Research on the direction of aviation power operation capability improvement

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Abstract. In the current rapid development of the power grid and the complex internal and external environment, the traditional method of manual inspection of the line cannot meet the development requirements of the power grid, and the aviation power operation has the advantages that traditional manual power operation does not have. Therefore, the grid company should combine the advantages and capabilities of the aviation power operation with the power line operation and maintenance business itself, improve the cooperative inspection capability of aviation power operations, the intelligent inspection capability of aviation power operations and the emergency of aviation power operations. Repair ability, etc.

1. Introduction
Transmission line maintenance and repair operations include transmission line inspection, transmission line defect management and transmission line fault handling. The helicopter power operation and maintenance technology refer to the use of helicopters for the operating platform of the power operation technology, including inspection lines, maintenance and elimination. The type of work is the professional direction of the integration of power and aviation. The advantage of using helicopters for power operation and maintenance is that the helicopter can take off and land vertically and hover in the air, so that it can perform tasks in narrow areas and other complex terrains where vehicles and general machinery cannot reach. It can take-off and land on the area of the site, also need the lower degree of hardening.

In the current rapid development of the power grid and the complex internal and external environment, relying on traditional manual line inspection and maintenance, there are problems in the inspection of special terrain and meteorological conditions, difficulty in finding defects in the bottle mouth and above, and low efficiency of inspection. Helicopters have obvious advantages in aviation power operations. Therefore, advanced technology should be used to improve the collaborative inspection capability of aviation power operations, the intelligent inspection capability of aviation power operations, and the emergency repair capability of aviation power operations to improve operational efficiency.

2. Improve the collaborative inspection capability of aviation power operations
In the current rapid development of the power grid and the complex internal and external environment, relying on traditional manual line inspections, it is difficult to inspect the inspection under special terrain and meteorological conditions, it is difficult to find defects in the bottle mouth and above, and the efficiency of inspection is low. There are obvious advantages in conducting aviation power operations. Moreover, with the use of drones more and more extensive, and assisting in the
transmission of satellite transmissions, the patrol operations are gradually changed from ground to ground plus air, and space-to-ground and overhead transmission lines are realized. From the perspective of time, the cooperation of helicopters, drones and manual inspections can effectively utilize resources, reduce inspection costs and improve inspection efficiency.

Helicopter inspection has the advantages of high efficiency, flexibility, speed, and geographical influence, and can perform multi-task loading and fine inspection operations. The drone inspection has the advantages of small terrain limitation, good tower inspection effect, low cost, simple operation and high inspection efficiency. It can effectively cooperate with manual and helicopter inspections in the scope, content and frequency of inspection. The traditional method of manual inspection is that the operator carries a telescope, a range finder and other equipment to conduct inspections on the ground or on the tower, which is not efficient.

The coordinated inspection is mainly aimed at the synergy of helicopters, drones and labor, and exerts the maximum benefit of the synergy of the three. Through the analysis of the advantages and disadvantages of the three, in the division of labor inspection recommendations: helicopter line is mainly used for high-voltage, cross-region DC and 500kV and above voltage level overhead transmission line fine inspection and detection, disaster investigation and post-disaster grid assessment, supplemented by the maintenance work; small multi-rotor UAV is mainly used for detailed inspection, fault patrol and channel inspection of overhead transmission lines of various voltage levels, supplemented by inspection and maintenance operations; fixed-wing UAVs are used for channel inspection, Disaster investigation and post-disaster power grid assessment; manual inspection is mainly used for overhaul operation of overhead transmission lines of various voltage levels, supplementing inspection and inspection work.

3. Improve the intelligent inspection capability of aviation power operations

With the development of big data, cloud computing, Internet of Things, mobile Internet and artificial intelligence, in the inspection professional, especially in line operation and maintenance, deepening visible light, infrared, laser scanning, geographical environment, meteorological conditions, etc. The effective integration of the inspection information, and the in-depth mining application value of the inspection data.

