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Some Thoughts on Strengthening the Construction of High-Tech Equipment Maintenance Support Capacity

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Abstract

Based on the actual situation of the enterprises, this paper puts forward the methods and measures to strengthen the construction of high-tech equipment maintenance support capacity and maintain the equipment perfectness from four aspects: training maintenance support talents, using new maintenance methods, improving system integration support, and doing a good job in the construction of maintenance supporting facilities.

Keywords: high-tech equipment, maintenance support capacity, education and training

1. Introduction

In recent years, with the rapid development of equipment construction, a large number of high-tech equipment have been introduced, which puts forward new and higher requirements for maintenance support work. From the current situation, the contradictions, and problems, such as the long generation cycle of high-tech equipment maintenance capability, the large gap in the professional quality of maintenance personnel, the limited equipment supply chains, and the inadequate construction of supporting facilities, are quite prominent. We must attach great importance to them, comprehensively implement measures, speed up the construction of high-tech equipment maintenance support capability, strive to maintain the high-tech equipment's perfectness, and give full play to the maximum operational efficiency of the equipment.

2. Speed up the Training of High-Tech Equipment Maintenance Support Talents

Talents are the foundation of equipment development. The more high-tech equipment, the more high-quality talent is needed to operate. We must pay close attention to education and training as the primary task of constructing high-tech equipment maintenance support capacity.

2.1 Select Maintenance Personnel

Based on the necessary profession for the maintenance support of high-tech equipment, we will implement a competitive learning examination system to ensure that the best maintenance personnel are selected from the good. The cadres who have positive political thought, a solid professional foundation, a strong desire to develop in enterprises for a long time, and a strong will to learn maintenance, as well as those who want to learn, are willing to learn, and are capable of learning will be added to the high-tech equipment maintenance support team. Adhere to the principle of quality first, not pursuing quantity, not engaging in "training in rotation" for everyone and designate special personnel to focus on training. In practice, it is advisable to designate two personnel for each profession to attend two to three on-site training for the best effect.

2.2 Strengthen Post Learning

Learn the principle of equipment, establish the concept of overall function, grasp the depth of learning the principle of high-tech equipment from the three aspects: overall structure-function, overall signal function, and overall control function, clarify the required and optional content in the textbook, and identify the learning focus.

Learn the system circuit, strengthen the consciousness of the module circuit, and decompose a complex system circuit into parts by modules, so that the complex system circuit structure becomes simple and clear, which is conducive to simplifying the learning difficulty of the system circuit. Learn the fault analysis, identify the detection node, clarify the detection condition, formulate the detection plan, draw the detection flow chart, and identify the fault-finding path. Learn fault maintenance, integrate theory with practical installation through simulation training, carry out skills training while working, follow up learning and training as a trainee and other practical training, and master fault maintenance skills.

2.3 Do a Good Job of On-Site Training

On-site training is the best way to master high-tech equipment maintenance skills quickly. It is necessary to assign tasks, burden responsibilities, and specify requirements to trainees, and resolutely prevent the phenomenon of "doing something as a mere formality" and "going through the motions" with society. Considering the characteristics of more content, shorter time, and higher on-site training requirements, trainees should attach great importance to their thoughts and devote themselves wholeheartedly to their actions. They should take the on-site training as a rare opportunity to improve their own quality, make full use of the resource advantages of the manufacturer, seize every moment to think and ask more questions, operate, and participate in more tests and detections, and learn new knowledge and skills, striving to achieve the "in-depth" training goal.

3. Make Full Use of New Means of High-Tech Equipment Maintenance and Detection

Due to the high degree, multiple applications of new technologies and complex structures and principles of high-tech equipment science and technology, it is necessary to use new methods and means to carry out maintenance support, and constantly improve the quality and efficiency.

3.1 Use Built-in Test (BIT) to Complete Real-Time Automatic Condition Monitoring

High-tech equipment has a relatively complete BIT system. Through real-time monitoring of key circuits, modules and interface signal parameters, the control circuit completes fault display, protection control and audible and visual alarm.

3.2 Use Interactive Electronic Technical Manual (IETM) to Complete Fault Information Maintenance

IETM is based on the application of multimedia and database technology and combined with the fault diagnosis expert system, remote network technology and virtual reality technology. It aims to promote the digitalization, informatization and intelligence of high-tech equipment maintenance support, which will significantly improve its effectiveness. The fault diagnosis of IETN is mainly based on the description of high-tech equipment fault phenomenon by maintenance personnel. The fault information (such as technical parameters and fault codes) of high-tech equipment is input into IETM, and the fault diagnosis analysis tree in the knowledge base of the expert system is used for automatic reasoning and analysis to generate fault causes and give maintenance suggestions. The best solution from the maintenance scheme is selected to achieve the "foolproof" fault diagnosis and eliminate high-tech equipment.

