Engineers' Notebook:

As Two-Piece Isolators, Bushings And Rings Solve Many Assembly Problems

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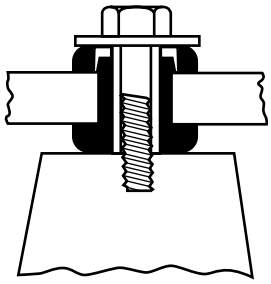
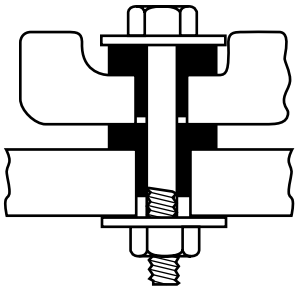
Rubber or plastic isolators, such as grommets, washers or bushings, provide a relatively inexpensive, off-the-shelf way to control vibration in equipment containing fans, motors, actuators or other mechanical devices. For example, by using a small elastomer donut to make a "soft" connection, it is possible to stop the cooling fan in a notebook computer from transmitting its vibrational energy to other components or to the ABS shell.

Figure 1



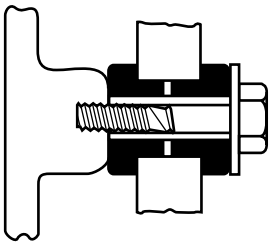
Ring & Bushing

Figure 2



Double Bushing

Figure 3



Double Bushing

A two-piece isolator—or ring and bushing—provides an ideal solution when the thickness of the mounting area varies from case to case or if it does not match the dimensions of any of the standard grommets that are available. In some applications, particularly those involving hand assembly, a grommet that "comes apart," each piece installed from opposite sides, may be easier to insert than a one-piece grommet. Generally, an elastomeric one-piece grommet is preheated, to increase pliability and ease the installation process.

In many cases, a ring-and-bushing combination presents more fastening flexibility, by making the connection "adjustable." The ring can be positioned anywhere along the length of the bushing's shank. (Figure 1.) There is also the option of using two bushings for the installation, either shank-to-flange (Figure 2) or shank-to-shank (Figure 3).

As with one-piece grommets, design engineers will need to calculate the load per isolator and the expected operating temperature, before they can choose the geometry of the bushing and the material from which it will be molded. They also must identify the specific vibration frequencies that need to be isolated. A component vendor can help identify these factors to select the most effective isolator for the application.

If an isolation problem entails a single, predictable vibration source, an isolator molded from virtually any elastomeric material will decouple the source from

its environment and stop the transmission of vibration energy. If, however, there are several energy sources, including devices that start and stop or cycle through a series of functions, shock impulses must be addressed, as well as vibration. In that case, an elastomer with damping capabilities can both provide a "soft" connection and effectively absorb and dissipate potentially damaging shock energy.

E-A-R Specialty Composites offers several styles and sizes of rings and bushings molded from the company's proprietary ISODAMP®, ISOLOSS® and VersaDamp™ lines of damped elastomers.

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