Research and Analysis of Machine Design Based on Computer Aided Technology

Jinhua Yan1,*

1 Dongying Vocational Institute, China

*Corresponding author e-mail: yanjinyou.ossl@sinopec.com

Abstract. Compared with the traditional mechanical engineering design, the intelligent mechanical engineering automation design has obvious economic applicability. In recent years, with the continuous development of China's mechanical engineering design field, mechanical engineering design has been effectively innovated and promoted, automation technology as a representative of which also has an obvious role. In this paper, the concept of mechanical design, manufacturing and construction in the new era is expounded, and the principle and application of intelligent technology are analyzed for readers' reference.

Keywords: Mechanical Design, Automation Technology, Machinery Manufacturing

1. Introduction

Mechanical engineering design in mechanical process has a wide range of applications. As early as the 1980s, the concept of "mechanical engineering design automation" was first proposed in the mechanical engineering design report jointly developed by Swedish and Japanese companies, and subsequently received widespread attention and application.

2. The development status of mechanical engineering design

2.1. Development of mechanical engineering design automation

Mechanical engineering design has a long history of development. In the 1950s, mechanical manufacturing experiments in crystallizers were launched for the first time, and in the 1980s, Kawasaki Iron and Steel Corporation of Japan started practical testing and application of mechanical engineering design. Because the internal structure of the early mechanical manufacturing device is small, the automation technology applied in the mechanical process has a certain difficulty, so it is necessary to adjust the spacing of the mold in different directions, and drive the final braking effect by adjusting the spacing. In the 1990s, the design of automated mechanical engineering evolved into a double-bar machine, with two braking magnetic fields acting simultaneously to control the speed [1]. With the progress of science and technology and the development of society, in recent years, China has been widely used as the basis of automation of full-width three-segment mechanical engineering design, this three-segment braking has a more obvious braking effect. Compared with foreign machinery manufacturing, domestic mechanical engineering design has a wider range of practical
applications. However, due to the late start of domestic experimental testing of mechanical engineering design, there is a big gap between domestic and foreign related technologies. Therefore, it is still necessary to further strengthen the research on automation technology to improve its application effect.

2.2. Principles of mechanical engineering design

The principle of automation technology in mechanical process is complex, and the application of electromagnetic induction is one of the important bases of automation technology. In general can be used in a static magnetic field on the electromagnetic induction within the mechanical mould, and can be seen from the electromagnetic theory knowledge: motion state machine can be used to ensure the stability of operation of the equipment, and effectively restrain the error, through mechanical automation operation to ensure the stability of the equipment, the performance has a very extensive application in mechanical engineering design.

![Figure1](image)

**Figure1.** The composition of the braking system of an automobile

After machine building has begun, the induced current in the equipment interacts with the regional magnetic field to produce a braking force that has the characteristic of being in the opposite direction of the mechanical flow. The production of machinery is also further distributed and adjusted under the action of the magnetic field, so in the process of adjusting the magnetic field structure and size corresponding to the need to make the mechanical meniscus electromagnetic induction, and in the best range, the appropriate adjustment of the magnetic field fluctuations can make the design and manufacturing of machinery to play its best performance [2].

3. The important role of automation technology in mechanical process

3.1. Development of automation technology

The application of automation technology in mechanical process can significantly improve the production quality of mechanical equipment [3]. However, it is difficult to find a mechanical engineering design model suitable for closed-loop controller control in the research and development of mechanical engineering design without the guidance of ready-made technology system. However, the author found that there is a relatively easy way: firstly, the parameters of mechanical automation technology should be unified; secondly, system identification and toolbox integration should be carried out under the overall regulation of open-loop, and the model of mechanical engineering design
Automation system should be established from two aspects of data input and output. In addition, further research shows that the effect of automation in mechanical engineering design principle, prospect and optimum design has a certain role, and in the experiment of billet mechanical machine, automation technology applied to steel billet more significantly enhance the surface quality of low frequency electromagnetic field application also to promote the efficiency of automation.

3.2. Application of automation technology in mechanical engineering design
Mechanical automation itself in the overall operation is more reliable and stable, and in the industrial environment has also been used more. However, in the measurement of the closed-loop controller, the widely used mechanical automation in China often detects the poor PI parameters and slow response speed of the controller, which affects the precision control requirements of the controller application. According to the experimental results in the literature we found that mechanical automation in the design and application of the controller, no matter in the transient or steady state conditions have presented a relatively stable performance. For the control system whose output response is too long in the actual control system, the author finds that the design of the neural network based prediction device can effectively limit the delay conditions and further improve the control system response of the DC motor.

With the application of mechanical automation controller more and more widely, many researches and works focus on the application of mechanical automation closed-loop controller. The PID technology with the genetic algorithm as the core can effectively assist the DC motor to carry out the transfer of the electric power system, while the closed-loop PID control based on the genetic algorithm can effectively help the mechanical automation in the PID parameter control to achieve the optimal control, but also more significant than the traditional closed-loop control effect [4]. On the whole, mechanical automation closed-loop controller has a good application effect on the basis of parameter identification.

4. Discussion on the application of intelligent technology in the field of mechanical engineering automation

4.1. The importance of intelligent technology in the field of mechanical engineering automation
The intelligent technology in modern mechanical engineering not only has the practical application and the development prospect in the engineering survey, but also has the remarkable application in the related geological condition survey. In addition, the intelligent technology in modern mechanical engineering can also collect the overall situation and parameters of the building, and also provide certain guidance and help for the construction of the construction project, so as to improve the stability of the construction project.

