Received: 18 Mar. 2022 | Revised: 28 Mar. 2023 | Accepted: 14 Apr. 2023 | Published online: 23 Apr. 2023

RESEARCH ARTICLE

Journal of Global Humanities and Social Sciences
2023,Vol. 4(2)47-51
DOI: 10.47852/bonviewGHSS23208560201

# Research on the Application and Management of Mechatronics Technology in Coal Mines

BON VIEW PUBLISHING

**Xiayi Wu*,[1] & Yangqi Han[1]**
[1]*Chongqing College of Architecture and Technology，China*

**Abstract:** The application of mechatronics technology in coal mining enterprises is in line with the current trend of industrialization in China. In the specific production and mining links, strengthening the application and management of mechatronics technology in coal mines has an important role in promoting the improvement of coal mining efficiency. Therefore, this paper analyzes the specific application of mechatronics technology in coal mines, and gives specific management measures combined with the current problems in the application process, aiming to achieve safe production in coal mines and improve the application effect of mechatronics technology.

**Keywords:** coal mine; mechatronics technology; application; management

## 1. Introduction

With the rapid development of the economy and society, the coal industry is facing more fierce competition in the current social development, and the wide application of science and technology in all walks of life also has a certain degree of influence on the development of the coal industry, in this context, to enhance the level of science and technology in the coal industry, and to use mechatronics technology as the support to apply to the coal industry, which is not only conducive to enhancing the efficiency and Stability, but also to enhance the coal mining efficiency by enhancing the level of science and technology in the coal industry, so the study of the application and management of coal mine mechatronics technology has important value, which can further enhance the safety and efficiency of coal mining (Kou, 2022).

## 2. Specific applications of mine mechatronics technology

### 2.1 Application in coal mine production facilities

Mechatronics technology has strong functionality in the specific application process, which can not only effectively improve the safety and stability of the coal mining process, but also help the coal mine production system to improve the management efficiency. The application of mechatronics technology in coal production facilities can use the expert diagnostic system and remote monitoring system supported by this technology to ensure the safe and stable operation of coal mining equipment, as well as to ensure the safe and stable operation of the hydraulic support equipment management, to achieve the implementation of monitoring of coal production facilities, so that in the event of certain improper operation of underground production equipment, it is possible to timely contact It is also possible to combine some of the coal mining machine devices in the current coal production operation process to achieve automatic coal cutting processing, which can further enhance the mechanisation level of coal mining equipment while improving the stability of the underground mine force point, and is of great practical value in promoting the application of mechatronics technology in coal mines (Ren, 2022).

### 2.2 Application in coal mine transportation

In the process of underground coal mining,

**Corresponding Author:** Xiayi Wu
Chongqing College of Architecture and Technology，China
Email: 413073992@qq.com

many coal mine transport processes are handled by beltization, this belt transport has a wide range in the coal mining process, and is the transport method used by most coal mining enterprises, but there are still certain problems in the application process, such as the belt transmission process is easy to transport runaway and broken belt and other problems, slipping phenomenon also often occurs, all these problems to the belt transport These problems have created certain obstacles to the widespread use of belt transport. The application of mechatronics technology in the process of coal mine transport can be achieved through the belt integrated protection device to achieve efficient processing, this device in the actual application process not only has the advantages of easy installation and easy to use, but also through the installation of smoke alarm and over-temperature automatic sprinkler device to improve the safety and stability of the coal mine transport process(Hou, 2022), in this way, the automatic control device can both In this way, automated control devices can effectively solve the problems that exist in the traditional conditions of belt transport, but also enhance the mining efficiency of coal mining equipment through the functional application of mechatronics technology, which is an important contribution to the safe operation of coal mining. At the same time, the application of mechatronics technology in the process of coal mine transport can also form an automated management mode, the simple operation of coal mine equipment makes all the equipment movements tend to be unified, both to improve the efficiency of coal mining, but also through the application of mechatronics technology to improve the economic benefits of the mining process.

