MERSEN

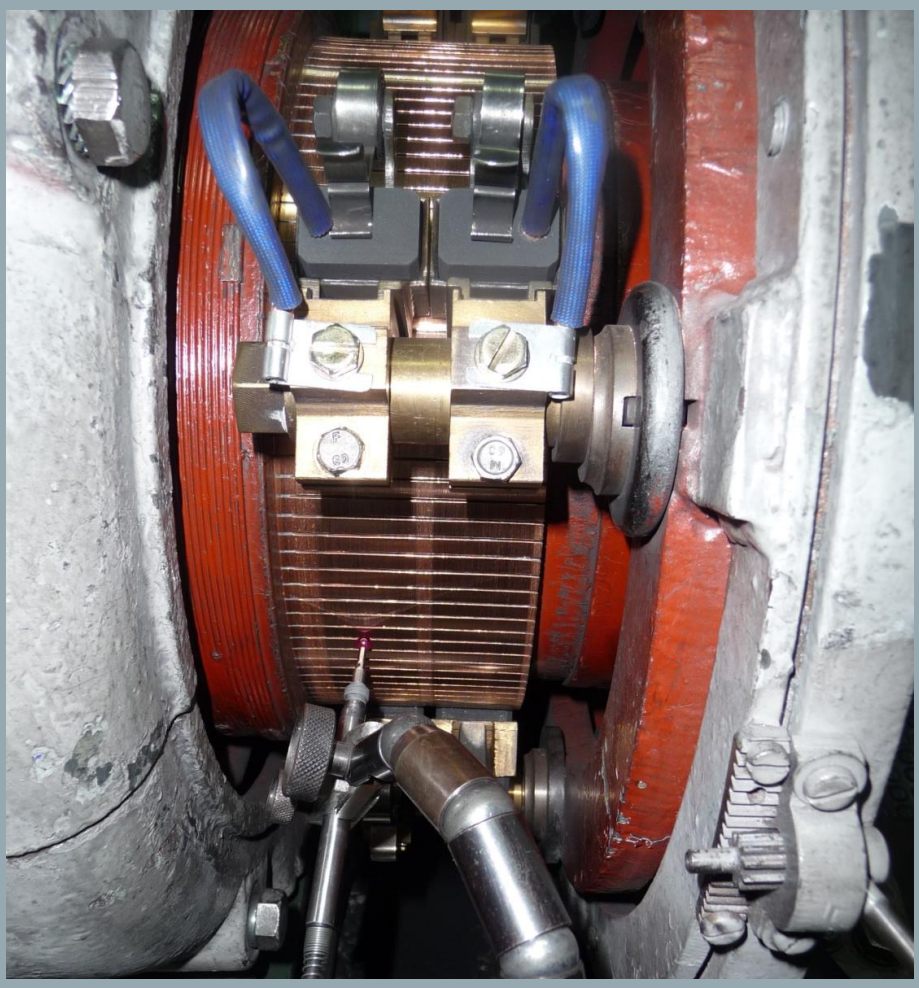
Expertise, our source of energy

MERSEN'S SERVICES

OPTIMIZE YOUR EQUIPMENT'S PERFORMANCE, INCREASE PRODUCTIVITY AND REDUCE MAINTENANCE COSTS




- Brush wear, maintenance and downtime reduction
- Machine performance increase
- Evaluation of the equipment condition before total or partial repairs
- All market segments
- All types of machines
- Replacement parts



SERVICES

SAFETY IS OUR PRIORITY

All our field service specialists have the appropriate Safety & Health qualifications:

- Electrical works
- Chemical environment
- Working at height
- Offshore
- Mining
- Specific customers' safety authorizations
- First aid / CPR