Figure2. Computer-based static force diagram of automobile
Next, we analyze the parameters of the whole Audi A4L. As shown in the figure above, it is the static force analysis diagram of the car [5]. In the case of given wheelbase and load, the distance of the
wheelbase can be measured according to the relevant formula. Combined with the corresponding data analysis, we can get:

\[
\begin{align*}
G_a - G_z L & = 0 \\
G_1 L - G_b & = 0
\end{align*}
\] (1)

Equation (3-1) can be used to find the respective centroid positions in both empty and full load conditions. Then, the centroid positions in no-load conditions are as follows:

\[
\begin{align*}
b' & = 1512.52 \text{mm} \\
a' & = 1395.48 \text{mm} \\
h_g & = 690 \text{mm}
\end{align*}
\] (2)

Center of mass position at full load:

\[
\begin{align*}
a & = 1512.16 \text{mm} \\
b & = 1395.84 \text{mm} \\
h_g & = 710 \text{mm}
\end{align*}
\] (3)

According to Table 3.1, the wheel rolling radius can be obtained:

\[
r_r = \frac{D_r - 245 \times 0.65}{2}
\] (4)

In the above formula, rim diameter;\(D_r = 18\) in; \(18 \times 25.4 \text{mm} = 457.2 \text{mm}\). \(r_r = 387.85 \text{mm}

With the continuous development of intelligent technology in modern mechanical engineering, the performance of intelligent geological survey technology is also constantly improved, and the function of receiving construction engineering data parameter processing is also very significant, which can be further improved. Function and principle of intelligent technology in modern mechanical engineering is a very scientific and practical, and based on the analysis of the principle of the intelligent technology in modern mechanical engineering to the application in the field of engineering survey analysis, the unique technology of modern intelligent technology in mechanical engineering advantage and keep leading technology has far-reaching significance [6].

4.2. Application trend of intelligent technology in the field of mechanical engineering automation

There are essential differences between the intelligent technology of building engineering and the traditional data processing technology of building engineering survey [7]. The intelligent technology of construction engineering has high efficiency and can deal with the relevant data information of construction engineering on a large scale, so it has a very large application prospect and space in the field of mechanical engineering automation. The intelligent team of building engineering should protect the modern mechanical engineering accordingly, and report to the local government when the modern mechanical engineering is intellectualized, and choose different intelligent methods according to the actual situation. As people's living standard is getting higher and higher, the attention and quality requirements of modern mechanical engineering are also improved, and the engineering in the field of mechanical engineering automation in China has been correspondently established and a good cooperative relationship has been formed. In order to protect construction projects, the state has carried out better management of modern mechanical engineering and has carried out research on related technologies [8]. Construction projects in the process of the intelligent technology in the field of mechanical engineering, automation, the reasonable planning and the intellectualization of modern mechanical engineering, to the use of modern mechanical engineering materials to plan better, guarantee of modern mechanical engineering won't waste building materials, at the same time to the scientific management problem such as the intelligence and the use of modern mechanical engineering.

Intelligent technology of construction engineering can help relevant government departments to better manage modern mechanical engineering. According to the different demands of different
regions for modern mechanical engineering and the different geological conditions, relevant information can be collected to make reasonable deployment of modern mechanical engineering [8]. By using intelligent technology of construction engineering, local government can establish a stable modern mechanical engineering information processing platform, better collect and manage various situations of modern mechanical engineering, and promote the development of mechanical engineering automation system.

4.3. Problems faced by intelligent technology in modern building survey

Building intelligent technology applications in the modern construction survey will need to measure related technical personnel and modern building, building intelligent technology applications in the related technical personnel is the measure of modern architecture of intelligent construction engineering technology application of the practical work of the operator, their professional technical ability is very important, will directly affect the measure of modern building construction engineering safety and stability of the application of intelligent technology [9]. Just because of this, it is more necessary to train the professional skills of the application personnel of intelligent technology in modern building survey, to ensure that they have enough professional literacy, which is also an important link to improve the efficiency and quality of intelligent technology application in modern building survey.

In the current modern building survey in the application of building engineering intelligent technology, because of the modern building survey in the application of building engineering intelligent technology is a new development direction. Relevant professional colleges and universities should cultivate talents who are oriented to the application direction of intelligent technology of construction engineering in modern building survey. In order to ensure the steady progress of the industry, it is necessary to have a large pool of talents as backup resources. Only in this way can the vitality and capital of the industry be guaranteed. Related to higher education institutions should be based on the practice, starting from the practice, closely communication with the industry, constantly to understand the new trend of the industry, such ability can clear how to guide students to progress, industry trends and cultivate a batch of can struggle for the industry's elite talent, to fill the talent gap in this field [10].

5. Conclusion

With the continuous development of science and technology, mechanical engineering design technology in the current era has changed earthshaking compared with the last century, and intelligence has a significant application in mechanical engineering design, which effectively improves the efficiency of mechanical equipment work; At the same time, regular maintenance and irregular sampling inspection should be carried out from the inspection work of machinery and equipment, and risk assessment and supervision management of mechanical engineering design system should be carried out in a variety of ways, so as to ensure the normal operation of machinery and equipment automation and prevent accidents. The new era requires the continuous development and innovation of mechanical engineering design industry to promote the deep application of automation technology in mechanical process.

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