Project Name – Child Restraint Optimized Seat Design

Overview
Currently, there are some issues with fitment when using a child restraint in the rear seat of passenger vehicles. Ford has asked our team to identify these problems and give recommendations on how to improve their seat design in order to lessen the issues between child restraints and automobile seats. Challenges include identifying customer needs, utilizing and manipulating CAD files of Ford’s current rear seat, and analyzing the seat using various methods, both analytical and computer based.

Objectives
The objectives throughout the semester include improving the compatibility between child restraints and rear seats with respect to safety, ease of use, accessibility, and reliability. On the other hand objectives include a deeper understanding of real issues faced by engineers on the job and how to go about solving them.

Approach
● Narrowed down scope of project
  ● Decided which vehicle to focus on - 2016 Ford Fusion
● Performed external research on child restraint dimensions, issues, etc. to find customer needs
● Used customer needs and issues found through research to create a matrix showing how problems related to each need, then focused on the most important and feasible ones
● Discussed ways to improve the seat design within the team and with the sponsor based on the results of the matrix
● Received foam data and a CAD model of the rear seat from the sponsor and created four mock-up child restraints based on similar characteristics of existing child restraints
● Found improvements by using CAD models and all current information to perform tests on the current seat. Tests included: Foam stiffness calculations, seat recline angle testing, middle seat width analysis, restraint system investigation.
  ● After complete testing, a list of recommendations was created in order to improve the fitment of child restraints. Final recommendations: Decrease ILD to 338 N, widen middle seat by 3” for a total width of 14.95”, seat recline angle of 98°, additional lap belt on outboard seats

Outcomes
This project resulted in a better fitment of child restraints in rear automobile seats, thus improving the safety of children when in these vehicles and making it easier for an individual to install a child seat. These improvements could form the basis for a brandable set of features and result in more sales to families with children.