

Early Design Insights with Digital Functional Vehicle

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Overview:

NREL's mission is to lead the nation towards a sustainable energy future by developing renewable energy technologies, improving energy efficiency, advancing related science and engineering, and facilitating commercialization.

One of DOE's missions is to decrease petroleum consumption and emissions of light duty vehicle transportation while maintaining safety and affordability.

NREL's Digital Functional Vehicle program's goals are:

- Enable and accelerate new fuel efficiency technologies (HEV, fuel cells, manufacturing) by removing technical barriers.
- Investigate, develop, and implement light weight design processes for achieving improved fuel economy in high volume production vehicles.

In this paper the following key working strategies to achieve the DFV objectives are presented:

- Work with industry to identify projects with energy saving potential.
- Focus on math based processes in all phase of the design process (conceptual, CAD, CAE, manufacturing)
- Utilization of innovative design processes that lead to efficient load path generation (topology optimization, behavioral modeling, etc.)
- Ultra lightweight designs that achieve the desired quality level via probabilistic modeling of variations.
- Utilization of multi-physics optimization to impact, enable and accelerate the implementation of new fuel efficiency technologies.
- Technology Transfer to automotive industry.