



TRANSPORTATION

ADVANCED
MATERIALS AND
ELECTRICAL POWER
SOLUTIONS FOR
DECARBONIZING
AVIATION

**ADVANCED MATERIALS
TO REDUCE WEIGHT**
Ceramics | Composite | Insulation



MORE ELECTRICAL POWER
Busbars | Cooling Solutions | Power Capacitors

MATERIAL EXPERTISE FOR HIGH TEMPERATURE AND WEIGHT SAVINGS

As a worldwide leader of high performance materials, Mersen has built over the years an extended experience in the aircraft industry, representing million of hours of operation. Together with industry leaders, Mersen experts work to unlock significant improvements in terms of aircraft weight, fuel consumption, total life cycle costs and aircraft reliability.

ENHANCED SOLUTIONS TO SUPPORT ELECTRIC AIRCRAFT TREND

Optimization of aircraft performance, decrease operating and maintenance costs, increase dispatch reliability, and reduce gas emissions - have underscored the aircraft industry's renewed push toward the concept of electric aircraft. Mersen through its wide range of solutions in Electrical Power supports the industry to fly toward the ambitious future of aviation.



TRL7+

**EN9100
CERTIFIED**

ISOSTATIC GRAPHITE

Performance

EXTREME OPERATING TEMPERATURES

up to 600°C
in oxidizing atmosphere

NO LUBRICANT REQUIRED

dry friction with high speed
and low surface pressure in
extreme environments

STRENGTH INCREASES WITH TEMPERATURE

X2 at 2500°C
strength than at room temperature

HIGH CHEMICAL RESISTANCE

in extremely corrosive environments

EASED KINEMATICS

<0,2 coef friction in dry conditions

PURITY

ELECTRICAL
CONDUCTIVITY

NO THERMAL STRESS INSIDE GRAIN STRUCTURE

low young modulus (9 to 25 GPa)
holding high thermal shocks

RESISTANCE
TO HIGH TEMP

THERMAL SHOCK
RESISTANCE

PERMEABLE TO GAZ

porous structure, with 10%
pore volume
permeability < 0,1 with
impregnation

SELF
LUBRICATED

POROSITY

LOW COEFFICIENT OF THERMAL EXPANSION (CTE)

graphite is thermotropic and
CTE from 4,0 – 7,5 10⁻⁶ / °C

MECHANICAL
STRENGTH

LOW THERMAL
EXPANSION

EXTREMELY GOOD THERMAL UNIFORMITY

from 20 to 130 W/m.K

CHEMICAL
STABILITY

OUTSTANDING
THERMAL
CONDUCTIVITY

FRICTION
PROPERTIES

LIGHT
WEIGHT

WEIGHT SAVINGS

1,8 g/cm³ density
(4x lighter than steel)



**GRAPHITE
ISOSTATIC / EXTRUDED**



**INSULATION
RIGID / FLEXIBLE**
CALCARB®
GRAFSHIELD™ GRI™



**C/C COMPOSITES
2D / 2,5D**
AEROLOR®



**SINTERED
SILICON CARBIDE**
BOOSTEC®

UNIQUE MATERIAL EXPERTISE FOR IMPROVED PERFORMANCE

CARBON AND GRAPHITE

SHAFT SEALS / DYNAMIC SEALS

- Works at high speeds without seizure
- Reduced operation gap / leaks under high temperature conditions
- Possible metal housing for easier integration into the system
- Self-lubricating properties
- No blocking when starting or stopping the system
- No seizing, even after long periods without use
- Possible on-demand design
- Reduced leaks thanks to the optimized design (overlaps, etc.)

GUIDES AND BUSHES FOR PUMPS AND JET ENGINE BLADES

- Self-lubricating properties to reduce friction torques
- Reduced wear
- Operates at temperatures of up to 650°C
- No seizing, even after long periods without use
- Compatible with most aerospace fluids
- Can be impregnated for increased service life
- Can be shrunk-fit for easier integration into the system

CARBON / CARBON COMPOSITE

BRAKE DISKS AND PADS

- Stable friction coefficient
- Reduced wear thanks to the use of composite materials
- High friction coefficient
- Dry or lubricated operation
- Low- and high-energy braking

CARBON

PUMP VANES

- Self-lubricating properties
- No blocking when starting or stopping the system
- Can be impregnated for increased service life
- Dry or lubricated operation at high speeds

