

A Study on the Development of Automotive Front Lower Arm by Using Hybrid Manufacturing Process

¹ So, Sang-Woo*, ¹Kim, Jae-chul, ¹Hwang, Hyun-Tae, ²Kim, Dong-ok, ³Lee, Jong-Hyun

¹Ulsan Techno-park Automotive Parts Innovation Center, Korea,

²Korea Automotive Technology Institute, Korea

³Seo-jin Industrial co., Korea

KEYWORDS – Hybrid Lower Control Arm, Casting, Press Stamping, Durability, Buckling

ABSTRACT - This paper presents an investigation on the mechanical characteristics of automotive front lower arm by using hybrid manufacturing process, and verifies the properties of tryout method in fabricating casting for front lower arm.

Recently, although there have been many researches for assembly through hybrid materials, those are still not enough to apply into production. To increase the competitiveness of the automotive industry, front lower arm with the ultra-lightweight, high-intensity, and environmentally-friendly manufacturing technology should be developed. To make the automotive front lower arm competitive, the development of lower arm parts is required along with the optimized cast node. Most of the domestic front lower arm is manufactured by the press method which makes upper panel and lower panel by press stamping before welding two pieces. The lower arm is the important complementary parts which is mounted on the cross member and knuckle, and reduces the impact from the ground.

Ahead of beginning this study, benchmarked some foreign production methods as a precedent research and the production method is in correspondence with the front lower arm design.

This research is aimed for parts upgrade with hybrid technology. In case of a successful research, it will be applied to be front sub-frame, rear cross member and other chassis parts as well as front lower arm and contribute to the lightweight automotive parts and the improvement of technology.

The tryout is corresponded with front lower arm test method and the research of test method to achieve the reliability of parts combination through hybrid materials. By means of the development of the hybrid lower arm for automobiles, the 20% of weight reduction has been achieved compared to that of steel parts. And after completing the product design, it was verified by analysis and simulations of structure, durability, buckling, In this result, the real evaluation test proved of the analysis and tests by the final performance test in comparison with the current parts, through the tryout.

Therefore, the purpose of this study is accomplishing the ultra-lightweight hybrid front lower arm by generalizing the skills in the front lower arm field and lightweight-reduce field where have been studied sporadically until now.