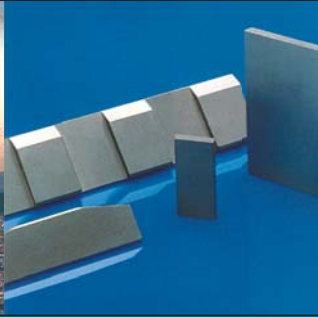




MORGAN
INDUSTRIAL CARBON

MORGAN INDUSTRIAL CARBON



PUMPS COMPRESSORS STEEL INDUSTRY PAPER MILLS FOOD INDUSTRIES OIL REFINERIES CHEMICAL INDUSTRIES GLASS & METALLURGICAL INDUSTRIES RAIL CHEMICAL INDUSTRIES POWER GENERATION INDUSTRY

mechanical carbon

application & uses

MECHANICAL CARBON

uses and application notes

Overview

Carbon is perhaps one of the least known engineering materials, yet it is remarkably versatile. The surprisingly complex makeup of carbon lends it to properties, which are of particular interest to the designer and maintenance engineer.

Some of the properties include:

- Low wear rate
- Very high mechanical strength in compression
- High strength at elevated temperatures
- High strength to weight ratio
- Low modulus of elasticity
- Relatively low density (approx 2gm/cm³)
- High resistance to thermal shock
- Good electrical conductivity
- Excellent dimensional stability
- Self lubricating, providing a low coefficient of friction at high and low temperatures
- Chemically inert
- Non oxidising up to 550°C in dependant upon grade
- Easily machined to fine tolerances



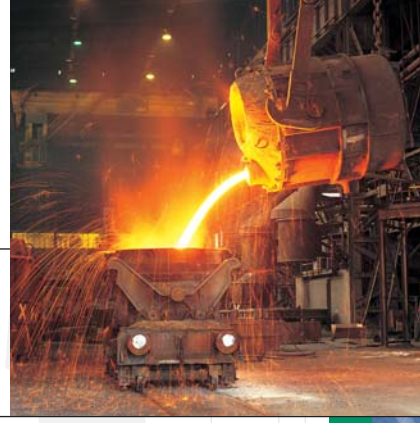
Applications

The properties inherent with carbon, allow its use in a wide variety of engineering applications that would be deemed unsuitable for conventional material use.

The unique properties of carbon are suited to the following conditions:

- Applications in which contamination risks are high with conventional lubricants, industries would include food processing and chemical plants
- Applications in which high temperatures are necessary, including furnace and boiler equipment
- Applications in which components must work in contact with corrosive fluids or gases
- Applications in which components are immersed in fluids having inadequate film properties to ensure suitable lubrication
- Application requiring high levels of purity including, such items as crucibles and furnace boats



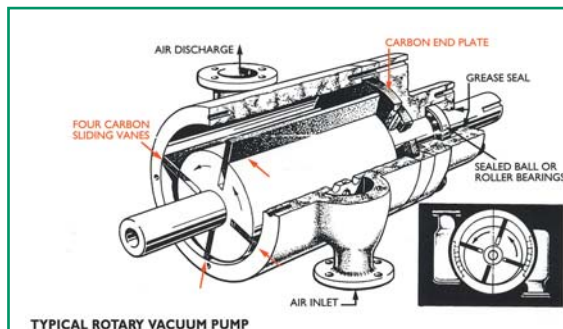


Listed below are typical carbon products and the industries in which they are used

Application

Industry and use

■ Carbon bearings	■ All industries where conventional lubrication methods cannot be used
■ Carbon seals and gland rings	■ All industries wherever fluids, steam or compressed gases are used
■ Carbon piston rings and piston rod packing rings, as well as filled PTFE piston rings and piston rod packings	■ All industries where oil free gas supply required
■ Carbon pump vanes	■ All industries where oil free compression or vacuum is required, including fuel pumps
■ Carbon moulds, formers, dies and funnels	■ Glass and metallurgical industry
■ Flange lubricating rods and blocks	■ Railway, tramway, overhead crane tracks, rotary kilns
■ Carbon degassing tubes	■ Metallurgical industry
■ Carbon crucibles	■ Metallurgical industry
■ Carbon thermocouple sheaths	■ Furnace applications for protection of thermocouples immersed in molten metals
■ Lift door guides	■ Lift industry
■ Raschig rings	■ Chemical industry
■ Steam ejector and injector nozzles	■ Chemical industry
■ Burner nozzles	■ Chemical and aeronautical industry
■ Anodes and electrodes	■ Chemical and cathodic protection
■ Carbon tubes and fittings	■ Chemical industries



