

Recommendation of Maintenance of Power Receiving Substation Systems

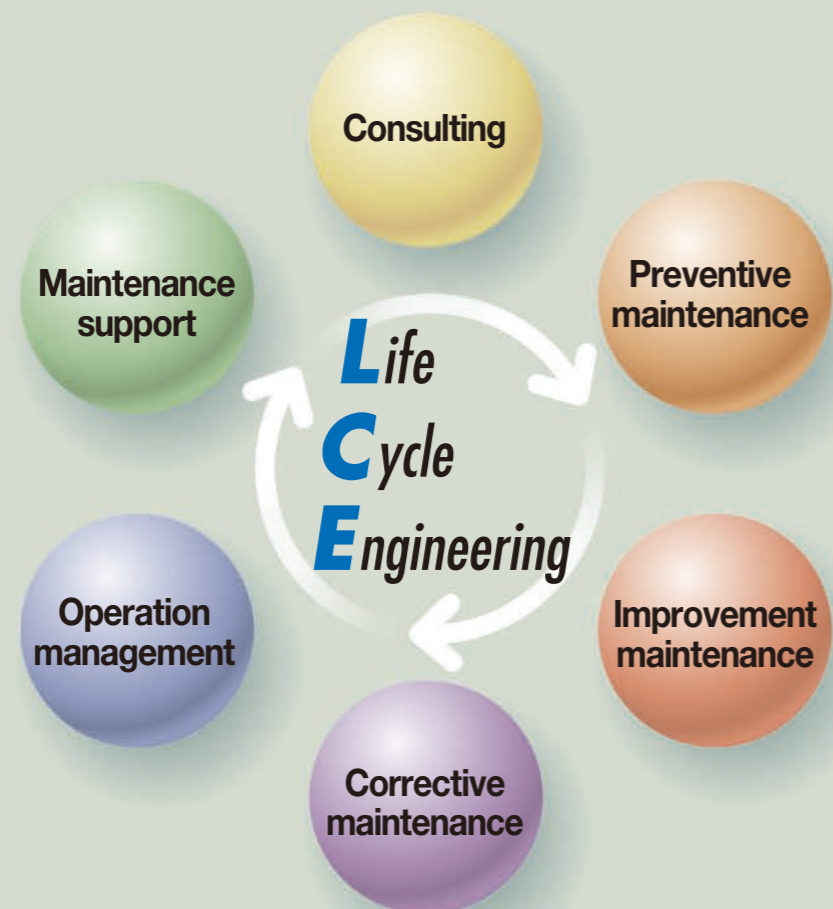
**We propose the optimum maintenance plan
for the customer.**



At Meidensha group,
we ensure that the customer's
power receiving substation systems
are maintained in sound condition.

We propose life cycle engineering for existing equipment.

As maintenance professionals, we propose consulting and preventive maintenance based on an investigation of the operating environment and equipment diagnosis.
We provide 24-hour support for reliability by corrective maintenance, operation management, and maintenance support.



1. Necessity of Maintenance

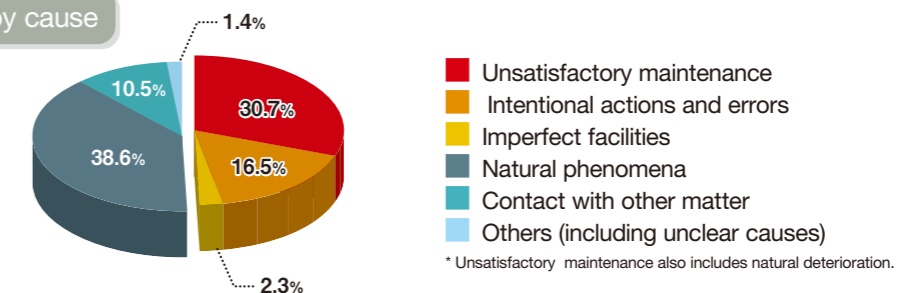
Electric equipment is at risk of the following types of accidents.

In order to prevent accidents and ensure stable operation, the professional engineer about the equipment must perform maintenance.

