The Turkish Journal of Occupational / Environmental Medicine and Safety

2017; Volume 2, Issue 1(3):60-72 Web: http://www.turjoem.com ISSN : 2149-471

EXPLORING THE ECONOMIAL REASONS OF THE USAGE OF UNHEALTHY & LOW RESISTING FAR-EAST PRODUCTS IN THE WATER PIPE SYSTEMS

Burak ÖZTÜRK[1], Özkan KÜÇÜK[2], İrem DÜZDAR[3], Yusuf Serhat ALTINBİLEK[4]

[1]Kastamonu University, Materials Science and Eng. Dep't,

[2]Kastamonu University, Materials Science and Nanotechnology Eng. Dep't,

[3]Düzce University, Industrial Eng. Dep't,

[4]Yıldız Technical University, Mechanical Eng. Dep't.Istanbul

Corresponding Author:
Burak Öztürk, PhD Student
Konak Fitting Establishment, Research and Development
Çankırı State Highway 6.km Çınar Village Road No: 12, Akyurt / ANKARA
Tel: +90 0542 478 58 87
e-mail: uzmantasarimmerkezi@gmail.com

ABSTRACT

Introduction

This study presents an economical survey about the cheap and poor quality Far-East production fittings in the water systems of the buildings in Turkey.

Material and Methods

The authors aim is to show the differences on the production processes and the pre and post-molding operations between these and the domestic products; and to exhibit the causes of differences in the costs and the prices of these two products.

Results

At the end the reasons of the common usage of the Far-East products in Turkey are determined.

Conclusions

Under the light of the result of this survey, it is tried to make some predictions to use better fittings in the water systems by promoting the domestic producers by employing the MRP and Cost Analysis methods

Key Word: Cost Analysis, MRP, Fittings, Cast Molding

INTRODUCTION

Our country is on the center of the different geographical fault lines. There can occur some defaults like cracks and breaks on the poor quality Far- East produced materials used for the natural gas and water systems of the buildings as we lived in the past earthquake. Generally, the Far- East products manufactured as pig iron. Most of the spheroid graphite or tempered cast iron products are not manufactured by thermal operations. The fitting materials produced in Far- East are using commonly because of their low prices. There is a common idea that the prices of these parts are less than the production costs of the domestic products. The domestic fitting material producers lost their competition abilities because of the cheap and poor quality materials exported from Far- East. As a result of this, in the last 20 years 18of the producer firms having TSE accreditation could not survive in this area. In this study it is tried to calculate the minimum domestic production cost for the 1" fitting material. These costs will be compared with the price of the safe and amortizing Far- East product in an unbreakable microstructure. Via this comparison the economical dimension of the basic idea of the water and ifs health will be analyzed. The MRP and cost evaluation will be done to prove the calculation for the first time in the literature.

The production cost systems of manufacturing companies are analyzed established in Denizli [1]. The availability and costs of solar energy is analyzed for our country in a comparison with the European countries [2]. The contribution of cost analysis on the success of the company is explored [3]. By using Grey Relational Analysis the multicriteria supplier selection is achieved [4]. The decision making tools depending on the cost, cost for product life cycle, objected cost, kaizen costs are analyzed [5]. The effect of supply chain in the manufacturing process[6]. The development, features of manufacturing performance criteria in the companies, and their relations with the continuous development is studied [7]. The MRP application for the railway industry is analyzed [8].The integration model of MRP systems by simulation is discussed [9]. The success factors for the MRP application in the construction industry in Turkey Is researched [10].

MATERIAL AND METHODS

Equipment Management: MRP and the cost analysis is tried to be integrated in this study. The product supply and the producing man-hours will be determined. The family tree and percentages for each material will be analyzed. The total manufacturing time will be calculated.

The machine working time is determined as 26 days. The producing man-hours will be calculated as 30 days according to the official procedure. The sum of minimum wage, transportation, social security payment, annual compensation and the meal fee will be 2.100 TL/person. The calculation for each product will be done by using the US Dollar and Euro values of November, 26Th, 2016. The energy cost will be calculated on the daily selling price of TL/ kWh determined by Enerji-Sa. Investment, rent, storage, and galvanizing costs are not included in the calculations.

