DESIGN IMPROVEMENT THROUGH ENHANCED PROCESSES AVAILABLE WITHIN NVH CONSOLE

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ABSTRACT –
Motivation:
The challenges faced by an analyst during the procedure of improving a design with respect to NVH are multiple. As many as possible "what-if" studies need to be conducted and when these are related to a complicated and large model as the full vehicle is, then the time needed is considerable. Reduced modelling is a means to increase performance but this in turn, adds complexity and the process becomes more prone to errors. On the other hand, it is often the case that the outcome / conclusions of these studies are not easy to fully comprehend or to materialise them by applying a modification to the model. For example, the result of a Transfer Path Analysis could indicate that a particular Noise Transfer Function is mostly contributing to the total noise but this information is difficult to exploit. It would be more beneficial if there is an indication of which structural transfer function that can be easily changed (i.e.: by adding a rib) is the one that will bring improvement to the total response.

Solution:
The above considerations led BETA CAE Systems to the development of the NVH Console, an integrated suite for multi-component NVH analyses which is embedded in ANSA and allows rapid design improvements as “what-if” analyses with respect to NVH modelling techniques by minimal computational efforts. Functionality of this tool is now further extended towards providing more tangible feedback to the analyst who can be easily realized as a design modification. Moreover, the easy creation and handling of superelements along with the direct output / submission of the full assembly enable the usage of Nastran for "what-if" studies as an alternative to the FRF Assembly methodology of μETA.
The new capabilities of the NVH Console will be described through a case scenario that involves the implementation of targeted countermeasures for NVH issues. The “what-if” study capabilities of the NVH Console and especially the TPA analysis in combination with the innovative path stiffness analysis method provided by μETA helps to isolate first the most contributing component and then to identify the transfer path that should be modified. Based on those findings, the analyst can apply reinforcement methods, which are provided in NVH Console and re-assess quickly the results without the need to run the solver again. In a next step, those proposals can be translated in targeted FE design modifications directly in ANSA, this being the direct result of the tangible indication provided by the path stiffness analysis. After validating that design improvement, the respective component is reduced to a superelement. In this way, its footprint to the solving time is minimised and therefore, the analyst can focus on other components for further improving the behaviour of the full assembly but this time by running Nastran itself. However, in this case the handling of the superelements and the output / submission of the full assembly to Nastran is automated and streamlined by the NVH Console. Run-time checks are conducted (i.e.: dependency checks, entities integrity, etc.) and in cases where problems are encountered these are either solved real-time or, if this is not possible, the process stops and the user is notified. Thus, significant time saving is achieved and errors are avoided, enabling at the same time the conductance of more "what-if" studies.