
China Automobile Manufacturing Technology Roadmap¹

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

China Automobile Manufacturing Technology Road Map¹

Overall Thinking

- Based on the main line of development “Green manufacturing, intelligent manufacturing, quality manufacturing, rapid manufacturing”, comprehensively increase quality and efficiency, and at the same time decrease energy consumption;
- Focused on aluminum, magnesium alloy and carbon fiber composite, gradually master lightweight material manufacturing technology;
- Use power assembly and new energy automobile’s drive system as breakthrough point, significantly improve processing and manufacturing technology for bearings and gears, to digitalize and intelligentize equipment manufacturing.

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Automobile Manufacturing Technology_ Goals, road map and development focuses¹

Development Goals	Technology Roadmap	Development Focuses
<ul style="list-style-type: none">• Improve automobile quality; Decrease energy consumption; Reduce environmental impact; Increase production efficiency• Reject ratio reduction: 25% in 2020 → 45% in 2025 → 65% in 2030• Labor productivity average annual growth: 7.5% in 2020 → 6.5% in 2025 → 5.5% in 2030• Energy consumption per GDP decrease compared to 2015: 20% in 2020 → 35% in 2025 → 50% in 2030	<ul style="list-style-type: none">• Traditional manufacturing technology• New material manufacturing technology• New assembly and parts manufacturing technology• Intelligent manufacturing technology	<ul style="list-style-type: none">• Lightweight car body manufacturing technology• Lightweight chassis manufacturing technology• Power assembly precision manufacturing technology• New energy automobile electric drive system manufacturing technology• Digital manufacturing technology• 3D printing technology• Intelligent manufacturing technology• Green manufacturing technology

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Development Goal

Aluminum, magnesium alloy takes up over 15%, 1.2% of automobile total weight

Aluminum, magnesium alloy takes up over 20%, 2% of automobile total weight

Aluminum, magnesium alloy takes up over 30%, 4% of automobile total weight

Stamping Technology

Establish design standards for aluminum alloy parts cold stamping; 50% achievable rate of car body aluminum alloy plate manufacturing technology

Form stamping technology for aluminum automobile parts; 100% achievable rate of car body aluminum alloy plate manufacturing technology

10% achievable rate of car body magnesium alloy plate manufacturing technology

Joint Technology

Develop joint strength control technology suitable for steel/aluminum and aluminum/magnesium seam welding and spot welding

Joint fatigue strength is 2 times of resistance spot welding – cost close to or lower than resistance spot welding's

