

PARAMETRIC SHAPE OPTIMIZATION OF VEHICLE BODY FOR WEIGHT REDUCTION AND STIFFNESS IMPROVEMENT

¹Joanna Rakowska, ¹Behrooz Shahidi, ²Sunil Earla[^], ²Ravi Nimbalkar, ²Vasanth Gandhi

¹FORD MOTOR COMPANY, Dearborn, MI, USA

²BETA CAE SYSTEMS, Farmington Hills, MI, USA

KEYWORDS – Ford Motor Company, Parametric Multidisciplinary Shape Optimization, ANSA

ABSTRACT – Designing a vehicle body involves satisfying multiple, often conflicting requirements. Optimization is a way to develop a weight efficient design that also optimizes vehicle performance with regard to attribute targets. This paper presents a real world application of the shape optimization process to reduce the vehicle body weight while satisfying the Torsional stiffness requirements. In this work the response surface approach is used based on DOE computer simulations with Topology Shape changes as design variables. The paper investigates the shape changes and weight savings. It describes how the overall weight saving is affected by individual shape change requirements. The paper discusses the attribute response sensitivities and how they can be used to: (a) tune the design to meet targets, and (b) decouple the process to reduce the number of DOE runs. Furthermore, the paper presents the trade-off analysis, and its application for developing a balanced and weight efficient design.