The production cost calculation given below is calculated according to the MRP and family tree of cost analysis. In the Table 1, A represents the unit cost, B supply time, C calculation formula, and D the total cost. The general cost; labor, energy, equipment, raw material, modification, and scrap costs will be studied in 6 basic groups.

Table.1. Model Manufacturing

1. Model Manufacturing (2.222,50 TL)				
a) Design Cost (390 TL)				
Design and R&D Work				
Good /Service Name	A	B	C	D (TL)
Design and Research Work	3.000 TL/Month	3 Days	=a/30*B	300,00
Standard and Model Research				
Good /Service Name	A	B	C	D (TL)
Standart Cost			Estimated	60,00
Equipment and Office Expenditures				
Good /Service Name	A	B	C	D (TL)
Standart Cost	300 TL/Month	3 Days	A/30*B	30,00
b) Production Cost (1.322,50 TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	6 Days	A/30*B	420,00
CNC Machine Operation and Maintenance Cost				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0.4 TL/kWh	60 Hours	A*B*Power	360,00
Oil Costs			Estimated	30,00
Aluminum Billet and St 37 Plate Raw Material Costs				
Good /Service Name	A	B	C	D (TL)
Billet Aluminum	13 TL/ Kg	25 Kg	A*B	325,00
St 37 Plate	2 TL/Kg	25 Kg	A*B	50,00
Machining Costs				
Good /Service Name	A	B	C	D (TL)
Drill	20TL/ 2 Usage	1 Usage	A/2	10,00
12" Milling Cutter	100TL/ 2 Usage	1 Usage	A/2	50,00
Cutter	75TL/ 2 Usage	1 Usage	A/2	37,50
6 rl Finishing Cutter	80TL/ 2 Usage	1 Usage	A/2	40,00
c) Finishing Costs(510 TL)				
Labor Costs				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	6 Days	A/30*B	420,00

Machine Operation and Maintenance Cost				
Good /Service Name	A	B	C	D (TL)
Wear Tools	200TL/ 20 Usage	1 Model	A/20*B	10,00
Cylindrical Polishing	10 TL	2	A*B	20,00
Emery	5TL	1	A*B	5,00
Pin	5 TL	4	A*B	20,00
Kit			Estimated	5,00
Cutter	15 TL	2	A*B	30,00
2. Pattern Box Manufacturing (1.882,50 TL)				
a) Design Cost (330 TL)				
Design and R&D Work				
Good /Service Name	A	B	C	D (TL)
Design and Analysis Work	3.000 TL/Month	3 Days	=a/30*B	300,00
Equipment and Office Expenditures				
Good /Service Name	A	B	C	D (TL)
Standard Cost	300 TL/Month	3 Days	A/30*B	30,00
b) Production Cost (1.212,50 TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	3 Days	A/30*B	210,00
CNC Machine Operation and Maintenance Cost				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0,4 TL/kWh	60 Hours	A*B*Power	360,00
Oil Costs			Estimated	20,00
Pig Billet				
Good /Service Name	A	B	C	D (TL)
Pig Cost	8 TL/Kg	60 Kg	A*B	480,00
Machining Costs				
Good /Service Name	A	B	C	D (TL)
Drill	20TL/ 2 Usage	1 Usage	A/2	10,00
12" Milling Cutter	100TL/ 2 Usage	1 Usage	A/2	50,00
Cutter	75TL/ 2 Usage	1 Usage	A/2	37,50
8" Spherical Cutter	90TL/ 2 Usage	1 Usage	A/2	45,00
c) Finishing Costs(370 TL)				
Labor Costs				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100	4 Days	A/30*B	280,00

