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SELF-LUBRICATING BEARING & WEAR MATERIALS
CIP COMPOSITES



COLUMBIA INDUSTRIAL PRODUCTS

Established in 1998

Columbia Industrial Products (CIP Composites™), founded in 1998 in Eugene, Oregon, is a manufacturer and global supplier of custom self-lubricating composite bearing materials. CIP recognized the demand for textile reinforced composites that provide high strength, low coefficient of friction, and are easy to machine. CIP is proud to offer these solutions, along with personalized customer support to its clients, serving a broad range of industries around the world.

Our Mission

As the industrial leader in the manufacturing and distribution of high quality composite laminate materials, our team exceeds customer expectations by providing skillful solutions with on time delivery to global markets, with the highest level of integrity and commitment to Customer First!

Our Vision

To build and nurture sustainable relationships with our employees, customers and suppliers, in order to provide exceptional customer service with the highest quality material performance.

Short Lead Times

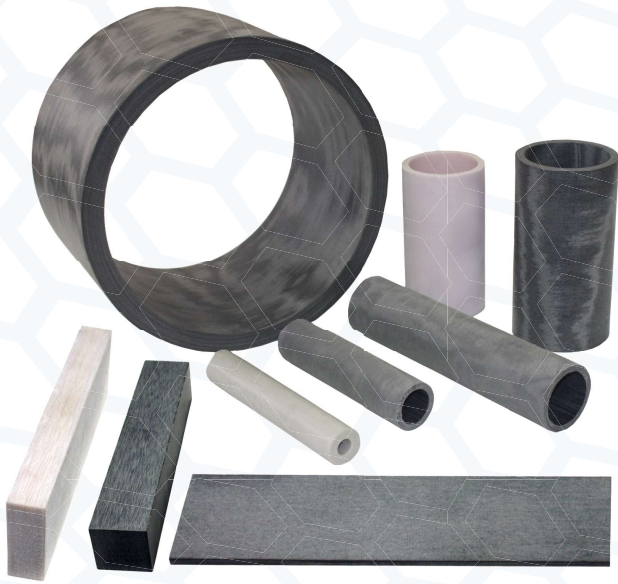
Custom sizes, fast delivery and expert service to meet your needs. CIP offers a fully equipped machine shop on location where components can be manufactured to customers' specifications. Our experts provide 24-hour emergency support and are focused on finding solutions.

Engineering & Technical support

Exceptional service is achieved with our engineering, sales and production under one roof. Together we provide years of experience and a high level of industry and application knowledge. From sales to logistics, customers turn to us for superior service and support.



PRODUCTS



Tubes and sheets

STANDARD SHAPES

TUBES

Minimum ID	1/2 in. (13 mm)
Maximum OD	100 in. (2540 mm)
Standard Lengths	16 - 24 - 32 inch (406 - 610 - 813 mm)

SHEETS

Minimum Thickness	1/8 in. (3 mm)
Maximum Thickness	4 in. (102 mm)
Standard Widths	16 - 24 - 32 in. (406 - 610 - 813 mm)
Standard Lengths	16 - 24 - 32 in. (406 - 610 - 813 mm)



Wear pads: curved, segmented, countersunk or counterbore holes



Custom machined components



Plain bearings (bushings), flange bearings, split bearings, spherical bearings, water lubricated bearings



Thrust washers



Electrical insulators and thermal insulation



Hydraulic and pneumatic wear rings

MATERIALS

Columbia Industrial Products offers multiple textile, lubrication and resin combinations to provide the most suitable material for your application. Below are the most common CIP Composite material grades. Our dedicated team will help you choose which CIP material will best fit your specific application, taking into consideration the type of environment (wet/dry, dirty/caustic), amount of load, speed of moving parts, and temperature among other factors. For complete material spec sheet data, please contact our sales department.



