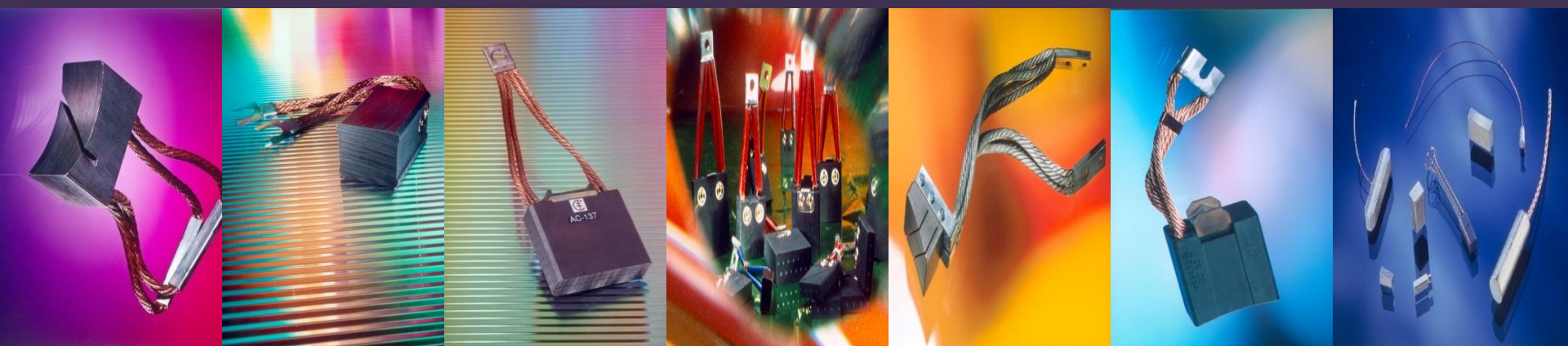


CARBONE LORRAINE

DEDICATED INNOVATION , DEDICATED PARTNER

CARBON BRUSHES AND BRUSH HOLDERS

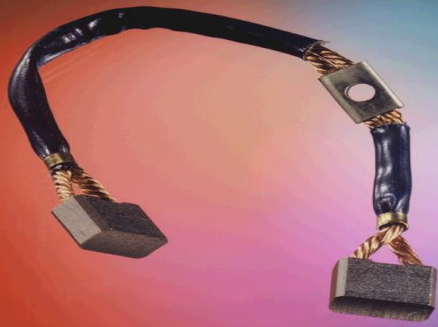


Introduction

Electrical applications of graphite have been a core activity of CARBONE LORRAINE for many years. The business is centered on brushes, and brush holders, designed to supply current to electric motors. In addition to current collectors for the transport sector. Both as original equipment and replacements.

CARBONE LORRAINE, the world leader in brushes and brush holders offers a complete and reliable range of products to a highly diversified customer base.





Carbon Brushes

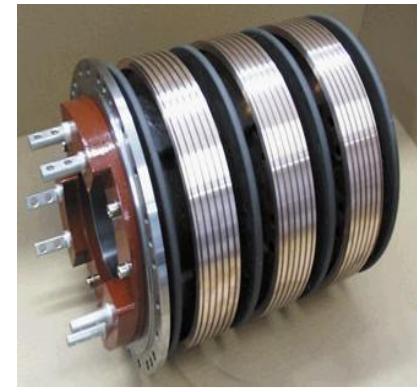
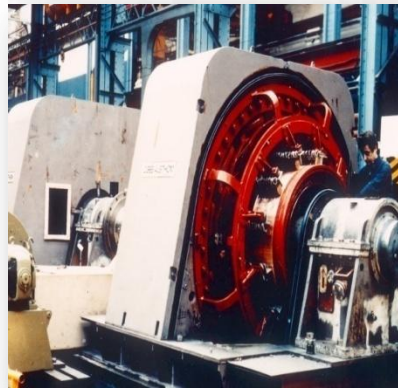
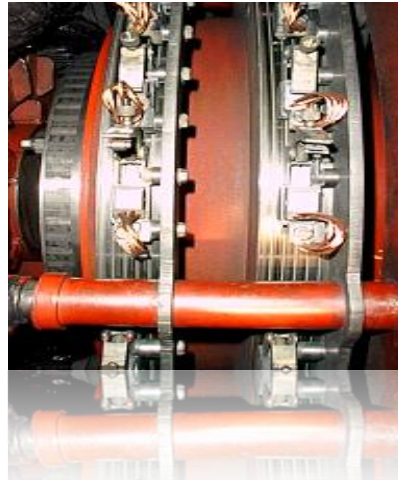
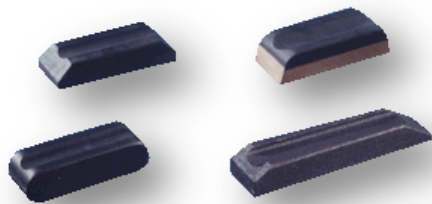


