

Review Article

Economic Modeling of Profit and Cost & Quantity in Forge Process of Screw

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Abstract: With the increasing labor quantity the profit may increase after a certain quantity, which means the deficit will be substituted by the benefit in forge process of screw. So that through turnover to be established the benefit may be formed after turn point. Detail value is needed to calculate the field according to the curves between them. The TC and AC is the first factor to consider and then AVC and AFC which is second factor.

Keywords: modeling; turnover distribution; economic cost and quantity; forge process; screw.

1. INTRODUCTION

The forge process of screw is an automatic flow production line with expensive machine. This process includes three punches ie. first second and third punch and drawing & picking off processes in order to form the profile of screw from rod materials so it is an automatic process which completes five functions in whole manufacture. The profit is calculated through turnover and cost (ie. AC, TC, MC) which is an important factor in manufacture [1, 2]. In this paper the turnover has been computed and drawn from their relation with cost. The turnover AC, TC & MC and goods quantity is investigated for search their change in these processes. For the better benefit it must be studied further it can gain the profit use. Since the total cost stability is key as for manufacture. How we can define stable and low cost parameter is significant matter. For the inference the different drawing between profit total cost and quantity is made to analyze the change and low cost situation in this study. The constant labor L & capital K is defined to fit to total cost value for screw forging process.

In the forge process the screw will be granted forge which is a important process to form complete profile semi-finished good. The cost evaluation is a important one to save person and capital. So model is established that includes function of cost and quantity to solve the cheapest cost. It lets labour and capital is a independent variable to find the cheapest cost. In economics the cost may be calculated according to define different parameter so it is solved by the correspondent formula to each parameter. The establishment of fact parameter is based on the forge process only and it is found that the every cost changes in a course with independent variable. The cost is significant in economics which may draw every curve to evaluate the whole trend in quantity [3, 4]. Only in this way can we find the optimum path to choose and solve our cost aim. Certainly in this computation it is optimum original parameters to ensure the reality and optimum. By comparison it is found the whole data fit to well. So it is thought that the establishment is successful by this path. We can compute the formula through a certain parameter and adopt optimum resolution to obtain constant for our cost evaluation. We looks forwards to making a role in our cost and quantity calculation in this paper. Further research may be done in the profit scope defined according to the condition like condition of a certain labor and capital. They have difference in this condition furthermore the turnover point with AVC & AFC under this condition. Furthermore the three coefficients precision is also a important factor to evaluate. In this paper the detail investigation is investigated under the condition of certain labor and capital the equation of total cost and turnover is resolved in order to find the profit point and value that is the destination of this paper.

2. The economics modeling

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The Cobb-Douglas function is

$$Q = \gamma L^\alpha K^\beta \quad \text{---(1)}$$

Production quantity Q; γ is technique coefficient; α is producing labour; β is capital elasticity. It has

$$\ln \gamma = \ln Q - \alpha \ln L - \beta \ln K \quad \text{---(2)}$$

Due to equation (2) it obtains

$$\ln(Q_1 / Q_2) = \alpha \ln(L_1 / L_2) + \beta \ln(K_1 / K_2) \quad \text{---(3)}$$

Here, subscript 1 and 2, 3 is three coordinate.

$$\ln(Q_2 / Q_3) = \alpha \ln(L_2 / L_3) + \beta \ln(K_2 / K_3) \quad \text{---(4)}$$

α is solved in terms of (3) it can be gotten

$$\alpha = \frac{\ln(Q_1 / Q_2) - \beta \ln(K_1 / K_2)}{\ln(L_1 / L_2)} \quad \text{---(5)}$$

$$\text{And } \alpha = \frac{\ln(Q_2 / Q_3) - \beta \ln(K_2 / K_3)}{\ln(L_2 / L_3)} \quad \text{---(6)}$$

