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ULTRALIGHT STEEL AUTO SUSPENSIONS

AMERICAN IRON AND STEEL INSTITUTE

Overview:

The UltraLight Steel Auto Suspension (ULSAS) study is an initiative by a global consortium of 34 steel companies from 15 countries, who united to communicate the attributes of modern steel to their automotive customers. It is a showcase for the best automotive design technology that can be brought to bear on today's highly complex technical challenges, and it is a primer on understanding and exploiting the properties of steel as they apply to automotive suspensions.

The design phase encompassed five types of steel suspension systems across a range of vehicle sizes, resulting in the creation of a comprehensive range of suspension system designs that met or exceeded the targets. The five types are identified in the table below.

Lotus Engineering, U.K., conducted the two-year study that concluded in 2000.

Benefits:

ULSAS and its companion studies established that intelligent application of the latest steel technologies can match the weight savings of so-called exotic materials, while offering significant cost advantages, as shown in the following table.

ULSAS Summary Results

	Cost (Saving)		Mass (Saving)	
	Target	Results	Target	Results
Twistbeam	0%	6%	20%	32%
Strut and Links	0%	2%	20%	25%
Double Wishbone	0%	0%	20%	17%
Multi-Link®	20%	30%	0%	3%
Lotus Unique*	0%	22%	20%	34%

Mass reductions on the various ULSAS steel designs ranged from 17 to 34 percent.

On costs, ULSAS matched those of conventional steel designs, and showed up to a 30 percent cost reduction in a design comparison with aluminum.

Technology Transfer:

These studies establish that intelligent application of the latest steel technologies can match the weight savings of so-called exotic materials while offering significant cost advantages. That is because while steel is a relatively dense material, it also is very stiff and strong, and appropriate engineering can take advantage of these properties to make lightweight, cost-effective systems.

As in ULSAB, high-strength steel was used in many areas. Large, thin-wall sections, for example, were possible because of the unique properties of high-strength steel. Hydroforming was proposed for some components as was tailored blanking. Laser welding was assumed in many cases, both at the component level and in final assembly.

Throughout the design process, material requirements were reviewed by consortium members. Where it was beneficial to mass and cost improvements, members specified near-reach high-strength steels. To satisfy performance requirements, designers used combinations of high-strength and ultra high-strength steel sheet and forging grades.

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