ARTIFICIAL INTELLIGENCE - SUPPORTED SHAPE OPTIMIZATION OF AN AUTOMOTIVE RUBBER BUMPER

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In rubber bumper design, the most important mechanical property of the product is the force-displacement curve under compression and its fulfillment requires an iterative design method. Design engineers can handle this task with the modification of the product shape, while the axisymmetric finite element model of the rubber product is an efficient way to evaluate the working characteristics.

Using an optimization process in place of a trial-and-error-based mechanical engineering design method can help a company stay competitive in the market if the iteration process can be automated. Regardless of how the objective function behaves, metaheuristic search techniques can be used to approach the optimal solution; however, task-specific hyperparameter selection is required. The computational cost of the simulation-based objective function evaluation makes it impossible to solve the tuning process in time. Artificial intelligence tools can be used to increase automation and decrease the amount of time needed for engineering optimization tasks. The developed procedure can reduce uncertainty and increase the design cycle's efficiency, which together accelerate innovation.