Present state of electrical accidents

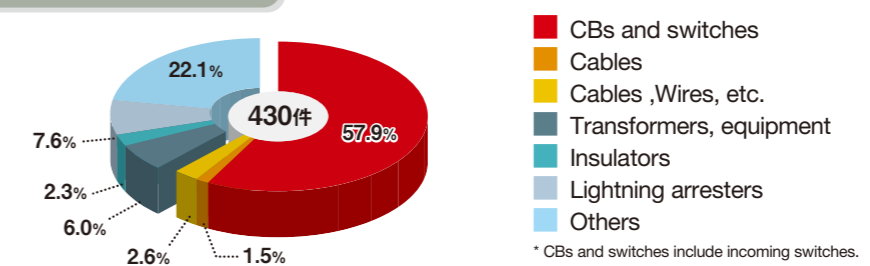
1. By cause, inadequate maintenance, mistake, negligence, and inadequate equipment account for more than half with 53% of the total.
2. By damage location, switches are most frequent, followed by cables, wires, etc., transformers, insulators, and surge arresters.
3. By damage phenomena, insulation decrease, ground faults, and burning account for 50%.

Classification by cause



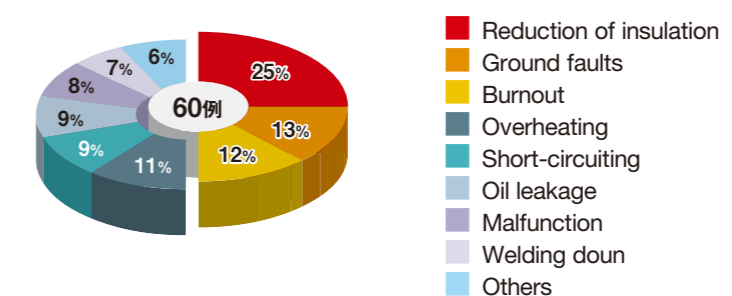
Excerpt from the electrical security statistics by the Nuclear and Industrial Safety Agency of the Ministry of Economy Trade and Industry, Fiscal 2002

Classification by failure spots



Excerpt from the electrical security statistics by the Nuclear and Industrial Safety Agency of the Ministry of Economy Trade and Industry, Fiscal 2002

Result of analyzing failures classified by phenomena for 60 cases of equipment operated over 20 years



Excerpt from study on the reliability of long-used incoming and transforming facilities by the Japan Electrical Manufacturers' Association (JEMA), Fiscal 1999

2. Accident examples

This is how it looks when an accident occurs.
The following photos show typical accident of each equipment.

焼損相
類似機種での内部発熱
Burnout because of aging deterioration of the shunt resistor of an high-voltage surge arrester

Tracking
Insulation support plate
Ground fault caused by moisture absorption deterioration of an oil circuit breaker

Insulation bus bar
Bus bar short-circuit due to debris-borne and contamination of switch gear

Insulation support plate
Insulation resistance reduction caused by moisture absorption of the insulating material of a dry-type transformer

Overheating burnout caused contact failure of a circuit breaker

Overheating burnout caused by increased contact resistance of an air circuit breaker