	TL/Month			
Machine Operation and Maintenance Cost				
Good /Service Name	A	B	C	D (TL)
Wear Tools	200TL/ 20 Usage	1 Model	A/20*B	10,00
Cylindrical Finishing	10 TL	2	A*B	20,00
Emery	5TL	1	A*B	5,00
Pin	5 TL	4	A*B	20,00
Cutter	15 TL	2	A*B	30,00

3. Pattern Production 56.831,00 TL				
a) Punch - Stamp Costs(26.923 TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	39,000/Month	50.000/B*A	26.923,00
b)Heating Cost (5.333 TL)				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0,4 TL/kWh	26 Days	A*B*Power (5kW)	5.333,00
c) Sand Cost				
Resin Cost				
Good /Service Name	A	B	C	D (TL)
Resin Cost	18.325 TL/2.5 Kg	2.000 Kg	A*B	14.660,00
Mold Sand Cost				
Good /Service Name	A	B	C	D (TL)
Mold Sand Cost	2,8 TL/Kg (20 Kg)	16.000 Kg	A*B	2.240,00
d) Maintenance Cost (2.666 TL)				
Labor Cost				
Good /Service Name	A	B	C	D
Monthly Labor Cost	2.500 TL/Month	26 Days	A*B	2.166,00
Material Cost				
Good /Service Name	A	B	C	D (TL)
Maintenance Materials Cost			Estimated	500,00
e)Pressed Air Costs (800 TL)				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0,4 TL/kWh	78 Hours	A*B*Power (20kW)	800,00
f) Scrap Cost (4.209 TL)				
Scrap Product				
Good /Service Name	A	B	C	D (TL)
Scrap Cost	Pattern Cost	8%	A*0.08	4.209,00

4. Preparation & Molding Costs 218.146,00 TL				
a)Sand Preparation Cost (49.439 TL)				
Sand Screening & Mixing				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	5.3 Month	A*B	11.214,00
Energy Cost	0,4 TL/kWh	1.102 Hours	A*B*Power (6kW)	2.666,00
Materials Cost				
Good /Service Name	A	B	C	D (TL)
Bentonite	0,39 TL/3 Liters	46.5 Kg		9.375,00
Coal Powder	0,52 TL	1.5 Kg		12.607,00
Sand	0,56 TL	6 Kg		13.577,00
Screened Sand		-50 Kg		
b) Furnace, & Pressing Costs (32.996 TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	5.3 Month	A*B*2 Employee	22.435,00
Furnace Worker Cost	2.100 TL/Month	2.2 Month (180 Furnace)	A*B	4.725,00
Material Cost				
Good /Service Name	A	B	C	D (TL)
Undercoat Sand	1.29 TL		200 Furnace- 600 Kg	696,00
Pot Sand	1.53 TL		200 Furnace- 15 Kg	20,00
Pressed Air Costs (800 TL)				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0,4 TL/kWh	1.280 Hours	A*B*Power (10kW)	5.120,00
c)Molding Materials Preparation (95.221,00TL)				
Scrap				
Good /Service Name	A	B	C	D (TL)
Total Cost	0,7 TL/Kg	100 Kg	A*B*160 Furnace	11.200,00
Mold Filling Loss				
Good /Service Name	A	B	C	D (TL)
Total Cost	0,7 TL/Kg	259 Kg	A*B*160 Furnace	29.000,00
Magnesium				
Good /Service Name	A	B	C	D (TL)
Total Cost	10,1 TL/Kg	8 Kg	A*B*160 Furnace	12.928,00
Carbon				

