Overview
Ford Motor Company currently uses injection molding to create the cushion of their seat. With the rise of additive manufacturing and the advancements of technology, we are looking for an optimal solution to replace the current seat pad design by 3D printing it. This new design should exceed performance and ideally be cost effective and easy to manufacture.

Objectives
- Simplify the manufacturing of the car seat foam pad by designing it to enable 3D printing.
- Identify the benefits in terms of cost and performance of the new design.

Approach
- Identified the objectives of this project by initial discussion with our point of contact at Ford.
- The customer needs and target specifications were identified.
- Possible concepts were generated through brainstorming and concept mapping.
- Using a Pugh matrix, we performed concept screening and concept scoring. The concept with the highest score, which was 3D printing using a material called Layfomm, was selected as our final concept.
- Once the CAD file of the design of the seat were obtained, various small scale prototypes were printed and evaluated to learn the most optimum printing method.
- We performed deformation testing on both the current material and our choice of material and obtained the stiffness of each material.
- We compared the cost and performance of the current design with our new design with data requested from Ford.

Outcomes
- Material properties are similar to those of conventional foam (shore hardness of A40).
- The seat pad is able to withstand typical load cycles and passes the flammability test.
- 3D printing using Layfomm will reduce the need for large initial investment in specialized machinery required for injection molding.
- Further design changes will require no changes in tooling.
- 3D printing using Layfomm will provide rapid iteration and make it possible to customize seats.