

Your Partner for Sealing Technology

SELF-LUBRICATING BEARING & WEAR MATERIALS



YOUR PARTNER FOR SEALING TECHNOLOGY

Advanced Sealing Technology is the distributor for leading famous brands for The Netherlands. Advanced Sealing Technology offers dedicated design and development from the market leading famous brands products and material Portfolio; a one-stop shop providing the best in elastomer, thermoplastic, PTFE and composite technologies for applications in aerospace, industrial, and automotive industries.

With 30-years' experience, Advanced Sealing Technology engineers support customers with design, prototyping, production, test and installation using state-of-the-art design tools. We also make use of the international production network of over 50 facilities among them several famous brands.

Advanced Sealing technology fulfills challenging service requirement, supplying standard parts in volume or a single custom-manufactured component.



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SELF-LUBRICATING BEARING & WEAR MATERIALS

Standard Shapes Tubes

Minimum Bore	1/2 in. (13 mm)
Maximum Bore	65 in. (1651 mm)
Standard Lengths	16– 24 – 32 inch / (406– 610 – 813 mm)

Sheets

Minimum Thickness	1/8 in. (3 mm)
Maximum Thickness	6 in. (152 mm)
Standard Widths	16-24-32 in
Standard Widths	16-24-32 in / (406-610-813 mm)
Standard Lengths	24-36-48-60 in. / (610-914-1219-1524 mm)



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



Thrust washers: Manufactured as tubes and sheets, then custom machined to a variety of finished products



Wear pads: curved, segmented, countersunk or counterbore holes



Electrical insulators and thermal insulation



Hydraulic and pneumatic wear rings



Custom machined components

BENEFITS

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

Benefits	Advantages
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 to introduce 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 AST 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

Non-conducting	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

AST 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
- Pneumatic Actuator
- Electrical Actuator
- Pumps
- Food Processing
- Handling Systems
- Crane Systems
- Earth Drilling & Processing
- Material Handling
- Mining Equipment
- Agriculture
- Wood Products



Hydro Applications

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



Marine Applications

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



Oil & Gas Applications

- CALM Buoy
- Fairleads
- Launch & Recovery
- Riser Tensioner
- Iron Roughneck
- Boom /Mast
- Pump-Jack
- Pipe Staker
- Rig Walker
- Boom /Mast



AST COMPOSITES

AST Composites are laminated polymer materials made by impregnating textiles with thermosetting resins. Solid lubricants are added to the resin to provide evenly dispersed lubrication throughout the material. AST offers multiple textile, lubrication and resin combinations to provide the most suitable material for your application. Our dedicated team will help you choose which AST 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. AST Composite materials are represented by three (3) digits based on the chosen textile, lubricant and resin. For example: AST151

Advantages	
Polyester	
PTFE/Polyester Combination	
Meta-Aramid	
Lubrica	
None	Electrical or shim applications
Graphite	Dry conditions
Moly (MoS ₂)	Wet conditions
PTFE	Wet or dry conditions
Graphite & PTFE	Dry conditions needing lower friction
Moly & PTFE	Moly & PTFE
Resin	
Standard Polyester	
Marine	
High Temperature / Chemical Resistant	



Left: Polyester
Middle: PTFE/Polyester
Right: Meta-Aramid



Bottom: Raw tube surface; direct from oven
Middle: Rough turned surface
Top: Finished machined surface

PROPERTIES

Physical Properties Tests performed on AST100 Series sheet material. The physical properties of AST 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. AST composite bearings and wear pads are a great solution for your current metallic or plastic bearing challenges.

Compressive Strength (ASTM D695)		
Ultimate	50,000 PSI	345 MPa
Yield	15,000 PSI	103 MPa
Parallel	13,500 PSI	93 MPa
Modulus	500,000 PSI	447 MPa
Tensile Strength (ASTM D638)	11,000 PSI	75 MPa
Tensile Modulus of Elasticity (ASTM D638)	470,000 PSI	240 MPa
Poisson's Ratio (ASTM D3039-08)	0.231	
Shear Strength (ASTM D2344)	12,000 PSI	82 MPa
Flexural Modulus of Elasticity (ASTM D790)	260,000 PSI	1,793 MPa
Hardness Rockwell M (ASTM D785)	100	
Density (ASTM D792)	0.047 Lbs./in ³ ..1.3g/cm ³	
Water Swell (ASTM D570)	<0.15%	

