
China's Automobile Lightweight Technology Roadmap¹

Source: 1. China Automotive Engineering Institute, <Energy Saving and New Energy Vehicle Technology Roadmap>, Oct. 2016

The Outline of Automobile Lightweight Technology ¹

- In the short term, China's automobile industry will focus on development of high-strength steel and advanced high-strength steel technology to achieve their application rate in automobiles of more than 50%.
- In the medium-term, the automobile industry will focus on development of third-generation automotive steel and aluminum alloy technology in order to achieve the industrial production of aluminum alloy parts and aluminum parts.
- In the long-term the automobile industry will focus on the development of magnesium alloy and carbon fiber composite materials technology in order to achieve the wide range application of carbon fiber composite materials in automobile bodies and parts

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Development Goals and Technical Approaches of Automobile Lightweight Technology

Development Goals

By 2030

- Application proportions of high-strength steel will increase substantially;
- A vehicle will use more than 350kg of aluminum;
- A vehicle will use 25kg of magnesium alloy
- A vehicle will use 5% of carbon fiber

Based on its weight in 2015, a vehicle's weight loss

2020	2025	2030
10%	20%	30%

Technical Approaches

- Application of Lightweight material
- New manufacturing technology and processes
- Advanced structural optimization or design methodology
- Vigorously promoting the application of high strength steel, aluminum alloy, magnesium alloy, engineering plastics and composite materials in automobiles

