

# Key Task of China Robot Industry Development-Technologists Cultivating

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## Abstract

This paper discusses the importance of the robot to economic development and social progress, and point out that robot related technologist storage and training are important influencing factors to robot industry. Current situation of China robot development, robot technologists and robot industry personnel employment are analyzed. Then it concludes that robot related personnel cultivating is base and key to develop the robot industry further. Feasible technologists cultivating strategy is proposed finally.

**Keywords:** Robot industry, personnel cultivating, technology training.

## 1. Introduction

Robot is "top pearl of the manufacturing crown", its research, development, manufacturing and application are important marks to measure the science and technology innovation, high level manufacturing of one country. So, in 2014, competition in robot field increases to pink, not only in technology and business field, many firms compete drastically, but also in strategy, many countries put the robot into important position.

In the 17th academicians conference of Chinese Academy of Sciences and the 12th academicians conference of Chinese Academy of Engineering held on June, 2014, President Xi Jinping clearly presented that "China needs not only to improve the robot level, but also to promote the market share". Facing the market development opportunity, experts in China robot industry take 2014 as the first year of the China robot development and soar.

In robot development route report latest published, USA puts the robot and internet into equally important locations, and the robot technology is regarded as the core technology to realize the manufacturing reform and advance the economy development. European Union has started the civil

robot research plan-SPARC, which plans to invest 2.8 billion Euro till 2020 and produce 240 thousands work positions. The most remarkable plan is that in order to keep its leading position, Germany proposed the industry 4.0 plan, taking the intelligent robot and intelligent manufacturing technique as the entry point to greet the new industry revolution.

Japan regards the robot industry as the key support of its economy growth strategy, and in its new industry development strategy, the robot industry is listed one of the highlighted support industries. South Korean drawn up "intelligent robot basic plan" and published "robot future strategy look into the distance 2022", and pointed out the future develop direction of the robot. So global robot competition expanded intensely from 2014.

In order to keep up with the pace of the global robot development, and occupy more market share, China must accelerate its robot development strategy, especially the robot technologist cultivating.

## 2. Current situation of China robot development

Under the support of the national policy, and influenced by the good policy of the industry development, China robot increases drastically and has become the largest global market of the robot and intelligent equipment. With the development and expanding of the robot industry scale, robot market needs not only the key core techniques, personnel cultivating is the more important thing.

Robot industry experts regard that 2014 is the first year for the China robot, and in the future 30 years, China robot market will keep at least 30% high speed increment. According to the statistics of the international federation of robotics (IFR), in 2015, year supply of China industry robot exceeded 20 thousands, and China had more than 130 thousands

robots. Facing the high speed development robot market, research, production, operation and maintenance of the total robot industry will bring more work opportunities, at the same time, it also puts forward higher demand for the personnel.

Nowadays, the world is faced with the manufacturing reform, and China manufacturing is faced with great difficulty and challenges, such as population advantage disappearing, labors lacking, labor cost increasing drastically, etc. Therefore, traditional industries transforming and upgrading have become more and more urgent. China industrialization begins late, and lacks of the high quality technologists, autonomous innovation ability and intelligence level are very low. Though the robot can substitute people to do the heavy works, but if we really want to realize human-machine integration, there is a long way to go. Under the background of that China is faced with the traditional industries transforming and upgrading, high level manufacturing returns back to USA and EU, while low level manufacturing transfers into those countries with lower labor cost, all these force China to reform its manufacturing mode.

In recent years, robot prices decrease and their performance promote continuously, while the labor cost also increases yearly. If robot can substitute human being to do some simple works, it can decrease the cost effectively and improve the efficiency. Though the future of our robot market is very bright, we still face many concrete difficulties, e.g., small finance investment, lacking the basic research personnel and technologists. Hence, it is very important to cultivate the robot professional technologists, and promote the total technique level of the industry.

### **3. Current situation of China robot technologists**

Robot integrates intelligent techniques, information techniques and digital techniques, and can substitute human to carry out some simple, repetitive and onerous works. At the same time, it can complete such works as information collecting, case feedback, analyzing and disposing, and determining and making decision, etc, so it can realize the human intelligence through machines.

Though the robots and other intelligent equipments substitute partial traditional industries which make the enterprises to recruit less workers, they also bring new demand for high quality professional personnel. First, partial workers free themselves from operating posts of high intensity, high difficulty, high risk and low salary. In addition, they will also produce a sea of researchers and application personnel associated with the automatic system industry.

