

# Research on Emission Pollution Control of Automobile Manufacturing Enterprises

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**Abstract:** Firstly, the characteristics of automobile production system are briefly analyzed. Automobile production system is an open, discrete, nonlinear and uncertain dynamic system. On this basis, the carbon manufacturing problem of automobile production system is put forward, and the carbon emission status of automobile production system is analyzed. The energy consumption structure and carbon emission characteristics of automobile production system is analyzed, and the carbon flow is analyzed in combination with the energy flow and material flow of automobile production system. Put forward energy-saving and emission-reduction measures, and macro-energy-saving and emission-reduction suggestions of enterprises and countries.

**Keywords:** Automobile Production System; Energy Consumption; Carbon Emission; Energy Saving and Emission Reduction

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## 1. Research background

In recent years, with the aggravation of extreme weather in the world, the climate problem has begun to attract worldwide attention and become one of the most attractive discussions among countries. All countries in the world should make joint efforts to reduce waste emissions, curb climate change and save the environment on which human beings depend. Through the efforts of international organizations and countries, more and more countries and organizations gather under the banner of "low carbon" to make joint efforts to explore the earth beneficially and get out of the predicament of high energy consumption and high carbon emissions as soon as possible. In the future, how to deal with the serious changes of global environment and climate will always be the focus and hot issue of all countries and communities <sup>[2]</sup>.

From the current research situation at home and abroad, compared with developed countries, China's research on carbon emissions in automobile field started late, and there is a certain gap between the research system and developed countries. In addition, at home and abroad, more and more attention has been paid to the research on energy consumption and carbon emissions of automobile production system, and its application value is also constantly improving <sup>[8]</sup>.

## 2. Research purpose

By identifying the carbon emission sources of the automobile production system, this paper analyzes the energy consumption structure and carbon emission characteristics of the automobile production system, and makes a quantitative study on the carbon emission of the automobile production system, and finds out the high-carbon emission links of the automobile production system, which provides a theoretical basis for proposing strategies and methods to reduce the carbon emission of the automobile production system.

## 3. Research significance

The research results of this paper are helpful to enrich the automobile production system and the theoretical system of

carbon emission, and provide theoretical basis and reference for building a perfect low-carbon automobile production system.

*Environmental pollution.* At present, environmental pollution is mainly concentrated in the following aspects: first, temperature chamber effect; second, ozone layer destruction. Due to the balance between ozone and oxygen, the atmosphere has formed a relatively stable ozone layer, which blocks the ultraviolet radiation of the sun and protects human beings from harm. Third, acid rain spread; Fourth, desert expansion; Fifth, accelerate the extinction of rare species; Sixth, air pollution is serious. Among them, automobile exhaust is the biggest pollution source, and carbon monoxide, hydrogen carbide, nitrogen oxides and carbon particles in automobile exhaust are the most important pollution sources that endanger human health and life [6].

*Emission control of automobile manufacturing enterprises.* Physicochemical methods generally adopt two-stage coagulation and precipitation methods. Because the quantity and quality of automobile coating wastewater fluctuate greatly, there are some problems such as unstable wastewater quality, high operating cost and difficulty in meeting higher water quality requirements when using physicochemical treatment methods alone [1].

*The main impact on emission pollution control of automobile manufacturing enterprises.* The main pollutants include: carbon, hydrogen compounds (HC), carbon monoxide (CO), nitrogen oxides (NOX), sulfur compounds (SOX), soot, etc., mainly from three aspects: First, exhaust emissions. I.e. pollutants discharged directly from the exhaust pipe. This is the combustion product of the engine. Second, crankcase discharge. This is a mixture of combustion products and unburned fuel discharged from the crankcase ventilation pipe from the gap between the piston ring and the cylinder wall. Its main component is hydrocarbons. Third, the oil tank, oil pipe joints, etc. volatilize. Its composition is hydrocarbons.

## **4. Emission mechanism of automobile manufacturing enterprises**

*Closed-loop control.* Up to now, the most effective way to purify the exhaust gas of spark ignition engine is to adopt the closed-loop control system of catalytic converter D, which relies on the closed-loop control circuit to keep the mixture of air and fuel in the optimal range all the time.

*Idle speed emission control.* Idle speed of engine is a working state with serious emissions. When the engine is running at idle speed, part of the fuel can't burn completely due to lack of oxygen, resulting in a large number of combustion intermediates being discharged from the engine, so idle speed is the working state of gasoline engine with high HC and CO emission concentration.

*Thin control.* The greatest advantage of rarefaction is that it can greatly reduce the emission of nitrogen oxides while reducing the thermal efficiency. Lean engine is not limited by cylinder knock limit, so it can adopt higher compression ratio and smaller pumping loss, which is beneficial to improve component load characteristics.

*EGR control strategy for exhaust gas recirculation.* EGR system control requirements: NO<sub>x</sub> emission increases with the increase of load, and EGR quantity also increases with the increase of load; At idle speed and light load, NO<sub>x</sub> emission concentration is low, EGR; Combustion stability cannot be guaranteed. When the engine warms up, the coolant temperature and intake air temperature are very low, and the NO<sub>x</sub> emission concentration is also very low.