In terms of above equation it can be gotten

$$\beta = \frac{\ln(Q_1 / Q_2) \ln L_1 - \ln(Q_1 / Q_2) \ln(L_1 / L_2)}{\ln(K_1 / K_2) \ln L_1 + \ln(K_1 / K_2) \ln(L_1 / L_2)} \quad \text{---(7)}$$

$$\beta = \frac{\ln(Q_1 / Q_2) \ln(L_1 / L_2) + \ln(Q_2 / Q_3) - \ln(Q_1 / Q_2)}{[-\ln(K_1 / K_2) + \ln(K_2 / K_3)] \ln L_3 + \ln(K_2 / K_3)} \quad \text{---(8)}$$

From equation (2) it has

$$\gamma = \text{EXP}(\ln Q - \alpha \ln L - \beta \ln K) \quad \text{---(9)}$$

The formulas for cost control are listed as below

$$AC = TC / Q \quad \text{---(10)}$$

$$MP_L / P_L = MP_K / P_K \quad \text{---(11)}$$

$$TC = KP_K + LP_L \quad \text{---(12)}$$

$$MP_K = dTP / dK \quad \text{---(13)}$$

$$MP_L = dTP / dL \quad \text{---(14)}$$

$$AP = TP / L \quad \text{---(15)}$$

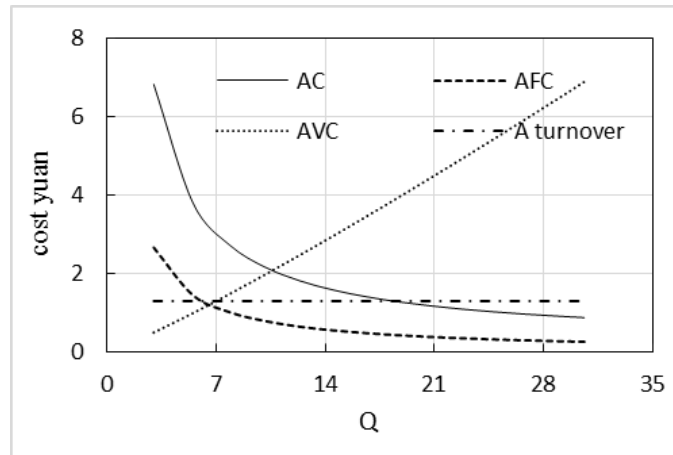
$$\text{And } A_t = T_t / Q \quad \text{--- (16)}$$

Here, K is capital; L is labour; TC is total cost; VC is variable cost; FC is fixed cost; AC is average cost; AFC is average fixed cost; AVC is average variable cost ; A_t is average turnover; T_t is turnover. Formula of (16) is deduced for the average turnover with quantity in this study. The calculated constant is $\gamma=3$; $\alpha=0.58$; $\beta=0.3$ respectively. This one is average of results in terms of above equation. The parameter $P_l=0.6\text{RMB}$ and $P_k= 0.4\text{RMB}$. Turnover is in terms of 1.3RMB . The detail narration is expressed as below. When proposal is 10 times the above coefficients may be solved, and then according to this formula solve the quantity of goods and other costs.