MECHANICAL CARBON

uses and application notes (continued)

General industry

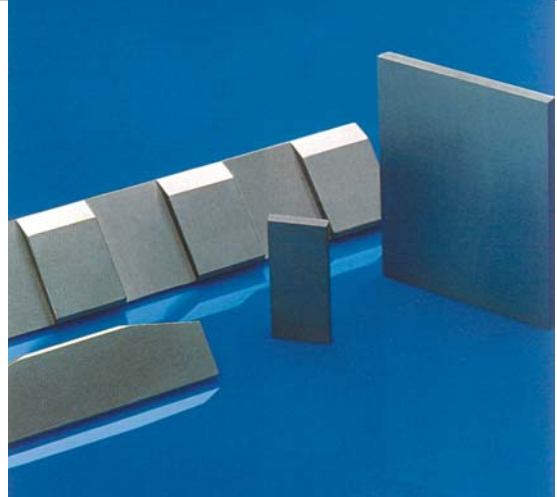
Carbon bearings

Carbon bearings are used where oil or grease lubricated bearings are unsuitable for use. Carbon/graphite bearings can run dry, using the natural lubricating properties of the carbon/graphite material, alternatively they can be fully immersed in liquids such as water, acids, alkaline solutions and solvents. It is preferable that the bearings are either fully immersed in the liquids or run completely dry.

Small quantities of oil or grease are detrimental to operation and should be avoided.

The three principle applications of use are:

- Where contamination is undesirable as in textile and food machinery i.e. by avoiding the use of oil or grease, PTFE with various fillers can successfully be used in these applications
- In oven, furnace and boiler equipment, where temperatures are too high for conventional lubricants
- Where the bearings are immersed in liquids such as hot and cold water, seawater, acidic and alkaline solutions, or in solvents such as petrol and benzines



Carbon vanes

Vanes are used in rotary compressors, vacuum pumps and for the pumping of solvents and acids.

The three principle applications of use are;

- All industries where oil free compressed air and vacuum are required
- Food industry i.e. milking machines using carbon bladed vacuum pumps
- Fuel pumps



Carbon and filled PTFE piston rings

Compressors, carbon and filled PTFE piston rings are used where oil free gas is required.

The three principle applications of use are:

- Instrument air in all industries
- Process air in food industries, such as breweries
- Process gases in chemical and petroleum industries

Gland rings

Gland rings are extensively used in steam turbines, both as pressure seals in high-pressure glands, and vacuum seals in low-pressure glands. They are also used in many applications as air or gas seals in industrial plant on compressors, blowers and fans.

The two principle applications of use are:

- Power generation (steam, water and gas turbines)
- Chemical and petroleum industries