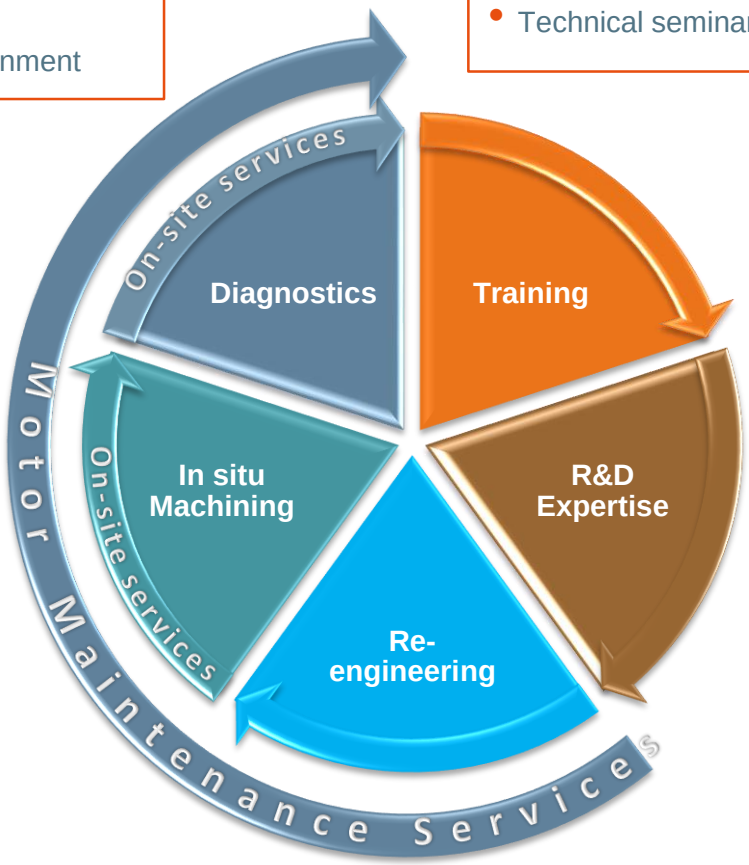
A COMPLETE RANGE OF SERVICES

DIAGNOSTICS
On-site motor inspections

- Application
- Mechanical
- Electrical
- Engineering / Environment

TRAINING

- High quality technical training
- Customized training curriculum
- At either our location or yours
- Technical seminars



IN SITU MACHINING

- Machining and refurbishment of your slip ring assemblies and commutators
- A whole range of tools for maintenance of slip rings and commutators, selected or internally developed where required

R&D EXPERTISE

- Development and rental of test benches
- Material analysis

RE-ENGINEERING

- Design and re-engineering of components
- Complete retrofit solutions

THE MERSEN SERVICES PORTFOLIO

	Services & Training	Description
1	On-site services - Diagnostics	Standard machine inspection
2		Comprehensive inspection
3		Specific electrical machine inspection
4		Machine environment inspection
5	On-site services - In situ Machining	In situ machining and refurbishment of slip ring assemblies and commutators
6	On-site services - Maintenance	Mersen DustCollector maintenance
7	Re-enginering	Design and re-engineering of components
8	Windtracker™ services offer	Complete service offer & Technical expertise in signal and power transfer
	Training	At our location
9		At your location
		Technical seminars
10	R&D expertise	Testing capabilities
11		Material analysis

1 → 4. ON-SITE SERVICES - DIAGNOSTICS

	MACHINE INSPECTION		SPECIFIC ELECTRICAL INSPECTION	SPECIFIC ENVIRONMENT INSPECTION
	STANDARD PACKAGE	COMPREHENSIVE PACKAGE		
Operating condition assessment	●	●		
Carbon brush function and design analysis, identification and choice of the grade	●	●		
Slip ring assemblies and commutator film analysis	●	●		
Commutator and slip ring assemblies: surface roughness	●	●		
Commutator geometry	●	●		
Diameter measurement of commutators, slip ring assemblies or rolling stock wheels		●		
Vibration control		●		
Brush-holders pressure measurement, visual analysis and adaptation	●	●		
Complete machine study		●		
Carbon brush arm position equidistance control		●		
Neutral line adjustment			●	
Machine environment condition analysis	●	●		
Evaluation of the heat exchange level				●
Temperature measurement of carbon brushes, slip rings, commutator and winding	●	●		
Commutation measurement			●	
Measurement of the shaft and grounding current			●	
Insulation measurement and control			●	
Electric circuit control			●	
Cooling flow calculation				●
Analysis of pollutants				●
Calculation of losses connected to the carbon brush and commutator/slip ring assemblies				●
Technical report	●	●	●	●

1. ON-SITE SERVICES – DIAGNOSTICS: STANDARD MACHINE INSPECTION

TECHNICAL ISSUES

- Carbon brush dusting
- High carbon brush wear
- Sparking
- Abnormal commutator or slip ring assemblies appearance (striation, deformation, electric marking etc)
- Vibrations with frayed, cut, ripped off cables or glazed surface of carbon brush
- Cable discoloration
- Broken spring of the brush-holder
- Slip ring threading
- Selective action

Standard machine inspection

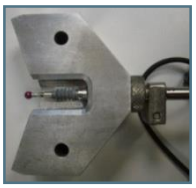
MERSEN'S SOLUTIONS

	Description
1	**Commutators and slip ring assemblies**
	→ Surface roughness
	→ Commutator geometry
	→ Vibration control (bearings, balancing, frame inspection, shaft alignment)
2	**Brush-holders**
	→ Brush-holder pressure measurement
	→ Brush-holder clearance to carbon brush measurement
	→ Brush-holder condition visual analysis
3	**Diameter measurement of commutators, slip ring assemblies and rolling stock wheels**
4	**Technical report**

Vibration control

Vibration analyser

CL-Profiler



DiaMeter

2. ON-SITE SERVICES – DIAGNOSTICS: COMPREHENSIVE INSPECTION

TECHNICAL ISSUES

- Carbon brush dusting
- High carbon brush wear
- Sparking
- Abnormal commutator or slip ring assemblies appearance (striation, deformation, electric marking etc)
- Vibrations with frayed, cut, ripped off cables or glazed surface of carbon brush
- Cable discoloration
- Broken spring of the brush-holder
- Flash over
- Slip ring threading
- Selective action

