### Keeps nuts securely attached

It meets NAS3350 vibration testing requirements, and can withstand the most severe vibration or shock. It can also be used to keep nuts firmly fixed.

##### Excellent cost performance

Even large sizes are available without molding at low cost. We can manufacture just the right size to meet the requirements of the installation site in millimeter increments.



## SEClean

### A cleaning tool with excellent dust-collecting properties.

SEClean is a polishing tool with high dust-collecting properties that controls the scattering of shavings and wire materials while firmly removing rust and paint from steel structures, even in the corners, with a grinding force equivalent to that of SP2 polishing. The lightweight, compact design reduces the burden on the operator.



SEClean page

#### Main features

##### High dust collection efficiency

The use of a proprietary dust collection cover drastically reduces the scattering of shavings. It supports efficient work while being environmentally friendly.

##### Dust collection in corners

The slide cover at the end of the dust collection cover opens and closes, allowing the brush to reach even the corners for highly accurate cleaning.

##### Lightweight and easy to use

Combining a compact dust collection cover with a low-speed, high-torque disc grinder, the machine has the same workability as conventional models and the advantage of being lightweight.

##### Significantly improved safety performance

The use of materials and structures that prevent breakage of the brush wire, as well as dust collection covers, suppresses the scattering of wire, making operation safer.



## TPG Paint

### A proven paint that has protected power transmission towers for many years.

This paint provides long-term protection against corrosion by employing a two-coat coating system. The base coat is a modified epoxy resin paint with superior antirust properties, while the top coat is a fluoropolymer resin paint featuring high weather resistance.



TPG Paint page

#### Main features

##### Superior weather resistance

The top coat incorporates fluoropolymers and pigments that inhibit photocatalytic reaction. The paint has excellent weather resistance and retains its luster even in harsh environments.

##### Aesthetic appeal preserved

The two-coat system prevents the penetration of corrosive factors and provides incredible antirust performance to preserve the beauty of the product.

##### Long-term corrosion resistance

Applying a primer coat with modified epoxy resin paint provides excellent adhesion and long-term rust prevention.

##### Prevents paint film wear and tear

Compared to conventional paints, the top coat film features minimal wear, retains its thickness over a long period of time, and protects the base coat.



## Training and seminars



## Cultivating specialists responsible for the future of companies and electric power.

As the aging of electric power and other social infrastructure facilities progresses, optimal maintenance and renewal to maintain facility functions are becoming increasingly important. As such, the cultivation of human resources to support maintenance and renewal has become an urgent issue. TDS provides training and seminars that enable trainees to learn electric power engineering effectively and systematically, taking advantage of the experience and technology we have accumulated over many years supporting electric power network facilities. At our state-of-the-art training facilities, our experienced instructors nurture the electric power specialists of the future.

### Two locations easily accessible from central Tokyo

The Human Resources and Technology Development Center is equipped with new and old substation and underground power transmission equipment, allowing for realistic and practical training that goes beyond theory to actually using and operating the equipment. The center is characterized by its ability to provide effective and systematic training in electric power engineering. There is a center in Saitama equipped with substation training facilities and a near miss experience room, and a center in Tokyo with underground power transmission training facilities.



Human Resources and Technology Development Center  
Saitama City, Saitama Prefecture (just north of Tokyo)



Human Resources and Technology Development Center  
Tamagawa, Ota Ward, Tokyo  
\*At the TDS Tamagawa Plant

### Power transformer training facility



### Underground power transmission training facilities



### Near miss experience facilities



**Electrical equipment engineer training school**

**A training program that can be applied to practical work, using actual equipment.**



Electrical equipment engineer training school page

Using actual power collection and transforming equipment, students can learn the principles, structures, and roles of equipment and protective relays, as well as examples of disasters caused by electrical equipment. With guidance from experienced professionals, students will be able to understand electrical equipment, which will not only ensure equipment safety but also further improve the skills of the technicians.



A full lineup of training equipment



Training using actual equipment is possible



Experienced instructors

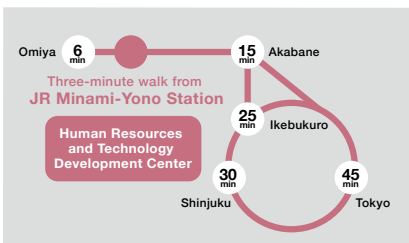
**Near miss experience school**

**Improving safety awareness by simulating hazards.**



To near miss simulation school page

With the ultimate goal of eliminating workplace accidents, this practice-oriented program provides realistic and safe simulated experiences of existing potential hazards. Students can learn the skills necessary to ensure safety on the job site in a condensed, half-day course. It will heighten sensitivity to hazards and improve safety awareness.



Potential day trip to a facility near the Tokyo metropolitan area



Practice-oriented program



Experience newly introduced full-harness crash prevention equipment

**Power engineering training**

**Students can focus only on acquiring necessary knowledge, making the program highly efficient.**



Power engineering training page

Professional instructors with extensive experience at electric power companies provide a practical, useful curriculum from basics to application, customized to meet the needs of each customer. A variety of theme-based seminars are also available.

**Tailor-made training**

Training programs are customized for a variety of themes and issues, including facility design, grid operation, and maintenance management.



Thorough safety training based on extensive experience



Theoretical system that can be used in practice from basics to application



A full sensory experience conveys the realities of operation



Teaching design concepts and techniques developed through practical experience

■ Please feel free to contact us for further information.

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