

Engineering Economic Analysis - A Case Study

A.Vijaya Madhavan

Assistant Professor, Department of Mechanical Engineering, Adhiparasakthi Engineering College, Melmaruvathur, Tamilnadu.

Abstract- Economic analysis is an effective tool in the decision-making process. The Economic Analysis process is an iterative procedure for evaluating and ranking alternatives that meet an objective. In present case study of problem faced by a small scale industrialist in choosing best alternative manufacturing method is discussed.

I. INTRODUCTION

Economic analyses are “pre-expenditure” analyses designed to assist a decision-maker in identifying the best new projects or programs to adopt. Program evaluations are “post expenditure” analyses designed to evaluate ongoing approved projects/programs to ensure that objectives will be attained in a cost effective manner. The analyses are based on actual performance.

The Economic Analysis process is an iterative procedure for evaluating and ranking alternatives that meet an objective. Proper performance of this process requires each of the following six key steps be done to completion(fig 1):

Fundamental Rules for the selection and Planning of a manufacturing Process

1. The process must assure a product that meets all design requirements of quality, function and reliability
2. Daily production requirement must be met
3. Full capacity of the machine and its tooling should be utilized
4. Idle operator and idle machine time must be reduced to minimum

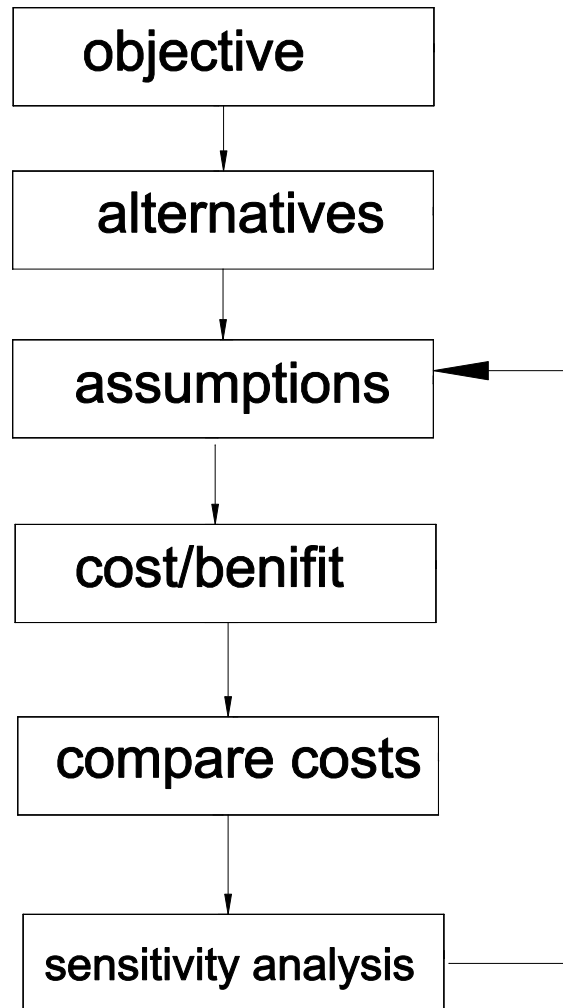


fig.1

5. The process must provide the maximum utilization of the minimum amount of material

II. CASE STUDY

Mr.K.Satyanarayana, entrepreneur, having tool-room and fabrication shop. He got an order for fabrication structure, requires 100nos of blanks of mild steel, Dia 140mm and 5mm thick. He is having the following machinery and equipment..

- 1.6feet lathe
- 2.1/2”Dia drilling machine
- 3.Welding Trans former and allied equipment
- 4. A tool cutter and grinder
- 5. Gas cutting equipment

- 6.Hand grinder

And necessary tools and consumables.

Mr.Satyanarayana has to choose best manufacturing method which is economically cheap and viable.

Mr. Satyanarayana's Problem can be found a solution by using the Economic analysis process.

Problem solving method-

Step 1 Objective- To manufacture 100nos of mild steel blanks of dia 140mm and 5mm thickness.

Step 2 Alternatives-Different methods of manufacturing blanks-

- 1.Blanking operation using mechanical press
- 2.Gas cutting operation and subsequent machining on lathe.
- 3.Chain drilling and subsequent machining operation on lathe.
- 4.Cutting blanks on drilling machine using flying cutter, which can be manufactured in his shop.

Step 3 – assumptions –

- 1.He is having Semiskilled labour only and no big material handling equipment.
2. It is a one time job and can not afford to invest much money for the above job.

Step 4- Costs involved and benefits, if any in each operation-

1.Blanking operation on mechanical press, which he does not have, and has to be out sourced. The cost of tooling is very high for each blank manufacturing, as the quantity required is very small. More over the technical feasibility of blanking of 100mm and 5mm thickness is very less,as it requires very big mechanical press, (350 tons capacity).

2.Gas cutting of small blanks requires very skilled workman and ,material will get wasted in cutting and machining allowances.

The material required for gas cutting is standard sheet of 1mX3m . The weight of the sheet is more to little bit difficult handle without handling equipment.

3. Chain drilling on the periphery of circle as shown in the figure1 and machining subsequently. In this process extra material will be lost and the sheet metal of size 1mx3m to be used.

