

RUBBERCRAFT®

**Leaders in the Development
and Manufacture of High
Performance Application Specific,
Elastomer Parts
and Components**



**Setting the Standard for Precision Engineered High Quality
Custom Manufactured Elastomer and Rubber Solutions™**

About the Company

Rubbercraft is a high technology company that designs, develops and manufactures precision engineered custom elastomer and rubber parts, components and systems for the aerospace, commercial aviation, communications, defense, fitness, medical, and transportation industries. The Company has a wide-range of capabilities and know how in precision molded and extruded rubber and elastomers. Rubbercraft has expertise in surface bonding of elastomers to metal, fabric, composites and Teflon® and specializes in rubber-to-metal and rubber-to-composite bonding designs that mold seals directly to surfaces.

The Company has a complete on-site laboratory for the formulation and testing of elastomer and rubber compounds. Rubbercraft mixes, molds and extrudes

a wide variety of elastomers, including silicone, fluorosilicone, EPDM,

Butyl, Viton®, Nitrile and Neoprene. The Company also has an extensive inventory of extrusion dies and molds that provide rapid turnaround and lower cost for companies in need of such products and components. We work with customers at every stage of the part or component solution, from an existing drawing or design to a custom mission critical solution.

Rubbercraft applies its proprietary technology to electrical emissions control, thermal protection and noise emission absorption. We provide electromagnetic compatibility (EMC) with our proprietary conductive elastomers. Emissions control and shielding technologies are applied to electromagnetic pulse (EMP), electrostatic discharge (ESD) and radio frequency interference (RFI) parts and components.

Understanding Customer Requirements

Understanding the need and what the solution must accomplish.

Understanding the technology that must be applied to the solution.

Understanding the application of the part or component.

Understanding the technical aspects of the system requirements.

Rubbercraft's understanding of customer requirements and what the solution must accomplish comes from more than 100 years of customer service and also from its cadre of professionals who have worked in our customer community. Having been on the "other side of the desk" gives our team particular appreciation, perspective and understanding of the customer's manufacturing environment, system and delivery requirements, component needs and the required solution.



IN PERFORMANCE



Delivering Solutions to Customers' Needs

Customers regularly come to Rubbercraft with the following requests...

- ▶ I want my system to withstand vacuum and pressure extremes without leaks.
- ▶ I need my assembly to be able to expand and contract without affecting its strength or losing its sealing capability.
- ▶ I don't want my product to be corroded or deteriorated by solvent fumes.
- ▶ I want my aircraft enclosure to be hermetically sealed so that moisture doesn't come in.
- ▶ I need to protect my electronics product from overheating.
- ▶ I need to maintain electrical integrity while shielding my system from electromagnetic interference.

...without knowing how to approach the solution.

This is where Rubbercraft's expertise begins.

Leaders in the Development and Manufacture of High Performance Application

Delivering Value and a Best of Class Solution

When customers come to Rubbercraft for custom manufactured elastomer and rubber solutions, they know their component or part will be application specific, precision engineered with high quality and will address their needs with a best of class solution.

The reasons why Rubbercraft delivers best of class solutions is simple and straightforward. For more than a century, Rubbercraft has been responding to unique customer requirements with rubber and elastomer solutions.

No other company has such a successful track record of length of service, understanding customer requirements and delivering solutions that give the customers' product performance to specification.

A "Start to Finish" solution™:

From concept and design to full production, the Rubbercraft advantage is a "Start to Finish" solution. It starts with understanding the customer's need and what the solution must do.

► **Qualifying the requirement.**

Rubbercraft is thorough in its qualifying process to better understand customer detailed requirements up front and early on in the process. The gathered information brings the customer and Rubbercraft together in a process that aids in the specification, design and tooling alternatives, optimizes the solution deliverable, and saves time and money.

► **Materials selection and formulation.**

Delivering a best of class solution requires:

- selecting the best polymer material to meet the component and application requirements.
- formulating the polymer material into a proprietary elastomer compound to best suit the customer solution.

Rubbercraft's expertise in selecting the best polymer and formulating the elastomer give added assurance that the customer's part or component will meet or exceed mission critical specifications.