Good /Service Name	A	B	C	D (TL)
Total Cost	4,89 TL/Kg	4 Kg	A*B*160 Furnace	3.129,00
Silica				
Good /Service Name	A	B	C	D (TL)
Total Cost	5,12 TL/Kg	4 Kg	A*B*160 Furnace	3.276,00
Supplementary Silica				
Good /Service Name	A	B	C	D (TL)
Total Cost	10,69 TL/Kg	3 Kg	A*B*160 Furnace	3.260,00
Pig Iron				
Good /Service Name	A	B	C	D (TL)
Total Cost	1,58 TL/Kg	120 Kg	A*B*160 Furnace	30.366,00
Perlite				
Good /Service Name	A	B	C	D (TL)
Total Cost	0,31 TL/Kg	2 Kg	A*B*160 Furnace	92,00
d)Molding Operation (31.690,00 TL)				
Melting Furnace Heating Cost				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0,4 TL/kWh	270 Hours	A*B*Power (250kW)	27.000,00
Molding Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	67 Days	A*B	4.690,00
e)Mold Opening & Cleaning (7.050,00 TL)				
Mold Opening & Cleaning Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	70 Days	A*B	4.900,00
Energy Cost				
Good /Service Name	A	B	C	D (TL)
Diesel Fuel	4,30 TL/Lt	62,50 Liters	A*B	2.150,00
e)Maintenance(1.750,00TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.500 TL/Month	15 Days	A*B	1.250,00
Material Cost				
Good /Service Name	A	B	C	D (TL)
Maintenance Materials Cost			Estimated	500,00
5. After Molding Manufacturing Operations (66.849,00 TL)				
a)Partition (6.300,00 TL)				

Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	3 Months	A*B	6.300,00
b) Improper Product (19.989,00 TL)				
Scrap Material Cost				
Good /Service Name	A	B	C	D (TL)
Scrap Cost	Product Cost	8%	8%*Product Cost	19.939,00
c) Thermal Operation (25.970,00 TL)				
Maintenance Cost				
Good /Service Name	A	B	C	D (TL)
Maintenance Cost			Estimated	1.200,00
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	11 Days	A*B	770,00
Energy Cost				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0,4 TL/kWh	180*6 Hours	A*B*Power (250kW)	24.000,00
d) Grinding Operation (25.970,00 TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	125 Days	A*B	8.750,00
Energy Cost				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0,4 TL/kWh	125*8 Hours	A*B*Power (1,5kW)	600,00
Material Cost				
Good /Service Name	A	B	C	D (TL)
Grinding Materials Cost	20 TL/Piece	125Pieces	Estimated	2.500,00
e) Sandblasting Operation (2.740,00 TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	22 Days	A*B	1.540,00
Energy Cost				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0,4 TL/kWh	176 Hours	A*B*Power (10kW)	700,00
Material Cost				
Good /Service Name	A	B	C	D (TL)
Maintenance Materials Cost			Estimated	500,00

6. Machining Operations (57.966,00 TL)				
a) Partitioning(9.100,00TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	130 Days	A*B	9.100,00
b) Mold Assembly (5166,00 TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	62 Days	A*B	5.166,00
a) Thread Milling (43.700,00 TL)				
Labor Cost				
Good /Service Name	A	B	C	D (TL)
Monthly Labor Cost	2.100 TL/Month	250 Days	A*B	17.500,00
Cooling Liquid				
Good /Service Name	A	B	C	D (TL)
			Estimated	5.000,00
Mold				
Good /Service Name	A	B	C	D (TL)
Cold Work Tool Steel			Estimated	800,00
Guide Cost				
Good /Service Name	A	B	C	D (TL)
1/2" Guide	150 TL/Piece	1.000 Pieces	A*B	15.000,00
Maintenance Cost				
Good /Service Name	A	B	C	D (TL)
		250 Days	Estimated	1.000,00
Energy Cost				
Good /Service Name	A	B	C	D (TL)
Energy Cost	0,4 TL/kWh	8 Hours*250 Days	A*B*Power (5,5kW)	4.400,00

RESULTS

The manufacturing process is searched as a family the tree and the cost analysis is achieved. Their effect on the costs depending on the product types are given on the Table 1 and its graphic representation on Figure 1. Main cost types are gathered and unit cost is calculated on Table 2, and shown on Figure 2, the % affecting graph.

