BARRY CONTROLS

DEFENSE & INDUSTRY
Antivibration

Helpful Hints for Completing the
Barry Controls Engine Isolation Data Analysis Form

The Engine Isolation Data Analysis Form is mostly self explanatory. Other than the general information from the top section, it is primarily focused on eliciting powertrain component weights and dimensions in the three orthogonal axes.

It is also eliciting CG and isolator locations in the three orthogonal axes with respect to a common origin. We use the popular convention for powertrains of taking all feature locations from the crankshaft centerline and the rear face of the engine block.

Following are explanations on the more complex aspects of the form:

- If your feature is on the opposite side of the dimension shown, enter negative values. For example, your bell housing mounts are 2" below the crankshaft centerline. We show mounts on the bell housing as above the crankshaft centerline. So, enter '-2' in the Z1cell.

- If a feature is not needed, enter 'NA' or a dash in the appropriate cell. For example, if you do not include a rear most "tail stock" isolator, enter 'NA' or '-' in the X5 and Y2 cells.

- If you only use a single mount at the front or rear, enter '0' in the appropriate cell. For example, if you use a single front mount, enter '0' in the Y1 cell.

- When mass moments of inertia (MMoI) are not known, overall dimensions of the primary powertrain masses (i.e. engine, transmission, generator, or pump) must be included so we can calculate MMoI by modeling them as simple geometric shapes (e.g. rectangular blocks or cylinders). These calculations assume homogeneous distribution of mass within the geometry, so they are estimates only and typically not as accurate as measured MMoI's or MMoI's calculated from more sophisticated models.

When your package is significantly different from the simple schematic included on our form, feel free to use sketches instead or as supplements. Two common examples include asymmetrical spread of the Rear mounts and when the rear accessory CG off axis. You can also provide your own spreadsheet of data using our form as a guide

Be sure to include units of measure.

From this information, we can calculate load distribution on the isolator and the six degree of freedom natural frequencies and mode shapes using proprietary software.

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Identifying the make and model of the engine or transmission is useful because it enables us to include descriptive comments in the analysis files to document the powertrain system being analyzed. This is especially important if multiple powertrain configurations are being analyzed. It also gives us the opportunity to double check the mass properties provided by comparing to historic data that may exist from prior analyses.

The information about the number of cylinders, operating speed range (especially idle speed), and engine type (2-stroke or 4-stroke) is critical for understanding the primary disturbing frequencies that the isolation system will need to address. Firing order is important for engines that are not inherently balanced and may have 1st order or 2nd order disturbances to be considered.

If the powertrain components have substantial fluid capacity (oil, coolant, hydraulic fluid) that can affect the mass properties, it is important to document if the values provided are “wet” or “dry” weights.

It is always helpful if information about the end-product is provided so we can consider other factors that may be relevant to isolator selection besides isolation performance. For example, is the powertrain used in a piece of stationary equipment or is it vehicle mounted, is it intended for on-highway or off-road application, does the powertrain have a belt power take-off going across the mounting system, will the isolators be required to react powertrain torque (especially if multiplied by gearing), are there any special environmental factors to consider?

What is the intent of the analysis?

- Is this a new mounting system design? Are the mounting locations fixed or are you open to suggestions for moving them if improved performance results?
- Is this an upgrade or fix to an existing mounting system? If so, what isolators are currently used and what issues are you trying to resolve or what aspects are you trying to improve?

If there is a specific style of isolator that you would like to have considered for your application, Barry Controls can usually evaluate them. For example, if there is an isolator design currently being used for this powertrain or a similar powertrain that you are happy with, or unhappy with, it can help guide us toward or away from specific isolators based on your experience or history. Is this a new mounting system design or an existing mounting system that has issues that are trying to be resolved?

For additional information, please see our technical paper on isolating internal combustions engines on our website at:

http://www.barrycontrols.com/uploads/tech/IsolatorsInternalCombustionEngines.pdf