**2.3 Application of safety monitoring systems in coal mines**

The safety monitoring system plays a very important role in the coal mining process and is a specific application of mechatronics technology in the coal mining process. This system is not only capable of integrating all aspects of the management system, including production monitoring and network safety information, but can also be combined with the current mine safety networking technology to carry out comprehensive monitoring, which is a concrete application of mechatronics technology in safety monitoring. At the same time, in the actual process of coal mining and safety production, the application of safety monitoring systems need to be combined with the actual situation of production conditions to carry out operations, so that in the reasonable application of mechatronics technology, but also to achieve real-time monitoring of the coal production process, not only can provide strong technical protection for coal mining safety, but also through the stable improvement of monitoring efficiency to achieve China's The further improvement of the coal mining management system.

## 3. Analysis of the problems that exist in the management of coal mine mechatronics technology

**3.1 Inadequate equipment management can easily lead to safety accidents**

In the process of coal mining, the application of mechatronics technology requires the use of a variety of mining equipment, the operation and management of these devices is very important, however, from the current situation of the application of technology in coal mining enterprises, although the introduction of mechatronics technology has gradually begun, but in the process of using the equipment is still used by mining personnel, these staff do not know enough about the use of equipment In addition, some coal mining enterprises often overload their equipment in order to speed up the progress of coal mining, which makes the process of coal mining a serious safety hazard. Safety production accidents will affect the economic efficiency of the enterprise, and in serious cases will also cause a certain degree of harm to the personal safety of the staff(Lei, 2021).

**3.2 The low quality of staff is likely to cause irregularities in operation**

There are relatively more safety hazards in the process of coal mining, so the quality of staff

requirements are relatively high, and need to be combined with the relevant operating procedures and mining procedures to strictly operate, but from the current actual situation of the application of mechatronics, many coal enterprises have relatively low comprehensive quality of staff, both the lack of relevant knowledge training, but also due to the lack of basic safety awareness and the lack of standardized operation In this way, the coal mining process is prone to some irregularities, which will not only bring a certain threat to the personal safety of the staff, but also make the coal mining process relatively lack of management process system, and in serious cases will also affect the smooth development of the coal mining process. Therefore, it is necessary to effectively adjust the current application of mechatronics technology and improve the safety awareness of staff by strengthening business training and management training, so as to guarantee the effective application of mine mechatronics technology.

### 3.3 Low awareness of management responsibility leads to poor management

The application of coal mine mechatronics technology in enterprises needs to be adjusted through strict management systems and management norms to ensure the smooth implementation of coal mining sites, but from the perspective of the current management of coal mining enterprises, as the application of this technology is in its infancy, many coal mining enterprises have not yet established relevant mechanical and electrical management departments, resulting in a lack of clear management systems and management systems in the process of technology application In this way, in the actual coal mining process, many electromechanical management departments also lack management personnel, the relevant management techniques are relatively backward, and the management awareness of the mining process at the site is relatively weak, which directly affects the further improvement of the management system of coal mining enterprises. This has a direct impact on the further improvement of the management system of coal mining enterprises. In response to these problems, coal mining enterprises need to make effective adjustments in line with the actual situation of the current mechanical and electrical management, so as to achieve the wide application of mechatronics technology with a perfect management system(Zhou, 2021).

## 4. Analysis of the management measures of coal mine mechatronics technology

### 4.1 Strengthen equipment management and improve production efficiency

On the one hand, it is necessary for coal mining enterprises to make adjustments in accordance with the current technology application and to update the equipment in a timely manner, so that the equipment can not only always be in the best working condition, but also achieve further improvement in the mining efficiency of coal mining enterprises; on the other hand, coal mining enterprises should also carry out more standardized management of the equipment. On the other hand, coal mining enterprises should also carry out more standardised management of equipment, through the establishment of a complete equipment management file to effectively monitor and manage all production aspects of the equipment, so as to achieve further optimisation and adjustment of the equipment management system, while also achieving scientific and standardised technical management, which is of great value in improving the production efficiency of coal mining enterprises, as well as reducing various safety problems through standardised management(Liu, 2021).