Potential under brush reading

MERSEN'S SOLUTIONS

	Description
1	**Static**
	→ Complete machine study (operating conditions, patina analysis)
	→ Carbon brush arm position equidistance control
	→ Neutral line adjustment
	→ Carbon brush function analysis
	→ Brush-holder adaptation
2	**Dynamic**
	→ Environment conditions evaluation
	→ Evaluation of the heat exchange level
	→ Temperature measurement of carbon brushes, slip ring assemblies and commutator
	→ Winding temperature measurement
	→ Commutation measurement
	→ Vibration control (shaft line)
	→ Measurement of the shaft and grounding current
3	**Technical report**

3. ON-SITE SERVICES – DIAGNOSTICS: SPECIFIC ELECTRICAL MACHINE INSPECTION

TECHNICAL ISSUES

- Electrical marking on commutator strips, on slip ring assemblies or on the carbon brushes
- Sparking
- Vibrations
- Turbo alternator current distribution problems

Specific electrical machine inspection

MERSEN'S SOLUTIONS

	Description
1	**Commutators and slip ring assemblies**
	→ Surface roughness
	→ Commutator geometry
	→ Vibration control (bearings, balancing, frame inspection, shaft alignment)
2	**Brush-holders**
	→ Brush-holder pressure measurement
	→ Brush-holder clearance to carbon brush measurement
	→ Brush-holder condition visual analysis
3	**Diameter measurement of commutators, slip ring assemblies and rolling stock wheels**
4	**Technical report**

Insulation control with Megger measuring device

Harmonics control

LCR Meter

Measurement of shaft currents

4. ON-SITE SERVICES – DIAGNOSTICS: MACHINE ENVIRONMENT INSPECTION

TECHNICAL ISSUES

- High carbon brush or commutator wear
- Oil presence in the carbon brush compartment
- Coloration of the cable, brush-holder or commutator due to acid attack

Control of the operating conditions

MERSEN'S SOLUTIONS

	Description
1	Temperature measurement at vent inlet and outlet
2	Cooling flow calculation
3	Analysis of pollutants
4	Calculation of losses connected to carbon brushes and commutator / slip ring assemblies design
5	General advice on components and materials (winding, insulation materials...)
6	Technical report

Thermometer hygrometer

Infrared camera

5. ON-SITE SERVICES: IN SITU MACHINING AND REFURBISHMENT OF SLIP RING ASSEMBLIES AND COMMUTATORS

TECHNICAL ISSUES

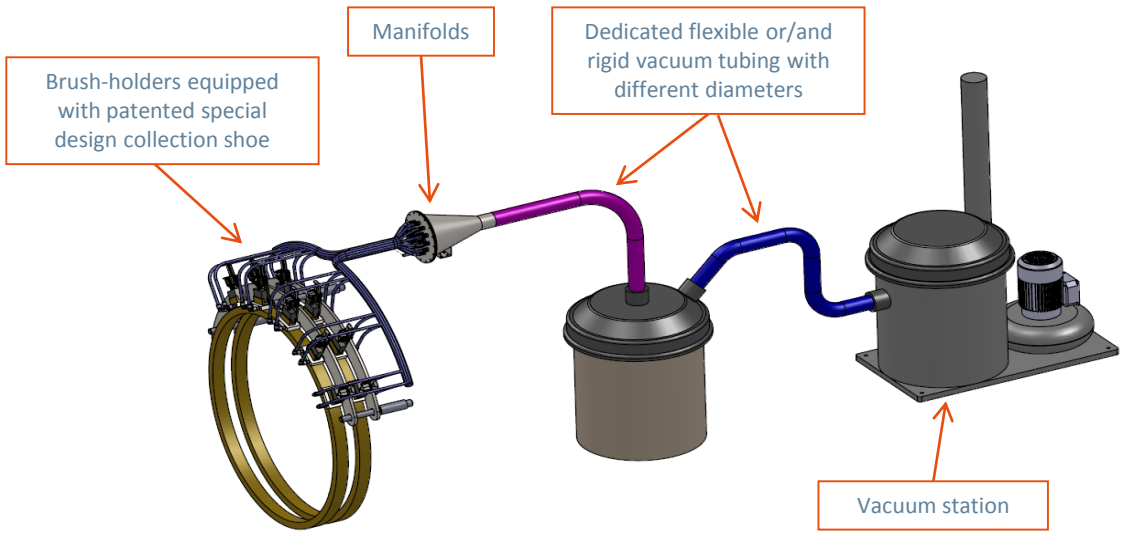
- High carbon brush wear
- Sparking
- Abnormal commutator or slip ring assemblies appearance (striation, deformation, electric marking etc)
- Vibrations with frayed, cut, ripped off cables or glazed surface of carbon brush
- Cable discoloration
- Broken spring of the brush-holder
- Flash over
- Slip ring threading

