

HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING COURSE

DIPLOMA PROJECT

**A STUDY ON THE PRODUCTIVITY
IMPROVEMENTS IN THE CYPRUS
MANUFACTURING INDUSTRY**

M/922

BY

PANAYIOTIS TOUMBAS

JUNE 2001

HIGHER TECHNICAL INSTITUTE	PROJECT NO. 3286
----------------------------------	-------------------------

**A STUDY ON THE PRODUCTIVITY
IMPROVEMENTS IN THE CYPRUS
MANUFACTURING INDUSTRY**

by

PANAYIOTIS TOUMBAS

PROJECT REPORT

Submitted to

**the Department of Mechanical Engineering
of the Higher Technical Institute**

**Nicosia, Cyprus
in partial fulfillment of the requirements
for the diploma project of**

**TECHNICAL ENGINEERING
in**

MECHANICAL ENGINEERING

June 2001

HIGHER TECHNICAL INSTITUTE	PROJECT NO. 3286
----------------------------------	---------------------

ACKNOWLEDGEMENTS

Firstly, I would like to thank my supervisor Dr. Andreas Stasis, for his help during this semester and for his guidance during the preparation and the completion of my project.

Also, I would like to thank Metalco Ltd and especially Mr Andreas Fragoullides production manager of the industry, for their cooperation.

A STUDY ON THE PRODUCTIVITY IMPROVEMENTS IN THE CYPRUS INDUSTRY

By: Panayiotis Toumbas

SUMMARY

This project has been divided into eight chapters.

Chapter one deals basically with the work study, the basic procedure of work study and the working conditions.

Chapter two deals with the diagrams, which show parasitically the procedure that a metal roll is converted to a small storage room; the total distance covered by the workers. Some of the diagrams are the flow process, the transportation and the detailed flow process.

Chapter three, refers to the detailed description of processes involved.

Chapter four deals basically with the problems faced at the various stations and classification of them.

Chapter five refers to the suggestions, solutions that they could be for better existing conditions.

Chapter six is about the actual changes and corresponding cost which should be made for more improvement of productivity.

Chapter seven deals basically with the performance of existing conditions and the performance of best compromised conditions and comparison of cost for proposed changes with profit.

Chapter eight refers to the summary of recommended solutions, further work and to the plant of suggestions implementations.

Introduction

The continuous competition among products and services with originate from different enterprises and organizations raise the necessity to improve the productivity in the enterprise or the organization in order to keep being competitive. In either cases the improvement aims at lower production cost, increased profits.

So what is productivity

Production is defined as the creation of good and services. Productivity is the enhancement of the production means a favourable comparison of the quantity of resources employed (inputs) to the quality of good and services productions (outputs).

That is productivity is the ratio between output and input. This definition is a general one and can be applied in any enterprise, industry or economy as awhile.

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}} = \frac{\text{Units produced}}{\text{input used}}$$

What are the resources at the disposal of a manufacturing company?

1. Building and Land

Land in a convenient location on which to erect the building and other facilities necessary for the operations of the enterprise, and the buildings erected on it.

2. Machines

Plant equipment and tools necessary to carry out operations of manufacture, the handling and transport of materials, office equipment and storage room.

3. Materials

Materials that can be converted into products to be sold. They include rolls sheets of metals, trolleys, over head cranes, welding device, grinding wheel, drilling machine with air shear press machines, machine of ordinary metal sheers, electric shear cutting machine for use in the processes of manufacture and packing materials.

4. Man power

Men to perform the manufacturing operations; to plan and control to do clerical work; to buy and sell.

The Use of all these resource determines the productivity of the enterprise. These resources consist of "real" costs are therefore incurred. Their cost may also be measured in terms of money. Since higher productivity means more output from the same resources, it also means lower money costs and higher net money returns per unit.

My whole study is concerned with improvement of productivity of a Metal working Industry. The name of the industry is Metalco Ltd and is located at Latsia industrial area.

The type of production used in Metalco is the batch production. This means that the company produces a number of different products in varying quantities for a range of customers.

So, the quantities produced are based upon customers orders. Due to that, a really large stock is built up. Other reasons that stock is built up are the port strikes and the metal rolls that are coming from abroad. At Metalco industry there are two production lines. One production line deals with the production of portal frame, small storage rooms or garage, and ordinary metal sheers, and other production line deals with portal frame. the products are either disposed in

local market or they are exported in European Countries. My project deals with the first production line.

The problems faced with specific industry that restrict its productivity were investigated and analysed in order to come up with economically and functionally approved solutions. The whole project has two faces. On the first face it aims to provide useful and helpful information with solution for improvement and the second face it aims to combine these with probable further factory expansion.

CONTENTS

Title page	
Acknowledgements	i
Summary.....	ii
Introduction.....	1
Table of Contents.....	4

Chapter 1

1.1 Information about Metalco.....	8
1.2 Work Study.....	8
1.3 Basic procedures of work study.....	9
1.4 Working conditions.....	10

Chapter 2

2.1 Objectives of layout.....	13
2.2. Types of layout	13
2.3 Flow process diagram of the production procedure	13
2.4 Plant layout	14
2.5 Transportation Diagram – String Flow Diagram	14
2.6 Detailed Flow process Diagram	15
2.7 Process chart Symbols	16
2.8 Flow process chart	17
Appendix No. 1 – Flow Process Diagram.....	18
Appendix No. 2 - Plant Layout	19
Appendix No. 3 – Transportation Diagram	20
Appendix No. 4 – Flow process chart	21
Appendix No. 5 – Detailed flow process	22
Diagram	

Chapter 3

3.1 Detailed Description of process	24
3.2 Cutting the metal sheets	24
3.3 Preparation of trapezoidal metal sheets for body-making of a storage room	25
3.4 Preparation of metal sheets for the sides body of a small storage room....	26
3.5 Preparation of metal sheets of assembly.....	26
3.6 Assembly the main body with the four sides	27
3.7 Preparation of ordinary metal sheets for a small storage room	27

Chapter 4

4.1 Description of the problems faces at the various stations	29
4.2 Classification of problems and difficulties	31

Chapter 5

5.1 An Ideal solution	36
5.2 Compromised solutions	37
5.3 Further Information	38
Appendix No. 6 Compromised Solution No. 1	40
Appendix No. 7 Compromised Solution No. 2	41
Appendix No. 8 Compromised Solution No. 3 (proposed)	42
Appendix No. 9 Flow process charts (proposed)	43

Chapter 6

6.1 Actual proposed changes and corresponding cost.....	45
6.2 Additional cost for further improvements	46

Chapter 7

7.1 Existing conditions	48
-------------------------------	----

7.2 Performance of best compromise conditions60
7.3 Comparison of cost for proposed changes with profit61

Chapter 8

8.1 Conclusion63