

## **The Efficient Combination of Supplier Management and the Guarantee of the Quality of Product**

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**Abstract.** The quality, cost and schedule of the products and service of suppliers have direct effect to finally product, and improving the supply chain is benefit of competition of products. A company usually purchase various materials from suppliers, but their scale management ability of suppliers are different. In this way, lots of quality problems caused bad effects to quality reputation. In this article, we analyze the reason of those problems; summarize and provide the terms for improvement way, including choosing of suppliers, authorization of inspectors, extension of NCR, communication of quality information, convey on technological requirements, application of the quality control plan, combination of purchasing plan and annual assessment of suppliers; find out the management flow and improvement direction; guide suppliers to adapt the requirement of the development of factory; improve the manufacturing skills and management level; guarantee the outsourcing and cooperative products conform with our standards, reflect the quality of products.

### **Introduction**

The quality, cost and schedule of the products and supplier's service are important parts of the quality, cost and schedule we finally provide. If suppliers can provide high-quality products, the quality of products and the improvement of supply chain benefits and competition of STP product will be ensured [1,3]. Recently, the management level has provided some requirements for suppliers [2], some duty departments are proposing procedures to improve their quality, and conveying various markets, techniques, quality information, and annual assessment results of suppliers. Suppliers are attaching great importance to the quality of products, so the quality of products is more stable. However, some problems are appeared in the process of checking and acceptance, procession, assembling and operation, which has aroused the attention of management level. The suppliers with those problems including strategic suppliers, excellent suppliers, long-term cooperative suppliers and so on. So the combination of the management of suppliers [4] and the quality of products, making the management of suppliers to be more effective, and giving full play to the quality management of suppliers are the research directions of the project.

### **Situation analysis**

#### **Insufficient Understanding on Technological Requirements and Standards of New Products**

Take the gas turbine for example, its procession are transformed by foreign drawings, and suppliers don't assess the drawing or craft efficiently, thus some important requirements are lost. Suppliers put into production under this condition, thus the quality is not qualified, and users refuse the products. Considering the cylinder welding, the heat treatment results of pipe fitting has a great difference with technological agreements and drawings.

#### **The Honest Behaviors and the Hiding Problems of Suppliers**

The honest behaviors of suppliers include reveling problems truthfully, providing real examination records and so on. The main problems are product inspection and no explain for the existed problems. For instance, the examination didn't change with the drawing, inspectors copied a wrong size of products. In addition, some consignment invoices didn't conform with the real products.

Phenomena in the procession or end product have resulted in the following troubles.

### **Incomplete or Wrong Quality Document**

Soft record--in the term of quality documents, with the improvement of customers' requirement, the request on record is not only submitting timely, but also the accurate, comprehensive and traceable content. Especially to a complete set of products, a simple qualification or quality certification can't meet the demand of customers' requirement any more. Some inspection recording documents are incomplete, some size inspection records are unreal. The inconformity of the report and actual product affects the quality and efficiency of the check of products.

### **The Aptitude and the Quality Control Ability of Suppliers Can't Meet the Requirement**

With the increase of the cooperation of products, a lot of suppliers lack employees with the ability of quality control, and their inspectors are not equipped with related aptitudes, thus the quality of suppliers can't be guaranteed. Some suppliers are confronted with personnel turnover, but they don't take actions to comprehend and adjust personnel in time. So the indifference of the defects of products in the process of manufacture leads to the difficulty of treatment.

### **The low-quality of encasement, Which Doesn't Conform with the Encasement Standard**

When we open the packages to examine the encasement quality, we usually find many serious nonstandard package problems, including debunching, short item, corrosion, bad cleanliness, no certificate of conformity, no identification, no label, the inconformity of the material requests, etc. They may be retreated for the inconformity of requirements to repackage.

### **The Defects of Products**

The deformation of hardware, the absent procession of the low press cylinder, the inconformity between the drawing and product, these internal defects of some important castings aren't processed timely, which results in the difficulty of accomplishment. And the procession is not conformed with the requirements like heat treatment standard, makes new defects appeared. What's worse, those defects can only be found in finished machining, which makes it's more difficult to meet the demand. For some medium-sized and small forging, working procedures like tempering are lacked, and they have a big, difference in reexamination of defects, which causes the loss of reputation and economy. Simple potential demands, such as deburrer are not met, and the bearing block and oil return pipe are sent to assembly platform while the scrap irons haven't be cleared out.

### **The Terms for Improvement and Some Achievements of Test Run**

Targeting on the problems suppliers provide in quality management and control in examination [5], we propose the following five measures for improvement, hoping to improve the quality of products and perfect the management of suppliers.