- ❖ A wide range of brush grades that cover many industrial activities and applications
- ❖ Our **100 years** of experience guarantees reliable partnership of the highest level

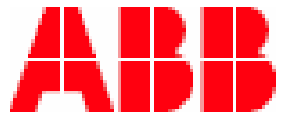


Applications

- ✓ D.C. Motors
- ✓ Motors with slip rings
- ✓ Turbo generators
- ✓ Mud pumps
- ✓ Rotary tables



Widely Used in These Motors

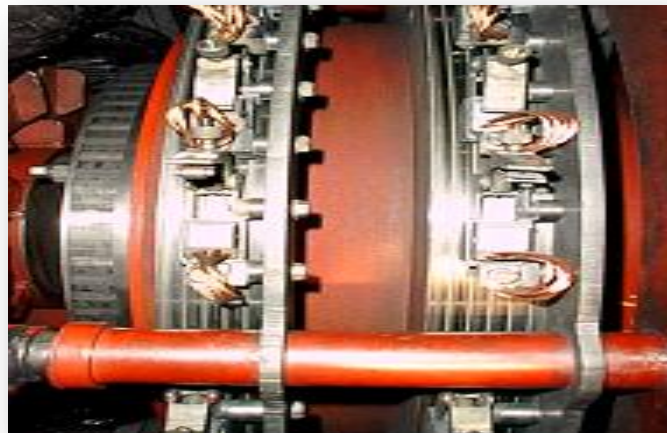
The logo for ABB, consisting of the letters 'ABB' in a bold, red, sans-serif font.The logo for ALSTOM, with 'ALSTOM' in a blue, sans-serif font and a red circle around the 'O'.The logo for BHEL, featuring the Hindi text 'बी एच ई एल' above a blue square containing a white lightning bolt and the letters 'BHEL' in white.The logo for ANSALDO, with 'ANSALDO' in a blue, sans-serif font between two horizontal red bars.The logo for INDAR, featuring a grey circular graphic with a white 'I' and 'A' inside, followed by 'INDAR' in blue and 'MAQUINAS ELECTRICAS' in smaller blue text below.The logo for SIEMENS, with 'SIEMENS' in white, sans-serif font on a red rectangular background.The logo for BAUMÜLLER, featuring a red Greek letter Omega symbol above the word 'BAUMÜLLER' in a bold, black, sans-serif font.The logo for GE, a blue circle containing the white letters 'GE' in a stylized, cursive font.The logo for JEUMONT, with 'JEUMONT' in a bold, red, sans-serif font.The logo for LEROY SOMER, featuring a green stylized 'LS' symbol followed by 'LEROY SOMER' in a black, sans-serif font.The logo for Kirlokar, with the name 'Kirlokar' in a white, cursive font on a black rectangular background.The logo for RELIANCE ELECTRIC, with 'RELIANCE ELECTRIC' in a black, sans-serif font and a blue and black stylized 'R' symbol to the right.The logo for T-T Electric, with 'T-T Electric' in a bold, blue, sans-serif font.The logo for MITSUBISHI, featuring a red three-pointed star symbol above the word 'MITSUBISHI' in a black, sans-serif font.The logo for SICMEMOTORI, with a stylized 'SE' symbol in blue and black followed by 'SICMEMOTORI' in a bold, black, sans-serif font.The logo for OTC, with 'OTC' in a purple, sans-serif font inside a green oval, and 'Vitalizing Industry' in smaller black text below.

.....and many more

The logo for CARBONE LORRAINE, with 'CL' in a blue, sans-serif font above 'CARBONE LORRAINE' in a smaller, black, sans-serif font.

Customers of CARBONE LORRAINE...

- ❖ OEM's
- ❖ End Users
of
 - ✓ Electric DC rotating machines
 - ✓ Equipment using sliding contacts

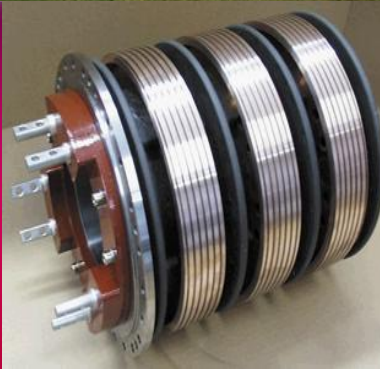


Customers of CARBONE LORRAINE...

- ❖ Power Generation
- ❖ Transport
- ❖ Industry
- ❖ Special Applications

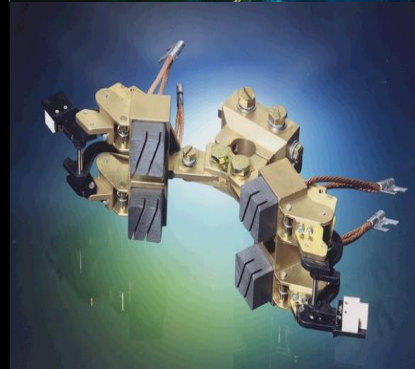


Customers of CARBONE LORRAINE...