FLEXIBLE GRAPHITE - POPYEX®

FLANGE GASKETS

- Excellent properties for use under pressure and temperature
- Not sensitive to thermal shocks
- No ageing: neither shrinkage, nor hardening, nor hot creep
- Practically unlimited chemical resistance
- Non-polluting (asbestos-free)
- Easy to cut and shape

ENHANCED SOLUTIONS FOR ELECTRIC AIRCRAFT

COOLING SOLUTIONS FOR POWER ELECTRONICS

AIR HEAT SINK

- Optimised fins assembly technology (Swaging Process – Machining – Vacuum Brazing Process)
- High cooling performances
- Weight saving benefit and Compact design
- Reliability and Long Life time in harsh Environment

LIQUID-COOLED HEATSINK

- Tailor-made optimized solutions using aluminium vacuum-brazing process
- High thermal performance
- High pressure withstanding
- High reliability and lifetime

LAMINATED BUSBARS

LAMINATED BUSBAR FOR POWER ELECTRONICS

- Decrease inductance
- Increase capacitance
- Improve thermal characteristics

LAMINATED BUSBAR FOR POWER DISTRIBUTION

- Cabling function optimization
- Time savings on assembly
- Eliminate wiring errors

LAMINATED BUSBAR TO OPTIMIZE SOLUTIONS (PRINTED CIRCUIT BOARD)

- Increase current density
- Time savings on assembly
- Improved thermal characteristics;
- High resistance on shocks and vibrations

SOLUTIONS FOR ROTATING MACHINES

CARBON BRUSHES

- Four types of graphite grades
 - Impregnated electro graphite (resins/metal salts)
 - Electrographite with MoS₂ cores
 - Carbon graphite enriched with MoS₂
 - Copper graphite enriched with MoS₂
- Tried and trusted riveting techniques
- Wear detection system

BRUSH-HOLDER / SLIP RING ASSEMBLY

- Customized solutions
- Good mechanical stability
- Optimal guidance of the brush
- Optimized distribution of the electric current

LIFE ON-BOARD

AUXILIARY MOTORS



PUMP CARBON BRUSHES



BRUSH-HOLDERS



FLANGE GASKETS

ELECTRICAL POWER GENERATION AND DISTRIBUTION



COOLING DEVICES



BUS BARS

BRAKING



CARBON / CARBON COMPOSITE DISCS

TECHNICAL PERFORMANCE

FLUID CONTROLS



BEARING / GUIDES



PUMP VANES



BURSTING DISCS



DYNAMIC SEALS



FLANGE GASKETS

AIR CONDITIONING



SHAFT SEALS



DYNAMIC SEALS



BEARING / GUIDES



FLANGE GASKETS



STARTER / GENERATOR



CARBON BRUSHES



BRUSH-HOLDERS



SLIP RING ASSEMBLIES

ENGINE COMPONENTS



VANE GUIDES



SHAFT SEALS

ACTUATION



CARBON BRUSHES



BRUSH-HOLDERS



BRAKES / TORQUE LIMITERS



GLOBAL EXPERT IN ELECTRICAL
POWER AND ADVANCED MATERIALS

AMERICAS

MERSEN USA
Bay City, MI
Greenville, MI
St Marys, PA
Columbia, TN

MERSEN MEXICO
Monterrey

MERSEN ARGENTINA
Buenos Aires

MERSEN CHILE
Santiago

MERSEN COLOMBIA
Bogota

MERSEN BRAZIL
Sao Paulo

EUROPE & AFRICA

MERSEN BENELUX
Schiedam

MERSEN GERMANY
Suhl & Munich

MERSEN FRANCE
Gennevilliers & Bazet

MERSEN IBERICA
Barcelona

MERSEN TURKEY
Gebze

MERSEN ITALY
Malonno

MERSEN NORDIC
Kista

MERSEN UK
Teesside & Holytown

MERSEN SOUTH AFRICA
Johannesburg

ASIA & OCEANIA

MERSEN CHINA
Chongqing,
Kunshan
Yantai

MERSEN INDIA
Pune & Bangalore

MERSEN JAPAN
Tokyo

MERSEN SOUTH KOREA
Cheonan

MERSEN OCEANIA
Reservoir Victoria

MERSEN TAIWAN
Taipei