4.Cutting blanks on Drilling machine requires a flying cutter as shown in the figure2, can be manufactured at own shop. And the blank not requires any further machining .The material that can be of strips of 150mm width by 3m/6m length. It can be handled easily.The chamfer on one side of the blank helps in fabrication.

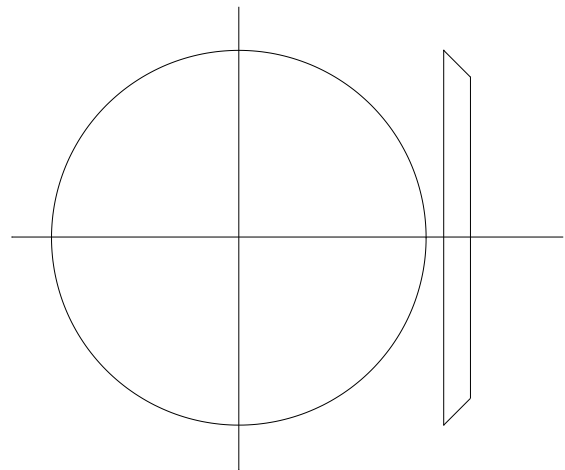


Fig 2 required blank

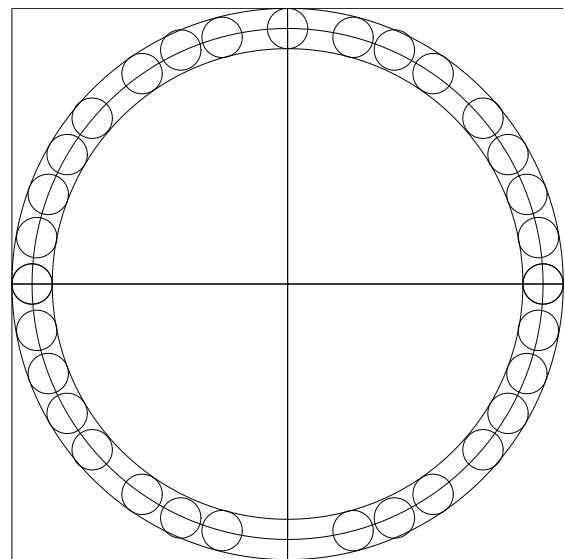


Fig 3 chain drilling

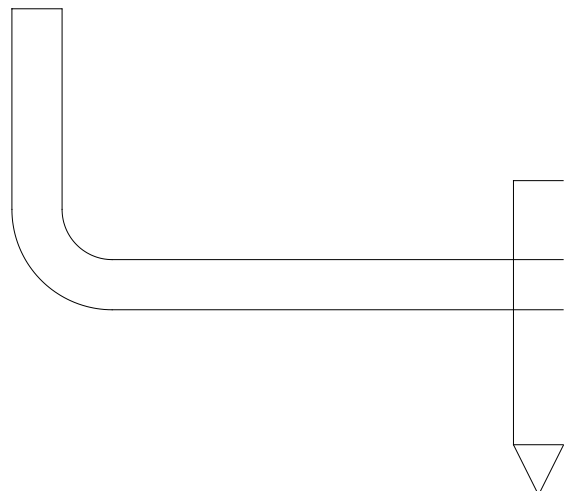


Fig 4 flying cutter

III. CONCLUSION

The same methodology can be extended to new product development, new projects.

SNo	Process description	Cost/ benefit	Remarks
1	Blanking by press	high tooling cost	inhouse not available
2	Gas cutting	high skill labour more material extra machining	inhouse not available
3	Chain drilling	high skill labour more material extra machining	time consuming
3	drilling flying cutter	no high skill labour no extra machining	recommended

Comparison Table

Above table reveals that the process of making the blanks by using flying cutter is most economical and viable for Mr.Satyanarayana.

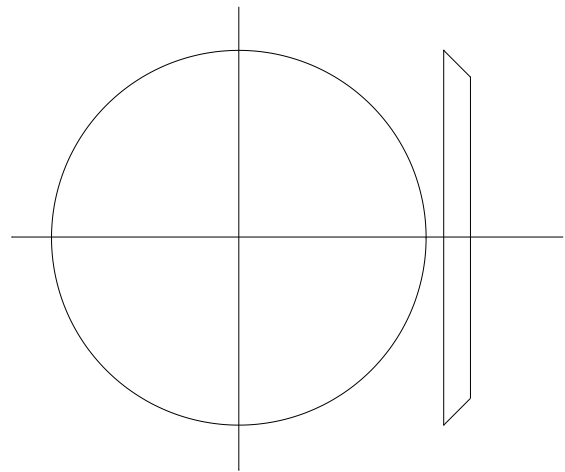


Fig5 blank prepared with flying cutter

REFERENCES

- [1] Economic Analysis Hand book

AUTHORS

First Author – A.Vijaya Madhavan, M.Tech ,IIT ,Chennai(Madras) 1987 Industrial Metallurgy 25 years of Industrial Experience Joined in Teaching Profession, as very much interested in teaching. , E mail Id vmasuri62@gmail.com Tel mobile 0918220633034, Assistant professor, Mechanical department, Adhiparasakthi Engineering college, Melmaruvathur, Chengalpattu, Kanchipuram District, Tamilnadu 603319, India