

Wear Resistant Antifriction Polymer Composites

2017

OPM 94 OKSAFEN sheet materials and OKSAFEN structural materials were developed and put into industrial production based on thermal resistant organic fiber fillers and polymer binders. The materials feature high antifriction properties and ensure low friction with low wear rates.

Our composites are based on patented formulas.

OPM 94 OKSAFENs are made as 1350 mm × 750 mm sheets with a thickness of 0.5 mm to 180 mm.

OKSAFENs are made as materials ready for thermal pressing-in or provided as ready-made parts of these materials according to customer's drawings and on customer's dies.



Main benefits offered by our materials:

- Parts made of OPM 94 OKSAFENs and OKSAFENs are considerably superior to bronze, copper, bimetal, textolite, PTFE and various polyamides in terms of their antifriction properties in friction joints, wear rate and operating loads (2 to 10 times);**
- Operate under both wet and dry friction conditions;**
- Operate in media with the high content of various abrasives, mineral oils, oil products;**
- Operate stably in $4.5 \leq \text{pH} \leq 8.5$ media range;**
- Materials preserve operating properties at $-100\text{ }^{\circ}\text{C}$ to $+250\text{ }^{\circ}\text{C}$, momentarily up to $300\text{ }^{\circ}\text{C}$;**
- Materials are resistant to contact loads up to 1800 kg/cm^2 ;**
- An important advantage of OPM 94 OKSAFENs and OKSAFENs when operating in friction joints is the reduction of mating counter face friction;**
- No lubricant is required for bearings of our materials when operating in dry friction conditions and therefore no any excessive grooves, connections of lubricating nipples and joint sealing;**



Due to their polymer base, our materials are quite easy to machine using various methods: turning, milling, drilling.

Multi-year operation of our products in friction joints, various gears running under different heavy-duty conditions proved that our wear-resistant composites and products enable:

- considerably longer gear life**
- higher reliability and longer overhaul life**
- lower repair and operation costs**

Our company is the best partner for machine builders that need to increase service life and reliability of their products.

Materials similar to our ones in specifications stated, in general, are either significantly more expensive or poorly meet constantly growing customer demands.

Production and processing technologies for these materials require expensive instrumentation. Organization of production at all numerous manufacturing steps requires high qualification and experience. Our company has all these qualities with the products shipped in hundreds of tons to our customers year by year without any quality claims on their part.



All new modifications undergo operation tests and industrial implementation in various heavily-loaded friction joints of gears such as:

- Brasses of side-bearing pads in bogies



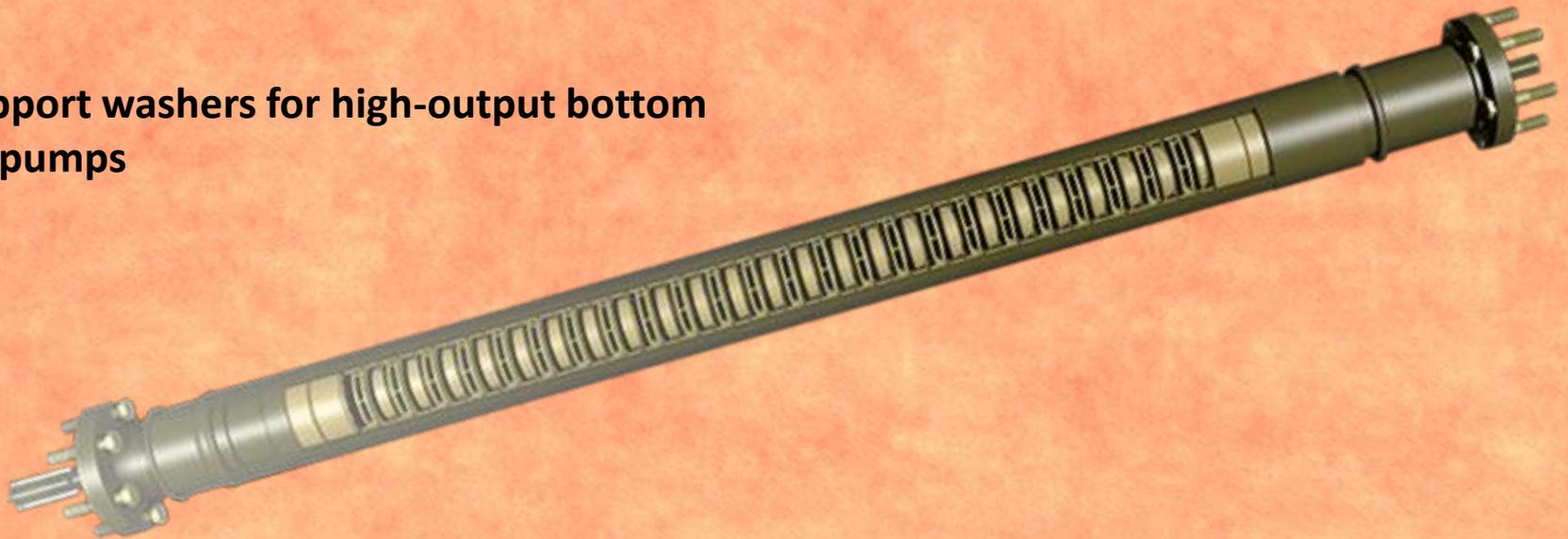
- Bushings of lower track wheels in crawler machines