### 4.2 Strengthen pre-job training and personnel quality

The application of mechatronics technology in coal mining enterprises requires professional technicians to operate, therefore, the professional quality of the staff is an important factor in the application of technology application effect, in this process requires staff to further strengthen the pre-service training of mechanical and electrical management personnel, and carry out pre-service training before the staff starts work, which can help the staff to carry out targeted pre-service training

work and improve the Technology application effect, can also directly understand the overall operating state of technical equipment, so that in the actual operation and production process to implement standardised management. At the same time, vocational training is also an important way to improve the quality of personnel. In this process, managers need to adjust and optimise the structure of personnel positions in conjunction with the actual application of mechatronics technology, so as to improve the application of mechatronics technology and at the same time to achieve safe production in coal mining enterprises(Hao, 2021).

**4.3 Strengthen management functions to ensure safe production**

In the production process of coal mining enterprises, the soundness and perfection of the management system is an important factor affecting the application of technology, in this process, it is necessary to set up electromechanical management departments to play management functions. On the other hand, the application of mechatronics technology in the actual production process of coal mining enterprises is intuitively important, not only for the effective adjustment and optimisation of the actual use of equipment, but also for the effective adjustment of the safety hazards in the actual production process, and for the timely identification of some objective causes of the hazards, so as to strengthen prevention, so as to improve the management efficiency and At the same time, the safety of the coal mine can also be guaranteed.

**4.4 Sound management system and increased awareness of responsibility**

The application of mechatronics technology in coal mines needs to be supported by a safe and stable management system, so that the overall function of the mechanical and electrical management of the coal mine can be given full play, and the mining process can be standardised through the improvement of the system. On the one hand, it is necessary to incorporate the various processes and links of coal mining in the construction of rules and regulations, and to improve management efficiency by establishing management systems for different links, so that coal mining enterprises can further play their management functions and achieve effective improvement of management efficiency. On the other hand, the improvement of the management system can promote the effective division of management responsibilities and the implementation of responsibilities to individuals, which not only enhances the awareness of responsibility of employees, but also enables the further refinement and adjustment of the management process through comprehensive supervision and management and coordination, which is of great value to the comprehensiveness and integrity of the application of coal mining technology (Shi, 2021).

## 5. Conclusion

In summary, the application of coal mine mechatronics technology is an important direction to adapt to the current development trend of industrialization in China. As a basic energy source, coal mine is the most demanded basic resource in China, and it is necessary to further improve the importance of coal mining in the mining process, and to adjust and improve the current management system, so as to strengthen the management and application capability of mechatronics technology in the coal mine production process In order to achieve the safety and stability of the coal mining process.

## Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

## References

Kou, B. (2022). Analysis of the application of mechatronics numerical control technology in coal mining machinery. *Mining Equipment*, *2022*(06), 178–180.

Ren, Y. (2022). The application of mechatronics technology in coal mine production. *Energy and Energy Conservation*, *2022*(04), 215–217.

Hou, J. (2022). Research on the application and management of mechatronics technology in coal

mines. *Western Prospecting Engineering*, *34*(03), 191–192.

Lei, Z. (2021). The application of mechatronics n umerical control technology in coal mining machinery. *Coal and Chemical Industry*, *44*(S1), 80-81+126.

Zhou, Z. (2021). Application of coal mine electromechanical technology and its automatic development direction. *Contemporary Chemical Research*, *2022*(16), 11–12.

Liu, M. (2021). The application of mechatronics technology in mechanized coal mining. *Science and Technology Innovation and Application*, *11*(24), 165–167.

Hao, J., & Li, lianxiang. (2021). Research on the application of coal mine electromechanical integration products in coal production. *Contemporary Chemical Research*, *2021*(16), 65–66.

Shi, Z. (2021). The application of mechatronics in modern mines. *Contemporary Chemical Industry Research*, *2021*(16).

**How to Cite:** Wu, X., & Han, Y. (2023). Research on the Application and Management of Mechatronics Technology in Coal Mines. *Journal of Global Humanities and Social Sciences*, *04*(02), 47–51. https://doi.org/10.47852/bonviewGHSS23208560201