Composite Technology
for Sealing Elements and Engineered Components
Composite Technology for Sealing Elements and Engineered Components
Fewer Components, Less Complexity

With composite technology the number of single parts in component assemblies, equipment and systems can be reduced so that installation and maintenance become clearly more efficient. Components of diverse materials are connected to create an integrated and reliable molding or shape. Parker Prädifa is a specialist in composite solutions.

New Development Potential Due to Extensive Freedom of Design

Due to the combination of the specific advantages of diverse materials in one component, completely new development potential can be realized. Composite technology makes it possible to achieve complex product geometries and to meet functional requirements in compact, weight-saving and effective ways.

Material Know-how

Parker Prädifa offers a wide range of advanced composite solutions using diverse material combinations such as rubber/plastics, rubber/metal or plastics/plastics. Parker Prädifa's expertise in engineered materials and manufacturing technology enables innovative solutions.

An Unbeatable Double: 2-Component Rubber/Plastics

Beneficial for humans and the environment as well as durable and cost-efficient are 2-component rubber/plastics direct composite solutions. They do not require primers and make it possible to substitute metals by plastics.

Composite Technology Has Strong Selling Points

Reliable Performance
- The stabilization of small and delicate parts improves handling
- Reduction of potential assembly mistakes
- Reduction of potential leakage due to connected seal geometries
- Avoidance of parts loss in sub-assemblies during installation and subsequent use

Tolerance Aspects
Reduction of tolerances due to
- Smaller number of parts
- Stabilized seal geometries within the assembly

Space Savings
Reduction of the required assembly space
- Compact design
- Smaller number of components

Cost Benefits
- Reduction of assembly costs due to dimensional stabilization of the soft component/seal geometry
- Lower maintenance, warehousing and logistics costs due to reduction of parts diversity
- Reduction of quality costs due to higher process stability
- Substitution opportunity, e.g. of metal by plastics

With composite technology the number of single parts in component assemblies, equipment and systems can be reduced so that installation and maintenance become clearly more efficient. Components of diverse materials are connected to create an integrated and reliable molding or shape. Parker Prädifa is a specialist in composite solutions.
Plastics Instead of Metal

Less Weight, No Corrosion

Rubber/metal combinations have proven their viability in many applications, especially since metal can be combined with a large number of rubber grades. The problem: Metal is relatively heavy, prone to corrosion and always requires a primer system and thus additional process steps and technical equipment. In addition, the manufacturing process entails solvent emissions which, for environmental and health reasons, require special precautions such as extraction systems.

In contrast, rubber/plastics combinations have benefits such as lower weight and no risk of corrosion. Above all, however, they enable manufacturing solutions without the use of primers. As a result, production complexity, parts price and weight can be significantly reduced and durability enhanced – and the environment benefits as well.

Whether or not an optimization of your sealing element or engineered component is possible by substituting metal depends on the desired technical characteristics. Parker Prädifa’s experts are ready to assist you with relevant advice at any time.

Less weight, no corrosion and no need for bonding systems – there are a number of arguments that speak for substituting metal by plastics. Particularly for new development projects, it pays to consider the option of using plastics instead of metal as early as in the design stage.
Know-how Connects
Materials, Design, Processes

With comprehensive expertise in product design, materials and the related process and manufacturing technologies Parker Prädifa develops efficient and reliable composite solutions.

Parker Prädifa uses “classic” methods to achieve form-fit and direct adhesive connections using primer systems, as well as forward-thinking, eco-friendly and cost-efficient methods of direct adhesive connections that require no primers and make it possible to substitute materials.

Like all technologies, each of these methods has advantages and disadvantages which must be weighed against each other.

For the development of solutions delivering dependable performance and long service life, and for reliable manufacturing processes, extensive expertise in materials, engineering design and process technology is indispensable.

Materials
Know-how in joining specific materials and material combinations

Design
Engineering know-how (Joining of thin-walled components, consideration of undercuts, etc.)

Processes
Current and future challenges to be met by the joining processes

Component
Current and future requirements regarding the characteristics of joined components
Joining Technologies

**Form-fit Connections**

Purely mechanical connections by means of undercuts, locking, linking, press-fit, etc. Suitable for components in applications with low demands made on the composite’s strength, e.g. for shipping or installation of components.