### **The Guarantee of the Aptitude of Suppliers and Personnel Related On Quality**

After several years implement of the choosing, evaluating, and reevaluating of suppliers according to the requests of Siemens, the management requirements of power station improved a lot. However, we should always work hard to improve the quality.

**Stressing the Aptitude and Ability of Suppliers.** The power station group performs the same evaluation procedure to all companies and carries out the access system strictly. From 2012, the group conducted aptitude carding work, compiled the detailed list of suppliers, including the manufacturers and agents, and proposed requirements on the aptitude of suppliers [2]. All suppliers should be equipped with ISO9001 certification, and a quality management system which runs validly [5]. Enterprises must get related industry permit when it comes to special equipment. Suppliers also need good financial condition, independent quality examination agency and quality guarantee department, and some specialized inspectors and testers for material, procedure, and products.

**Proposing Requirements of the Aptitude of Technicians.** Suppliers should have examination posts according with technological requirements and aptitude; inspectors should have technological authorization according with products; inspection personnel should have the second qualification; special types of work, such as welder, physicochemical tester, metrological verification personnel, must have corresponding qualification. Suppliers need technicians who can meet the manufacturing requirements and have the ability to compile craft documents, make quality plan, conduct quality examination and recording which conforms with STP drawing and technical requirements [1].

**Perfecting the Audit Procedure of New Added Suppliers.** Important products and procedures are listed into the qualified list after manufacture evaluation. New module: potential suppliers, comprehensive audit, temporary suppliers, one time code, trail order, product authentication, trail order until the third one, pass the product authentication, code of qualified suppliers, acceptance check. In the process of qualification authentication, MIP/MQCP, NDT, FAI and other technological indexes must be included. The risk assessment decides the qualification plan directly according to the importance of products and the former manufacture conditions. Aim: obtain qualification and qualification guarantee system, and have the self-perfecting ability.

**Authorizing to the Inspectors of Suppliers.** The Effects of Trail Implementation. On 12 July, 2012, the quality assurance department issued certification for the inspectors of core suppliers according to Shanghai Automobile's Regulations on the Authentication of the Inspectors. They are Shanghai Yida Machine Corporation Limited, Shanghai Honggang Power Station Equipment Casting Corporation Limited, Shanghai Turbine Factory Fule Industry General Corporation. The authentication stresses the power, duty and deadline of suppliers, the qualification condition, method, inspector's stamp, illegal procession, and the application process. The inspectors of suppliers with authentication have the right to discharge the final check, meanwhile the suppliers should take on the final quality and material audit responsibility. Suppliers obtaining the authentication should also stand in the point of STP [1], and put emphasis on the quality of final products. After the subsequent trace for one year, there aren't obvious feedback of quality problems in three suppliers, and authorization stamps are not used causally. The general condition is good, so the testing efficiency and effect has improved, and the three suppliers propose the requirement to add authorized inspectors. In the actual practice, we also find that the authorized inspectors have the problem to avoid heavy work.

**Imagine on the Further Authorization Work.** The self-examination function should be given out with the resources of suppliers to broaden the authorization scope. The inspectors should be trained organically to know more about the requirements for product quality and recording documents. In 2011 and 2012, the training for some suppliers and cooperation manufacturers were held, specialists in Shanghai quality association and the quality management personnel were invited to be lecturers. The training include examination theories, skills, testing requirements, measurement standard, quality control standard such as the aptitude, qualification documents, recording, cleanliness, identification, etc. The training has laid solid foundation for the propel of work of inspectors. With the perfect regulations on the quality guarantee, the level to level management of inspectors has been achieved. We decide to authorize the inspectors from our strategic and excellent suppliers after assessing and checking, who must be trained to know the right and obligation. This will improve the self-guarantee ability of suppliers to ensure the qualified products.

## **The Extend of NCR and Communication of Qualification Information**

**The Extend of NCR System.** The setting of the NCR system for suppliers can help us know the qualification information in the process of manufacturing and accelerate the process of qualification problem in time. Honggang and Yida adapt the NCR system, and great effects have appeared, then we conduct NCR trail Wuxi Touping yepian Corporation Limited this year. The first NCR was issued on 7th August, and 145 NCR reports are issued until the end of 2012. The entire operation is normal, we will communicate with other suppliers to propel our applications.

**Communication on Quality Information.** Setting the communication platform between Shanghai Automobile and suppliers, contracting for labor, materials and purchasing, organizing meeting at regular intervals, and inviting our technicians to talk about the problems. Carrying out the monthly report form management system, here are the content: quality system of suppliers, organization, change of producing area and quality information, survey report and measure of great quality problems, NCR statistics analysis report, and change of personnel aptitude. The answers to suppliers' questions can be distributed to working parties in the form of quality management and assessment by email. To improve the ability of suppliers, many improvements for inspectors can be taken, such as training and coaching, to meet the request of Shanghai Automobile factory and our final users. The quality examination of inspectors can be improved in the form of actual measurement of important position, size, and the line tolerance size.