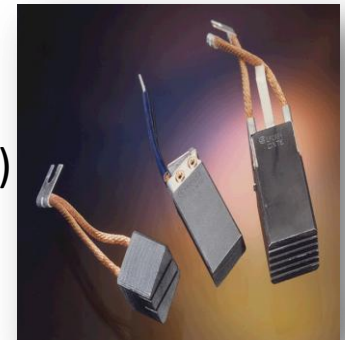
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Customers of CARBONE LORRAINE...

- **Natural graphite grade -LFC554**
- **Developed specifically for use on high speed slip ring excitation applications**
 - ✓ Low friction coefficient at 100m/sec
 - ✓ Low contact drop
 - ✓ Low losses/higher load capabilities/ cooler running
 - ✓ Long life and friendly to slip ring
 - ✓ Ability to handle high current densities up to 13A/cm² (80A/inch²)
 - ✓ Speed capabilities up to 100m/s (20,000 fpm)
 - ✓ Brush pressures of 130 -180g/cm² (1.85 – 2.55 psi)
 - ✓ Many approvals (GE, BHEL, Alstom Power, Ansaldo, Shanghai Electric ,Siemens Westinghouse).....



Customers of CARBONE LORRAINE...



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Customers of CARBONE LORRAINE...

We work in all the applications

Main traction (electrical and diesel electrical systems)

- ✓ High speed trains
- ✓ Freight
- ✓ Regional transportation
- ✓

Other:

- ✓ Heavy metro
 - ✓ Tramway
 - ✓ Trolley
 - ✓ Light metro (val-light automatic vehicle) LVA
 - ✓ ...
- ✓ **Main fields of activity civil aviation: all types of aircraft**
- ✓ **Military aviation: all types of aircraft**



Carbon brush for TGV
high speed train traction
motor



Customers of CARBONE LORRAINE...



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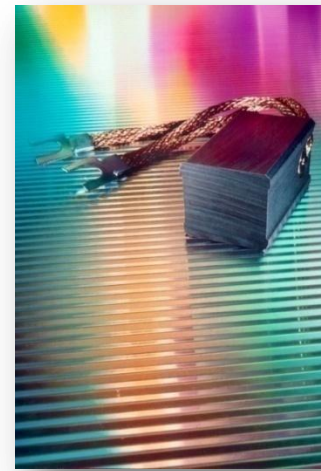


Customers of CARBONE LORRAINE...

- ✓ Cement plants
- ✓ Iron and steel mills
- ✓ Paper mills
- ✓ Rubber and plastics industry
- ✓ Rolling mill motor
- ✓ Docksides cranes and unsolders
- ✓ Forklift trucks
- ✓ Cable and wire industry
- ✓ Sugar Industry
- ✓ Other industries



Brush for commutators motor
For the cable industry



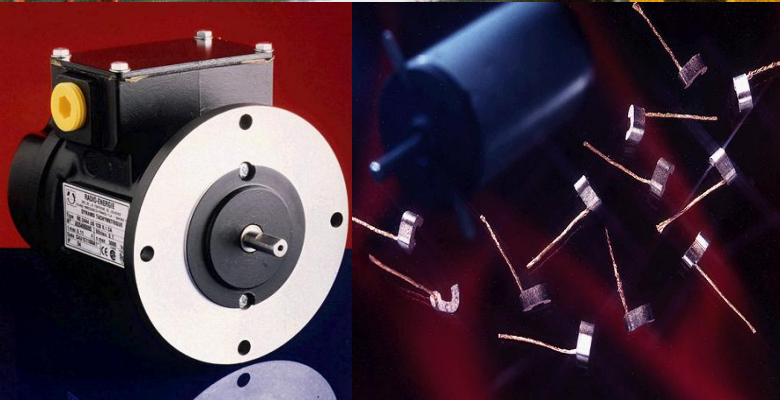
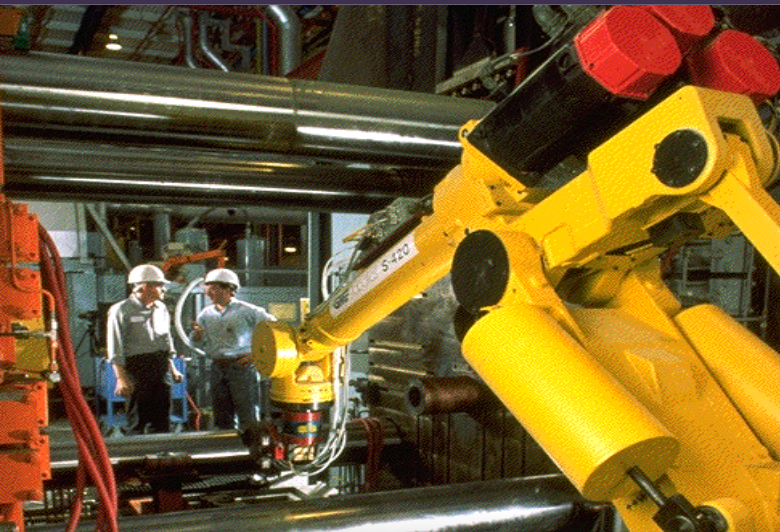
Carbon brush for TGV
high speed train
traction motor