Understanding Customer Requirements



► **An optimum application of proprietary formulated polymers to a broad range of custom manufactured elastomer and rubber parts and components such as:**

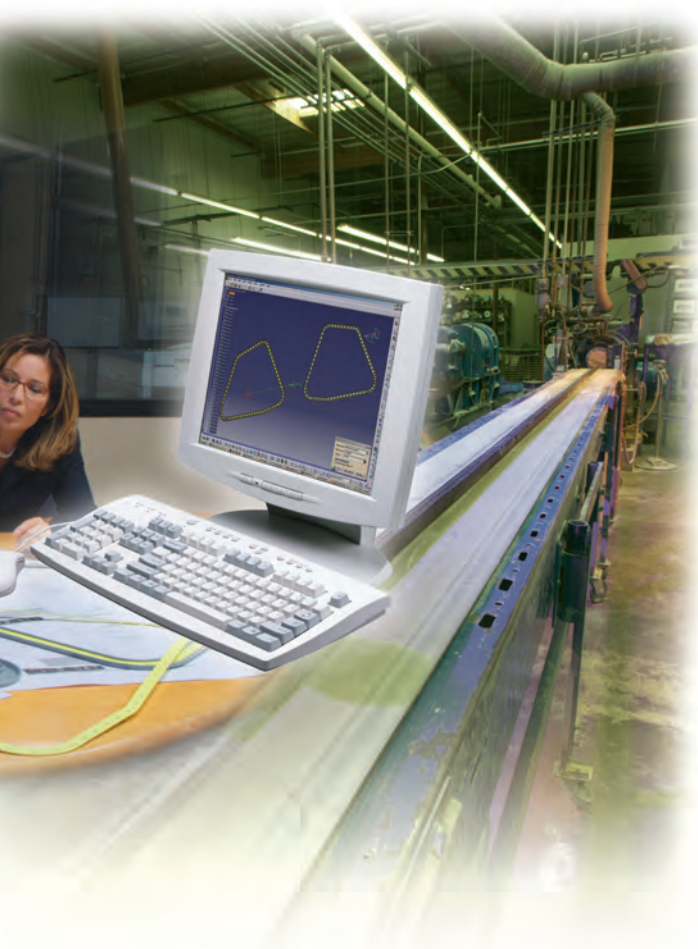
- seals
- gaskets
- bladders (fabricating fixtures)
- counterweights
- bellows
- cover assemblies
- seals and gaskets for EMI shielding and thermal management
- other mission critical parts



A wide range of precision engineered high quality parts and components, manufactured from a custom design or the customer's drawing.

Applying technology, innovation and know how to customer needs

Specific, Elastomer Parts and Components



add significant improvement to the overall lifecycle performance of the solution and deliver more impact and better value to our customers.

- ▶ **Industry leading surface bonding and adhesion expertise, surface adhesion chemistry technology, technique and know how to bond rubber and elastomers to:**
 - metal
 - fabric including Kevlar®, Nylon, Polyester
 - composites
 - Teflon®
- ▶ **State-of-the-Art manufacturing and assembly of high quality parts, components and systems in quantities that meet customer needs and requirements.**
- ▶ **Lead times that meet program requirements.**
- ▶ **All under Rubbercraft's internal control and accountability.**
- ▶ **Reliable on time delivery.**
- ▶ **Providing exceptional customer service and responsive pre and post sales support.**

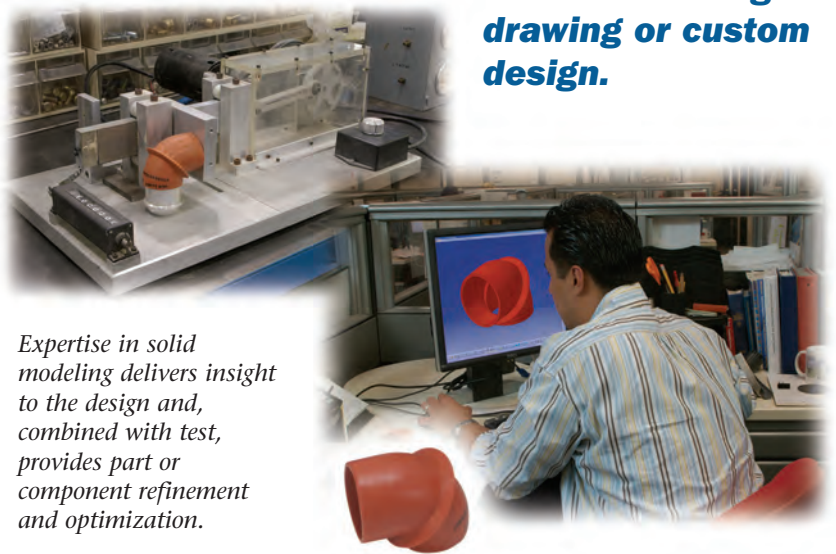
▶ **Engineering expertise and know how combined with design and test.**

Applying a concurrent systems engineering approach to an integrated solution.

