

The transport systems of simulation and optimization of Dingfeng's slime and gangue power plant

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Abstract

To solve the problem of transporting the slime and gangue which in the power plant at the long-distance, and improving the economic and environmental benefits, it plans to design the pipeline of slime and gangue. Under the premise of the feasibility, begin to implement and manage the transportation method of the pipeline. This paper describes the transportation methods and research status about slime and gangue, such as traditional or existing transport planning scheme. Comparing these programs to choose the best method under the guidance of maximize benefits, in order to solve the problem of material transportation from Suncun mine to the power plant. It provides an effective way to solve the issues of slime utilization and

environmental protection and creates enormous social and economic benefits in the coal industry. Thus build coal - electricity - Fine coal industry chain, to promote the rapid development of new coal-fired power industry.

Keywords: slime and gangue; pipeline; logistics planning; economic and environmental benefits

1 Research Status

1.1 Domestic research

Coal is China's main energy, also is one of the main sources of environmental pollution. In recent years, with high-quality coal resources exploitation every year, the existing coal mine sulfur, ash, gangue content also increased year by year, gradually increased the proportion of coal washing, waste rock and slime utilization

problems arising after washing increasingly prominent. Gangue and slime in situ piling, resulting occupy large tracts of land, gangue spontaneous combustion; slime accumulation in a very unstable state, namely the loss of water, dried that flying is not only a waste of energy, pollute the environment, but also seriously affect workers and local health of the residents, even restricting the normal production of enterprises. According to statistics, in 2011, our country has been produced about 659 million tons of coal gangue, the comprehensive utilization of the amount of 410 million tons, the comprehensive utilization rate of 62%. Of which more than 65% for power generation, coal gangue brick and the other for farmland reclamation and other aspects of road construction and underground filling. Slime industry in China started late, poor utilization of the foundation. Until the early 1990s, China's first coal slurry power plant began to test applications. At present, how to increase the slime utilization and expand the scale utilization of slime, is the current need to address the issue. It is an

important part to use of coal, coal gangue and using circulating fluidized bed combustion power generation in China's development of clean coal technology. In recent years, due to the national policy support, coal gangue, coal power generation technology is developing rapidly and becoming more mature. National Development and Reform Commission issued the "China Resources Comprehensive Utilization Annual Report (2012)" shows that China coal gangue, coal power generation capacity of 28 million kilowatts, equivalent to reducing 42 million tons of coal mined. Gangue, coal for power generation to solve the waste rock pile up area, reducing pollution and harmful gases due to spontaneous combustion of coal gangue and emissions on the environment; significant reduction in the slime accumulation, erosion and weathering the impact on the ecological environment; greatly improve the utilization of this kind of low-grade fuel to achieve the economic, social and environmental benefits.

1.2 Status power plant

Suncun coal mine in Xintai City,

Shandong Province, which is one of the world's deepest mines, the annual production is about 1.7 million tons and more than 1300 meters deep. According to the study report, the fuels mainly come from coal gangue and slime of Suncun mine. To plan the production capacity of suncun mine, shown in Table 1.

Table 1 coal mine, coal preparation plant annual production capacity

Mine	Raw coal	Select ed	Gangu e	Coal	Low quality coal	Slime
Suncun mine	300	105	54		30	

The company's development goals: Stick to rely on scientific and technological progress, and take high resource utilization, safety and security, good economic returns, less environmental

pollution coal industry sustainable development; deepen the reform of the system of paid use of coal resources, accelerate the integration of coal resources, form a rational development, strengthen conservation, recycling, focusing on the production of safe, environmentally friendly and harmonious development of coal resources exploitation and utilization system; strict industrial access, specification development order, improve the exit mechanism, the formation of large-scale coal bases as the main body, and external environment and transportation conditions to adapt, and regional economic development coordination industrial layout; promote coal technology innovation system and build a sound market-oriented, business-oriented, science research combining coal technology innovation mechanism, the formation of a number of industry key technologies with independent intellectual property. Strengthen the comprehensive utilization of coal resources, promote clean production, the development of recycling economy, establish a compensation mechanism mine

ecological environment restoration, building a resource-saving and environment-friendly mining namely: to build coal - electricity - Fine coal industry chain and promote new coal industry Rapid development; promote market-oriented reforms, improve coal market price formation mechanism, strengthen the production, transportation, coal demand convergence to promote overall balance, the formation mechanisms, unified, open, competitive and orderly modern market system of coal.