MERSEN'S SOLUTIONS

	Description
1	Diamond or ceramic machining of commutators and slip ring assemblies
2	Stone grinding of commutators and slip ring assemblies
3	Mica undercutting
4	Bar edge chamfering
5	Commutator and slip ring assemblies profile measurement
6	Commutator and slip ring assemblies diameter measurement
7	Replacement of the carbon brushes
8	Replacement and adjustment of brush-holders
9	Contact surface seating
10	Final dimensional inspection
11	Technical report

Approved & licensed technology

6. ON-SITE SERVICES: MERSEN DUSTCOLLECTOR MAINTENANCE



MERSEN'S SOLUTIONS

	Description
1	**General machine inspection**
2	**Dust cleaning near carbon brushes**
3	**Brush-holders and dust suction shoes**
	→ Dismantling, cleaning, mechanical characteristics control, brush-holder pressure measurement
4	**Manifolds**
	→ Dismantling, cleaning, mechanical characteristics control, connection leakage control
5	**Pipes**
	→ If flexible: control and replacement (if necessary) → If rigid: control, cleaning
6	**Separator**
	→ Cleaning, leakage control
7	**Vacuum unit**
	→ Filter control and replacement (if necessary)
8	**Technical report**

Monitoring in option:

- Electrical set up with hydro generator running (stop & go)
- Alarm in case of depression loss
- Alarm in case of carbon brush wear

7. RE-ENGINEERING: DESIGN AND RE-ENGINEERING OF COMPONENTS

TECHNICAL ISSUES

- High carbon brush wear
- Electromechanical failures
- Old design electrical parts
- Flash over
- Slip ring threading
- Over/Under-loaded brush design

Retrofit kit for Hitachi generator

MERSEN'S SOLUTIONS

- Re-design to reduce brush wear, maintenance and downtime
- Complete retrofit solutions (carbon brushes, brush-holders, slip ring assemblies, brush gear housing)
- Plug & play solutions
- No machine modifications required

	Description
1	Complete field diagnostic
2	Report to R&D
3	Analysis and recommendations
4	Prototype
5	Tests in the field (or test benches)
6	Tool design and manufacturing
7	Reengineered solution manufacturing
8	Follow up in the field and after sales
9	Technical report

8. WINDTRACKER™ SERVICES OFFER: COMPLETE SERVICE OFFER AND TECHNICAL EXPERTISE IN SIGNAL AND POWER TRANSFER

TECHNICAL ISSUES

- High carbon brush wear
- Sparking
- Abnormal commutator or slip ring assemblies appearance (striation, deformation, electric marking etc)
- Vibrations with frayed, cut, ripped off cables or glazed surface of carbon brush
- Cable coloration
- Broken spring of the brush-holder
- Flash over
- Slip ring threading or grooving

MERSEN'S SOLUTIONS

	Description
1	**Complete service offer:**
	→ Uptower support according to the industry's safety standards
	→ In situ machining of the generators' slip ring assemblies
	→ Training: Stagelec or Extelec
	→ "Green" programs : dedicated carbon brush recycling program
2	**Technical support & expertise in signal and power transfer:**
	→ Diagnostics
	→ Re-engineering
	→ Redesign to Cost
3	**Offshore wind turbines Signal Transfer Systems maintenance service**
4	**Technical report**

9. TRAINING

At our location

- Duration: 2 days
- Session: as per time schedule

OR

At your location

- Duration: according to request
- Session: on request

OR

- Programme drawn up depending on your requirements

TECHNICAL SEMINARS

- **High quality Technical Training** to help you to maximize the efficiency of your staff while minimizing the costs
- With a **variety of training solutions** and highly qualified Mersen specialilsts, we can customize a learning solution that works for you
- **Customized Training Curriculum**: dedicated program specially for your staff needs and experience level to optimize your time and learning
- Training at customer's site or in our **Training facilities** located in Europe, India and USA
- **Who should participate?** Engineers, technicians and electrical maintenance personnel

DESCRIPTION

	Description
1	**Introduction** → Production of raw materials → Manufacture of carbon brushes and brush-holders → Brush grade groups and corresponding applications
2	**Understanding the basic rules and functions of the carbon brush**
3	**Parameters influencing the carbon brush behaviour**
4	**Analyzing motor malfunctions by observing the condition of the carbon brushes, commutators and slip ring assemblies**
5	**Using diagnostic and control equipment**
6	**Practical examples to improve preventive and corrective maintenance**

10. R&D EXPERTISE: TESTING CAPABILITIES

TECHNICAL ISSUES

- Development of electric machines for new applications
- Application difficulties, extremet climate conditions, speed or current variations etc

MERSEN'S SOLUTIONS

- Support for new development projects
- Support for diagnostics on electrical machines
- Large range of existing test benches
- New test bench development
- According to customer's specifications