- Often, customers will come to Rubbercraft with a particular need, such as sealing a critical system, without an understanding of how to accomplish the solution. It may be as fundamental as the need to have two components sealed from outside air pressure or the need to seal out dust, dirt, and sand. Or it may be a complicated and demanding application requirement. Rubbercraft's system engineering expertise and our collaborative working relationships support this concurrent engineering approach. By interfacing directly with the customers technical community, we



Parts or components manufactured from an existing drawing or custom design.



Expertise in solid modeling delivers insight to the design and, combined with test, provides part or component refinement and optimization.

Capabilities

The scope of Rubbercraft's capabilities is unique in the industry and provides innovative, technically advanced solutions to customers' needs. All of our capabilities are focused on one thing – a best of class cost effective solution. All of our capabilities capture our expertise in fabricating elastomer and rubber materials into parts, components and system solutions. We combine these capabilities with a thorough understanding of how to work with the customers' systems to deliver a precision engineered, high quality, cost effective application and solution.

Precision Engineered Molding and Extrusions

Selecting the right process for the right application

Rubbercraft has the capability to mold or extrude parts and components to our customers' demanding and exacting tolerances and dimensions where space, weight and performance add premium value to our customers' products and systems.



We are known for our ability to extrude and/or mold a comprehensive range of product forms to exacting requirements, complicated shapes and sizes using high-performance elastomers that support demanding applications. Having expertise in both processes delivers additional value and a range of response to our customers.

Molding or Extruding Thousands of Different Sizes and Shapes

Die Cutting Expertise, Wide Range of Equipment

Our in house die cutting and tooling expertise to cut to a specific shape, elastomer know



how, and our assortment of equipment, gives Rubbercraft the capability to mold or extrude thousands of different sizes and shapes and deliver cross-sections as small as 1/100 of an inch in diameter to a component with diameters measured in feet; from simple circular cross-sections to complicated lock and key type extruded assemblies.

Bonding of Elastomer and Rubber to Metals, Composites, Fabrics, Teflon®

Surface Preparation Capability, a Higher Performing Vulcanized Bond

Surface Treatments Specific for Different Materials



Our industry leading surface adhesion technology and know how to bond elastomers and rubber to metals, fabrics, composites and Teflon® is a reason why customers look to Rubbercraft for precision high performance custom solutions.

Rubbercraft's ability to vulcanize elastomers and rubbers to different substrates and materials provides a higher performing bond than an adhesive or secondary bonding operation.

Fabric Reinforcement

Knowing the Right Reinforcing or Protective Fabric to Use for the Best Solution



Customers often come to Rubbercraft with parts or component needs not knowing that a fabric reinforcement may improve performance. We have the know how to select the specific fabric which provides additional strength, rigidity, durability, and longevity. Rubbercraft's engineers and technicians work with a wide variety of different reinforcing materials from fiberglass to polyester, aramids and ceramics, graphite reinforced fabric to pre-pregs. We often bond fabric for fire protection or for flame barriers.

Control Over Tool Design and Fabrication

Delivering precision high quality parts and components requires responsibility and control over tooling design and building the tool. Rubbercraft's turnkey tooling services provides our customers with a best match solution to their engineering requirements.



Tubing and Stripping

Rubbercraft produces different tube cross-sections with a variety of inside hollow diameters and varying wall thicknesses to create the desired outside diameters in a variety of colors, sizes, shapes and continuous lengths. We also have the ability to deliver strip materials with width and thickness in almost any configuration, all manufactured to very specific material requirements and specifications.

Splicing

Rubbercraft's splicing methodology and know how sets us apart. Unless directed otherwise, we make our splicing compound from the same parent material out of which the basic part is made. This process provides exceptional chemical compatibility between the extruded or molded component and the splicing adhesive and delivers superior strength in that splice joint.



State-of-the-Art Lab and Testing Facility

The Company's lab and test facility give Rubbercraft unique agility, control and the capability to quickly modify or customize a compound. We can add performance characteristics, create modifications, quickly evaluate the impact of those changes,



validate and verify the physical and mechanical properties of the compound to show that it meets customer requirements.

