

THE INFLUENCE OF TECHNICAL CHANGES ON THE PRODUCT SELLING PRICE

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Abstract

The product price plays an important role and makes the production related costs an important issue to be considered. The more the company is able to reduce its costs, the higher the profit it is able to create from the sales of the product. The price must reflect the market environment in which the buyer is willing to buy the product at the price acceptable. The costs that are to be reduced are of various kinds: material costs, machinery and labor costs, energy costs, costs related to sales etc. All the costs mentioned are connected with the production process itself. For the costs to be reduced it is important to make changes to the production process. It is the aim of the article to describe the production process changes resulting in the reduction of costs and optimal selling price. Optimal selling price can be described as the price which is acceptable for both the seller and the buyer. The article deals with the influence of technical changes on the product selling price, the company's financial plans including the cost rationalization through changes in the production process. Methodology uses the calculation formulas showing the price creation and cover contributions of different orders. Further on, financial plans of companies are used to demonstrate the plan without the rationalization of costs, i.e. without the technical changes made and with the rationalization of costs. The assessment of the influence of changes on the product selling price is presented.

Key words: small electric machine, calculation, contribution margin, financial plan

1. INTRODUCTION

Small electric machinery production is aimed at more precise construction and, at the same time, smaller size of the machinery. All production processes can be expressed in financial items, thus any change in the production process can be assessed using financial criteria. Financial assessment is important for the company management because it is the aim to make profit and maintain the market value. With the company business aimed at the production of small electric machinery any technical and financial change in the production process is crucial. Calculation is used to set the price. It can be approached from different points of view. Within the case study presented in the article the calculation using the cover contributions of different orders was used. Cover contributions are always given by the difference between the yields expected and the individual costs and are set so that it is clear what kinds of costs are of the highest value and participate in the whole product price. It is the aim of each firm to increase its profit from the sales of products. The goal can be achieved through the changes in the production process resulting in the reduction of costs. If the selling price is respected by the market, the reduction results in higher profit from the sales of each product.

2. LITERATURE REVIEW

Among the basic materials for the production of small electric machines we include, if not considering only mechanical parts (shafts, bearings) magnetic materials, conductors and insulators.

For the choice of the appropriate production process it is important to take different aspects into consideration: the size and the number of conductors, the batch size, production costs, the handwork and machine work ratio etc. These will influence the whole product price level.

Electric machines have advanced significantly in recent years due to the introduction of new materials. New electrical steels have reduced losses and rare earth permanent magnet materials have provided

a 'lossless' source of magnetic flux. Recent advances in construction methods have reduced winding losses, so there is a continued trend to increase efficiency (Mecrow & Jack 2008).

Load consumption of individual items (material, human factors in the form of wages, machinery, etc.) expressed in the form of cash, which are incurred in order to achieve the desired yield. That the use of cost were profitable, the costs must be lower than the benefits achieved (Vítková & Hájek 2009).

Calculation can be defined as the calculation of planned or incurred costs related to the given quantity that can be expressed as the product or service supplied and the internal view of the performance. Within the company, it is possible to use calculations to express, for example, the calculation of profitability, calculation of costs, production calculations or the most comprehensive part i.e. the calculation of investment projects planned. We can see that the information values in the company calculation subsystem cannot be omitted. Setting the price calculation of the assortment provided can be considered an irreplaceable calculation function (Král 2003).

Strategic management is a highly important element of organizational success. The need to know what the business is about, what it is trying to achieve and which way it is headed, is a very basic requirement determining the effectiveness of every member's contribution. Every successful entrepreneur has this business self-awareness and every successful business seems to have this clarity of vision, even though it does not arise from a formal planning process (Pearson & Gordon 1990).

Quality strategies and strategic planning are one of the cornerstones of long-term corporate prosperity. A tool for the creation of a global business strategy and its use in an everyday practice is a strategic management system. It's not however a separate mechanism, it only is a function of the standard management system. Generally, the management system is a set of rules which may or may not be supported by information and communication technologies (Vrana & Richta 2005).

Strategic financial plan covers a key position in the system of function plans. Implementation of the various functional plans requires the expenditure of certain sources from which the most important are the financial resources. The demands on the limited financial resources are reflected in the financial plan in the form of debt levels, liquidity situation etc. This plan provides essential information for the correction of certain functional plans (e.g. withdrawal or postponement of certain investment projects with impacts on production plan, business plan etc.). If we are "conservative", the basic components of the strategic financial plan consists of profit and loss, balance sheet and cash flows, as well as the profit distribution plan, capital budget and the budget of external financing (Novotný, Pour, Maryska & Basl 2010).