*Turbocharging technology.* Exhaust gas turbocharger is one of the most prominent projects in the internal combustion engine manufacturing industry in the last century, and automobile engines have been increasingly used here in recent 20 years. After adopting the supercharging technology, not only the economy of electric power and economy has been significantly improved, but also the emission performance has been improved.

## **5. Emission Status of Chinese Automobile Manufacturers**

*Emissions of Chinese automobile manufacturers.* In the past decade, due to the rapid development of China's economy, the number of cars in cities has increased rapidly, the large and medium-sized cities have been expanding continuously, traffic congestion has intensified, and air pollution has become increasingly serious. A report released by the International Health Organization shows that the cities with serious air pollution in the world are as follows: Taiyuan, Milan, Beijing, Urumqi, Mexico City, Lanzhou, Chongqing, Jinan, Shijiazhuang and Tehran. Among the top ten cities with serious pollution, China occupies the seventh place. In urban air pollution, the harmful gases produced by automobile exhaust are mainly CO and NO.

HC.

*Emissions of Chinese automobile manufacturers.* The composition of photochemical smog is very complicated, but ozone, acrylic acid, acrolein, formaldehyde is harmful to secondary pollutants such as animals, plants and materials. The main injuries of humans and animals are eye and mucous membrane irritation, headache, respiratory disorders, deterioration of chronic respiratory diseases, abnormal lung function in children, etc.

*Causes of pollution emitted by Chinese automobile manufacturers.* According to the report of the Health and Safety Committee, the death caused by air pollution is about 100,000 euros, and the economic loss caused by automobile traffic to society exceeds the income from road and bridge fees and fuel tax.

## **6. Emission Control Model of Automobile Manufacturing Enterprises**

*Factors affecting emissions of automobile manufacturing enterprises.* In recent years, with the increasing frequency of extreme weather in the world, climate issues have begun to attract global attention. With the progress of social civilization and the acceleration of industrial economy, the emission of greenhouse gases has increased sharply, which has led to adverse changes in the ecosystem and human living environment. As a major energy consumer, China has spared no effort in energy conservation and emission reduction. At the same time, China is a big manufacturing country in the world. The high growth and high output value of Chinese manufacturing enterprises are at the expense of high energy consumption and high emissions. In view of the environmental pressure, at present, China has taken industrial upgrading and structural transformation as the focus of future development, but for a long time to come, the manufacturing industry will still be the economic pillar of China.

*Emission control index system of automobile manufacturing enterprises.* In order to cope with the global resource shortage and the adverse changing trend of the environment, countries around the world have made great efforts to launch a "low-carbon revolution" with high energy efficiency and low emissions as the core, vigorously develop low-carbon economy, conform to the development trend of the new era, become a new driving force for their own development, and respond to multiple crises such as financial crisis, economic recession, environmental deterioration and climate change.

*Emission control results.* In recent years, low-carbon manufacturing has become a hot spot in the automobile industry. All kinds of automobile enterprises are not only committed to low-carbon automobile production, but also to promote low-carbon environmental protection of the whole society. Although automobile manufacturing enterprises vigorously develop policies of low carbon, environmental protection, energy saving and emission reduction, the present situation of automobile manufacturing industry has not been greatly improved [7].

## **7. Countermeasures and suggestions for emission control of automobile manufacturing enterprises.**

*Develop total emissions.* Due to the serious emission pollution of used cars in China, the emission pollution control standard stipulated by the state has not been reached after the transformation of pollution reduction control technology, which should be resolutely eliminated and effective, reasonable and feasible management methods and measures should be formulated at the same time [4].

*Setting emission standards.* With the understanding of carbon emissions in energy consumption, the quantification of carbon emissions has become a new research object. In order to obtain greenhouse gas emissions from product production activities, there are currently three commonly used methods: life cycle assessment method, input-output method and mixed life cycle assessment legislation based on input-output method and life cycle assessment method.

*Reduce productivity.* Advanced energy saving and emission reduction technologies are adopted in automobile production process engineering. Energy saving and emission reduction of automobile production system must first be reformed by itself, and energy saving and emission reduction must go deep into every link of construction and manufacturing [3].

## Conclusion

In the low-carbon era, automobile manufacturing enterprises are facing severe pressure. Environmental impact has become an indispensable consideration in formulating enterprise development strategies. It is inevitable for automobile enterprises to gradually transform into low-carbon enterprises. In this paper, from the perspective of low carbon, taking automobile production system as the research object, the identification and quantification of carbon emission sources in automobile production system are studied quantitatively.

This paper refers to and studies a large number of domestic and foreign related literatures, but at present, the domestic research on carbon emissions in automobile field started late, with a wide range of research, limited data and materials related to this research, and limited school time and ability of the author. There are still many shortcomings in this paper. However, with the development of research and practice, the research content of this paper can be expanded from many aspects.

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