

# Polymer Products for Valve Applications



CUSTOM ENGINEERED POLYMER COMPONENTS  
FOR CRITICAL VALVE OPERATIONS



**CDI**  
PRODUCTS®

A Michelin Group Company

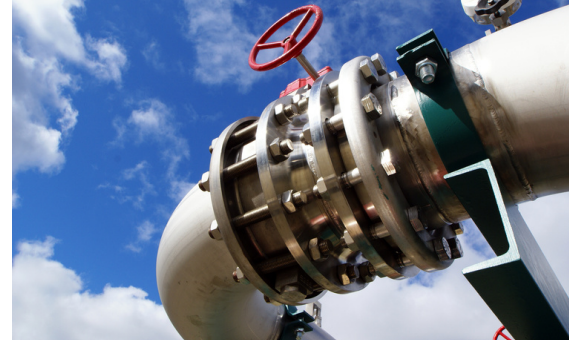
### Custom Engineered Polymer Components for Valves

Our expansive portfolio of high-performance polymeric materials and on-site engineering and design experts offer our customers an invaluable resource for transforming advanced engineering materials into high-performance solutions. Our range of materials enables valve OEMs and end-users to improve reliability, enhancing efficiency and savings in life cycle costs.

### Challenging Environmental Conditions Increase Demands

CDI Products has manufactured and engineered plastic valve components for over 50 years. Our strong materials portfolio ensures that CDI has the material best suited for your application. From cryogenic liquid natural gas (LNG) to high pressure / high temperature (HPHT) service, CDI has the experience, expertise, and technology to ensure that your most critical parts meet your performance requirements.

CDI engineers have decades of experience fitting the best materials to some of the most challenging applications. Our custom in-house blending capabilities mean that if we don't have the material you need, we can make it.



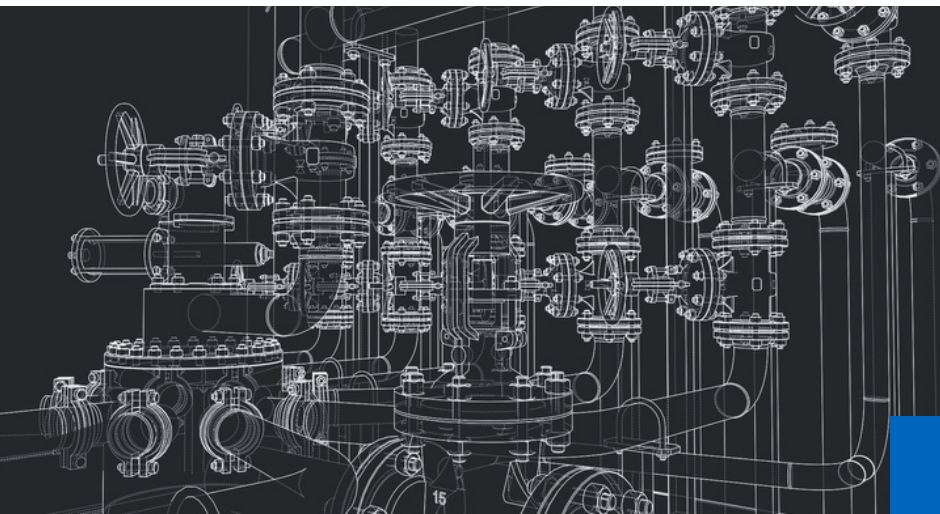
## Greater reliability and life cycle cost savings

### Tailored Solutions to Improve Reliability and Life Cycle Costs

Our materials portfolio offers a wide variety of solutions to handle the various applications and demanding environment of the Valve market.

- High and Low Temperatures
- High Corrosion and Conductivity
- Aggressive Fluid Media
- High Radiation
- Low Emissions
- Abrasive Slurry
- High Cycles
- Leaks and Flow Mitigation





We take cost, quantity, load capacity, temperature, fluid media, and stem & housing materials into consideration to match the best valve component to the performance environment.

### Typical Pain Points for the Valve Market

- Reduce pressure and temperature fatigue
- Reducing friction and vibration
- Reducing contamination and mitigating cavitation
- Extending life performance
- Decreasing wear
- Improving sealability
- Simplifying design
- Boosting productivity
- Reducing the cost of operations

## What makes us unique.

### Plastics

Since we design and specify our compounds, we have superior control over the properties and performance of our materials. The broadest range of plastics manufacturing and processing methods enables us to use the most appropriate method per application.

### Composites

Strategic integration of components with thermoplastic composites solves challenges that no single material can accomplish. Not only do we manufacture composite products, we develop our own unique composite materials.

### Custom Compounds

Our custom compounds are created from different polymers and filler packages, each designed to specifically address customer requirements.



Selecting the right valve and seal can determine the success or failure of the system or process.

**Partnering with the right manufacturer can too.**

## What sets CDI apart.

Materials expertise, collaborative partnerships, vertical integration, and superior value are what set us apart.

Our experts stay abreast of the latest advancements and develop solutions using our proprietary formulations. We can design custom blends tailored and validated to your specific application.

Our collaborative partnerships with OEMs provide tangible ROI to end users' operations for new projects and existing installations.

Our in-house engineering, material development, and manufacturing offer full vertical integration. From raw materials to finished products, we have the expertise and industry knowledge to solve your toughest challenges.

Our products are engineered to meet and exceed the highest standards while still delivering superior value.