2 Power plant pipeline

2.1 Pinnacle of power plant traditional mode of transport

Currently slime and gangue material transportation between mines and power plants Suncun merely Automotive stage, bicycle transportation less, and high energy consumption and costs, while the presence of human, material Sinatra's capacity, as well as road damage, road repair Long-term care expenditures and coal mines, power plant equipment unit and other expenses. In addition, as the leading industry Suncun coal base area for the coal development, automobile transport

capacity is mainly coal Sinatra's, and less goods brought into the car back empty rates. It is very difficult to take advantage of two-way transport, when the use of coal-fired power plants peak road transport, coal volume and the number of vehicles the car shown in Table 2.

Table 2 car coal volume (gangue, coal, low quality coal) and the number of vehicles

Table2

Capacity/MW	Daily consumptio n	Maximu m daily intake	Daily maximu m	Annual consumptio n
1x300	3749	4498.7	236	93.72

2.2 existing transportation technology solutions

Pipeline transportation has many advantages, such as transport capacity, low energy consumption, low shipping, easy comprehensive automated management; footprint, terrain, terrain limit small, the Czech Republic should select short paths, shorten transport distances; Transportation Safety sealed, basically not affected by bad weather, long-term security and stability; basically does not produce waste residue, no environmental pollution; saving equipment expenses. Additionally, coal mining reserves and production Suncun great stability conducive to long-term use of the pipeline; while our country in terms of research, design, equipment manufacturing and transportation pipelines and other construction materials has basically met the conditions. Therefore, this paper put forward a proposal to consider a road according to the terrain, geographical location, near residential areas and other factors: the construction is expected to invest 19 million, curved road transport distance of 2.8km of

pipeline; according to the circular economy, vertically integrated development ideas, based logistics planning ideas co-ordinate the overall, considering many factors feasibility of its construction, construction costs, safety management, quality supervision, systematic and automated operation, select the point straight proposed Option Two: Select the straight line distance Suncun coal power plant 2km from the optimal path, construction of underground coal slurry pipelines and gangue materials. Pipeline transport and road transport conveyor technology comparison shown in Table 3.

3 practical values of underground pipelines

Underground pipeline transportation safety, continuous, stable, all-day operation of the production process and consumption process together, and construction can take a shortcut, not restricted by rivers and mountains, to ensure peak power plant coal industry Suncun normal operation, the realization of coal

Project	Pipe conveyor	Road transport
Haul/km	2	5
External factors	Small	Big
Management	Small workload	Big workload
Operational flexibility	Adapted to	Flexible
Environmental Impact	Small	Big
Reliability	High	General
Technical Evaluation	★★★★	★★★
Initial static investment	3647.83	1226
Present value of the annual running costs	2586.34	6667.2
Total dynamic investment	6234.17	7893.2

power industry integration, peer through, completely breaking the long-term constraints Suncun material handling coal mining enterprises "bottleneck." Construction of the pipeline will transport the material to promote its advance towards the goal of eco-businesses, and ultimately economic harmonization coal, technical efficiency, eco-efficiency and social and sustainable development. The construction of the pipeline is built directly on the new logistics system downstream core resources, coal, waste rock and other materials pipelines technologically advanced, safe and efficient, saving energy, the green

economy, in full compliance with the "scientific development, energy conservation, environment-friendly, changes in development, building an innovative country "strategic approach, material handling coal companies to build a new channel to provide a good role model. By building material transportation pipeline project, the pinnacle of power plants can significantly reduce logistics costs and operating costs, in competition with other large coal enterprises occupy a very strong position to become the material transport pipeline industry leader.

In summary, it can be seen in the construction of underground pipelines can get to maximize the overall efficiency of enterprises and comprehensive benefits under the guidance of the pipeline investigate safety, technical and economic feasibility of the construction of the project implementation process so that more accurate, standardization, standardization and improved construction and implementation of the project, forming a coal enterprise management model to improve the efficiency of the plant

material transportation modes peak quantify environmental benefits, potential resource protection, while full use of resources and improve the economy of the project, the community efficiency to achieve maximum profit objectives of the project and seek further cost savings, not only greatly improve the level of logistics planning of the project, but also for material handling projects played a good role model the new channel has an important significance.