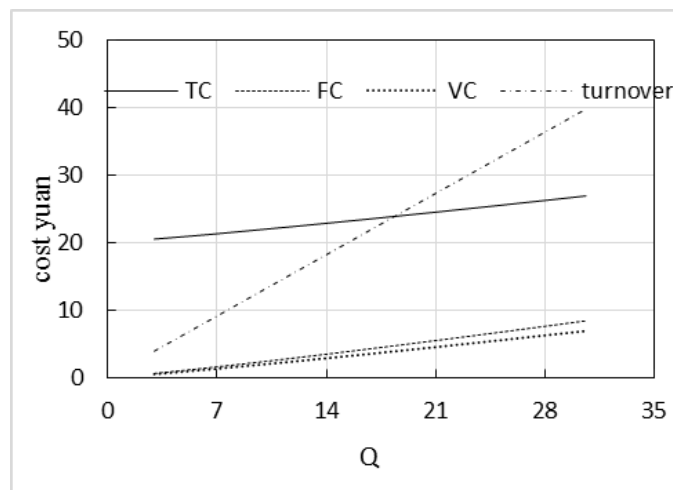
3. DISCUSSIONS

As seen in Figure 1(a, b) according to independent variable L and K the AC is main factor, its value is less than AVC and more than AFC under 1.3RMB . The turnover is about 1.5 yuans which intersects with AC at quantity of 7 which may be the turning point when the labour and capital quantity is variable. It may be said that the beyond this point the profit will be gained and less than it the loss will be gained. As seen in Figure 1(b) when L and capital quantity is variable the longrun costs TC shows linear distribution with goods quantity when they are variable. They are intersected at 19 of goods quantity too which explains when the quantity is below 19 it will produce deficit. Only the quantity arrives more than 19 we will benefit from this process. In this study the total cost is preciser than average cost ie. $TC > AC$.

Meantime the turnover line will meet VC at less than 2 quantity which expresses that low VC in this case. With the increasing the goods quantity these three longrun cost will incline too. As seen in Figure 2(a ~f) the different status will happen with Figure 2(a &b), (c &d) and (e &f) of $L=10$, $L=13$ & $L=16$ respectively besides their value being big. This is cost inclined since the labour quantity inclines. Moreover the point inclines from 19 to 21 quantity when labor increases which is bad effectiveness. So the total quantity inclines from 10 labors to 16 labors which is also due to the inclining labors quantity.