**Setting the Quality Information Platform of Suppliers.** Setting the purchasing information, cooperation purchasing parts platform in the factory, putting the requirements and files of contract, technical agreement, quality assurance agreement to ensure information can be known in time. The content of the platform include test pass rate of products, analysis on the trend of suppliers' situation, feedback of suppliers' quality information, survey report of suppliers' quality problems, audit report of the supervision of suppliers, recording and assessment of the acceptance of quality of purchasing products. With the set of this platform, the information of suppliers can be open to the public, and the quality problems can be solved transparently, thus the hidden danger can be avoided.

## **The Convey of Technical Requirements of Quality and the Manufacturing Procedure Control**

Suppliers must know the technical standards of packages, make preparations efficiently, and allocate necessary materials to meet the demand of manufacture. However, it needs to convey the requirements fully via signing technical and quality guarantee agreements and make quality plan. At present, we presents clear requirements in the area of unclear power, gas turbine, and military products that the outsourcing production of parts must assign technical and quality guarantee agreements, and suppliers should know technical requirements before production, which has gained good effects. However, the products of other projects haven't produced according to the standard, including some important overseas projects, so we should unify the standard.

**Strengthening the Convey of the Requirement of Technique and Quality.** The purchasing of important parts should assign technical and quality agreement, including requirements of technical assimilation and preparation, and make technical parameters clear for suppliers to understand fully. The content suppliers can't understand should be explained and clarified, the crafts of suppliers should be audited to meet the requirements of drawings and technical agreements. The purchased item involving in the technical parameters should be audited by technical department.

**Stressing the Application of Quality Control Plan of Worksheet and Important Parts in Outsourcing and Cooperative Suppliers.** Worksheet is the certificate to reveal the quality of the process of product quality control, so outsourcing suppliers are required to establish worksheet system and make record carefully. The first trail production contract should be conducted with certification to avoide risk. The manufacture of important parts should have witness points. The procession control of suppliers should be supervised and checked selectively, the regulation of the admit and management of suppliers should be enforced strictly, the check of sub-package products should have detailed rules, the manufacture quality management regulations should be performed [5], and related duties and responsibilities should be practice. Aim—making suppliers to understand the technical quality and application standard, guaranteeing quality with process control,

strengthening node control, forming the ability of preventing mistakes, and doing work well in the first time.

### **The Combination of the Purchasing Plan and Annual Assessment of Suppliers**

**Improving the Annual Assessment, Making the Assessment Results Reflect in the Purchasing Plan.** Now we conduct annual assessment on suppliers, and the results are announced in the supply convention [3], which is the basis of choosing excellent suppliers. Suppliers have attached great importance to the assessment, and a certain degree of promotion has been made. However, most of our assessments are non-quantizing targets such as quality of products, price and delivery date, whose impressive grades don't make evaluation according to data, and the results can't reveal the comprehensive ability of suppliers. So, the establishment of the platform can accumulate the audit, acceptance qualified rate, and unqualified rate.

**The Incentive Mechanism for Excellent Suppliers.** Incentive mechanism can recommend suppliers of high-quality and good management. The commendation of excellent suppliers can come into play the role of suppliers. Financial incentive mechanism for suppliers can also bring the initiative of suppliers into full play. Continue to perfect the information files with the statistic analysis of the internal and external suppliers NCR. Problems found in the products of outsourcing or cooperative suppliers should base counted into the quality files and brought into the assessment of cost, and the related information should be conveyed into the financial department and purchasing department, practicing the compensation system, which will be brought into the annual assessment. The combination of purchasing plan and annual assessment results can improve the qualified rate of purchasing products [4].

### **Conclusion**

With the adjustment of the structure of products of our factory and increase of the outsourcing business, the quality of the product we purchase has direct influence on the reputation of our factory, it is of great necessity to strengthen the management of suppliers and improve the quality of products. By the research and analysis of project, we can find out the management flow and improvement direction, combine management with supervision efficiently, change the phenomena of the distance of management system, performance, procedure control, physical quality, guide suppliers to adapt the requirement of the development of our factory, improve the manufacturing skills and management level, guarantee the outsourcing and cooperative products conform with our standards, reflect the quality of products. For the reason that at the end of the finish of our project, we know that the organization of my factory has changed recently, such as establishing blade procession center and mating procession, then a new management module will be formed, the management module of suppliers will be adjusted. We will adjust, improve and perfect the management measure of suppliers according to changes.

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