4 pipeline problems and pre-benefit assessment solutions

4.1 Pipeline Problems

Transportation pipeline construction with a long construction period, a large amount of investment, involves a broader characteristics, which only exists in the objective economic output and includes a non-economic output, and sometimes the presence of a large number of cross-cutting, and therefore overemphasize economic evaluation and financial evaluation, assessment, or their lack of social benefits paid insufficient attention to pipeline construction projects are clearly insufficient to support

it. Another system of social evaluation does not regulate "economic short-termism" is relatively common, has yet to find an accurate measurement methods, the corresponding project and selection criteria will lack a solid foundation, it is difficult to make scientific decisions. Currently, the construction of underground pipelines material is still in the exploratory stage, proved that this is the most reasonable way to build a coal-transport chain, but the logistics planning and effective pipeline stage on analysis of a variety of materials while transport is not much See, generally speaking, has not established a comprehensive, systematic and scientific evaluation index system of social benefits and methods of these problems seriously hindered Suncun coal mining enterprises and scientific management.

4.2 develop solutions

To achieve better logistics planning pipeline transportation, which requires us to summarize a lot of theoretical researches on materials pipelines benefit analysis, the use of research and analysis, numerical analysis, charts and

other research methods to establish the mathematical model on benefit analysis, conducted "Material pipelines benefit analysis" of research, evaluation, or through the use of qualitative analysis" without antitheses "and" horizontal comparison method ", and thus the economic, social and technological benefits of a rough assessment of the project to standardize the management of existing , the process of construction, transportation management, total quality, safety management based on the theory, research material handling characteristics of pipeline projects and issues and management measures in the process of building the project encountered, propose reasonable project objectives, management, through analysis of the impact of the project construction and implementation factors, building projects and standardized management system and system implementation, so as to enrich the content of existing logistics planning.

5 Summary

Types of coal transport channels although diverse, but the situation

somewhat nervous, overall still railways, road transport, and coal transportation road bear, then led to the loss of secondary transport costs and improves resources. Slime and gangue material transportation pipelines, will change completely dependent on road transport in the past that the situation, which is to promote the development of coal enterprises, optimization of transport channel to ensure our supplies, reduce transportation costs etc is of great significance. Social evaluation project is to carry out the project with the evaluation work was developed in the 1960s, although its prototype can be traced back to the early period of development of capitalism, but generally speaking, the existing evaluation methods are mainly traditional cost-effective analysis, the new methodology and value-added method, and experience from the time they are used in various projects of view, both have their own advantages and limitations. Social evaluation of the proposed pipeline project is vital important for the construction of the mine. Although these plants peak years in the transport management

practice, constantly sum up, innovation, but managers for the social aspects of ideology, management ideas, are still affected by traditional methods, in particular the practice of mining transport corridor material transport corridors also not fully realize the implementation of the system of scientific planning, quality management personnel are also still needs further comprehensive training and awareness. How to quantify the overall efficiency of pipeline transportation of materials, optimizing the transport pipeline construction materials; how to improve the management of the pipeline transportation of materials, improve labor productivity, make full use of limited resources to improve the economic and social benefits to the pinnacle of power plant coal material Suncun Pipeline transportation planning and implementation is of great significance. This paper compares three transportation programs, the establishment of a comprehensive evaluation model of efficiency, merit-based program, so as to enrich the material Suncun coal power plant project pipeline

contents existing logistics planning, logistics planning results will reflect the design of integrated material handling peak power plant pipelines, construction progress, management and comprehensive benefits. How to do the planning and design of peak power plant logistics systems, and to take effective measures to maximize the overall efficiency under the premise of making the problem can be achieved is the focus of this article. I hope the overall efficiency of the material transport by pipeline analysis and improve the actual effectiveness of the material transport pipeline project (economic, social), to improve the level of construction management projects, better construction and implementation of the project, but also to the same types of projects provide a reference implementation of the building.

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