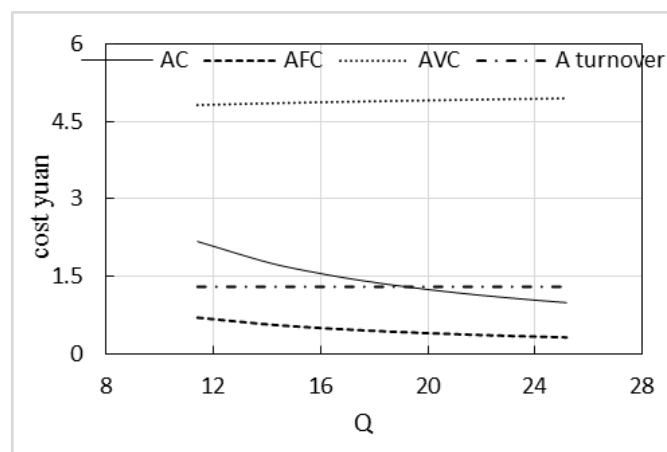


(a) L and K

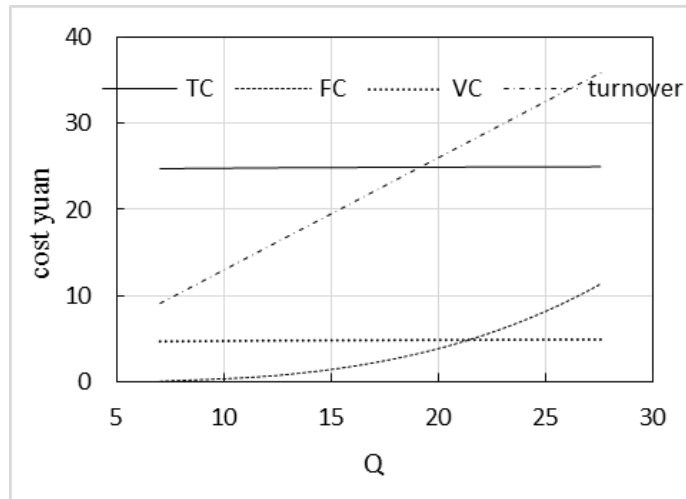


(b) L and k

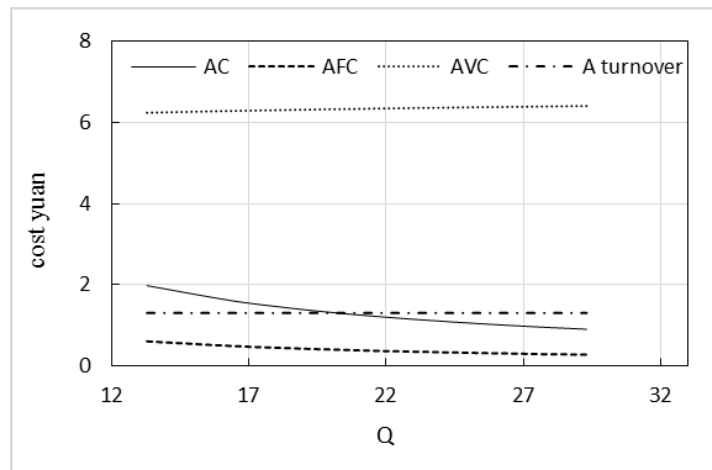
Fig-1: The drawing between turnover and cost with quantity and L &K under 1.3 RMB/piece in forging process



