

Is Automotive Sound Quality Just in the Ear of the Beholder?

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For quite some time we have been hearing about 'quality' and 'quality vehicles.' So I thought that now may be a good time to talk about this. Recently, however, I have also heard "I need this done immediately . . . , if I could have waited until tomorrow, why would I have come to you today? . . ." What does this mean? Do we have to put aside everything we were doing at that moment and take on a new task just because it is needed immediately? This is becoming the lingo in the automotive industry. I am not sure that this gives a good impression of the planning and organizational skills of the user group, or perhaps it is just beating on the supplier group. Neither am I sure whether this provides the quality that might be required.

The first thing we need to question is "what is quality?" Some people define quality as "we say what we do and we do what we say." This may be true as long as we keep thinking in a positive sense. However, quality should indicate how good a product we have. To achieve a quality product, we not only need to have a positive objective, but we also need to plan it properly and have the correct focus and interest.

Here are a few thoughts that come to mind immediately. About 15 years ago, journalists from the *Wall Street Journal* came to Detroit to interview people to understand what was happening in automotive acoustics, what was the game plan and what was the future of North American car companies. One of the answers they got was that the goal was to manufacture vehicles so that the noise perceived by the consumers will be like listening to music. Well, that may be an artistic viewpoint. In real life, the acoustics of North American passenger vehicles are superior to their counterparts of 15 years ago. But when these vehicles are judged for acoustic performance, they are compared with their competitors from overseas and not necessarily with other North American car companies.

An automobile is a very complex product. There are numerous individual components

that are assembled to build the vehicle. There are many places where we can make mistakes unless we are careful. There are several factors involved in developing a new vehicle. Some of these are:

- The market for a new vehicle.
- Knowledge of the competitors.
- Competitive products and consumer expectations.

We benchmark different competitive vehicles during development of a new product. We objectively and subjectively quantify the acoustics of competitive cars. We tear them apart so that we can evaluate individual components and understand reasons for their selection and their effectiveness.


To end up with our quality vehicle, we establish targets. Initially, we set a global target or a total vehicle target. After this, the challenging tasks begin. From the vehicle-level targets, we have to roll down to component and individual targets. If the roll-down targets are not developed correctly, we will not succeed. As a result, setting appropriate targets is critical. But we need to make sure we do the job correctly so we can meet these targets. If we do not start the work correctly, we will not be able to finish it correctly either. We need to be realistic and yet optimistic. In other words, we need to know our limitations, and know how to go about building a quality vehicle. We need to know that what we design on the drawing board we will be able to implement in assembly; otherwise we may not have the best results.

Looking at this from a global perspective, one would find that the design philosophy for building the car from one continent to another is different. This is understandable to some extent, based on the country, the environment, socio-economic conditions and the culture. We used to build cars in North America that emphasized mostly styling and speed. The more speed you want, the more powerful the engine needs to be. Therefore, the engine is likely to generate more noise. If the engine is going

to be noisy, we need to address this issue at the beginning so that the end product is a subjectively pleasing vehicle. In Europe, automobile companies build vehicles where they emphasize durability so the vehicle will last for a long time. The Asian automobile companies design vehicles that can be built and marketed in North America. To do so, they make their vehicles more durable, performance competitive, acoustically pleasing and more streamlined in the manufacturing process. In many ways they have won customer satisfaction.

We often do a root-cause analysis to understand problems. This allows us to go through a systematic approach to find out why there is a problem and how to eliminate it. In extending this to the development of a quality vehicle with high customer satisfaction, we need to look at the problem as follows:

- Identify and rank all noise sources and paths in a vehicle.
- Realize that often a noise problem is associated with multiple sources and paths. Therefore, we need to group individual sources and paths as primary, secondary and tertiary noise sources and paths in the vehicle.
- Address these groups one at a time, starting from primary sources instead of just addressing a source or a path that has the highest noise level.
- Focus on details, but do not lose sight of the global objectives.
- Recognize our limitations and be careful in making decisions. Should we try to make many changes all at once or just change a few items at a time? Evaluate the expected results of both strategies.

The important thing is: whatever we do, we need to do a thorough job. This is critical to developing an acceptable vehicle. If we fail, there are usually good reasons. When we succeed, we can credit good planning and execution. 

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