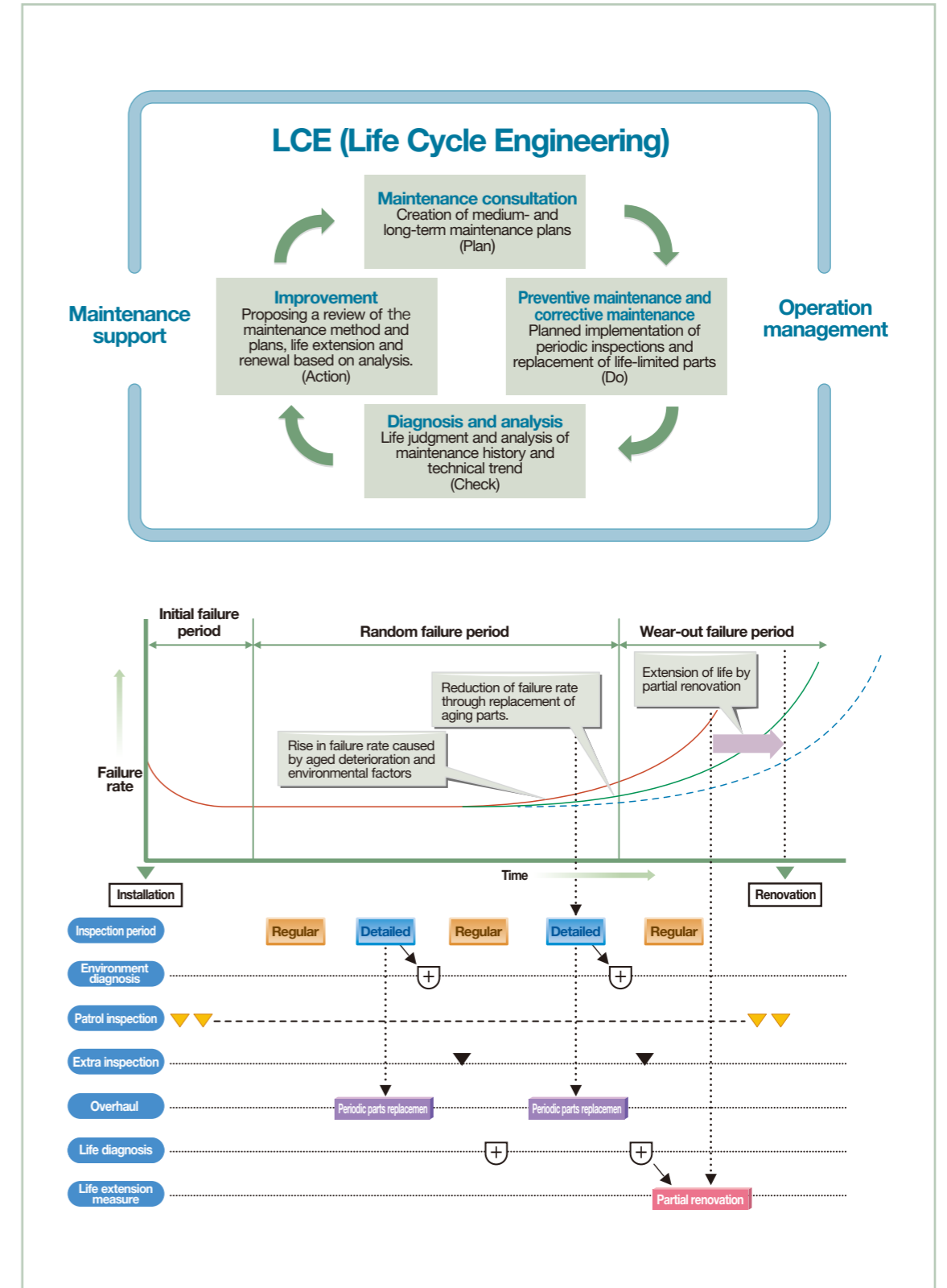
Overheating burnout caused by insufficient tightening of a MCCB breaker for wiring

• Except from consideration of reliability in long-used incoming and transforming facilities by the Japan Electrical Manufacturers' Association (JEMA), Fiscal 1999.

3. Maintenance process

The accident rate is increasing caused by aging deterioration and environmental conditions.

Long-term safe operation becomes possible by repeating the following main processes during the whole life cycle.



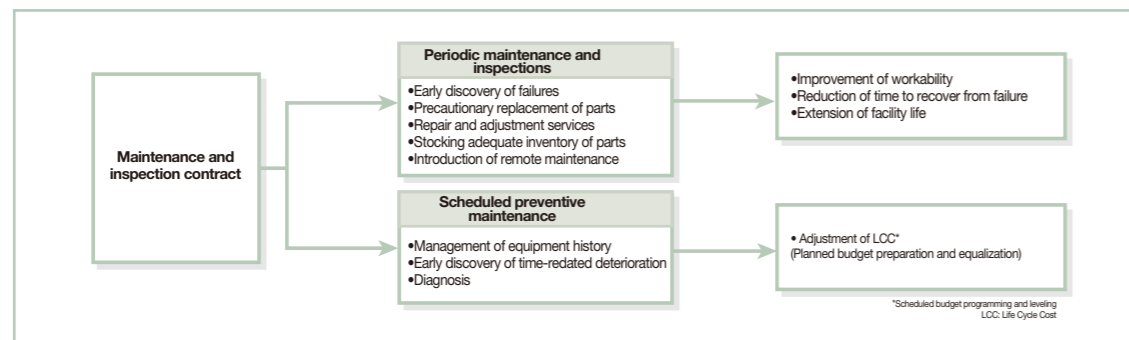
4. Recommendation of a Maintenance Contract

For Long-Term Stable Operation of your Facilities

In order to assure long-term and safe operation of your facilities without any problems, we are able to undertake maintenance and inspection services on your behalf. In order to optimize maintenance services for your facility operation plan, we strongly recommend that you complete a maintenance and inspection contract so that inspection and repair services can be accomplished promptly and most efficiently.

Advantages of a maintenance and inspection contract signed with our company.