Sheet / Slab Stock

Standard, EMI, Fabric Reinforced or Teflon® Coated



Closed Section Molding

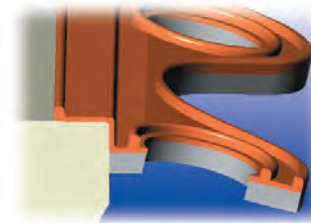
Using disposable or wash out cores without having to splice the section after removing the core tool.

Die-Cutting

Rubbercraft has a range of die-cutting operations to cut the material into a final shape.

Precision Tolerances

Customers often ask us to design and manufacture parts and components that perform to tolerances that are tighter and more stringent than the standard Rubber Manufacturers' Association published guidelines for rubber products.



Experts in Material Behavior

Knowledge of rubber and elastomers in relation to materials, such as composites and aluminum.

Custom Formulations

We apply a custom formulation to more than 90% of our customer requests to ensure an optimum solution. If it does not exist, the Company can formulate it.

Certifications and Approvals

- F.A.A. Approvals
- TSO (Technical Standard Order)
- PMA (Parts Manufacturing Authority)
- DMIR (Designated Manufacturing Inspection Representative)
- FAR 21.303 Fabrication Standards

Chemical and Physical Validation to Specifications

Validation of performance to specifications is a critical customer requirement and an area of broad technical expertise. The depth and breath of expertise is derived from the tens of thousands of rubber and elastomer parts and components Rubbercraft has delivered during the past 100 years.

Color Matching

Specializing in custom color matching; meeting Federal Standard 595; providing color samples.



Comprehensive Database

A comprehensive database that includes years of quote, performance and delivery history.

Metal Inserts and Seal Retainers

Many of our customers' seal requirements have an integral metallic or composite retainer built into the seal so that it more easily can be attached to its next assembly.



Protective Chemical Coatings

Rubbercraft has a great deal of expertise and know how in the requirements of protective chemical coatings, finishes and paintings based on the design and environmental applications that these particular parts or components will be exposed, such as salt water, jet fuel, hydraulic or deicing fluid.

Test and Validation of Design Performance

Lifecycle testing, analysis and validation of designs are often requirements requested by our customers. We can perform a wide range of physical and mechanical tests on the seal configurations to validate lifecycle performance, compression strengths, deflection rates, elongation, compression sets, changes in geometry and deterioration over time and exposure to different elements.

Applications

Rubbercraft manufactures and assembles a wide variety of precision engineered high quality parts and components from an existing drawing or custom design for a number of industry applications.

Seals

- ▶ Aircraft cabin, window and baggage door seals



- ▶ Aerodynamic seals for flight control surfaces

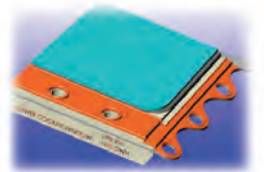


such as:

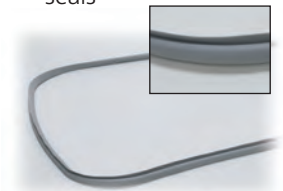
- Flaps
- Rudders
- Ailerons
- Elevators
- Flight control type structures
- ▶ Secondary control surfaces
 - Spoiler seals
 - Flap to wing seals
 - Flap track fairing seals



- ▶ Cockpit seals



- ▶ Leading edge seals
- ▶ Engine seals
- ▶ Wing access panel/fuel door seals
- ▶ Passenger door seals



- ▶ Fire barrier seals



- ▶ Window seals

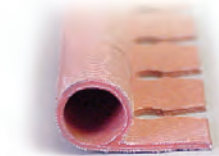


- ▶ Fuel tank seals
- ▶ Shaft seals
- ▶ Cover seals
- ▶ Lavatory and galley seals
- ▶ Avionics and electronic component seals in radar, communication and guidance equipment

- ▶ Seals for critical satellite components



- ▶ Seals to mate large concrete sewer pipe sections
- ▶ Fabric reinforced seals



- ▶ Teflon® vulcanized seals – metal and/or fabric inserts
- ▶ Teflon® encapsulated Creavey O-rings



