

Machine design theory

The machine design is through designs the new product or improves the old product to meet the human need the application technical science. It involves the project technology each domain, mainly studies the product the size, the shape and the detailed structure basic idea, but also must study the product the personnel which in aspect the and so on manufacture, sale and use question.

Carries on each kind of machine design work to be usually called designs the personnel or machine design engineer. The machine design is a creative work. Project engineer not only must have the creativity in the work, but also must in aspect and so on mechanical drawing, kinematics, engineerig material, materials mechanics and machine manufacture technology has the deep elementary knowledge.

If front sues, the machine design goal is the production can meet the human need the product. The invention, the discovery and technical knowledge itself certainly not necessarily can bring the advantage to the humanity, only has when they are applied can produce on the product the benefit. Thus, should realize to carries on before the design in a specific product, must first determine whether the people do need this kind of product

Must regard as the machine design is the machine design personnel carries on using creative ability the product design, the system analysis and a formulation product manufacture technology good opportunity. Grasps the project elementary knowledge to have to memorize some data and the formula is more important than. The merely service data and the formula is insufficient to the completely decision which makes in a good design needs. On the other hand, should be earnest precisely carries on all operations. For example, even if places wrong a decimal point position, also can cause the correct design to turn wrongly.

A good design personnel should dare to propose the new idea, moreover is willing to undertake the certain risk, when the new method is not

suitable, use original method. Therefore, designs the personnel to have to have to have the patience, because spends the time and the endeavor certainly cannot guarantee brings successfully. A brand-new design, the request screen abandons obsoletely many, knows very well the method for the people. Because many person of conservativeness, does this certainly is not an easy matter. A mechanical designer should unceasingly explore the improvement existing product the method, should earnestly choose originally, the process confirmation principle of design in this process, with has not unified it after the confirmation new idea.

Newly designs itself can have the question occurrence which many flaws and has not been able to expect, only has after these flaws and the question are solved, can manifest new goods come into the market the product superiority. Therefore, a performance superior product is born at the same time, also is following a higher risk. Should emphasize, if designs itself does not request to use the brand-new method, is not unnecessary merely for the goal which transform to use the new method.

In the design preliminary stage, should allow to design the personnel fully to display the creativity, not each kind of restraint. Even if has had many impractical ideas, also can in the design early time, namely in front of the plan blueprint is corrected. Only then, only then does not send to stops up the innovation the mentality. Usually, must propose several sets of design proposals, then perform the comparison. Has the possibility very much in the plan which finally designated, has used certain not in plan some ideas which accepts.

How does the psychologist frequently discuss causes the machine which the people adapts them to operate. Designs personnel's basic responsibility is diligently causes the machine to adapt the people. This certainly is not an easy work, because certainly does not have to all people to say in fact all is the most superior operating area and the operating process.

Another important question, project engineer must be able to carry on the exchange and the consultation with other concerned personnel. In

the initial stage, designs the personnel to have to carry on the exchange and the consultation on the preliminary design with the administrative personnel, and is approved. This generally is through the oral discussion, the schematic diagram and the writing material carries on. In order to carry on the effective exchange, needs to solve the following problem:

(1) designs whether this product truly does need for the people?
Whether there is competitive ability

(2) does this product compare with other companies' ' existing similar products?

(3) produces this kind of product is whether economical?

(4) product service is whether convenient?

(5) product whether there is sale? Whether may gain?

Only has the time to be able to produce the correct answer to above question. But, the product design, the manufacture and the sale only can in carry on to the above question preliminary affirmation answer foundation in. Project engineer also should through the detail drawing and the assembly drawing, carries on the consultation together with the branch of manufacture to the finally design proposal.

Usually, can have some problem in the manufacture process. Possibly can request to some components size or the common difference makes some changes, causes the components the production to change easily. But, in the project change must have to pass through designs the personnel to authorize, guaranteed cannot damage the product the function. Sometimes, when in front of product assembly or in the packing foreign shipment experiment only then discovers in the design some kind of flaw. These instances exactly showed the design is a dynamic process. Always has a better method to complete the design work, designs the personnel to be supposed unceasingly diligently, seeks these better method.