- ① Assured inspection and adequate replacement of parts can be carried out in consideration of time-related deterioration.
- ② Deterioration symptoms can be discovered at early stage. Predictive measures are taken to avoid failures.
- ③ Supplementary parts (authentic) can be furnished promptly.
- ④ Professional engineers offer proposals for repairs and improvements, and provide timely technical support.
- ⑤ Life cycle cost can be reduced.



Contents of the maintenance inspections

Classification	Contents	Equipment condition	Cycle
Patrol inspection *1	Confirmation of equipment abnormalities by external appearance, instruments, and by the senses (eyesight, hearing, smell).	Operation	Once/0.5 to 1 year
Simple inspection *2	Confirmation of the minimum required functions mainly by external appearance and visual inspection.	Stop	Once/year
Regular inspection	Implementation of cleaning, lubrication, and other light restoration measures without stopping the equipment, disassembly, etc. Confirmation and recording of the condition of the main functions and the operation of the equipment, etc., using the human senses, operation tests, etc. Judgment of presence or absence of abnormalities.	Stop	Once/1 to 3 years
Detailed inspection	Stopping the operation of the equipment, confirming the overall functions and performance of the equipment under consideration of the information obtained by patrols, regular inspections, etc., performing disassembly and adjustment accompanying parts replacement (overhaul), and overall wide-ranging measurement and testing. (This inspection requires expert knowhow.)	Stop	Once/3 to 6 years
Extra inspection	This inspection is performed to judge whether continued use is possible when urgency is required in the case of an abnormality detected by patrol or regular inspection, or when an unforeseen accident has occurred.		Any time

*1 Patrol inspections are performed by our company for customers where the equipment cannot be stopped easily.

*2 Generally, the classification of "simple inspection" does not exist, but it is an inspection for establishing a maintenance plan for regular inspections and detailed inspections.

Periodic inspection cycle and recommended renovation interval

No.	Equipment condition	Periodic inspection interval		Recommended renovation interval
		Regular inspection	Detailed inspection	
1	Switchgears	1 year	3 to 6 years	15 year
2	High-voltage oil-immersed transformers	1 year	3 year	20 year
3	Extra-high-voltage oil-immersed transformers	1 year	3 year	25 year
4	Gas transformers	1 year	3 year	25 year
5	Dry transformers	1 year	3 year	20 year
6	Power capacitors	1 year	3 year	15 year
7	Surge arresters	1 year	3 year	15 year
8	Instrument transformers	1 year	3 year	15 year
9	GIS, C-GIS	3 year	6 year	25 year
10	Vacuum circuit breakers	3 year	6 year	20 year
11	Vacuum electromagnetic contactors	3 year	6 year	15 year
12	Oil-immersed circuit breakers	3 year	6 year	20 year
13	Air circuit breakers	3 year	6 year	15 year
14	Circuit breakers	3 year	6 year	20 year
15	Protective relays	1 year	-	15 year

Note: PR pamphlet "Recommendation of maintenance inspections and life extension" of the Japan Electrical Manufacturers' Association

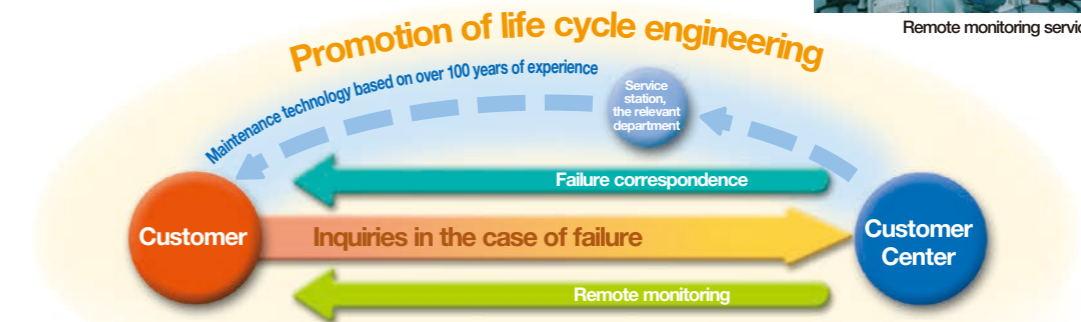
Customer Center

We implement more efficient maintenance based on over 100 years of experience as a heavy electric machinery maker.

- We respond to failure information from our customers 24/7 every day of the year.
- We plan for quick resolution of problems in direct connection with our service stations all over the country.



Remote monitoring service



Every day of the year

- We respond to inquiries concerning our delivery products and failure information to the customer 24/7. (Japan domestic only)

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