Carbon brush for
industrial electric motor



Customers of CARBONE LORRAINE...

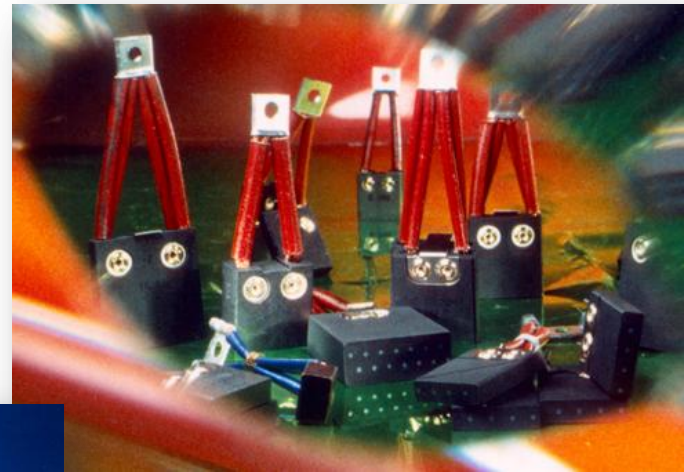


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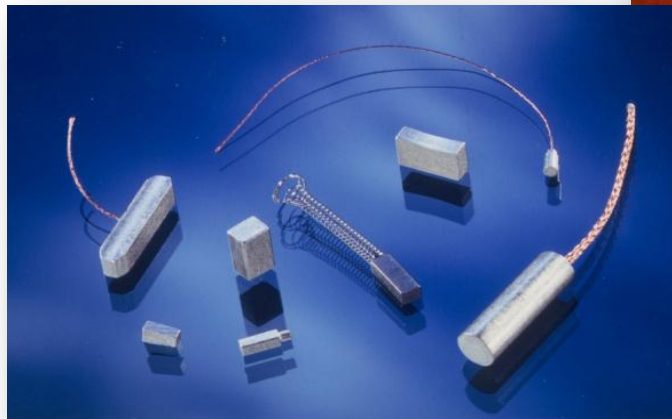


Customers of CARBONE LORRAINE...

- ✓ Space satellites
- ✓ Robotics
- ✓ Medical applications
- ✓ Low power machines



Carbon brushes for aerospace applications



Silver graphite brush
For low power machine





Brush Holders

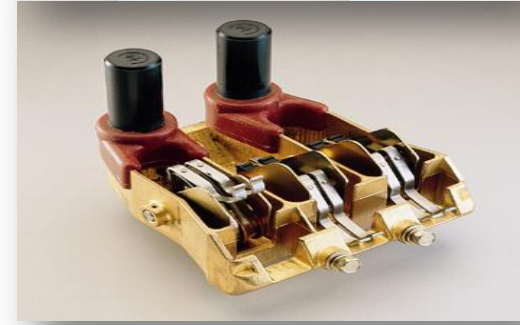


❖ Brush Holders for Industrial and Traction application



- ✓ Tandem Type Brush Holders
- ✓ Constant Pressure Brush Holders
- ✓ On line Changeable Brush Holders
- ✓ and many more.....

❖ Expertise in brush holders reinforced by acquisition of G.DIETRICH



Brush Holders

- A very important component of the motor
- Guides the brushes on the ring
- Distance between brush holder and ring must be 3 mm
- Position must be perfectly radial
- Spring pressure must be uniform

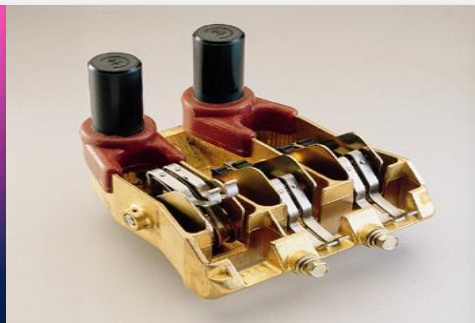
Assembly for aerospace applications (wipers)



Brush / brush holder assembly for industrial motor



Brush holders for railway applications



Assembly for forklift



Industrial brush holders



Thank You For Your Time

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