

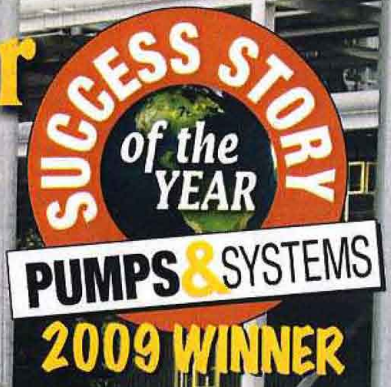
The Magazine For Pump Users Worldwide

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PUMPS & SYSTEMS®

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**Pumping Systems
and Components**

Mechanical Carbon Materials for Food Applications

Glenn H. Phelps, Metallized Carbon Corporation

Ensuring food safety and efficient production.

What is the secret to continuously baking or processing cakes, pizza, chicken, beer and thousands of other foods and beverages? Mechanical carbon materials used in the food processing equipment produce these foods safely and cost effectively. Oil/grease free, self-lubricating, mechanical carbon materials are used in conveyors on processing lines, packaging lines and food handling canning machines. Their use solves problems associated with typical oil/grease lubricants, which may contaminate food or cause equipment failure.

Mechanical carbon materials are also used for bearings on conveyors for continuous food baking and roasting ovens. Sleeve, thrust, pillow block and flange bearings are used in horizontal revolving ovens, vertical rotating rack ovens and tunnel ovens for baking cookies, cakes, pies, donuts, bagels, bread, pizzas, taco shells and pretzels. Bearings are also used in continuous roasters for roasting chicken, turkey, ham and coffee, and in equipment where parts run submerged in liquids.

The mechanical carbon materials come in various grades depending on use, and several have been accepted by the Food and Drug Administration (FDA) as "Generally Recognized as Safe" (GRAS) for food contact applications. These grades contain no FDA prohibited substances and are impervious to liquids. Imperviousness is achieved by filling the base carbon-graphite material's available porosity by vacuum/pressure impregnating the material with either thermal setting resins, molten copper, molten bronze or molten nickel-chrome. The impervious part surfaces can be easily washed or steam cleaned and there is no porosity within the material where bacteria could grow.

For contact with liquids with a pH above 6, mechanical carbon grades impregnated with copper and bronze are

recommended. For acidic foods with pH below 6 (for example vinegar, fruit juice or wine), grades impregnated with thermal setting resins or nickel chrome are recommended. The materials are available as either finished parts machined to user specifications, or as oversized blanks that users can machine themselves. Sizes up to 18 in diameter are available.

High Temperature Uses

At high temperatures (greater than 300 deg F), traditional oil/grease lubricants may volatilize or carbonize and lose lubricating qualities. This can cause high friction, high wear, galling and possibly seizing of metallic rubbing parts, resulting in costly maintenance and downtime. Polymeric seals in oil/grease-lubricated bearings can fail by melting or carbonizing and allow the oil/grease lubricant to flow out and contaminate the food.

Bearings manufactured from mechanical carbon materials are self-lubricating, non-galling, dimensionally stable, uniform throughout and have high compressive strength. Mechanical carbon grades work for bearings and other mechanical components because they provide long wear life when operating at elevated temperatures. The most commonly used grades for high temperature applications are copper impregnated, carbon-graphite and bronze impregnated, carbon-graphite, both of which are appropriate to temperatures as high as 700 deg F.

Submerged Low Viscosity Beverages or Liquefied Foods

Oil/grease lubricated metal bearings normally should not be used when the food processing equipment parts must run submerged in low viscosity beverages or liquefied foods, including

Mechanical Carbon Food Processing Applications

Use	Examples	Features	Material
High Temperature	Bearings for continuous baking ovens and roasting ovens	Self-lubricating and long wearing at temperatures up to 700°F	Copper-impregnated carbon-graphite Bronze-impregnated carbon-graphite
Submerged	Bearings and seal rings for pumps, meters, mixers, heat exchangers	• Long wearing • Dimensionally stable • Mechanically strong	Resin-impregnated carbon-graphite Nickel-chrome Impregnated carbon-graphite

potable water, milk, beer, soda, fruit juices and pharmaceuticals. Oil/grease lubricants can dissolve, wash away or contaminate the product being handled.

Mechanical carbon materials are chemically resistant to all liquids except for extremely strong oxidizing acids and alkalis and can provide long wear life in submerged applications. Resin impregnated, carbon-graphite grades are most appropriate for this application.

Specialized Grades for Pharmaceutical, Medical and Water Supply Use

Several mechanical carbon grades primarily used in the food processing industry have met additional stringent testing allowing them to be used for pharmaceutical uses, as well as in

public water supplies.

For example, certain grades have passed the stringent tests required for U.S. Pharmacopoeia Class VI Approval, compulsory for materials used in dental implants, implant tubing, prosthetic devices such as artificial heart valves, and drug containers.

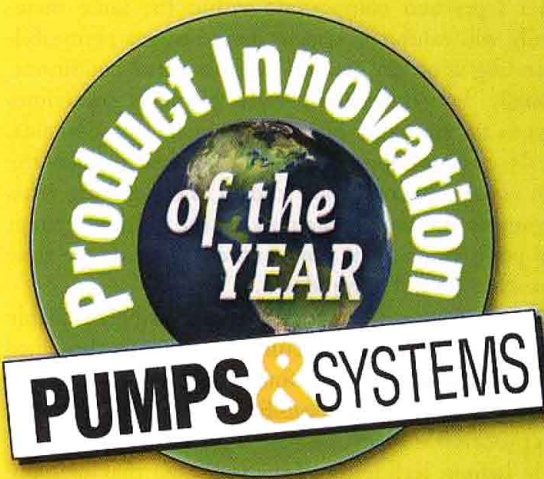
Additional mechanical carbon grades have also been tested and approved for equipment parts used in contact with the United Kingdom's public water supply. To meet this standard, the materials passed the tests associated with the United Kingdom's Water Regulations Advisory Scheme (WRAS).

Finally, a unique grade is available for dry running in dry nitrogen or in a vacuum. This grade is used in mechanical seals where dry nitrogen is used as the barrier gas between two mechanical seals, and is approved for use in critical pharmaceutical mixers.

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Glenn H. Phelps is the technical director for Metallized Carbon Corporation.



Product Innovation

Each month, *Pumps & Systems* features new products and technology in its Product Pipeline and various industry event Shows-in-Print. In 2009, we will recognize and highlight *the most innovative new products offered*.

The *Pumps & Systems* editorial team will accept nominations for our **Product Innovation of the Year Award** through Oct. 1, 2009. A winner and finalists will be selected by our expert Editorial Advisory Board and featured in our December 2009 issue.

Products must be introduced to the market from January 1, 2008 to August 31, 2009 with proof that it is an improvement over current technology based on actual use in the field. Testimony from an end user must also be supplied.

Visit www.pump-zone.com for complete rules and criteria, and to complete a nomination form.

**Deadline for Nominations:
October 1, 2009**

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