Thermal Properties

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



Coefficient of Thermal Expansion

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

Normal to Laminate	3.5 x 10-5 /Δ°F 6.3 x 10-5 /Δ°C
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Parallel to Laminate	1.8 x 10-5 /Δ°F 3.2 x 10-5 /Δ°C
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AST 300 Series - Operating temperatures -40° to 400° F (-40° to 204° C)

Normal to Laminate	4.0 x 10-5 /Δ°F 7.2 x 10-5 /Δ°C
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Parallel to Laminate	2.0 x 10-5 /Δ°F 3.6 x 10-5 /Δ°C
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Mechanical Properties

Coefficient of friction varies with application, shaft material, surface finish, load, speed, environment and external lubrication. AST 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

AST 121	0.15 - 0.20
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AST 151	0.13 - 0.15
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AST 251	0.05 - 0.10
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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.

Pressure Velocity (PV)

As a general guideline or reference, AST recommends limiting the PV for 100 series materials to 6000psi-ft/min for continuous duty or industrial applications. Similarly AST 200 series materials have recommended PV limit of 10,000psi-ft/min. Application factors can affect these PV limits, contact us for a review of your application.

Electrical Properties

Certain grades of AST Composites are excellent insulating materials and may be used in a number of different electrical applications. Non-graphite materials offer customers both a non-conducting and nonmagnetic composite that does not build up static charges.

Dielectric Strength (ASTM D149-97a)	200 volts / mil
Volume Resistivity (ASTM D257-07)	4.2x10 ¹⁵ ohm-cm

Chemical Resistance

AST 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.

68° F/20° C 120° F/49° C			68° F/20° C 120° F/49° C		
Acetic Acid 15/100%	S/U	L/U	Fatty Acids	S	S
Acetone 15/100%	S/U	L/U	Hydrochloric Acid	S	S
Alcohol Ethyl 15/100%	S/S	S/S	Hydrofluoric Acid	U	U
Aluminum Sulfate	S	S	Maleic Acid	S	S
Ammonia Liquid	U	U	Naphtha	S	S
Ammonia Aqueous	U	U	Nitric Acid 15/100%	S/U	S/U
Ammonium Carbonate	S	L	Oxalic Acid	S	S
Ammonium Nitrate	S	S	Phosphoric Acid	S	S
Benzene	S	L	Phthalic Anhydride	S	S
Bleach Liquors	S	L	Potassium Hydroxide	U	U
Calcium Chloride	S	S	Sodium Carbonate 25/100%	S/L	S/U
Calcium Hydroxide	U	U	Sodium Chloride	S	S
Carbon Tetrachloride	S	S	Sodium Hydroxide	U	U
Chlorine Water	S	L	Sodium Nitrate	S	S
Creosote	S	S	Sodium Nitrite	S	S
Citric Acid	S	S	Sulfuric Acid 50/100%	S/U	S/U
Ethylene Glycol	S	S	Trichloroethylene	U	U

S = Satisfactory

L = Satisfactory for limited service

U = Unsatisfactory

Satisfactory means that the material retains 50% or more of its original dry strength after immersion of at least six months.

MANUFACTURING CAPABILITIES

Custom Products

Advanced Sealing Technology 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.

AST Composites are manufactured as tubes and sheets, then custom machined to a variety of finished products. Spherical bearings with stainless steel balls, threaded components and many other custom products can be fabricated.