	Description
1	**Environmental chamber**
	to validate prototypes in all kinds of configurations: → Temperature: - 40°C / + 150°C → Humidity: 5% RH to 98% → Altitude: 0 to 2000 m = 790 mbar Dimensions : (2.70 x 2.40 x 2.20 m / *9 x 8 x 7 ft)*
2	**Slip ring test bench**
	→ Speed: 0 to 2900 rpm → Maximum weight: 500 kg → Maximum current: 1200 A AC (according to the current density and number of carbon brushes)
3	**Turbo generator test bench**
	→ Ring diameter: 19.0'' (480 mm) → Ring grooves: 0.12'' wide with 0.5'' pitch → Ring material: 4140 Alloy steel → Ring peripheral speed: 0 to 100 m/s → Current density: 0 to 1200 A DC → Carbon brush dimensions: t x 25 x r mm (t x 1'' x r)
4	**Corrosion test bench**
5	**Development of new test benches**

11. R&D EXPERTISE: MATERIAL ANALYSIS

TECHNICAL ISSUES

- Inconsistent material performance
- Incorrect grade selection
- Brush safety: lead, other hazardous components

MERSEN'S SOLUTIONS

- In addition to other Mersen diagnostics
- Support for new deveropment project
- Support for diagnostics on electrical machines
- Large variety of material analysis
- According to the customer's specifications
- Comprehensive reports

	Description
1	**Carbon brush grades**
	→ Physico-chemical analysis
	→ Micrographic structure
2	**Metal products**
	→ Mechanical properties
	→ Microstructure and chemical composition

ON DEMAND

12. SERVICES, TRAINING & MAINTENANCE: MAIN CUSTOMER REFERENCES

RENEWABLE ENERGY

Wind Energy: Maia Eolis, Vestas, REpower, Gamesa, La Compagnie du Vent, GE Energy, Enel Green Power
Hydro: EDF (France), Santo Antônio, Jirau, Electronorte (Brazil), Cahora Bassa (Mozambique), EdiPower, Enel Green Power (Italy)

Training made for REpower (France, Germany, USA), GE Energy (USA), Suzlon (USA), Gamesa (Germany, USA), Iberdrola (USA), VOITH (Germany), Enertrag (Germany), E-On (Germany), Hydro Quebec (Canada), Noble Power (USA), Next Era Energy (USA), GE Power & Water (USA), National Hydro (NHPC) (India) etc.

Mersen DustCollector maintenace made: Vattenfall (Norway, Sweden)

CONVENTIONAL ENERGY

Thermal and Nuclear Energy: EDF , E.ON (Italy)
Mining: Cleveland Potash, PowerFuel (UK)
Offshore, Oil & Gas: MP Saipem (Eni Group) (Italy, Spain), Bourbon (Brazil)

Training made for EDF (France), Electrabel (Belgium), GDF Suez (France), Hinkley Point (UK), Belkalyi Mines (Bielorussia), P&H Mine Pro – Joy Global (USA), Coal of India Ltd (India) etc.

TRANSPORTATION

Railways: Indian Railways (India), Southern Rail (UK), ACTS (Netherlands), Goviathameslink (UK)
Transit transport: London Underground, Rotterdam metro, Athens metro, Transpole, RATP Paris metro, SNCF (France)
Ports & Marine: Jan de Nul (Belgium), Dredging (Belgium), ECT (Netherlands), Igma Bulk Terminal (Netherlands) etc.

Training made for Metro of Istanbul (Turkey), Metro of Cairo (Egypt), RATP (France), Metro of Singapore, Indian Railways, SNCF (France), ONCF (Morocco) etc.

PROCESS INDUSTRIES

Metallurgy: Arcelor Mittal (Belgium, France, Germany, Spain), Usiminas (Brazil), Tata Steel (Netherlands, France) , Marcegaglia (Italy) etc.
Pulp & Paper: Shotton Paper (UK), SCA Hygiene (UK), Kappa (Netherlands), Sappi (Netherlands, Belgium) , Burgo (Belgium) etc.
Cement: Orcem (Netherlands), Holcim (Belgium), CBR (Belgium), Italcementi , Colacem (Italy)
Plastic & Rubber: Azko Nobel (Netherlands), Bayer (Belgium, Germany), AKG Polymers (Netherlands) etc.
Others: Eiffel Tower, Disneyland Paris (France)

Training made for Arcelor Mittal, Thales (France), ACOME (France), Georgia Pacific (France), Vicat (France), Steel Authority of India, Jindal Steel (India) etc.

13. QUESTIONNAIRE FOR IN SITU MACHINING OF MOTORS OR GENERATORS, page 1

CHECK LIST

MOTORS OR GENERATORS

QUESTIONNAIRE FOR IN SITU MACHINING

MERSEN SERVICES

This form includes Information elements required before the service call, please fill in the data carefully.

