

# Application of GIS in Oilfield Power System

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**Abstract:** This paper discusses the use of GIS in oilfield power system, combined with the basic concept and advantages of GIS, combined with the characteristics of the oilfield power system, put forward the overall design system of the oilfield power system, ensure the stability of the power system operation, give full play to the role of GIS.

**Keywords:** GIS; Oil field; Power system; Using the strategy

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## 1 Introduction

In recent years the development of computer technology in our country, in the process of the social development need to use more geospatial information, prompted the geographic information system technology in China is gradually perfect, the GIS system has many advantages, including the earth's surface and underground space information, can the complementary use of surveying and mapping information and survey information, can be superimposed multiple information statistics on the ground and underground. GIS system can make use of symbols to geographical feature space, at the same time using digital stored geographic features, so that you can save data storage space, can the infinite zoom graphics, the graphics update work and storage are very convenient, use a database to store all kinds of information and graphics, is helpful to share relevant data.

## 2 The characteristics of the oilfield power system are summarized

The electric power system plays an important role in the production process of the oil production plant. The management of the electric power system is relatively complex. Many oil production plants use traditional manual operation management, so the management workload is very large and the overall work efficiency is relatively low. In the development process of the oil production plant, the depth of development has been constantly strengthened. Through the layout of the infilling well network, the scale of the power system of the oil production plant has been continuously expanded. Meanwhile, the map of the power system has been sharply increased, and the map of the power system has become more complex. The traditional drawing and management methods cannot meet the production needs of oil production plants, so it is necessary to play the role of the GIS system. In the GIS layer, the transformer, various lines, and substations of the power system can be respectively corresponding, to generate spatial relations and strengthen the development of GIS.

## 3 Power system design

### 3.1 Overall design

The electric power system plays an important role in the daily life of the oilfield, but the management of the electric power system is very complicated and involves multifarious work. Combining the oilfield power system and GIS system, construct oilfield ground engineering, and develop a power system by using geographic

information systems. Based on the GIS platform, it mainly USES development tools such as Excel and Delphi. Through the strict investigation, establish the system function module diagram.

### **3.2 Partial functional design**

Line map: if a 10kv line is used, three conditions can be used to display the basic situation of the line, on the one hand, to establish a separate view, including the terrain and landform, on the other hand, to produce a separate view without landform and landform, and on the third hand, to add quantity to the original map. To generate a circuit map, the equipment relationship of the power system should be fully utilized to determine the spatial connection of geographical features. It is necessary to give full play to the role of geographic information system (gis) in the automatic generation of circuit maps.

Smart work ticket: in the process of line maintenance and operation, work ticket plays an important role. In the power system, 10 kV line construction process, need to show your working ticket, users can according to the practical circuit, the line name and dual number input in the input box, will disconnect breaker, to realize the automatic statistics and calculation system, at the same time to carry out the ground construction, attention to set up the warning sign, finally displayed on the screen, will eventually figure print run results. To improve the convenience of the user's printing operation, the system USES OLE technology to generate work tickets, and finally USES Excel to output the results.

Using the oil well to find the line: according to the actual work needs of the oil production plant, the user enters the name of the oil well in the system, so that the name of the power supply line can be timely inquired, and the position of the oil well and the overall situation of the line can be shown in the figure. To achieve this function, it is necessary to combine the spatial relevance of the equipment and automatically generate charts according to the actual operation of the line.

## **4 Key technologies**

### **4.1 Graphic standardization technology**

The AreView tool is used to accurately describe different geographical features through various layers. In the process of representing graphic information through each layer, symbols and colors that do not pass can be used, for example, roads are represented by broken lines, provinces are represented by polygons,

and provincial capitals are represented by points. In the process of using a review tool, the actual display form of each layer needs to be fully controlled. However, in the application process, the symbols provided in AreView are not comprehensive enough to meet the actual work needs. So you need to extend the notation in AreView in an efficient way. Bitmaps and TrueType font files can be converted to markup symbols, and the Avenue language is used in the notation process. The method of converting bitmaps and TrueType font files to mark symbols is more widely used, because it is more convenient to use, just need to edit TrueType font files to complete the work.

### **4.2 Divide and print graphics**

Because the GIS system has more geographical features, users do not need to use all the geographical information in the printing process, which requires the segmentation of graphics. In the GIS system, there are mainly three kinds of segmentation offenses. On the one hand, it can be divided by mines, on the other hand, it can be divided by rectangles. Finally, it can be divided according to the selected features. The GIS system can automatically generate smart work tickets, also can automatically extract the line map.

### **4.3 Combine AreView and Delphi5.0**

Users can ensure the flexibility of the GIS application environment by using AreView software. But a review also has limitations, lack of interactive features, users can only use content in each interface, if the user the choice of the table of contents, more need to use a lot of interfaces can complete the work, but such specific operation is also becoming more complex, cannot guarantee the flexibility of the interface, it is not about application development goals. To make up for the shortcomings of a review, you can use the method of dynamic connection library, because the use of Delphi to design a flexible user interface, staff can also use Delphi to enhance the development of the user interface, and in a review can be compiled into DLL, GIS users can be met all kinds of needs. Combined with a review and Delphi5.0 in the system, can achieve the intelligent worksheet and circuit outage maintenance card and other functions, and can guarantee the application effect.

### **4.4 OLE technical report printing**

Delphi has OLE automation components that can connect to Microsoft Office and create Office

documents. In the report printing process, this technology is used to input data from the database into Excel, and the user can adjust the Excel spreadsheet, and finally print out the report. To do this, you first need to connect to Excel, open the template file, transfer the data, and close the Excel connection.

#### 4.5 MapX

MapX is a programmable control. In the visual environment, connect the map function, organize the map according to the layers, display and scale the map and select the map. MapX can also be used to browse and query maps, and secondary development can be achieved. The combination of MapX and programming language can effectively achieve the above functions. The system can be used to display and process the lines and switches off the oilfield distribution network, assist the managers to fully understand the distribution network, ensure the scientific decision-making, and ensure the operation state of the network. According to the spatial graph, the pattern actual demand can generate a thematic graph. Binding related data, the staff can query the graph and attribute data in both directions, can query the power system load and equipment performance, at the same time can determine the distribution network system lines and equipment, etc., the wanted criminal analysis query results, the system can according to the user input name, in the

graphing practice accurate positioning.

## 5 Conclusion

In the process of power system management in the oil production plant, GIS plays an irreplaceable role in leasing. In the future, the managers of the electric power system of oil production plants need to deeply study GIS technology, which can reduce the burden of technicians and guarantee the overall benefit of the oil production plant.

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