Ashtabula Rubber Co.

DESIGN • PROTOTYPING • PROJECT MANAGEMENT • GLOBAL MANUFACTURING & SOURCING

Choosing The Right Elastomer Formula

Most Engineers understand the need for rubber components within their product design. In many cases, engineers supply Ashtabula Rubber with dimensional drawings because they know exactly what they want and what works. However, on occasion, projects do come up where expertise involving subtle points of rubber component design and rubber formulation. When this happens, Ashtabula Rubber is often called on for assistance. One of the most common oversights we find in the specifications involves the elastomer formula.

For example:

An automobile engineer needs a simple rubber seal on a gas tank to prevent leaking. In addition, the component must last four years before replacement. Knowing the exact dimensions of the component, a decision needs to be made about the type of rubber to use. After researching different types of elastomers, the engineer found that nitriles offer good fuel resistance. The engineer specifies a nitrile lathe cut part that is purchased and installed for testing. Within 10 minutes of installation the part has "ballooned" up and lost all the physical properties that it once had.

Choosing the right elastomer formula is essential when designing a rubber component. There are several questions about the component environment that must be answered to ensure the right material is chosen. Does it contact fluids? If so, what types? What temperature range will the part be subjected to? What is the expected life of the component? What is the target cost? Our engineers must know the answers to these questions to design the most effective component at the lowest price.

In the above situation, the engineer's thinking was correct, but lack of knowledge about nitrile compounds led to a failed component. Although nitrile offers good resistance to gasoline, not all nitriles are created equal. The engineer found out the hard way that some nitrile formulas actually absorb gasoline causing the component to swell, diminishing its physical properties.

This is the type of situation that we want our customers to avoid. Ashtabula Rubber has recently worked on two different material development projects where the existing material did not meet field performance requirements. We were asked to provide a solution.

1) A large manufacturer of latches and fasteners approached us about a hood strap that would be used for off-road vehicles. The current fastener was subjected to forces that caused the hood of the truck to vibrate. Ashtabula Rubber was asked to provide a rubber hood strap with a higher "pull force" to minimize noise and vibration for off-road conditions.

2) A heavy-duty truck brake system manufacturer asked us to design a new rubber spring. Although the old spring was working well, newly designed braking systems would subject the component to higher temperatures. The customer needed us to design a rubber spring with the same dynamic performance that would also maintain its properties in temperatures that climb as high as 250 Degrees Fahrenheit, as well as last for at least 500,000 miles. By working closely with our customer's design engineers and understanding the details of the application environment, Ashtabula Rubber quickly supplied prototypes of three alternative materials.

Rubber component material specifications are intended to reflect the environment in which the part will be operating. However, in practice, a standard laboratory test may not fully represent field conditions. Although a component may be required to address a particular set of factors, other problems can arise that an engineer may not foresee. In short, the desired performance of a rubber component as reflected in a material specification does not necessarily mean optimum performance in the field.

A recent example involves a compression seal for a train control system. The currently supplied seal (not ours) met print material specifications. However, in the field under certain conditions at low temperature (-50 Degrees Fahrenheit) the seals leaked. Because of Ashtabula Rubber's knowledge of materials and application environments, we were able to formulate a new material that met specifications and eliminated the low temperature leak problem.

Finally, one aspect of the formulation that is equally important is a compound's ability to be processed. A material with a low viscosity flows well, making injection molding a good process to use. A higher viscosity compound lends itself better to compression molding. The geometry of a component may favor one process over another. For instance, rubber to metal bonded parts are best made by transfer or injection molding. With the ability to process rubber through injection, transfer, and compression molding, we are always able to find the best solution to our customers component needs.