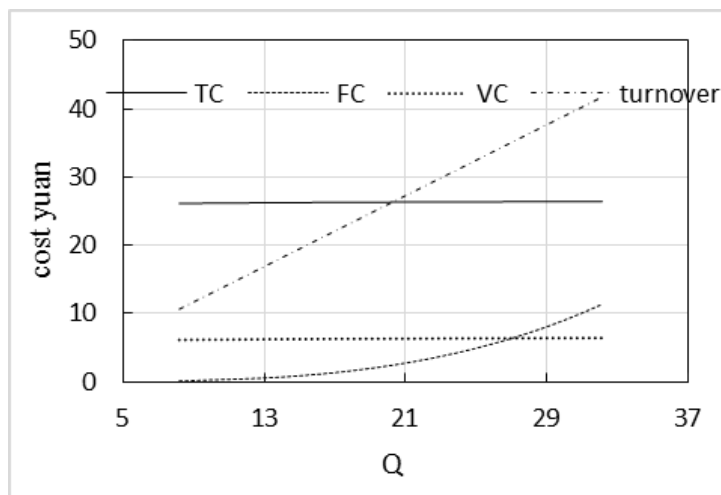
(a) L=10



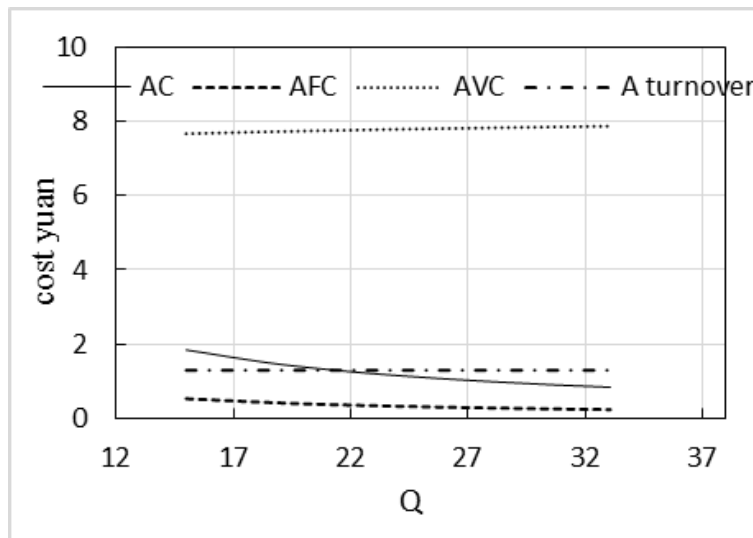
(b) L=10



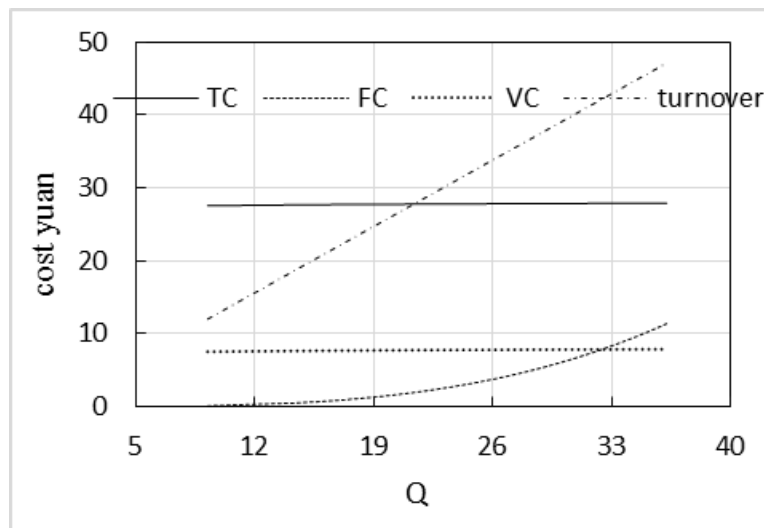
(c) L=13



(d) L=13



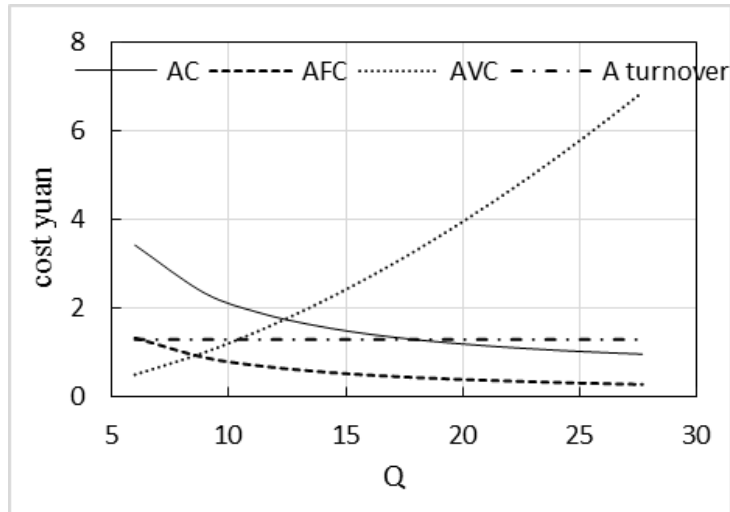
(e) $L=16$



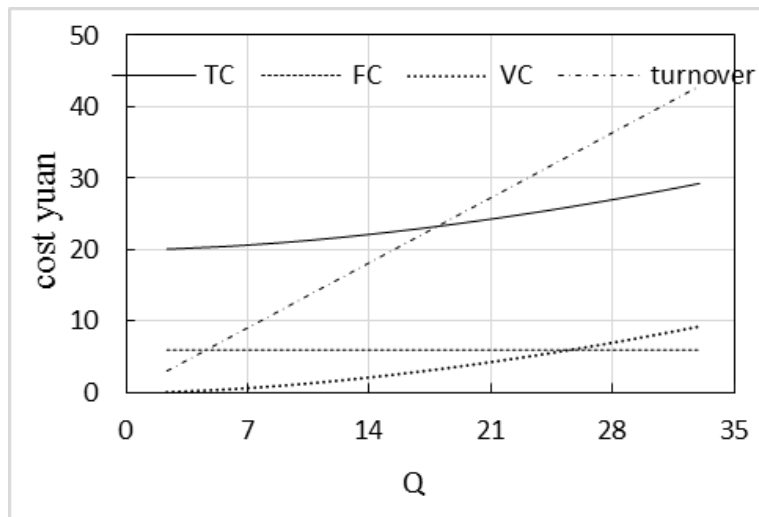
(f) $L=16$

Fig-2: The drawing between turnover and cost with quantity and K under L and 1.3 RMB/piece in forging process

