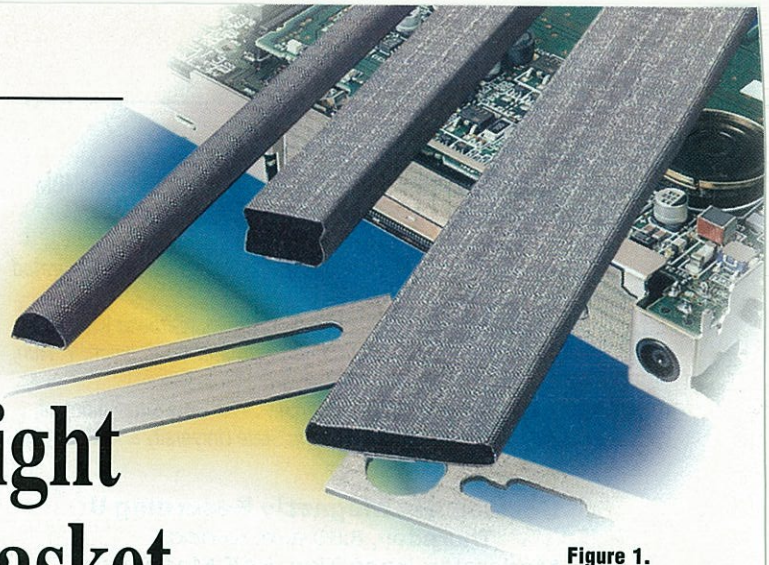

Choosing the Right EMI Shielding Gasket

Figure 1. Conductive Fabric-Over-Foam Gasket

by Ray Borgersen, Tecknit

In choosing the most effective EMI shielding gasket for products such as telecommunications equipment, computers, and automotive and medical electronics, often you can narrow the selection to three options: conductive fabric over foam, conductive elastomers, or beryllium-copper (BeCu) strips (fingerstock). Depending on the product's needs, these solutions provide varying EMI protection, intricacy of forms, and environmental protection.

Several factors must be considered when designing EMI shielding into products:

- Form, referring to the complexity of the form or pattern in which the gasket fits.
- Mechanical durability.
- Attenuation level. Most commercial applications typically require 60 to 100 dB but can go as high as 120 dB.
- Compression. Most commercial applications require low closure force. Compression force has the greatest effect on conductive elastomer shielding characteristics. Since they can be loaded with relatively low- to high-conductivity filler materials, conductive elastomers supply the widest range of shielding effectiveness.

BeCu strips and conductive fabric-over-foam gaskets are not affected as much by compression forces. As a result, they offer a narrower range of shielding capabilities. See **Table 1** for a comparison of typical shielding effectiveness for foam over fabric, elastomers, and BeCu strips.

- Galvanic compatibility between the gasketing conductive material and substrate metal. This avoids creating a galvanic cell, which can lead to corrosion.
- Environmental sealing from water, dust, and similar external substances.

Other selection considerations include cost, service life (cycles, actuations), tolerances, and mounting methods such as fastener types and adhesives.

Conductive Fabric Over Foam

Conductive fabric over foam makes sense where no environmental seal, complex profile, or demanding mechanical durability is needed (**Figure 1**). It can be the lowest-cost option.

The covering can consist of nylon thread coated with conductive metals woven into a fabric and wrapped over a soft urethane foam. Alternatively, a woven fabric may be metallized with nickel-copper or other metal coating, then wrapped around the foam core.

Flexible, conformable fabric over foam maintains close contact with surfaces with minimal compression for low-closure-force applications. It provides snug contact over irregular surfaces and around bends and corners, making it good for electronic enclosures such as doors and access panels.

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The choices are many, but the solutions explored in this article can help you zero in on the most effective shielding gasket for your product.

Gasket Type	Typical Shielding Effectiveness (10-kHz to 10-GHz Range)
Conductive Fabric Over Foam	80 to 115 dB
Conductive Elastomers	40 to 120 dB
BeCu Strips	75 to 120 dB

Table 1. Comparison of Typical Gasket Types

Less demanding EMI applications include grounding contact pads in cell phones and laptop computers. Fabric-over-foam gaskets also can shield the input/output backplane of laptops and PCs.

The manufacturing process limits it to relatively simple cross-sectional profiles such as squares, rectangles, and D-shapes. When a more complex profile is necessary, fabric over foam may not be the best solution.

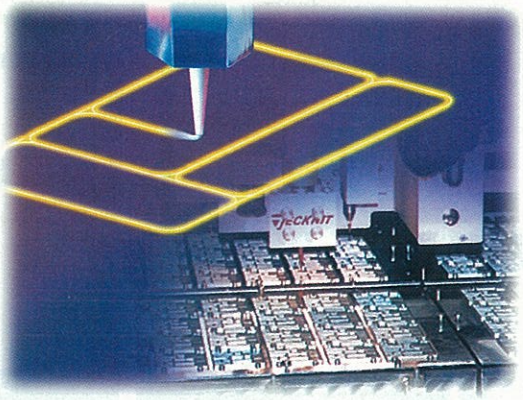

Figure 2. Robot Dispensing Conductive Elastomer

Conductive Elastomers

For more demanding shielding applications, conductive silicone elastomers provide a wide range of attenuation capabilities plus environmental and moisture sealing. The metal-filled elastomers can be extruded or molded into a wide range of form-fitting shapes and cross sections.

For very small cross sections, a formed-in-place silicone-based silver-copper-filled or nickel-graphite-filled conductive elastomer is dispensed robotically (**Figure 2**). The robot can deposit the elastomer on a surface as narrow as 0.025 to 0.030 in.

Readily disposable stainless steel solves environmental problems, yet provides comparable shielding effectiveness at prices similar to BeCu.

Conductive elastomers are filled with a range of materials, from silver (highest conductivity) to carbon. Carbon-filled elastomers, having the lowest conductivity and cost, serve applications requiring low shielding levels. Other filler materials include nickel-coated graphite, silver-plated glass, silver-plated copper, and silver-plated aluminum. Nickel-graphite is the most popular for commercial applications because of good cost/performance attributes.

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