The basis of intelligent transportation inspection for aviation power operations is based on the improvement of the intelligent operation level of various types of aircraft (including helicopters, drones, etc.) and the construction of various data application modules such as helicopters and drones. At the same time, based on three-dimensional inspection, centralized storage, batch processing and unified management of various inspection data; mass data batch processing, intelligent analysis capabilities to meet the application requirements of each business module, improve the inspection data utilization time; establish compliance with information security requirements The information is efficiently interconnected and transmitted, and the inspection data is connected to the intelligent inspection and control platform and the inspection information is shared. At the same time, under the overall structure of the intelligent inspection and control platform, the various inspection data and the inspection information are integrated to realize the seamless connection between the inspection management decision and the on-site operation, and the data application value is deeply explored to achieve unified analysis and all-round display. It has the functions of intensive management and control, emergency command, resource optimization and other functions to improve the quality, efficiency and efficiency of the inspection, and comprehensively build a coordinated three-dimensional intelligent inspection mode for overhead transmission lines.

The grid company's in-depth development of intelligent transportation inspection should firstly be based on the helicopter platform to enhance the intelligent operation capability of the helicopter. In the multi-sensor operation mode, data acquisition can improve the inspection quality, and at the same time, the application value of helicopter inspection data can be further explored to realize data processing and data analysis. Centralized storage and management of data applications, establishing data channels with the inspection and control platform, realizing data sharing and closed-loop management of
inspection defects, and improving the effectiveness of inspection data application. It should cover the development and application of helicopter intelligent inspection equipment technology and the construction of helicopter inspection data center.

4. Improve the emergency repair capability of aviation power operations

The power grid company should strengthen the emergency repair capability of the power grid and establish a special "special soldier" to ensure the safe operation of the power grid. With the large-scale development of the power grid, the line engineering is getting longer and longer, the terrain and landform cover a wide area, the channel environment is bad, and the helicopter repair is irreplaceable. At the same time, natural disasters in China occur frequently, and the threat of safe operation of the power grid always exists. In addition, in view of many large-scale activities, the requirements for safety and power conservation are increasingly strict.

Therefore, the grid company should improve the emergency repair capability based on aviation power operations, strengthen emergency training and response, speed up and increase quality, increase protection; improve power operation skills, cultivate power grid repair capabilities; expand business scope and reflect corporate social responsibility.

Strengthen emergency training to ensure rapid response capability

Grid companies need to be well trained, responsive and secure. Well-trained, navigation should regularize emergency drills: formulate emergency plans, increase the number of emergency drills, increase the speed of emergency operations, prepare for sudden business, and strengthen local cooperation: drills can be carried out together with local governments. In the process, we will demonstrate our own capabilities, increase our customer identification, and gradually incorporate them into local emergency repair systems; speed up response, conduct risk prediction and advance deployment: integrate existing empirical data to conduct risk analysis, and plan ahead and plan aircraft for potential emergency areas; Optimize base planning: rationally lay out operating points according to emergency needs; strengthen emergency dispatching and commanding capabilities by establishing emergency response mechanism and technical means; strengthen support capacity building, set up emergency detachment: set up team, specialize in emergency business organization, materials, logistics Work such as aviation inspection can be carried out by means of personnel from various departments; incentives for rewards and punishments can be included: emergency rescue drills and actual operations can be included in the scope of employee compensation awards, and the enthusiasm for participating in emergency operations can be enhanced.

Improve emergency response capabilities and make up for their shortcomings

At present, the main power grid companies' aviation power operations mainly carry out the basic patrol work of the power grid. From the basic inspection and transportation functions, to the power grid repair function, including the application of helicopter power line fire extinguishing, ice disaster, snow demolition after the snow disaster, temporary emergency tower construction after the collapse of the electric tower, etc., but the existing situation has not been related Business shortcomings: helicopters are de-icing, fire-fighting and other devices are missing, such operations are more dangerous than the general transportation business, and have higher driver skills and operational experience, and current flight skills are difficult to meet the requirements. The specific improvement measures include: accelerating the research and development of emergency devices, and formulating emergency operation plans that meet the respective business characteristics of helicopter fire extinguishing, snow removal and de-icing, and temporary construction of electric towers, and carry out the drills of the above-mentioned services, from low-voltage level to small-scale scope. The development of high-pressure grades and the gradual improvement of operational capabilities.

5. Conclusion

Aviation power operations have an irreplaceable advantage in line operation and maintenance. Power grid companies should give full play to the characteristics and capabilities of helicopter operations, strengthen coordination with UAVs, and rely on advanced technology to improve operational
capabilities and levels. It is the key work of the next grid company.

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