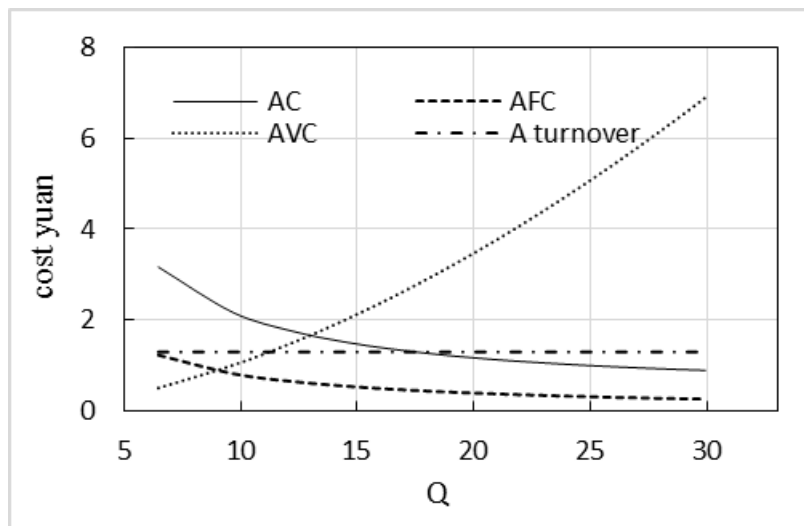
As seen in Figure 3(a~f) with the increasing goods quantity the TC will incline too while the other two will incline under 1.3RMB. The decreasing TC is due to increasing goods quantity and L . With the labor K inclining the TC inclines. TC declining means total cost will decline which causes good effectiveness if there is a more control. It is needed that the TC is main parameter so it is firstly needed check. It is big value than AC&VC and FC, then check later two. Usually AC is cost in a piece, AVC and AFC is cost a piece. AC is larger than AVC and AFC while TC is larger than the AVC&AFC. TC is usually the first factor to estimate the cost; VC and FC is the second factor to estimate. Here when K increases the AC has bigger good quantity. The AC quantity may incline when the K inclines from 10 to 16 yuan, meantime their point with turnover has inclination which is from 16 to 20 quantity. It explains that more capital will decline the AC one but it can change the turn point more ie incline the turn point value which explains bigger quantity is needed. Due to the declination of AC the more benefit may be earned because the capital is increased.