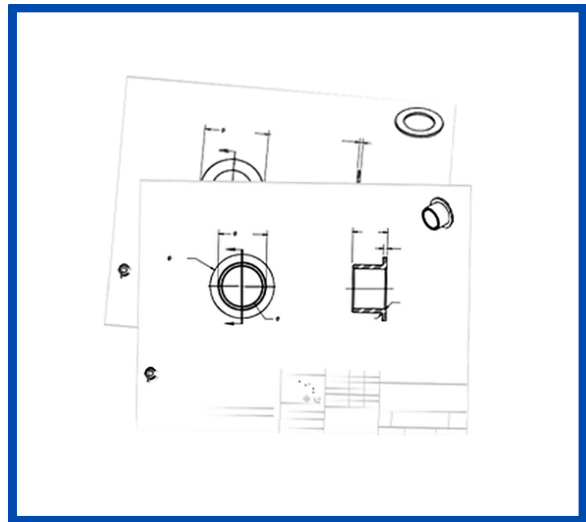
Machining

AST's 16,000 square foot facility includes state-of-the-art CNC machines, CNC lathes that provide live tooling functionality, and a CNC mill that has 4th axis capability. The CNC router table allows for quick production of sheet parts. Control and programming is provided by Master CAM X5 software. A complete array of new manual lathes provides capabilities to turn parts up to 65 inch diameters.

AST places high priority in the continual investment in quality machines, hardware and software to provide cutting edge technology for its workforce. This includes formal training, support services, and equipment maintenance to maximize the transfer of benefits to the finished product. These efforts enable AST to achieve the high level of efficiency that our markets and customers demand.

Testing Lab

Our on-site material testing lab is key to our ever expanding development of high quality materials. We offer the services of this lab to our customers, allowing project specific testing according to the requirements of their project or needs. Given the various materials' properties, our testing abilities provide specific results in an economical and efficient manner. In 2012, a new 100kN electromechanical tensile/compressive testing machine was added, which is fully computer controlled, providing highly repeatable results, more options for customized testing procedures, and formal reporting



MACHINING AND INSTALLATION

Machining

AST Composites are readily machinable by conventional machining techniques. As a general guide they may be treated as they would for soft metals such as aluminum or bronze, but machined (dry) without coolant. AST materials are nontoxic, although it is advisable to use adequate dust extraction when machining.

For turning, tungsten carbide or diamond tipped tools should be used to obtain a fine finish. High speed steel tools can be used for machining where accuracy below 0.005 inches (0.13 millimeters) is not required and for small quantity production.

Installation Methods

Freeze-Fit Bearings do not become brittle during the freezing process. Liquid nitrogen is the most efficient method; in some cases dry ice or refrigeration may be used. Once bearing is frozen, and outer diameter is smaller than housing, block or hold the bearing in place. As the bearing returns to ambient temperature it will increase in size and the proper interference with the housing will be obtained.

Press-Fit Bearings should be fully supported over their loaded area, with uniform interference fit. A suitable lead-in chamfer should be provided in the housing and on the bearing diameter to assure proper start. The amount of force can be suggested to make sure there is adequate power available.

Mechanically Fasten Shoulders, bolt on rings, other rings, or keepers can be used to prevent the bearing from moving over time. Flat components such as wear pads can be retained by countersunk screws or metal inserts and located by keeper plates where high lateral or shearing loads are anticipated.

Bonding AST Composites inherently bond well with adhesives. Bearings can be designed for glue-in installation with a minimum clearance of 0.005 inches (0.13 millimeters). During installation, bearings should be retained on top and bottom. Wear pads can be retained with adhesives to many metallic surfaces. We can recommend adhesives.



Counter/Mating Surface

The counter surface finish of the mating operating component has a major effect on the performance of the composite. Surface finish should ideally be 16 – 32 RMS (0.4 – 0.7 μm) RA minimum and HRB 80. Suitable mating materials would be hardened steels or stainless, and surfaces should be free from cutting edges and lubrication grooves or holes.

External Lubrication

AST Composites can be used with external lubrication if desired. We can custom design bearings and wear pads with lubrication grooves for water, grease or oil. If external lubrication is used, we recommend the use of water or synthetic oils/greas.



The information in this brochure is intended to be for general reference purposes only and is not intended to be a specific recommendation for any individual application. The application limits for pressure, temperature, speed and media given are maximum values determined in laboratory conditions. In application, due to the interaction of operating parameters, maximum values may not be achieved. It is vital therefore, that customers satisfy themselves as to be suitable of product and material for each of their individual applications. Any reliance on information is therefore at the user's own risk. In no event will Advanced Sealing Technology be liable for any loss, damage, claim or expense directly or indirectly arising or resulting from the use of any information provided in this brochure. While every effort is made to ensure the accuracy of information contained herewith, Advanced Sealing Technology cannot warrant the accuracy or completeness of information.

To obtain the best recommendation for a specific application, please contact Advanced Sealing Technology.

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