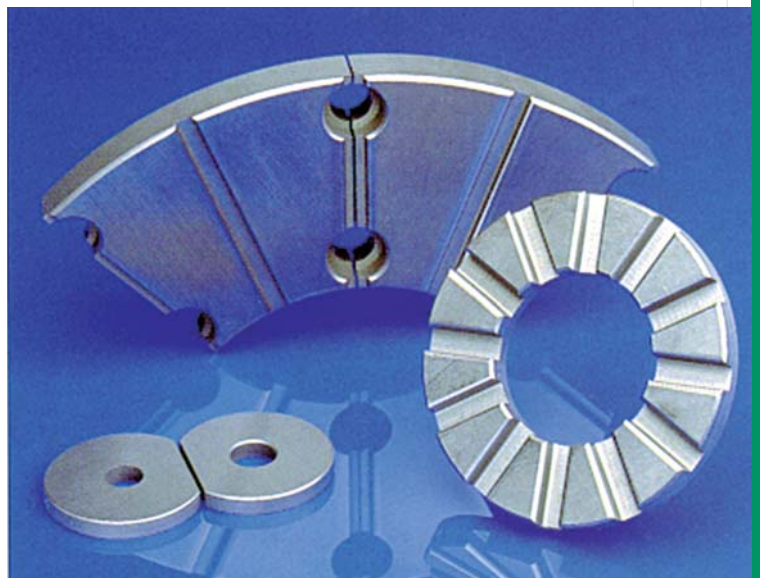
Seals

The mechanical seal consists essentially of a rotating carbon sealing ring, held by spring pressure or hydraulic pressure against a counterface.

Used for sealing of fluids in all industries

The three principle applications of use are:

- Process pumps in the oil and chemical processing industries
- Seals for pumps handling corrosive liquids
- Carbon faces for any type of mechanical seals
- Domestic washing machines
- Dish washers





MECHANICAL CARBON

uses and application notes (continued)

Power generation industry

Due to the high temperatures associated with this industry, there are many applications suited to carbon use.

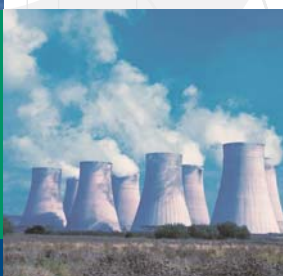
- Gland rings for steam turbines
- Gland rings for water turbines
- Piston rings and piston rod packings for instrument air compressors
- Bearings for boiler chain grates
- Boiler feed pump seals

Glass industry

- Carbon funnels for guiding molten glass into moulds. These replace oil lubricated cast iron funnels. The advantage of carbon funnels are:
 - Elimination of oil lubricating costs
 - A cleaner glass end product
 - Cleaner machinery, factory area and atmosphere due to lack of oil vapour
 - Better working conditions for operators
- Carbon bearings for conveyors and lehrs (annealing ovens)
- Carbon filled PTFE piston and piston rod packings for air compressors
- Carbon gland rings for steam turbines
- Glass forming tools

Metallurgical applications

- Carbon is used as a static mould for the manufacture of the following:
 - Diamond saw segments
 - Diamond tipped drills for exploration drilling
- Dies for continuous casting of non ferrous metals
- Degassing tubes for separating impurities from metals in a molten state
- Thermocouple sheaths
- Graphite crucibles
- Graphite electrodes





Steel and non ferrous industries

- Carbon bearings for conveyors in annealing ovens
- Carbon is used as a lining on run out tables supporting aluminium extrusions as they move out from the die. Carbon pieces are also used as guides for the extrusions as they emerge from the die
- Gland rings for boiler and steam joint applications
- Piston rings and piston rod packings for compressors
- Lubricating blocks for overhead crane tracks
- Graphite anodes for tin plating and silver recovery

Chemical Industries

- Steam ejector and injector nozzles, used for the creation of vacuum conditions in such processes as evaporation, condensation filtration, liquid transfer and crystallization. They are often preferred to reciprocating and rotary air pumps
- Acid mixers, used for the dilution or mixing of acids
- Burner nozzles used in the production of hydrochloric acid
- Pipes, fittings and impellers used for the movement of acids in plants

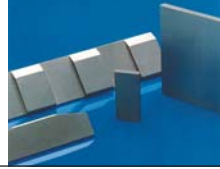
- Raschig rings used in distillation columns for the contacting of acids and gases
- Anodes for the production of chlorine and other chemical products
- Carbon or filled PTFE piston rings and piston rod packings
- Gland rings
- Carbon seals
- Carbon vanes

Food industries

Carbon is used to eliminate contamination from oils and greases.

- Carbon bearings for example, baking ovens
- Carbon vanes for processing equipment
- Carbon piston rings and packings. Oil free air for handling food processes i.e. sugar refining and beer production
- Carbon seals used in breweries, soft drink manufacturers, milk producers and sugar industries





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