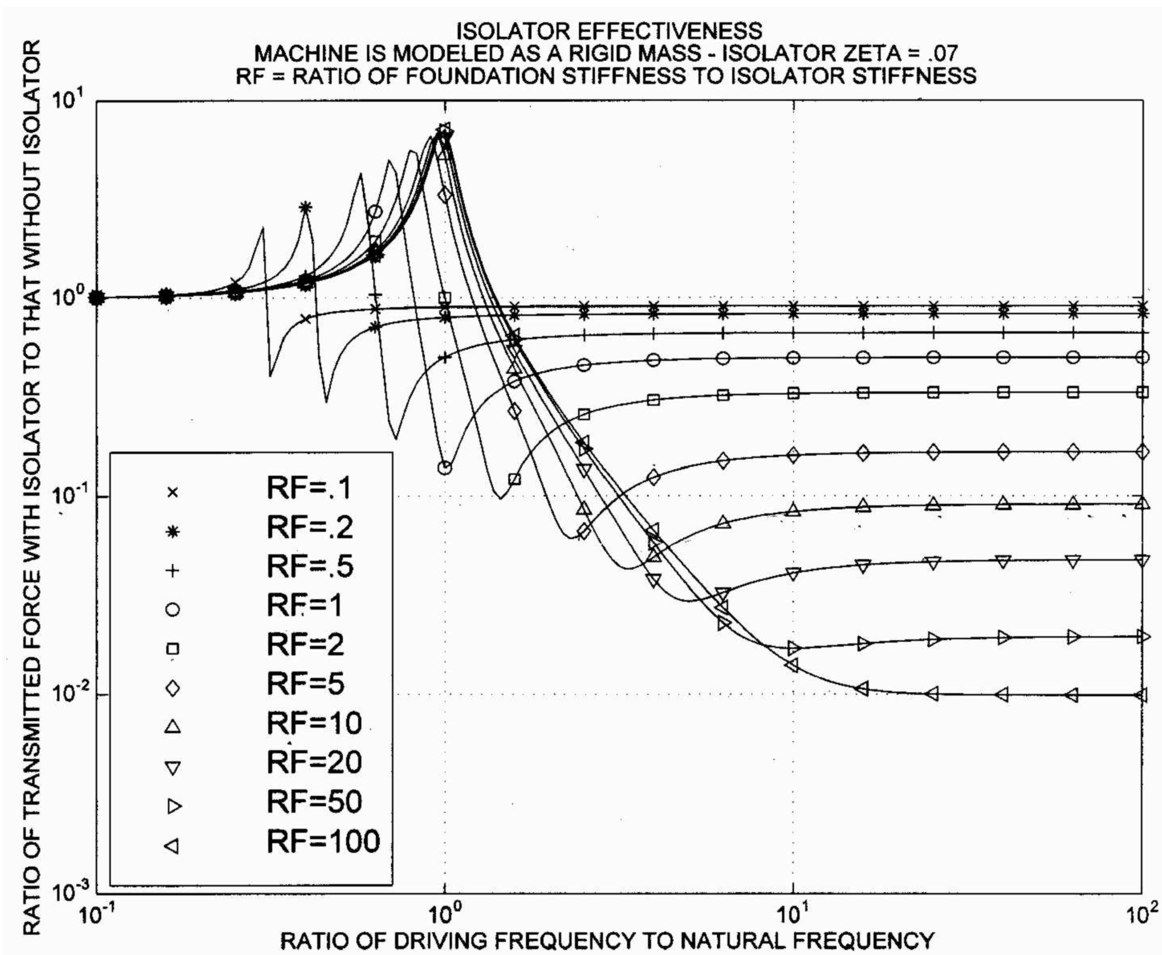
Q: Are the stiffness characteristics of the structures surrounding the isolators important?

A: Absolutely. The interaction with the support structures must be considered for an isolation system to work properly. Assumptions made with regards to the isolation system for basic analyses are:

- The supported item is a compact, rigid mass.
- The isolator is an ideal massless spring.
- The foundation or supporting structure is an infinitely rigid mass.

In reality, all the structures have finite stiffness and are springs in series with the isolators. If any of the structures are too soft, or low in stiffness, the isolators will not perform as expected. If the structures are soft enough, they will essentially work as the isolators.

The following chart (Figure 1) shows the effects of structural stiffness on isolation system performance:



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RF is the ratio of the foundation or structures stiffness to that of the isolator. A very low value, like RF = .1, produces a response through the isolator that is nearly the same as the input. In other words, the transmissibility is nearly 1 for the entire driving frequency range, and the isolator has little or no impact. As structural stiffness and RF increase for a constant isolator stiffness, isolation efficiency improves and approaches ideal theoretical levels. RF = 100 is close to ideal theoretical.

A practical rule to follow is to ensure that all structures are at least 10 times isolator stiffness.

This is enough to prevent isolator performance degradation, but not so much to add high cost and weight to the system. Note that RF = 10 achieves transmissibility less than 0.10 or better than 90% isolation. The best situation, RF = 100, will only approach 99% isolation