Mounts



Grips and covers

- ▶ For sporting and exercise equipment



Cover Assemblies



Jackets



Bumpers

- ▶ Bumpers for subway cars
- ▶ Bus and subway system handrails



Counterweights



Armrests and arm covers



Bladders

- ▶ Composite hat mandrels
Single piece up to 48' lengths



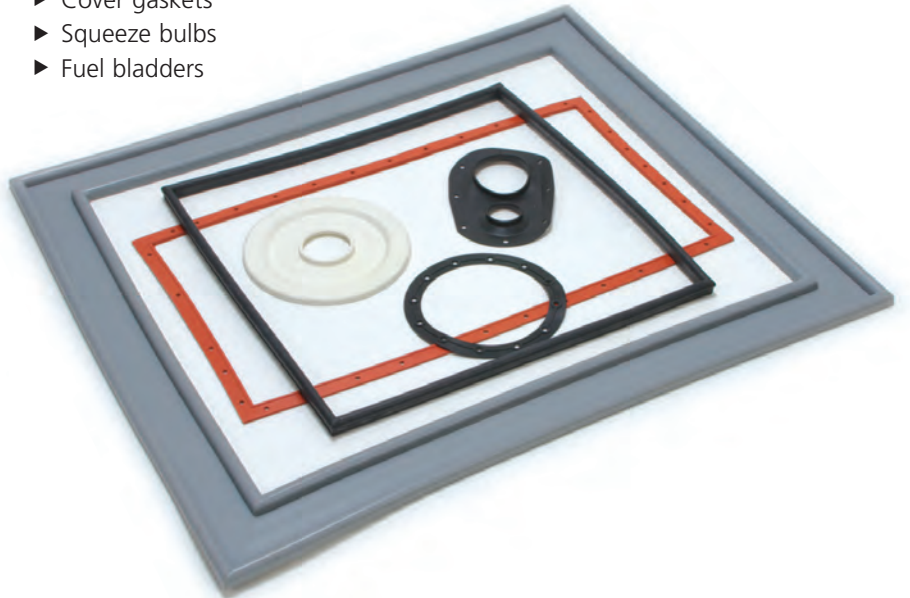
Bellows

- ▶ A wide range of configurations



Gaskets

- ▶ Void volume gaskets
- ▶ Window gaskets
- ▶ Cover gaskets
- ▶ Squeeze bulbs
- ▶ Fuel bladders



Conductive Elastomers

Electromagnetic Shielding

Providing Electromagnetic compatibility with Rubbercraft's conductive elastomers

Electrically Conductive; Mechanically Durable; Resilient and Conformable

The requirements for reliable performance of electronic systems, high density packaging and the need to lead advancements in digital technology are of utmost importance to Rubbercraft's customers.

To answer these critical customer needs and provide for electromagnetic compatibility, Rubbercraft applies proprietary technology to electromagnetic shielding gasketing and sealing elastomers that have properties, profiles, features and benefits unmatched by conventional gasketing materials.

Rubbercraft's EMI shielding and sealing technology, integrated with customer parts and components provide:

- ▶ electrical continuity between mating surfaces while ensuring environmental protection and vibration isolation.
- ▶ outstanding shielding performance while maintaining electrical integrity.
- ▶ long life in critical applications.

Rubbercraft's EMI shielding, custom formulated, high performance molded and extruded elastomers have

outstanding physical properties, chemical, fuel and solvent resistance in a wide range of temperatures.

Rubbercraft uses an extensive number of metallic and non-metallic fillers including carbon, silver, nickel, aluminum and copper.

Rubbercraft's conductive elastomer gaskets and seals include use of silicone, fluorosilicone and organic rubbers.

Rubbercraft can meet customers' EMC requirements by molding in place,

extruding continuous lengths, die cutting from sheet and vulcanizing to metal, composite, and a wide range of other materials. Applying combinations of these unique capabilities, we can:

- ▶ custom formulate and tailor conductivity and compatibility to each individual application.
- ▶ custom formulate parts and components for environmental requirements and temperature extremes.
- ▶ incorporate into a turnkey assembly.
- ▶ provide volume resistivity from 10^{-3} to 10^8 Ω -cm and shielding effectiveness from 80 to 115db.
- ▶ meet the MIL-DTL-83528C standard.

Thermal Management

Protecting Sensitive Electronics from Overheating

High speed processors and high density electronic packages generate significant heat, compromising required optimum performance of computing devices and network systems.