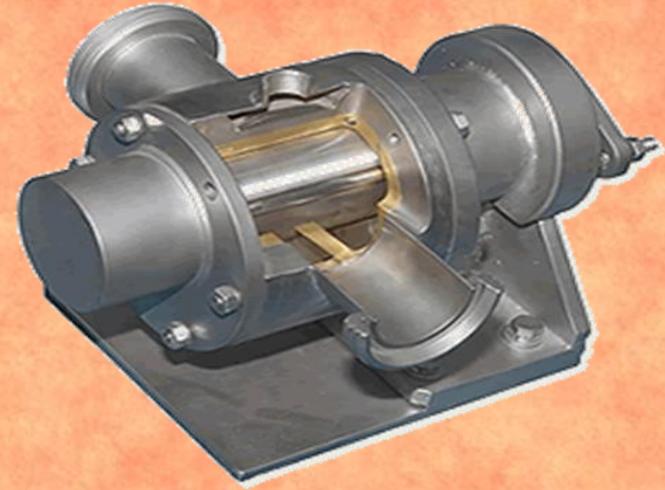
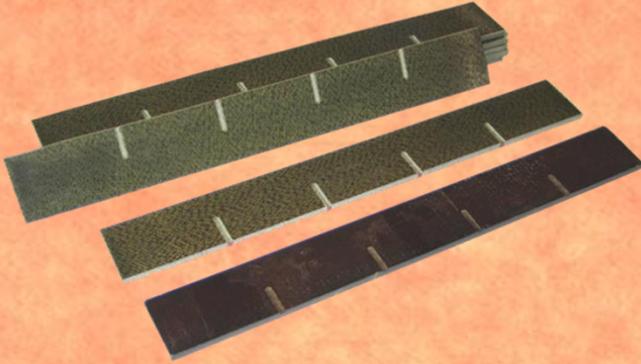
- Liners of guide shoes in elevators



- Support washers for high-output bottom hole pumps



- Rotary compressor blades



- Insulating rings for motors
- Bushings for suspensions, steering and brake systems in vehicles

- Guide slides
- Components of friction damping joints, etc.



Physical and Mechanical Properties

<u>Parameter name</u>	<u>Value</u>
Density, g/cm ³ , under bending	1.33-1.4
Breaking-down point, MPa	
- under tension	120-210
- under compression perpendicular to pressing direction	180
- under compression parallel to pressing direction	140-220
Charpy impact strength, kJ/m ²	35-60
Rockwell hardness number (for plastics), scale units	70-90
Equilibrium moisture content, %	2.7-3.5
Water absorption in cold water (24 hours), %	1
Oil resistance (24 hours), %	0.037
Gasoline resistance (24 hours), %	0.05
Linear wear rate	1•10 ⁻⁷ mm/km
Counterface rate	2-3 times lower compared to standard wear resistant materials
Frictional heat resistance	- 80 to + 300°C
Heat conductivity	0.15-0.18 W/m•K
Thermal coefficient of linear expansion, •10 ⁻⁶	2.6-4.3
Dry friction coefficient	0.08-0.23
Water friction coefficient	0.07-0.10
Oil friction coefficient	0.04-0.06