CIP HYDRO™

- Specifically designed for Hydropower environments
- Tested by PowerTech Labs
- Approved by the US Army Corps of Engineers



CIP MARINE™

- Specifically developed for marine environments
- Applications above and below the water line
- ABS and RINA Class approvals for rudder and stern tube bearings



CIP TEROTUF™

- Knife and gun grip material - 100% Polyester
- Non-toxic and chemically resistant to most cleaning supplies
- Available in a variety of colors

CIP151A	PTFE & MOLY	Wet/dry applications, high loading and slow rotational motion
CIP131	PTFE	Used commonly with hydraulic fluids
CIP121	MOLY	Wet/dry applications where high shock or edge loading is anticipated
CIP111	GRAPHITE	Low friction without grease, used primarily in dry environments
CIP101	NO LUBRICATION	Made for static applications, commonly used as electrical insulators
CIP251A	PTFE & MOLY	High load, slow oscillating movements offering low coefficient of friction
CIP252A	PTFE & MOLY	Recommended for sand and silty environments
CIP333A	PTFE	High temperature applications, offers excellent chemical resistance
CIP353A	PTFE & MOLY	Applications include down hole drilling, mining, & robotics

Physical Properties

The physical properties of CIP Composites make it an excellent wear and bearing material. As a general guide, this 100% bearing material is best suited for high load, high impact and slow rotating applications.

Compressive Strength (ASTM D695)

Ultimate.....	50,000 PSI.....	345 MPa
Yield.....	15,000 PSI.....	103 MPa

Tensile Strength (ASTM D638).....11,000 PSI.....75 MPa

Water Swell (ASTM D570).....<0.15%

Physical Properties Tests performed on CIP100 Series sheet material.

Thermal Properties

CIP Composites are thermal insulators and rely on mating metal surfaces to dissipate frictional heat. Although thermal expansion of CIP Composites is greater than that of most metal alloy bearings; it is consistent, predictable, and less than many plastics. CIP offers a variety of material grades to best meet your applications' temperature requirements.

Coefficient of Thermal Expansion

CIP 100 & 200 Series - Operating temperatures -40° to 200° F (-40° to 93° C)

Normal to Laminate..... $3.5 \times 10^{-5} / \Delta^{\circ}\text{F}$. $6.3 \times 10^{-5} / \Delta^{\circ}\text{C}$

Parallel to Laminate..... $1.8 \times 10^{-5} / \Delta^{\circ}\text{F}$. $3.2 \times 10^{-5} / \Delta^{\circ}\text{C}$

CIP 300 Series - Operating temperatures -40° to 400° F (-40° to 204° C)

Normal to Laminate..... $4.0 \times 10^{-5} / \Delta^{\circ}\text{F}$. $7.2 \times 10^{-5} / \Delta^{\circ}\text{C}$

Parallel to Laminate..... $2.0 \times 10^{-5} / \Delta^{\circ}\text{F}$. $3.6 \times 10^{-5} / \Delta^{\circ}\text{C}$

Mechanical Properties

Coefficient of friction varies with application, shaft material, surface finish, load, speed, environment and external lubrication. CIP Composites offer solutions which can eliminate noisy stick-slip problems, extend operating life and reduce wear, making for better operating efficiency.

Coefficient of Friction - Dry Dynamic

CIP 121.....0.15 - 0.20

CIP 151.....0.13 - 0.15

CIP 251.....0.05 - 0.10

Static coefficient of friction is generally very similar to dynamic, even after prolonged periods of rest, where other materials may develop high break-away torque requirements.

Electrical Properties

Certain grades of CIP Composites are excellent insulating materials and may be used in a number of different electrical applications. Nongraphite materials offer customers both a nonconducting and nonmagnetic composite that does not build up static charges.

Chemical Resistance

CIP Composites do not corrode and are unaffected by many solvents and chemical solutions. This eliminates many of the problems commonly encountered with metal bearings. For example: chemical wash down procedures which can attack the bearing and strip away lubricating oils. Composites may be attacked by ketones, chlorinated solvents, strong alkalis, and hot strong oxidizing agents. To evaluate chemical compatibility we will generally need to understand chemical concentrations, solution temperatures, and exposure.

