TORAY Toray Engineering D Solutions Co.,Ltd.

Customer's Voice

"Toray Group's development and support system supports our manufacturing culture. This is the reason why we continue to use 3D TIMON™."

Denso corporation Mr. Shigeru Akaike

Denso, a global supplier of automobile parts, has been working on resin warpage analysis by CAE since the 1990s in order to ensure the manufacturing quality of resin parts. We asked Mr. Shigeru Akaike from Denso, who has been leading the introduction and development of digital engineering by CAD, CAM, and CAE, about the background of the introduction of Toray Engineering D solutions's(TDS's) resin molding CAE "3D TIMON™" and the reason for continuing to use it.

Contents

-What are the current challenges in resin molding?

Our resin parts in various automobile systems are used everywhere, such as HVAC, heat pumps, and bus units. The difficulty in their development is to predict the deformation of the resin after molding, in another word, the "warpage". In order to ensure manufacturing quality, we design with reference to prototypes and improve the mold and molding process, but such work requires considerable labor and cost of course. In order to deal with these problems and, by extension, to shorten the design lead time, we have been working on warp analysis with CAE since the 1990s.
However, the difficulty of resin molding is only increasing. The number of in-vehicle systems increases and it limits spaces for resin part, and a high level for further miniaturization of resin parts is necessary to solve the conflicting requirements of "smallness / thinness" and "strength" at the same time. In addition, the scope of application of resin parts has expanded to automobile bodies. There is an urgent need for us to acquire new technologies and knowledge through CAE to meet these demands.

-What made you pay attention to 3D TIMON™?

The decision to introduce 3D TIMON™ dates back to 2000. The direct reason was that the developer of the CAE software that we had been using was acquired in the latter half of the 90's, and we could not receive the functional improvement and support that we requested. This was a big disadvantage for us. The molding with resins is difficult due to their high viscosity and elasticity, and the degree of warpage changes significantly in slightly different environment, even if resin same resin is used. And, there will be a difference in deformation depending on the quality of the design and the type of parts. Under these circumstances, if we were to aim for more accurate predictions, we thought that it was essential to implement our development concept and manufacturing method, the culture as a manufacturer in CAE, but that was no longer possible.
We have started to consider which alternative CAE software we should use. One of the candidates was 3D TIMON™.

-What is the key factor for introducing 3D TIMON™? Why is it being used continuously?

The key factor in our decision was that TDS promised to respond positively to our requests for functional improvements. I think that stance has not been changed until now. The use of CAE at our company are now expanding not only to the production engineering department that performs CAE analysis, but also to the product design department that is in charge of design and the manufacturing department that is in charge of on-site manufacturing. In order to understand the diverse needs for improvement of such a wide range of operations, we regularly hold technical exchange meetings where TDS and representatives of each department exchange opinions.
In the meeting, we discuss functional improvement based on gathered our voices such as, "I want to see the flow of resin when long fibers are added as well as short fibers," from Production Innovation Center, and "I want this kind of display from a different angle." from Manufacturing Department. Although improvements of one by one may be small, it is important that they are instilled and used in the every work place. The high independent development ability to certainly implement improvements is the one of the reason why we do not shift to other CAE software.
Another reason for using 3D TIMON™ is that TDS is a Toray group company that is familiar with plastics materials. When analyzing with new materials, it is necessary to investigate the characteristics of the materials, but Toray has a lot of expertize of various plastics materials and possesses with highly accurate data. It is possible to test quickly and accurately by referring the data.

-What are the results of the introduction?

By accumulating functional improvements through the technology exchange meetings, our manufacturing culture is embedded in 3D TIMON™, and the analysis accuracy of simulations is continuously improving. As a result, rework due to molding defects has been reduced, the saved up both man-hours and costs were used in various activities aimed at further improvement of manufacturing quality.
Of course, in order to improve the analysis accuracy of CAE, it is essential that the user masters the CAE software and has a deep understanding of its characteristics. In that point, TDS's generous education and supports were very helpful not only in introducing 3D TIMON™ but also in disseminating the latest knowledge at production site. It would have been difficult for us to achieve such results without them.

-What do you expect from 3D TIMON™ and Toray Engineering S solutions's in the future?

In molding process with resin, there are still a lot of unclear things such as the peculiar flow. It is often difficult to verify it with the actual product in terms of labor, cost, experimental method, etc., but we can try it more easily with CAE simulation. We are currently working on AI analysis of the enormous amount of analysis results obtained by CAE, and have already reached the point where we can achieve certain results. Based on this, we are currently planning to implement AI functions in 3D TIMONTM in collaboration with TDS.
Customization of 3D TIMON™ will continue in the future, but I would like to ask TDS for generous support that is closer to users more than before.

Contact Toray Engineering D Solutions
→ URL : https://www.3dtimon.com/en