We worked with a major automotive manufacturing company to optimize the spot weld count on any given vehicle BIW, thus decreasing the cost of the vehicle without compromising the functional attributes pertaining to NVH, durability, and safety.

Problem/Objective:

To gain a competitive edge in the industry, new vehicles must be developed rapidly as well as economically.

To reduce the cost of manufacturing by optimizing spot welds meeting all functional requirements concerning NVH, Durability and Safety.

Solution:

Using Machine learning and AI algorithms to reduce the manufacturing cost of vehicle and faster design cycle time through optimization. It is an accelerated approach to optimize spot counts on any given vehicle. The solution involves 4 main steps – sampling, descriptive stats, meta-model and optimization.

- In sampling, we take a predetermined number of observations from a larger population using methods such as Latin Hypercube method.
- After sampling, we create an analysis and the descriptive statistics show the correlations of various parameters to the given response variables.
- Then, a Meta-Model is created which formulate reasonably accurate surrogate models for linear and non-linear responses.
- Using ML based algorithms, the final optimized model is obtained.

Business Impact:

1. Considering a vehicle with 4326 welds, **388** welds were reduced. This is **~9%** savings in overall spot weld count.
2. **US $13.5 million savings** in manufacturing costs i.e. **US $39 per car** was saved.
3. Intuceo-Ex (ML based optimization) accelerates the optimization and reduces manpower costs by up to **~50%**.