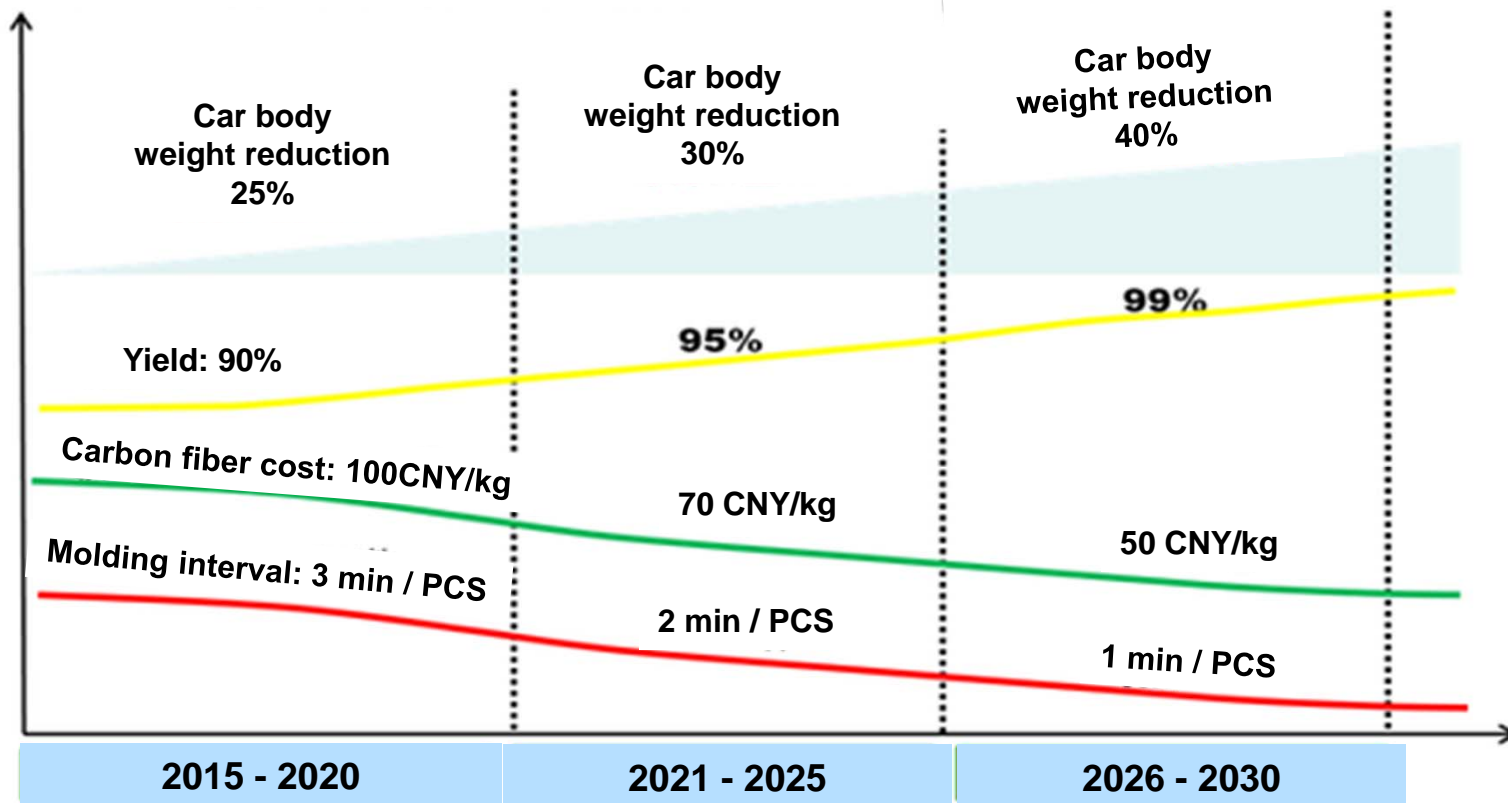
Joint fatigue strength over 2 times of resistance spot welding – cost close to or lower than resistance spot welding's

Car Body Covering Parts Manufacturing Technology Roadmap - Al, Mg alloy car body covering parts manufacturing technology

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Car Body Covering Parts Manufacturing Technology Roadmap - Carbon fiber reinforced composite parts manufacturing technology



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Automobile Manufacturing Technology Innovation Needs and Priorities¹

Category	Technology Innovation Needs	Prioritized Actions
Basic Prospects	<ul style="list-style-type: none"> Aluminum, magnesium alloy plate molding technology, study of new die-casting techniques and establishment of material performance database High performance aluminum car safety parts, construction parts extrusion material, molding and technique study 3D printing carbon fiber composite key technology study 	<ul style="list-style-type: none"> Lightweight car body manufacturing technology Automobile intelligent manufacturing technology alliance Engine advanced manufacturing techniques and equipment commonality technology innovation platform Green manufacturing technology and demonstration
Applied Technologies	<ul style="list-style-type: none"> Develop aluminum magnesium alloy car body parts molding technology Super high strength extra complicated parts low cost hot stamping technology Dry spraying room study and application Typical high performance car parts extrusion parts design and stamping technique study 	
Demonstration & Industrialization	<ul style="list-style-type: none"> Automobile engine parts demonstration production line Automobile green manufacturing factory demonstration Automobile parts intelligent extrusion factory demonstration Aluminum car body and chassis construction parts inner high pressure forming technique and equipment technology study 	
Commonality Platforms	<ul style="list-style-type: none"> Automobile intelligent manufacturing technology alliance Automobile manufacturing technology innovation and testing center Engine advanced manufacturing technique and equipment commonality technology innovation platform Carbon fiber composite industry commonality basic study platform 	

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