**Benefits**
- Possible combination of all – even chemically incompatible materials
- Possible optimization of the composite by plasma activation

**Adhesive Connections – with Primers**

Direct composites of diverse materials using primers. The chemical bond is largely independent of the combination materials used such as rubber/metal or rubber/plastics. This technology requires respective equipment such as spray booths or extraction systems.

**Benefits**
- High composite strength
- Flexibility of the material combination
- Possible optimization of the composite by plasma activation

**Adhesive Connections – without Primers**

Direct chemical composites of diverse materials with compatible material combination such as rubber/plastics, plastics/plastics.

**Benefits**
- Cost benefits in the manufacturing process due to elimination of primer
- Possible substitution of metal by plastics
- Eco-friendly
Parker Prädifa’s materials portfolio offers numerous materials that are suitable for the various joining technologies. Together with you, our application engineers will examine and evaluate the demands to be met by the component and the parts to be joined, and select the materials and manufacturing technologies best suiting your project in terms of reliability, durability, cost efficiency and eco-friendliness.

The chart shows an overview of typical combinations: rubber/metal, rubber/plastics and plastics/plastics which Parker Prädifa offers as direct composite solutions.
Process Technology

In addition to conventional composite solutions, Parker Prädifa offers process solutions without primers that provide clearly superior cost benefits. In this context, 2-component rubber/composite technology will become increasingly important in the future.

Rubber/plastics composite components without primers are produced in a one-step or two-step process, depending on the requirements profile. Compared to the joining technologies with adhesive systems, both offer the specific advantage of being eco-friendly and, due to the elimination of process steps and technical equipment for primer application and environmental and health protection, offer attractive cost benefits. Quality assurance includes the option of dimensional checks using AOI (Automatic Optical Inspection).

2-Component Manufacturing Process without Primers

Two-Step Process

- Process step 1
  - Rubber compound
  - Injection molding
  - Intermediate storage
  - Vulcanization
  - Deflashing
  - Inspection

One-Step Process

- Process step 1
  - Rubber compound
  - Plastics granulate
  - Injection molding/Vulcanization
  - Deflashing
  - Inspection

Benefits

- Enables more complex part geometries compared to one-step process
- Suitable also for medium manufacturing volumes

Challenge

- Requires precise coordination of design, material volume and temperature

Processes at a Glance

<table>
<thead>
<tr>
<th>Process</th>
<th>Process reliability</th>
<th>Complex part geometries</th>
<th>Composite quality</th>
<th>Price benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form-fit</td>
<td>★★★★</td>
<td>★★★</td>
<td>★★</td>
<td>★★★★</td>
</tr>
<tr>
<td>Primer</td>
<td>★</td>
<td>★★★</td>
<td>★★★★</td>
<td>★★</td>
</tr>
<tr>
<td>Direct composite one-step</td>
<td>★★★★</td>
<td>★★★</td>
<td>★★★★</td>
<td>★★★★</td>
</tr>
<tr>
<td>Direct composite two-step</td>
<td>★★★★</td>
<td>★★★</td>
<td>★★★★</td>
<td>★★★★</td>
</tr>
</tbody>
</table>
Versatile Applications

Due to its large selection of materials and possible combinations, Parker Prädifa is able to produce 2-component products for numerous applications in diverse markets.

- Housing components with static sealing functions (also conforming to relevant IP Codes)
- Housing components with rotating shafts
- Functional elements for translatory motion
- Sealing elements with positive-/non-positive-locking retention
- Dimensionally stable carrier plates with sealing function
- And more

Product examples
These products can expose you to chemicals including carbon black (airborne and extracts), antimony trioxide, titanium dioxide, silicas (crystalline), di(2-ethylhexyl)phthalate, ethylene thiourea, acrylonitrile, 1,3-butadiene, epichlorohydrin, toluenediisocyanate, tetrafluoroethylene, ethylene, formaldehyde, furfuryl alcohol, glass fibers, methyl isobutyl ketone, nickel (metallic and compounds), lead and lead compounds which are known to the State of California to cause cancer; and 1,3-butadiene, epichlorohydrin, di(2-ethylhexyl)phthalate, di-isodecyl phthalate, ethylene thiourea, methyl isobutyl ketone, methanol, toluene, lead and lead compounds which are known to the State of California to cause birth defects and other reproductive harm. For more information go to www.P65Warnings.ca.gov.