In addition to the financial strategy, it is necessary while creating a strategic financial plan to respect the fundamental strategic objective, which should be an increase of the company value, as well as reciprocal links of this plan to other functional plans and last but not least, the results of the financial analysis for the past several years preceding the planned period (Brancato 1995).

3. METHODS/METHODOLOGY

The case study explores the impact of technical changes associated with the production process of small electric machines on various kinds of costs and then on the financial plan of organization.

Current ATAS motors design corresponds to the period of each electric motors (types) section design and meets the customers' requirements. In the classic concept motors, so called skeleton design, the rotor shaft is mounted in self-lubricating or roller bearings. Stator and rotor plates cutting is done on automatic presses, bundling by riveting or sticking, the AL or AlSi rotors coating is done on ancillary pins.

Shafts are manufactured in machine shops on both classic lathes and modern NC and CNC machines with subsequent rotor bundle pressing or 'locking'. Then the rotor bundle surface is machined and the shaft is completed.

The stator bundle winding is made according to the calculations and KON drawings, pulled in mechanically or entered manually, depending on the series size. For a large part of production, the winding impregnation is done by dipping or dropping, impregnation may be omitted or vacuum impregnation is used.

Depending on serial production, the motor assembly is either collective ('nest' type) or selective individual. In most cases it is manual work.

Output control is always 100%. In some cases, the manual work is done using computer controlled single-purpose machines.

Assessment of possible structural and technological solutions for the current global developments:

- "waste-free" stator and rotor plates cutting tools
- bundling of stator and rotor bundles using tools or welding
- if possible skeleton-free motor design
- parts (shields) casting with no need for subsequent machining
- mechanical winding and stators and rotors pulling (winding design optimization)
- winding and terminals connections through fasteners
- impregnation by dropping
- automation of production (according to seriality)
- automation of testing
- standardization of parts and materials
- reduction in production energy demands
- reducing the negative impact of production on the environment
- savings in raw materials

For examination and testing of various changes in the manufacturing process the motor was chosen from a range of asynchronous motors, namely the C-section motor. C-section motors are general purpose motors (from the household use, e. g. in shredders, fan drives, to industrial use, e.g. control valves drive in power plants). They are produced in thousand-piece series, single-phase design with a permanent connected capacitor or in a three- phase design.

Based on the small electrical machinery individual parts examination and testing it was possible to make the following changes in the technical part of the production process:

- pressing plant - waste-free cutting, plates lubrication, the return waste recycling, stator bundles welding, speeding up the samples production (Laser)
- machine shop - mounting stators to the skeleton, degreasing, bearing plates and rotors machining, thread rolling, cutting fluids
- winding workshop - machine stator winding, replacement of the impregnant, methods of measurement, soldering
- installation - water-based paints, soldering (filling RoHS 2002/95 / EC), labels production, output control acceleration.

On the C-section type motor in question, the following changes were made:

- the fan and ventilation partition removal. Consequently, the shield recess was not machined and this led to the savings in time for production
- spraying of both bearing shields omitted – saving material and time

- cancellation of the rotor balancing due to the improvement of the rotor coating - saving time and cooperation saving

The following table presents the above mentioned measures in the monetary and time units (see Table I).

Table I. Analysis of technical changes.

The Panel	Own Material [CZK]	Cooperation [CZK]	Time [min]
Bulkhead	2.15	3.90	0.076
Fan	1.29	5.00	0.107
Shield			0.620
Shield			2.320
Rotor			2.400
Stator			0.500
Assembly			0.300
Total	3.44	8.90	6.323

In order to monitor technical changes associated with the production of small electric machines, respectively their impact on the various types of costs, it was necessary to establish a calculation of the prices of products. Calculation of products is divided according to types of costs and cover contributions (coverage earnings and other costs). This calculation is shown in the Table II.

Table II. Calculation formula.

Item	Value
amount	piece/year
price	CZK
revenue	CZK/year
material	CZK/year
material	CZK/piece
CM I	CZK/year
CM I	%
personal costs	CZK/year
personal costs	CZK/piece
CM II	CZK/year
CM II	%
energy costs	CZK/year
energy costs	CZK/piece
CM III	CZK/year
CM III	%

costs of sales	CZK/year
costs of sales	CZK/piece
CM IV	CZK/year
CM IV	%
other costs	CZK/year
other costs	CZK/piece
CM V	CZK/year
CM V	%
profit	CZK/year

The selling price set for 1 product (small electric machine) is given by the interpolation of the market price (i.e. the price the buyer is willing to pay for the product) and the price of costs set by the seller (i.e. the company) including the profit. The selling price without the technical changes is presented in Table III.