Recent year, the engineerig material choice already appeared importantly. In addition, the choice process should be to the material

continuously the unceasing again appraisal process. The new material unceasingly appears, but some original materials can obtain the quantity possibly can reduce. The environmental pollution, material recycling aspect and so on use, worker's health and security frequently can attach the new limiting condition to the choice of material. In order to reduce the weight or saves the energy, possibly can request the use different material. Comes from domestic and international competition, to product service maintenance convenience request enhancement and customer's aspect the and so on feedback pressure, can urge the people to carry on to the material reappraises. Because the material does not select when created the product responsibility lawsuit, has already had the profound influence. In addition, the material and between the material processing interdependence is already known by the people clearly. Therefore, in order to can and guarantees the quality in the reasonable cost under the premise to obtain satisfaction the result, project engineer makes engineers all to have earnestly carefully to choose, the determination and the use material.

Makes any product the first step of work all is designs. Designs usually may divide into several explicit stages: (a) preliminary design; (b) functional design; (c) production design. In the preliminary design stage, the designer emphatically considered the product should have function. Usually must conceive and consider several plans, then decided this kind of thought is whether feasible; If is feasible, then should makes the further improvement to or several plans. In this stage, the question which only must consider about the choice of material is: Whether has the performance to conform to the request material to be possible to supply the choice; If no, whether has a bigger assurance all permits in the cost and the time in the limit develops one kind of new material.

In the functional design and the engineering design stage, needs to make a practical feasible design. Must draw up the quite complete blueprint in this stage, chooses and determines each kind of components the material. Usually must make the prototype or the working model, and carries on the experiment to it, the appraisal product function, the reliability, the outward appearance and the service maintenance and so on. Although this

kind of experiment possibly can indicate, enters in the product to the production base in front of, should replace certain materials, but, absolutely cannot this point take not earnestly chooses the material the excuse. Should unify the product the function, earnestly carefully considers the product the outward appearance, the cost and the reliability. Has the achievement very much the company when manufacture all prototypes, selects the material should the material which uses with its production in be same, and uses the similar manufacture technology as far as possible. Like this has the advantage very much to the company. The function complete prototype if cannot act according to the anticipated sales volume economically to make, or is prototypical and the official production installment has in the quality and the reliable aspect is very greatly different, then this kind of prototype does not have the great value. Project engineer is best can completely complete the material in this stage the analysis, the choice and the determination work, but is not remains it to the production design stage does. Because, is carries on in the production design stage material replacement by other people, these people are inferior to project engineer to the product all functions understanding. I

n the production design stage, is should completely determine with the material related main question the material, causes them to adapt with the existing equipment, can use the existing equipment economically to carry on the processing, moreover the material quantity can quite be easy to guarantee the supply.

In the manufacture process, inevitably can appear to uses the material to make some changes the situation. The experience indicated that, may use certain cheap materials to take the substitute. However, in the majority situation, in will carry on the production later to change the material to have in to start before the production to change the price which the material will spend to have to be higher than. Completes the choice of material work in the design stage, may avoid the most such situations. Started after the production manufacture to appear has been possible to supply the use the new material is replaces the material the most common reason. Certainly, these new materials possibly reduce the

cost, the improvement product performance. But, must carry on the earnest appraisal to the new material, guarantees its all performance all to answer the purpose. Must remember that, the new material performance and the reliable very few pictures materials on hand such understood for the people. The majority of products expiration and the product accident caused by negligence case is because in selects the new material to take in front of substitution material, not truly understood their long-term operational performance causes.

The product responsibility lawsuit forces designs the personnel and the company when the choice material, uses the best procedure. In the material process, five most common questions are: (a) did not understand or cannot use about the material application aspect most newly the best information paper; (b) has not been able to foresee and to consider the dusk year possible reasonable use (for example to have the possibility, designs the personnel also to be supposed further to forecast and the consideration because product application method not when creates consequence.

In recent years many products responsibilities lawsuit case, because wrongly uses the plaintiff which the product receives the injury to accuse produces the factory, and wins the decision); (c) uses the material data not entire perhaps some data are indefinite, works as its long-term performance data is the like this time in particular; (d) the quality control method is not suitable and not after the confirmation; (e) the personnel which completely is not competent for the post by some chooses the material.

Through to the above five questions analysis, may obtain these questions is does not have the sufficient reason existence the conclusion. May for avoid these questions to these questions research analyses the appearance indicating the direction. Although uses the best choice of material method not to be able to avoid having the product responsibility lawsuit, designs the personnel and the industry carries on the choice of material according to the suitable procedure, may greatly reduce the lawsuit the quantity.

May see from the above discussion, the choice material people should to the material nature, the characteristic and the processing method have comprehensive and the basic understanding.