LIFECYCLE MANAGEMENT OF AN ULTRASONIC MACHINE

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ABSTRACT
This article traces the lifecycle of an ultrasonic machine starting with the necessities that have to be fulfilled and, of course, ending with the post selling service. Many researchers and factory owners prevent difficulties in buying an ultrasonic machine conforming to their demands that is why the aim of this article is to show the importance of the lifecycle establishment and how the needs of the buyer can influence it. There were analyzed many supplies and wasn’t find a flexible one that permits the buyer to chose many things, the way that can be done, for example, when you chose a car. The collaboration between the technical universities and the industry is very important because only working together good specialists can be made.

KEYWORDS: lifecycle, ultrasonic machine, phases, collaboration

1. INTRODUCTION

Generally speaking a machine lifecycle inquires all the phases that are followed beginning with the needs that will became a concept that will be design, test, manufacture etc. and ending most usually with the turning over.

The importance of the lifecycle is both for the manufacturer and owner because only knowing the precise steps they will be able to estimate write the costs and the benefits /3/.

![Figure 1: The specialized machines and equipments investment increasing in the industry field](image-url)

Lately the machines and equipments investment, in the industry field is increasing and according to the statistics the process is beginning, especially from 2002. A graphic representation of the investments evolution from 2002 till 2007 is reviled in figure 1.
The lifecycle depends very much on the activities that the owner is developing. The main types of machine and equipments owners are divided in three:

1. Research Institutes;
2. Technical Universities;
3. Industrial Enterprises.

An ultrasonic machine can be used in all three fields and has different lifecycle depending on them.

In accordance with the statistics, in Romania, the ultrasonic machine acquisition distribution taking into consideration the main application fields are showed in the figure 2.

![Figure 2: Machines and equipments investment distribution in the main fields](image)

The offers should be different for the university that the one for industry because of some of the following criteria's as:

1. The industry uses machines specialized in one process in comparison with technical universities that needs a machine that can be able with minor changes to cover as many process as is possible;
2. The industry is using the machine for obtaining high productivity while the technical universities are using them for a didactical aim;
3. Highest precision of the process is the goal of the industry on the other side the universities are looking for the possibility of teaching the student the basic practice on the manufacture process.

2. ULTRASONIC MACHINE LIFECYCLE

A usual machine lifecycle inquires a number of phases that can be observed in figure 3. The correctly estimation of the lifecycle phases is very useful bought for the manufacturer and owner too because they have to calculate the costs that characterize every phase.

Knowing the lifecycle phases the manufacturer manager will be able to estimate the final price of the machine, he will take into consideration the following costs:

a) Conception costs;
b) Design costs;
c) Prototype execution costs;
d) Test costs;
e) The assembling costs;
f) The packing costs;
g) Depositing costs;
h) Selling process costs;
i) Advertising cost;
j) Post selling service costs /1/.

The owner manager has to consider the costs of the following phases:
1) Placing;
2) Testing;
3) Manufacturing;
4) Maintenance;
5) Turning over /2/.
6) 

**Figure 3:** General lifecycle phases for a machine.

We took into consideration an ultrasonic machine lifecycle in order to find an improvement, an idea that will help the university to enlarge the technical laboratories with new machines and equipments and to bring benefits to the industrial owner.
The lifecycle phases for the ultrasonic machine from the manufacture management point of view are the same as for any machine, we could not modify anything that is why we concentrate on the owners management.

The solution that we find was to enlarge the ultrasonic machine lifecycle, so when the machine will not satisfy the owner needs concerning the productivity and the precision, instead of turning it off he will sell it for a small sum of many or donated to the university.
In this way bought parts will be in advantage as it follows:

- the industrial owner will receive a sum of money bigger that the one taken from a Recycling Center;
- the university will have a ultrasonic machine at the lowest price;
- every student will be able to learn the ultrasonic manufacturing process in the technical university, thing that will be in the universities benefits because will decrease the practice hour costs by excluding the transport;
- the university students and professors will not depend on the industrial enterprise disposability in receiving them and the manufacturing process will not be stopped, thing that will be in the industrial enterprise benefit;
- being able to make more hours of locally practice the students will became good specialists and this will be in the industrial owner benefit because he will reduce or even exclude the training period for the new employers.