CONTENTS

13. QUESTIONNAIRE FOR IN SITU MACHINING OF MOTORS OR GENERATORS, page 2

IN SITU MACHINING OF MOTORS OR GENERATORS — CHECK LIST

CUSTOMER
NAME: _____
ADDRESS: _____
GPS COORDINATES: _____
EMAIL: _____
TEL: _____

MERSEN's REPRESENTATIVE
NAME: _____
EMAIL: _____
TEL: _____

SUBJECT OF THE SERVICE CALL: ☐ Motor ☐ DC ☐ AC ☐ Generator ☐ DC ☐ AC

1 - MACHINE

Manufacturer: _____ Type: _____

☐ Horizontal ☐ Vertical

Nominal speed (rpm)	
Power (kW)	

DC Machine		AC Machine	
Armature voltage (V)		Stator voltage (V)	
Armature current (A)		Stator current (A)	
Field voltage (V)		Rotor voltage (V)	
Field current (A)		Rotor current (A)	

2 - SLIP RING ASSEMBLIES

☐ Manual grinding ☐ Machining Helical groove? ☐ With ☐ Without

Material: ☐ Steel (alloys) ☐ Bronze Depth of the helical groove (mm): _____

Number of rings	
Diameter (mm)	
Ring width (mm)	

3 - COMMUTATOR

☐ Manual grinding ☐ Machining

Diameter (mm)	
Width (mm)	
Nr of bars	
Mica width (mm)	

13. QUESTIONNAIRE FOR IN SITU MACHINING OF MOTORS OR GENERATORS, page 3

4 – ACCESS TO THE MACHINE

Access door dimensions: Width (cm): _____ x Height (cm): _____
Distance between rotor and door (cm): _____
Comments:

5 – BRUSH-HOLDER BOLT / SLIP RING ASSEMBLIES

Type: ☐ Square ☐ Circle
Number: _____

Diameter of the brush-holder bolt (mm)	
Or section (mm)	
Length of the brush-holder bolt (mm)	
Distance between the centre of the brush-holder bolt and the slip rings (mm)	
Distance between two brush-holder bolts (mm)	
Distance between the centre of the brush-holder bolt and the centre of the carbon brushes (mm)	

6 – BRUSH-HOLDER BOLT / COMMUTATOR

Type: ☐ Square ☐ Circle
Number: _____

Diameter of the brush-holder bolt (mm)	
Or section (mm)	
Length of the brush-holder bolt (mm)	
Distance between the centre of the brush-holder bolt and the commutator (mm)	
Distance between two brush-holder bolts (mm)	
Distance between the centre of the brush-holder bolt and the centre of the carbon brushes (mm)	

7 – BRUSH-HOLDERS / SLIP RING ASSEMBLIES

Adjustment to be made? ☐ Yes ☐ No
Replacement to be made? ☐ Yes ☐ No

8 – BRUSH-HOLDERS / COMMUTATOR

Adjustment to be made? ☐ Yes ☐ No
Replacement to be made? ☐ Yes ☐ No

13. QUESTIONNAIRE FOR IN SITU MACHINING OF MOTORS OR GENERATORS, page 4

9 – CARBON BRUSHES / SLIP RING ASSEMBLIES

Grade: _____
Dimensions (mm): t _____ x a _____ x r _____
Drawing Nr: _____
Replacement to be made? ☐ Yes ☐ No

10 – CARBON BRUSHES / COMMUTATOR

Grade: _____
Dimensions (mm): t _____ x a _____ x r _____
Drawing Nr: _____
Replacement to be made? ☐ Yes ☐ No

11 – MOTOR POWER SUPPLY DURING THE SERVICE CALL

☐ By the customer ☐ By Mersen

If "By the customer", please precise the method:

☐ Auxiliary motor
☐ Hydraulic , please precise the rotation speed (rpm): _____
☐ Other, please precise: _____

12 – SPECIFIC ELECTRICAL MOTOR INSPECTION TO BE DONE

☐ Insulation measurement and control
☐ Other, please precise: _____

13 – MACHINE CONDITION

☐ Dust
☐ Oil
☐ Other, please precise: _____

14 – MACHINE AVAILABILTY (provisional dates) _____

Comments:

Please send us pictures of the Commutator or Slip Ring assemblies, their nameplate, environment, condition etc.