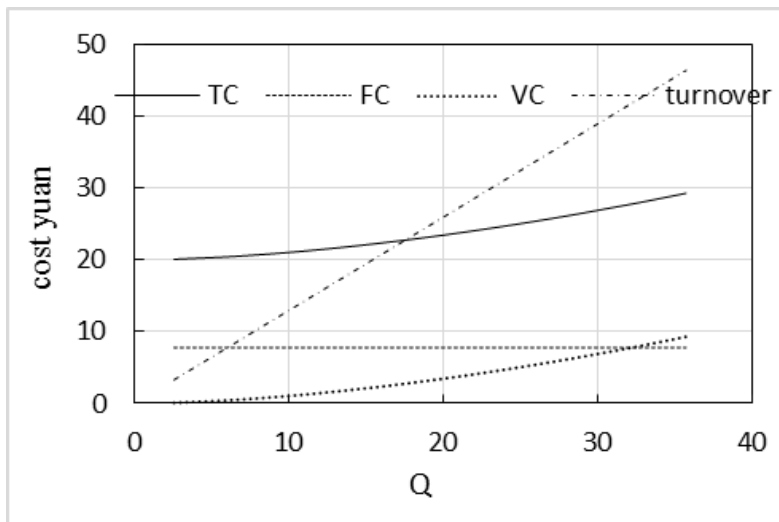
(a) $K=10$



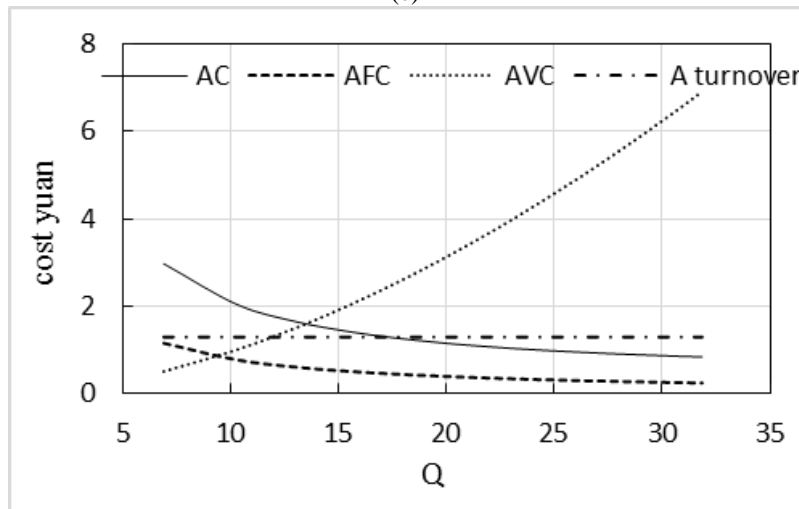
(b) $K=10$



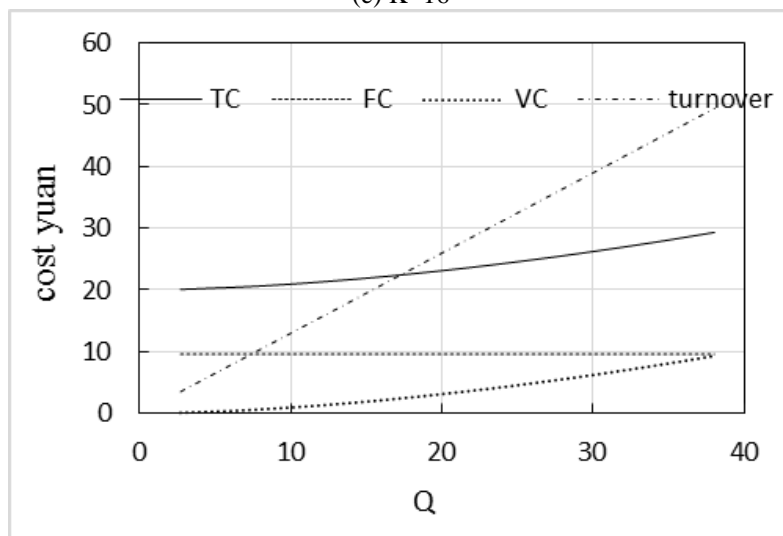
(c) $K=13$



(d) K=13
(e)



(e) K=16



(f) K=16

Fig-3: The drawing between turnover and cost with quantity and L under K and 1.3RMB/piece in forging process

The reasonable value we can calculate is K is 10 and L is 16 as seen in Figure 2 and 3 while the turn point changes from 10 to 18 in Figure 1 with L and K increasing by step 1 that means that the labour and capital may increase

the total cost as above. To find these ones three figures are drawn respectively. It is found that turn point 18 changes big profit at L being 10 and the quantity is 13 with a little incline at K being 10. in Figure 3(a) the second point is formed with VC at the 11 quantity. The third one with FC is at 8. Moreover the AFC meets turnover at 8 pieces and FC meets it at the same pieces. When the capital and labor is defined the benefit and cost may be known under the condition being defined. In Figure 2 and Figure 3 the labor and capital is defined and it is found that the whole price will be equal in capital Figure 3. this is due to the capital is equal to labor because of their same value. How may the price change in different labor and capital is the next research destination. It is found that the whole turnover point is 20 piece when the condition changes. It expresses that if the quantity is beyond 20 the profit will be formed in any labor and capital. Furthermore if the one is beyond this one far the profit will be higher. So the quantity of goods is below it there is not benefit to us. This is the point of total cost and turnover therefore the one with fixed and variable cost may be different.

In short the AC changes from 13 to 17 whilst TC changes a little with 17 in terms of $K=10$ and 16. It explains that AC is more sensitive than TC even if TC is more precision. It is needed that both of AC and TC will be considered in this study. AC is clearer than TC in terms of average one, on the other side TC will include objective directly. Even if TC satisfies the total amount AC may not have more benefit which is considered more.

4. CONCLUSIONS

With the increasing labor quantity the profit may increase after a certain quantity, which means the deficit will be substituted by the benefit in forge process of screw. So that through turnover to be established the benefit may be formed after turn point. Detail value is needed to calculate the field according to the curves between them. The TC and AC is the first factor to consider and then AVC and AFC which is second factor. When the relation between turnover and TC will be known so the quantity of goods may exceed the turn point. But the quantity can not be too big because the labor cost may be increased.

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