At present, for each 5 robot sold, there is one robot assembled in China. According to the increasing speed of China robot assembling, quantity and quality of the China robot professional technologists are very short. Investigation data from three large robot enterprises, i.e., ABB, Motoman and Fanuc, show that only in Suzhou, Wuxi and Changzhou city, there are more than 3000 enterprises use the industrial robots, and deficit of the industrial robot related professional technologists is more than 2000. In last year, only in Shenzhen city, the deficit of the robot technologists is about 50 thousands, and in Chongqing city, it is 5 thousands, the industrial workers deficit is 70 thousands. While in total China, the deficit is more than one million. All these data reflect that our professional robot technologists are very short, and the great need for the professional personnel.

### **4. Current situation of personnel employment**

Robot is a complex systematic engineering which needs many kinds of personnel, and different industrials and posts have different requirements for the personnel, so the qualified professional personnel must have comprehensive profession capacity to operate different kind of robots independently [1]. In many high level accurate manufacturing industrials, accuracy demand of the robot daily maintenance, debug and assembly are quite high, so it is very difficult for the unprofessional personnel to master the technique secret. Therefore, it needs the professional personnel to operate. For the research enterprises, it needs an army of high level technologists with abundant professional knowledge, massy theory base, and certain research ability and innovative quality.

Daily maintenance, debug and repair of the industrial robot production line need professional personnel to cope with. While at present, the most deficient personnel in these enterprises are the technique workers with abilities of advanced machine assembly, operation and maintenance. Only through collaborating between the machine and human can we get the machine-human integration, and create higher work efficiency and values for the enterprises. Based on the statistics, one robot needs 3-5 related operation, maintenance and integration application personnel. Salary of a robot technologist with high level integration application ability can be 500 thousands RMB. In the past year, salary of the technical works had doubled.

### **5. Personnel cultivating is base and key for robot industry**

China needs to improve the understanding of the robot technologists cultivating further. We must establish our robot personnel cultivating system to plan robotics technologists training. We should promote the robot technologist cultivating to national strategy, and build the path of our national robot technologist training.

Development of the robot industry should emphasize the personnel cultivating, because the personnel are the base and key for the industry development. With the continuous development of the robot industry, we have a higher demand for the personnel, and need a host of inter-disciplinary talents with international horizon.

Robot technologists are the most important thing in robot base construction. Executing the good development programming, mastering key technology and generalizing and applying robot technology, need high quality personnel to realize. To suit this social demand, we must program the high quality robot technologists cultivating plan to provide enough personnel guarantee for our robot industry entering new development opportunity era and sustainable development [2].

According to the development plan of the ministry of industry and information technology of China, till 2020, robot assembly number will reach one million,

and we need about 200 thousands industry robot related personnel. It means that from 2014 to 2020, we need to cultivate more than 30 thousands industrial robot application personnel. But now, our cultivation of the industrial robot professional personnel has fall behind.

Nowadays, though most of our national universities have established robot related majors and courses, they mainly do the theory research, program design and robot reality develop, and majors related with the industrial robot application are very short. We have many works to do in many fields, e.g., course content setting, personnel cultivating procedure and robot design, etc.

Robot technology research and market application have become an important sign to measure one country's technology innovation and high level manufacturing, it is no doubt that the technology innovation needs an ocean of personnel to realize. On one hand, government should pay more attention to cultivate the robot innovative personnel, combining the tendency of region development and industry development, integrating the high quality resource, uniting the universities, research institutions and enterprises to draw up the importing and cultivating plan of the innovative personnel. On the other hand, we should exert the demonstration, radiation and promotion functions of the imported personnel efficiently, and open related courses and majors to the robot technology and application. Moreover, universities are in charge of the theory train, and enterprises are responsible for providing practice platform, mainly to cultivate leading personnel who can impel the industry development and engineering technology key technologists.

In addition, we should establish the inspire mechanism for the robot technologists, and list the robot into the fields of national science and technology, education and comprehensive award. We should encourage undergraduates, graduates and technologists to carve out autonomously, and financially support their innovative thoughts and original results. Most importantly, we should construct the environment and atmosphere to make the robot elites to easily demonstrate their ability.

## **6. Conclusion**

With the rapid progress of the robot industry, intelligent degree of the industrial robot is becoming higher which not only promotes our labor techniques, but also bring new work posts. Therefore, we should strengthen the cultivating degree for the high level technologists, and prepare more personnel storage for future development.

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