BENEFITS

CIP Composites are commonly used to replace more traditional bronze, babbitt, nylon and wood bearing materials. Ideally suited for high load, slow speed applications, CIP Composites are designed to operate without external lubrication, and offer smooth, quiet performance. CIP Composites offer higher load capacity and better dimensional stability than many nonmetallic materials. When high strength, low friction and wear are important, **CIP is the clear choice.**

SELF-LUBRICATING

Solid lubricants are dispersed evenly throughout material

100% BEARING MATERIAL

Lubricated completely throughout the bearing; no fiberglass or metallic shell

ENVIRONMENTALLY FRIENDLY

Eliminates the need of external lubricants such as greases which can be carried away by water or heat

WET OR DRY RUNNING

Capable of operating in fresh or salt water, many chemical solutions, or in dry unlubricated applications

LOW COEFFICIENT OF FRICTION

Elimination of stick-slip; better operating efficiency

LOW WEAR RATE

Highly resistive to wear and abrasion

HIGH EDGE LOAD / HIGH SHOCK LOAD CAPABILITIES

Stable where side loading is anticipated, and where slight misalignment is present without damage or fracture

LOW THERMAL EXPANSION RATE

Dimensionally stable in high temperatures; predictable expansion

NEGLIGIBLE WATER SWELL

<0.15% water swell on all products, with the exception of CIP Hydro which is rated at <0.1%

EASY TO MACHINE

Machinable in place, no special tooling required

CHEMICALLY RESISTANT

Chemically resistant to most chemicals, unlike bronze and other materials that can corrode

NONCONDUCTING

Excellent electrical insulators; does not conduct heat or electrical current like metallic materials

EXCELLENT MECHANICAL STRENGTH

High ultimate strengths; resilient and durable in shock and misaligned loading conditions; absorbs vibrations and load fluctuation

NO ABRASIVE FILLERS

No fillers such as calcium carbonate that can scratch mating surfaces

STABLE IN ELEVATED TEMPERATURES

Materials available that are stable in temperatures up to 400°F (204°C)

INDUSTRIES AND APPLICATIONS

CIP Composites can be utilized in a variety of different industries and applications and are not limited to those listed below. Contact us to discuss your application.

Industrial Applications

- Ⓢ Hydraulic Cylinders
- Ⓢ Crane Systems
- Ⓢ Pneumatic Actuator
- Ⓢ Earth Drilling
- Ⓢ Electrical Actuator
- Ⓢ Material Handling
- Ⓢ Pumps
- Ⓢ Mining Equipment
- Ⓢ Food Processing
- Ⓢ Agriculture
- Ⓢ Handling Systems
- Ⓢ Wood Products



Hydropower Applications

- Ⓢ Wicket Gate
- Ⓢ Operation Ring
- Ⓢ Main Guide
- Ⓢ Vertical Gate
- Ⓢ Linkage
- Ⓢ Spillway Trunnion
- Ⓢ Servo Motor
- Ⓢ Lock/Miter Gate
- Ⓢ Head Cover
- Ⓢ Fish Screens

Marine Applications

- Ⓢ Rudder / Pintle
- Ⓢ Crane Masts / Davits
- Ⓢ Stern Tube
- Ⓢ Winches / Capstans
- Ⓢ Propeller Shaft
- Ⓢ Skidding Pads
- Ⓢ Fin Stabilizers
- Ⓢ Stern Rollers
- Ⓢ Thrusters
- Ⓢ A-Frame / LARS
- Ⓢ Fairleads



Oil & Gas Applications

- Ⓢ CALM Buoy
- Ⓢ Pumpjack
- Ⓢ Fairleads
- Ⓢ Winch
- Ⓢ Launch & Recovery
- Ⓢ Blowout
- Ⓢ Riser Tensioner
- Ⓢ Preventer
- Ⓢ Iron Roughneck
- Ⓢ Pipe Stacker
- Ⓢ Boom / Mast
- Ⓢ Rig Walker



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