In the figure 4 is schematically showed the ultrasonic machine lifecycle enlargement and this is applicable for every machine or technical equipment.

\[ 	ext{Figure 4} \] Lifecycle phases for an ultrasonic machine

Another modality of changing the machine lifecycle is by changing some parts of the machine and in this way her destination. In this manner a machine will be used for many different processes.

In order to acquire an ultrasonic machine for the Nonconventional Technology Laboratory of the Machine Manufacture and Industrial Management Faculty we use the AIV method. This method take into consideration the machine design and manufacture at the lowest price, the machine characteristics and functions importance related with the market demands.

The main criteria used were the following:

1) The machine adaptability in order to permit different manufacture processes;
2) The possibility to optimize the working parameters;
3) The machine liability;
4) The machine maintenance;
5) The acquisition price;

DEMANDS

MANUFACTURER

MACHINE

INDUSTRIAL OWNER

STOP

TECHNICAL UNIVERSITIES
6) The machine ergonomic;
7) The manufacture productivity;
8) The machine jig;
9) The manufacture precision.

Were analyzed the following four machines:

A. Specifications:
   2000C: hole diameter: 0.2-5 (mm), frequency: 20kc, power: 0-80W (maximum).
   2000D: hole diameter: 0.2-12 (mm), power: 0-250W (maximum).

B. Specifications:
   1. frequency - 25 KHz, 50 W Auto Tuning
   2. magnetostrictiv transductor PZT
   3. the maximum hole depth: 6 mm

C. Specifications:
   1. frequency - 25 KHz
   2. electrostrictiv transductor PZT
   3. the maximum hole depth: 10 mm

Figure 5 SY-2000C(D)

A. Name: Ultrasonic drilling machine
   Model nr. SY-2000C(D)
   Brand: SY
   Origin country: China
   Nr.: 1

Figure 6 ULTRASONIC DRILLING MACHINE (USD 25)

Figure 7 ULTRA-SONIC DRILLING MACHINE (USD 100)
D. Specifications:
1. frequency - 25 kHz, 150 W Ultra Tuning
2. electrostrictiv transductor PZT
3. the maximum hole depth: 25 mm

Figure 8 ULTRA-SONIC DRILLING MACHINE (USD 150)

E. Specifications:
1. frequency - 35 kHz;
2. power - 1000 W;

Advantages:
- High frequency; Working speed;
- Advance technology;
- Stable performance;
- Simple utilisation;
- Low energetic consuming;
- Low weight;
- Small dimensions;
- The possibility to obtain small holes with different shapes in different materials;
- The possibility for different welding processes;
- CNC.

The ultrasonic machine that has been acquired for the Nonconventional Technology Laboratory is the one presented in the figure 9 because it has many advantages as it was prior showed. Welding is the main process but with minor changes can drill and mill. This type of machine that allowed different manufacturing processes is suitable for the university laboratories.

3. CONCLUSION

In order to align at the European industry level the Romanian manufacturers have to be able to change and diversify the machine usefulness during the lifecycle. A professional ultrasonic machine allows drilling, welding, scarping, shaping etc.
The industrial enterprises not afford to use machines that are not manufacturing with high precision and productivity that is why they have to invest in very good and specialized machines and after their efficiency decrease under a standard they have to get rid of them.

Maintaining a machine with lower capability is in the firm detriment so giving it to the technical universities will bring them only benefits

In this way the biggest beneficiary will be the student that will learn the manufacturing process not only from books or seeing the machine at one visit at the factory, he will be able to work at the machine together with the coordinating teacher and will became a good specialist engineer.

The collaboration between the factories and the universities brings benefits to bought sides. The university will have laboratories that will permit the local forming for professionals engineers and the main advantage for the industrial enterprises will be the receiving of specialists without spending money on training process.

4. REFERENCES

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