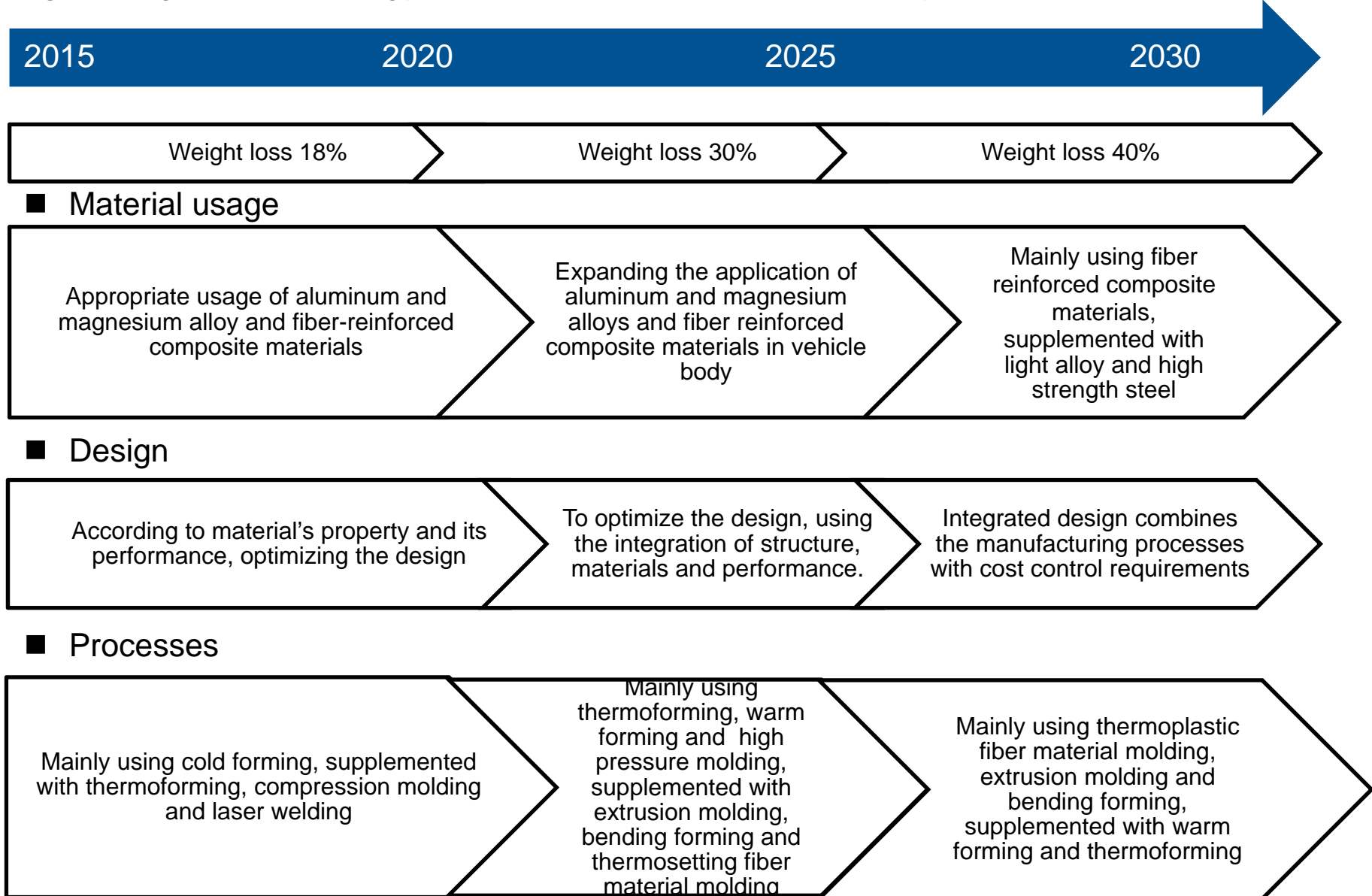
Development Priorities

- Lightweight of a vehicle body
- Lightweight of a vehicle's power transmission
- Lightweight of its chassis
- High-strength steel material and processes enhancement
- Production processes research of lightweight parts;
- Standardization, serialization research of lightweight parts
- Processing and efficient preparation of composite materials
- Material design and processing simulation of lightweight parts

Developing Roadmap of Lightweight Technology

	2020	2025	2030
A vehicle weight	10% less than in 2015	20% less than in 2015	35% less than in 2015
High-strength steel	600Mp level AHSS steel applications up to 50%	The amount of steel in third-generation automobiles will occupy 30% of the weight of white body	A certain proportion of steel, with a level above 2000Mp, will be used.
Aluminum alloy	Usage of aluminum reaches 190kg per vehicle	Usage of aluminum reaches 250kg per vehicle	Usage of aluminum reaches 350kg per vehicle
Magnesium alloy	Usage of magnesium reaches 15kg per vehicle	Usage of magnesium reaches 25kg per vehicle	Usage of magnesium reaches 45kg per vehicle
Carbon Fiber Reinforced Composite	Adding a certain amount of carbon fiber, 50% lower cost than in 2015.	Adding 2% of carbon fiber per vehicle, 50% lower cost than the previous stage	Adding 5% of carbon fiber per vehicle, 50% lower cost than the previous stage

Lightweight Technology Roadmap of A Vehicle Body



New Requirements of Lightweight Technology

Type	Technology Innovation Needs	Priority Action Items
Basic information	<ul style="list-style-type: none"> • Materials strength research • Lightweight structure design and computational research • Heterogeneous material connection properties research 	<ul style="list-style-type: none"> • Steel vehicle body • Multi-material passenger vehicle body and multifunctional materials commercial vehicle body • Ultra - light composite materials vehicle body (materials including carbon fiber, glass fiber, basalt fiber)
Application Technology	<ul style="list-style-type: none"> • Lightweight system integration and design technology • Lightweight connection process design • Lightweight parts design • Lightweight molding technology 	
Demonstration and industrialization	<ul style="list-style-type: none"> • Steel-aluminum hybrid vehicle body, all-aluminum vehicle body and multi-material lightweight vehicle body demonstration project • Ultra - light composite materials vehicle body demonstration project • New energy vehicles chassis lightweight industrialization 	
Common platform	<ul style="list-style-type: none"> • Lightweight common fundamentals of database system 	