Rubbercraft elastomers are filled with high thermally conductive materials and shield, remove and distribute heat buildup for reliable and efficient system operations. Rubbercraft's proprietary elastomer thermal pads accommodate:

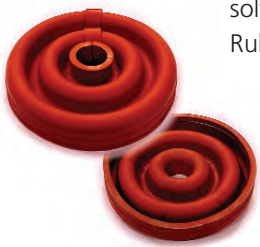
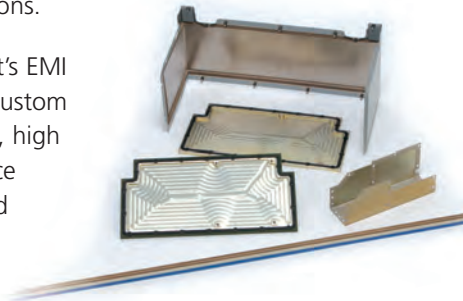
- ▶ stringent requirements of thermal conductivity
- ▶ electrical insulation, and
- ▶ fill gaps between heat generating components and heat dissipating surfaces.

Rubbercraft's thermal elastomers can be used as thermal pads with or without a reinforcing carrier.

Emissions Control

Rubbercraft also applies its proprietary elastomer based radar absorbing materials (RAM) and shielding solutions to:

- ▶ Radio Frequency Interference (RFI).
- ▶ Electromagnetic Pulse (EMP).
- ▶ Electrostatic Discharge (ESD).



State-of-the-Art Manufacturing and Assembly

Rubbercraft's manufacturing facilities have a wide range of extrusion, molding, forming state-of-the-art manufacturing and assembly capabilities closely supporting the engineering efforts for efficient runs of a wide range of elastomer and rubber parts and components. Manufacturing and assembly can range from a one-of-a-kind part for a vintage aircraft to a million units supporting the transportation or communications industries. The integration of engineering, design, test and manufacturing under one roof delivers rapid development that is of great benefit to our customers. Rubbercraft's manufacturing operations are flexible, capable of fast set-up to produce any system component.



The manufacturing process, experienced team and a demanding QA process ensures that quality parts and components, meeting or exceeding specifications, are delivered the first time and every time. The Rubbercraft laboratory and test facilities are an integral part of the manufacturing operations.

Unequaled Pre and Post Sales Support

Good communications are essential in proper pre and post sales support. Keeping our customers informed, before, during and after delivery, is a principal objective of the Rubbercraft team. Our sales support regularly starts by assisting customers with developing specifications and extends to:

- ▶ Technical services from our cadre of experienced engineers and designers
- ▶ Review of drawings and specifications
- ▶ Advising customers of suggested changes
- ▶ Samples for test and evaluation
- ▶ Product training
- ▶ Test support
- ▶ Servicing of systems

Reliable On-Time Delivery

Delivering unmatched value and benefits to our customers

At Rubbercraft, we pride ourselves in on-time delivery. Meeting our schedules helps our customers' meet theirs. We know that on-time delivery reduces and contains our customers' costs. As the oldest specialty rubber and elastomer supplier, Rubbercraft has unequalled design know how and a database that is leveraged for rapid

deployment. Our customers gain advantage and efficiency through speed of program and solution completion.

Confidence In Performance

Throughout the Company's history, performance at Rubbercraft is all about best of class workmanship, quality of the component and elastomer materials, delivered on time with reliable results at every step of design, development and production.

Rubbercraft's processes are designed to achieve repeatability and reliability. Rubbercraft's quality management system has been third party registered and certified to the requirements of AS9100 and ISO 9001: 2000.

Since the early 1900's, more and more customers have come to know the Rubbercraft standard. Our customers have confidence in the performance of our solutions and confidence in the performance of the Rubbercraft team. Our performance is best reflected in our capabilities and applications.



Customers often take advantage of Rubbercraft's library of dies and molds that contribute to lower cost and rapid response of part or component delivery.

RUBBERCRAFT®

*Leaders in the Development and Manufacture of
High Performance Application Specific, Elastomer
parts and Components*

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The Rubbercraft Family of Brands

- ▶ Rubbercraft
- ▶ Rubber Teck
- ▶ Silicone Rubber Specialties (SRS)
- ▶ Creavey Seal (www.creavey.com)
- ▶ Bobber Products® (BPI)

Delivering Exceptional Value to Our Customers

- ▶ Making it easy for customers to work with Rubbercraft
- ▶ A “start to finish” control over the solution delivery
- ▶ Insight, design know how
- ▶ Systems engineering approach to the solution
- ▶ An unequaled design database leveraged for rapid deployment
- ▶ Providing the best match to the requested solution
- ▶ Saving time and money
- ▶ Test and validation of component performance
- ▶ On time delivery
- ▶ Unmatched pre and post sales support
- ▶ Long lasting life expectancy

a Sanders Industries Company