## How we support the global valve industry

We offer custom high-performance polymer products for valves used in several industry applications:

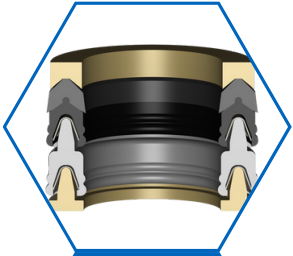
- Oil and Natural Gas
- LNG, Cryogenics, and Energy Transmission
- Water Management and Fluid Handling
- Chemical and Industrial Processing
- Aerospace and Defense
- Nuclear, Thermal and Power Generation
- Medical, Biomedical, and Pharmaceutical
- Marine and Automotive
- Construction and Agriculture



# Critical Valve Components

## Stem Seals

Whether you are sealing at 450°F or -320°F, CDI has solutions for stem seals. Our self-energized V-Packing removes the need to live loading at pressure classes up to 500#. Optiseal® spring energized seal assemblies have been qualified up to 15,000 psi and 400°F for PR2 and down to -320°F for LNG service. CDI also offers flexible graphite rings that can be added to stem packing for fire-safe valves.



## Seats & Sleeves

CDI manufactures seats for a number of valve types, including ball, butterfly, and plug valves. Whether you need a part made to print or design assistance on a new seat, CDI engineers work directly with your engineers to ensure that the design, material selection, and manufacturing process are optimized for your application. We have in-house capabilities to mold and machine up to 92" in diameter, so almost no job is too big! Seats can be machined or injection molded for higher volumes.



## Bearings and Thrust Washers

CDI manufactures bearings for all types of applications. Whether your need is for Cryogenic Temperatures, High Load, or Aggressive Media, CDI manufactures bearings to meet your needs.

### **Thermoplastic Bearings**

- PTFE for low loading and low friction performance
- PEEK and PPS for high loads and high temperatures

### **Fibrex® Bearings**

- Metal-backed bearings with a bonded layer of PTFE and glass fiber, allows for high loads seen in quarter turn valves and actuators



## Body and Bonnet Seals

Our Optiface® seals are ideal for body seals when elastomers cannot be used. With high load springs available, Optiface® seals provide tight sealing down to -320°F. Chemically resistive seal and spring materials meet NORSOK M710, API-6A, and NACE requirements.

## Custom Machined, Molded, or Formed Parts

CDI has specialized in the manufacturing of custom plastic components for valves for over 50 years. Our range of manufactured valve components includes poppets, bellows, diaphragms, and ball valve cavity fillers. Our manufacturing processes include compression molding, melt molding, ram extrusion, melt extrusion, isostatic molding, injection molding, thermoforming, and transfer molding. We also have in-house machining capabilities, so full traceability is maintained from resin to the final part.



# DESIGN AND MANUFACTURING

## Vertical Intergration

### MANUFACTURING PROCESSES

CDI offers a wide array of traditional and modern machining capabilities to manufacture valve parts, from short runs to full-scale production. We offer some of the most extensive molding and manufacturing capabilities in the industry, including:

- PTFE-based compounds up to 110"
- Thermoplastic-based compounds up to 44"
- Assembly and Finishing
- Injection Molding of finished and semi-finished parts
- Multi-Axis CNC machining

## Smart Manufacturing

### INNOVATIVE TECHNOLOGY

CDI's exceptional engineering staff combines material, application, and development expertise to create unique solutions for the most demanding industry problems. Our technical staff optimizes the design and manufacturing process by using state-of-the-art programs such as:

- 3D Solid Modeling (CAD/CAM)
- Finite Elemental Analysis (FEA)
- Mold Flow Analysis (MFA)
- Thermal Analysis (DSC, TGA, DMA, and TMA)

## Real Results from the Field

### Carbon Fiber Reinforced PEEK Material Selected for New Valve Design

Over the past 50 years, CDI has successfully completed a number of projects with leading valve manufacturers and industry innovators. With every partnership and every project, we endeavor to deliver quality components custom engineered and produced with the best materials for the target application.

One of our recent successes had our engineering, procurement, and material development teams working side-by-side with our customer on an ambitious objective. The goal was to redesign one of their most in-demand valves. The timeline to launch - less than one year.

- **Application:** Multi-industry valve equipment built to serve the Oil & Gas, Petrochemical, Industrial, Chemical, and Pharmaceutical Markets
- **Issue:** Manufacturer of High-Performance Valves was tasked to redesign an existing valve with an aggressive 1-year timeline
- **Valve Duty:** Essential that valve delivered reliability, low maintenance, in a competitive cost environment

### Technical Solutions

The first step was to analyze the current production valve and find ways to increase efficiency, reduce cost, and maintain dependability. CDI determined that a big cost driver was the machined PEEK valve seats, which could be replaced with an injection molded seat. The team discussed possible roadblocks like knit line, gate, flatness, and surface finish on the sealing face. A Finite Element Analysis (FEA) was conducted to give CDI's customer the confidence needed to proceed with this project on several smaller size valves. Several prototypes were machined from melt-molded PEEK material which best supported the tight timeline. CDI's objective was to find the perfect balance of tensile strength, thermal stability, elongation, wear, coefficient of friction, and moldability.

### Results

With lower cost molded parts and better performing seat material compared to unfilled PEEK, CDI's Carbon Fiber reinforced PEEK helped its partner meet the stringent time and equipment demands. The new design of the instrument ball valve delivered the quality end-users mandate. The new valve was rated from a broad temperature range and a high-pressure threshold. CDI's Carbon Fiber reinforced PEEK passed all the customer's product requirements, notably the cold and hot temperature thermal cycle testing without leakage, passed high pressure and chemical resistance tests.





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Contact us today for quality products for your most critical Valve applications.

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**Saudi Arabia Manufacturing:**

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Better Science. Better Service. Better Solutions.



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