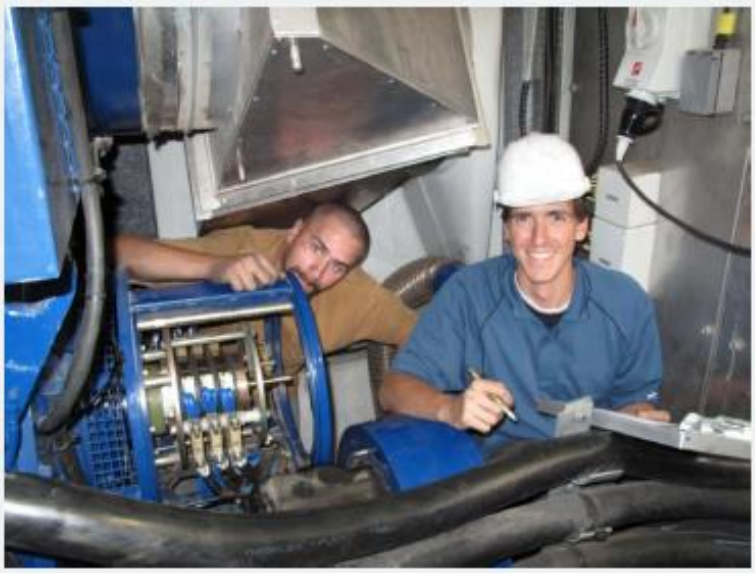
Contact: infos.amiens@mersen.com

14. QUESTIONNAIRE FOR IN SITU MACHINING OF WIND TURBINE SLIP RING ASSEMBLIES, page 1

CHECK LIST

WIND TURBINE SLIP RING ASSEMBLIES

QUESTIONNAIRE FOR IN SITU MACHINING



CONTENTS

MERSEN SERVICES

This form includes Information elements required before the service call, please fill in the data carefully.

14. QUESTIONNAIRE FOR IN SITU MACHINING OF WIND TURBINE SLIP RING ASSEMBLIES, page 2

CUSTOMER
NAME: _____
ADDRESS: _____
GPS COORDINATES: _____
EMAIL: _____
TEL: _____

MERSEN's REPRESENTATIVE
NAME: _____
EMAIL: _____
TEL: _____

TYPE AND MODEL OF THE WIND TURBINE: _____
☐ Onshore ☐ Offshore
Generator type: _____

1 – SLIP RINGS TO BE MACHINED

☐ Power ☐ Grounding

2 – METHOD TO TAKE OUR TOOLS UP TO THE NACELLE

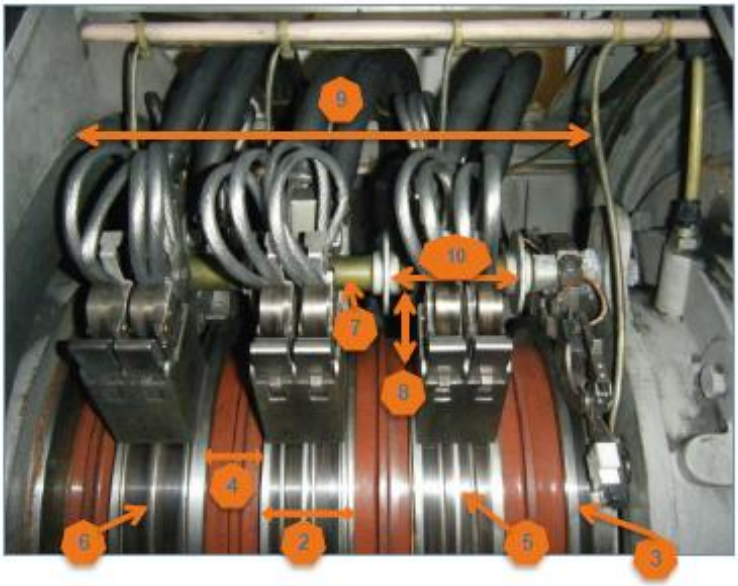
☐ Lifting device ☐ Elevator ☐ Other, please precise: _____

Comments:

Please send us pictures of the Commutator or Slip Ring assemblies, their nameplate, environment, condition etc.

14. QUESTIONNAIRE FOR IN SITU MACHINING OF WIND TURBINE SLIP RING ASSEMBLIES, page 3

3 – DIMENSIONS TO BE CHECKED BEFORE THE SERVICE CALL



Dimensions to be checked before the service call:

1. Ring diameter (mm): _____
2. Power ring width (mm): _____
3. Grounding ring width (mm): _____
4. Distance between rings (mm): _____
5. Helical groove: ☐ with ☐ without
   Depth of the helical groove (mm): _____
6. Ring material: ☐ Stainless steel ☐ Bronze ☐ Other, please precise: _____
7. Diameter of insulated rod (mm): _____
8. Distance between insulated rod and slip ring (mm): _____
9. Length of insulated rod (mm): _____
   Please precise if the measurement includes ☐ Power rings and/or ☐ Grounding ring
10. Distance between white insulated plates (mm): _____
11. Slip ring access dimensions: Width (mm) _____ x Height (mm) _____

PTT-form-wind-in-situ-machining-EN-1601

Contact: infos.amiens@mersen.com

15. QUESTIONNAIRE FOR ASSESSMENT OF TEST REQUIREMENTS, page 1

CHECK LIST

TESTING CAPABILITIES

QUESTIONNAIRE FOR ASSESSMENT OF TEST REQUIREMENTS

MERSEN SERVICES

This form includes Information elements required before the service call, please fill in the data carefully.