3.3 Preventive Maintenance Based on Condition-Based Maintenance (CBM)

The condition information of system operation is obtained by implanting sensors inside the equipment or external detection equipment, and real-time or periodic evaluation is carried out on it. Finally, it formulates the equipment maintenance demand, overcomes the drawbacks brought by post-maintenance and regular maintenance, extends the equipment operation cycle, and reduces the maintenance cost and failure probability.

4. Take a New Way to Maintenance Equipment Supply for High-Tech Equipment

With the continuous development of military-civilian integration, the socialization of equipment supply will be the inevitable choice of high-tech equipment maintenance support, which can effectively remedy the defect of relying solely on the military support mode.

4.1 Electronic Procurement

There are two procurement modes: peer-to-peer direct selling equipment purchase mode is adopted with equipment manufacturers, and relay summary purchase mode is adopted with overall equipment enterprises. Procurement payment of necessary equipment is directly completed through online banking.

4.2 Quick Distribution

Use mature commercial logistics distribution network and increasingly perfect Internet of Things (IoT) technology to build an efficient logistics guarantee channel. Through civil express delivery, high-speed railway transportation, air consignment, autonomous delivery by unmanned aerial vehicle (UAV) and other distribution methods, the difficulties in equipment transportation of high-tech equipment maintenance are solved.

4.3 Distributed Supply

The warehouse base equipment in different regions will be networked to ensure the sharing of equipment information and materials and equipment. The principle of proximity will be adopted for distribution. The mode of fixed transmission and supply at certain points will be broken, and the static fixed-point supply will be changed into a dynamic distributed supply, effectively overcoming the problems of repeated storage and untimely equipment supply. Distributed supply fully relies on the advantage of socialized support resources. Through networked procurement, rapid distribution, and distributed supply of equipment, the "one-stop" service of procurement, transportation and supply of high-tech equipment maintenance support equipment can be realized, so that it can be purchased, distributed, and supplied at any time.

5. Do a Good Job in the Construction of High-Tech Equipment Maintenance Support

With the simultaneous development of equipment and supporting facilities, we should focus on the supporting development of facilities, equipment, and maintenance materials according to the requirements of complete elements, reasonable configuration, and complete functions.

5.1 Optimize the Learning and Maintenance Site

The equipment education and training center and maintenance factory will be upgraded according to the requirements of high-tech equipment maintenance support. On the one hand, we will set up the network classroom, the simulation training room, the innovation equipment room, the technical reference room and other learning and training sites, configure training simulators, simulation equipment, establish visual systems, network monitoring systems, and create the necessary conditions in the equipment education and training center. It is necessary for realizing simulated training and network learning of high-tech equipment maintenance support. On the other hand, by the principle of "common use of the same specialty, the share of the general specialty, and the single use of the special specialty", and based on the interrelation of various types of high-tech equipment, different specialties are integrated, and the supporting facilities such as training and maintenance are integrated, so as to achieve the optimal allocation of resources and efficient function centralization.

5.2 Prepare All Technical Data

Given the allocation of high-tech equipment and in combination with the maintenance and support tasks of high-tech equipment, we have taken the methods of upward application, self-compilation and self-purchase, reference and absorption, and actively do a good job in matching corresponding regulatory documents, general data (including handbook of service instructions, general standards and basic textbooks), and special data (including maintenance tutorial, technical specification, quality inspection standard, maintenance equipment standard and emergency repair manual of model equipment) after carefully sorting out the existing technical data, so that the maintenance has reference and basis.

5.3 Accelerate the Informatization Construction of Maintenance Support

On the one hand, we will introduce and develop simulation training, mathematics, assessment, and other software for various types of high-tech equipment, improve the database system, and comprehensively enter the equipment information, work content, teaching courseware, maintenance flow, common troubleshooting and other elements involved in high-tech equipment maintenance support, to provide technical support for the development of high-tech equipment maintenance support training. On the other hand, the introduction of intelligent detection, maintenance, fault diagnosis and other advanced equipment for high-tech equipment maintenance support will improve the timeliness and accuracy of high-tech equipment troubleshooting.