Table III. Selling price – without technical changes.

Item	Value	Reality, without technical changes
material	CZK/piece	234.68
personal costs	CZK/piece	133.32
energy costs	CZK/piece	34.21
costs of sales	CZK/piece	23.69
other costs	CZK/piece	181.80
profit	CZK/piece	-32.94

1 Euro = 27 CZK

If the above described technical changes are made, the selling price of 1 product (small electric machine) will be set so that the profit is generated (see Table III).

Table IV. Selling price – with technical changes.

Item	Value	Reality, without technical changes
material	CZK/piece	215.00
personal costs	CZK/piece	130.40
energy costs	CZK/piece	31.59
costs of sales	CZK/piece	23.69
other costs	CZK/piece	167.86
profit	CZK/piece	6.14

1 Euro = 27 CZK

These selling prices were incorporated in the company's financial plans and in the calculations of the prices of all products which are or were sold. The financial plans were based on the situation of the year 2012, when no technical changes in products were made. Then the financial effect of the technical changes was calculated (see Table IV) and incorporated in the year 2013 financial plan. At the same time, the calculations without technical changes are presented (see Table V.)

Table V. Calculation formula for year 2013, with changes.

Item	Value	y. 2013/ without changes	y. 2013/ with changes
amount	piece/year	85 500.00	85 500.00
price	CZK	575.00	574.75
revenue	CZK/year	49 141 125.00	49 141 125.00
material	CZK/year	20 064 730.0	18 382 500.00
material	CZK/piece	234.68	215.00
CM I	CZK/year	29 076 395.00	30 758 625.00
CM I	%	59.17	62.59
personal costs	CZK/year	11 398 636.00	11 155 873.00
personal costs	CZK/piece	133.32	130.48
CM II	CZK/year	17 677 759.00	19 602 725.00
CM II	%	35.97	39.89
energy costs	CZK/year	2 925 046.00	2 700 707.00
energy costs	CZK/piece	34.21	31.59
CM III	CZK/year	14 752 713.00	16 902 045.00
CM III	%	30.02	34.39
costs of sales	CZK/year	2 025 307.00	2 025 307.00
costs of sales	CZK/piece	23.69	23.69
CM IV	CZK/year	12 727 406.00	14 876 738.00
CM IV	%	25.90	30.27
other costs	CZK/year	15 544 115.00	14 351 946.00
other costs	CZK/piece	181.80	167.86
CM V	CZK/year	- 2 816 709.00	524 792.00
CM V	%	- 5.73	1.07
profit	CZK/piece	-32.94	6.14

1 Euro = 27 CZK

4. RESULTS

From the above presented tables we can see that technical changes suggested (see Methodology) led to the reduction of the production related costs and it was even possible to create a partial profit within the selling price.

Comparing the situation with and without technical changes, we can see costs changes in the year analyzed (2013).

- Material – from 40.83 % to 37.41%
- Personal costs – from 23.20 % to 22.70 %
- Energy costs – from 5.95 % to 5.50 %
- Cost of sales – from 4.12 % to 4.12 %
- Other costs – from 31.63 % to 29.21 %

5. CONCLUSION

The above stated data prove that any change in the production process results in either positive or negative changes in the product price. In the case presented, technical changes resulted in the reduction of production process related costs. The most significant reduction can be seen in the material costs and other costs: 2.5-3.5 %. This reduction led to partial profitability in the product sales, which was about 1.07% for one piece. This value is not very high, however, if the situation without technical changes for the year 2013 is considered, the sales of the product would have been -5.73 %.

From the case study presented it can be concluded that the technical changes in the production resulted in the required reduction of the production related costs and even in partial profitability.

It was the aim of the article to show the influence of technical changes on the product selling price and on setting the company's financial plans including the rationalization of costs through accepting the changes in the production process. The article describes technical changes made and calculations used in the product price setting. Individual cost items are set including the profit per product considered without and with the changes in production. Subsequently, unit prices were used in the company's financial plan showing the effectiveness while respecting Rationalization of costs brought by the technical changes in production.

ACKNOWLEDGEMENTS

This paper has been written with the support of the project of Brno University of Technology, The Faculty of Electrical Engineering and Communication, project Ministry of Industry and Trade No. – FI 4/053 Rationalization of costs for small electrical machines.

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