CONTENTS

15. QUESTIONNAIRE FOR ASSESSMENT OF TEST REQUIREMENTS, page 2

TESTING CAPABILITIES

CHECK LIST

CUSTOMER
NAME: _____
ADDRESS: _____
GPS COORDINATES: _____
EMAIL: _____
TEL: _____

MERSEN's REPRESENTATIVE
NAME: _____
EMAIL: _____
TEL: _____

1 – APPLICATION

RENEWABLE ENERGY: ☐ Wind power ☐ Hydro power
CONVENTIONAL ENERGY: ☐ Thermal & Nuclear power ☐ Mining ☐ Oil & Gas
TRANSPORTAT ION: ☐ Railways ☐ Transit ☐ Aerospace ☐ Marine
PROCESS INDUSTRIES: ☐ Metallurgy ☐ Wire & Cable ☐ Paper ☐ Cement
☐ Other, please precise: _____

2 – TEST BENCH

☐ Slip ring assemblies ☐ Turbo generator ☐ Environmental chamber

3 – TESTING OBJECTIVES

_____
_____

4 – TEST BENCH DESCRIPTION

Motor	
Range of speed (rpm)	

Electrical parameters	
AC or DC current	
Stator current (A)	
Maximum current (A)	

15. QUESTIONNAIRE FOR THE ASSESSMENT OF TEST REQUIREMENTS, page 3

TESTING CAPABILITIES

CHECK LIST

4 – TEST BENCH DESCRIPTION (continuation)

Slip ring assemblies	
Number of slip rings	
Material	
Diameter (mm)	
Width (mm)	
Grooving pitch / groove (mm)	
Slip ring assembly drawing Nr (please include the drawing to the filled in questionnaire)	

Slip ring support	
Quantity	
Material	

Carbon brushes	
Quantity	
Grade	
Tangential dimension (t) (mm)	
Axial dimension (a) (mm)	
Radial dimension ® (mm)	
Specific carbon brush pressure (kPa)	

Brush-holders	
Quantity	
Brush-holder drawing Nr (please include the drawing to the filled in questionnaire)	

Environmental parameters	
Temperature (°C)	
Humidity (RH)	
Altitude (mbar)	

Ventilation system (if necessary)	
Necessary air flow (m^3/sec)	

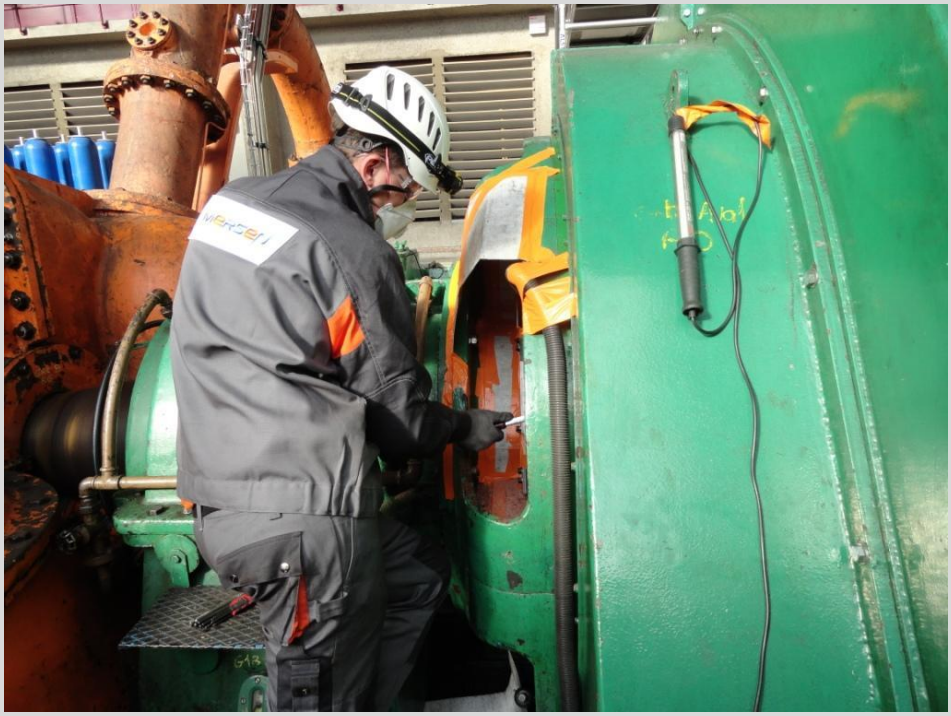
5 – MEASUREMENT PARAMETERS

Please precise the measurements to be done:

6 – METHOD OF RECORDING

☐ Continuous recording ☐ Item by item recording

Contact: infos.amiens@mersen.com



MERSEN SERVICES

MERSEN IS A GLOBAL EXPERT IN ELECTRICAL POWER AND ADVANCED MATERIALS

MERSEN SERVICES

- **On-site service calls** throughout the world
- **Commutation expertise**
- **Measurements** and **diagnostics**
- **Support services** on a daily basis
- Phone **technical assistance**
- Technical literature on our site www.mersen.com or on request

TRAINING

- **Training courses for maintenance of electric motors**
- For over 25 years, more than 3,000 technicians have been undergone training, either at our facility or theirs.

MOTOR MAINTENANCE

- **Diagnostics**
- **In situ commutator, slip ring and brush-holder refurbishment**
- **Support services** on a daily basis

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