Table 2. The Effect of Operation Types on Costs

OPERATION	COST (TL)	%
Pattern Box Manufacturing	1957,5	0,484563
Pattern Production	2222,5	0,550162
Mold Production	56831	14,06805
Machining	57966	14,34901
After Molding Operations	66849	16,54793
Preparation & Molding	218146	54,00028
TOTAL	403972	100

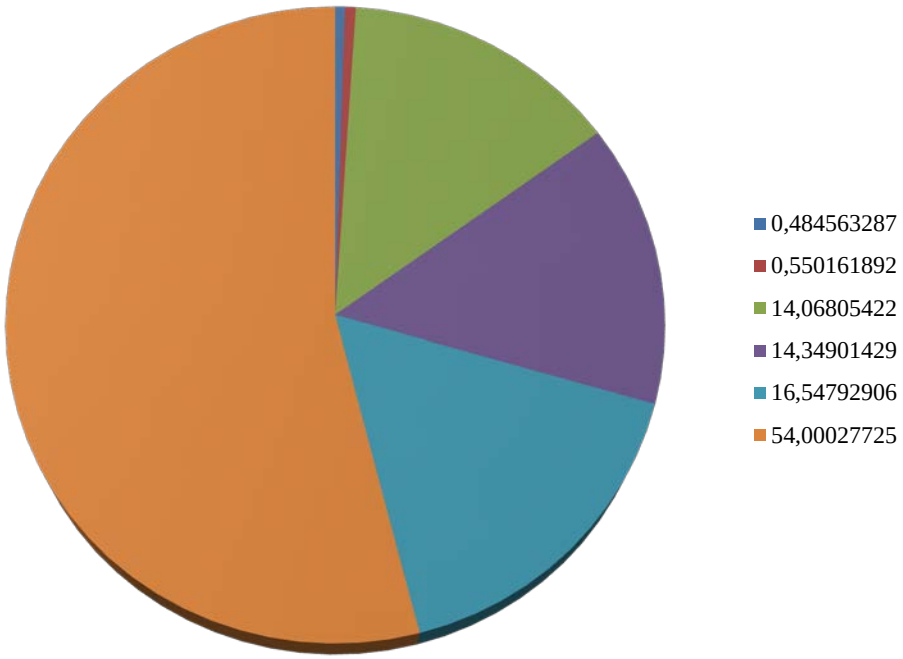

Fig. 1. Graph for the Effect of Operation Types on Costs

Table 2. The Effect of Main Costs

ENERGY	MAINTENANCE	LABOR	MOLDING RAW MATERIALS	EQUIPMENT	SCRAP
360	500	420	14660	30	4209
360	696	420	2240	30	11200
5333	20	280	9375	325	19989
800	500	280	12607	50	
2666	1200	26923	13577	10	
5120	500	2166	29000	50	
27000	1000	11214	12928	37,5	
2150		22435	3129	40	
24000		4690	3276	10	
600		4900	5260	20	
700		1250	30336	5	
4400		6300	92	20	
		770		5	
		8750		30	
		1540		10	
		9100		20	
		5166		480	
		17500		10	
		300		50	
		60		37,5	
		300		45	
		4725		10	
				20	
				5	
				20	
				30	
				2500	
				5000	
				800	
				15000	
73489	4416	129489	136480	24700	35398
%18,19160734	%1,093145	%32,05395	%33,78451972	%6,114285148	%8,762488489
				Total:	403,972 TL
Product Cost (Piece)	403972/500000 =0,80 TL/Piece	**Product Cost (Kg)**	0,80 TL/130*1000 =6,15 TL/Kg		

CONCLUSIONS

In this study, enterprise resource planning (ERP) and cost analysis had been done for a fittings producing firm. The unit cost in this study is calculated as 0,80 TL. The price of it is 0,60 TL. There is 25% loss for this product, and total loss is calculated as 100.000TL. The price of the Far-East produced fittings is 0,50 TL. This situation can be defined the reason for the 18 bankruptcies in the last 20 years in this ½ - 1" fittings producing firms.

The reason for commonly usage of poor quality materials for the water systems of the buildings is proved as just economical. The 18% energy and 32% labor costs those are the main two of cost factors are very cheap in the Far-East Countries. Besides these, the thermal operations, which are the 16% of the total production cost, are not performed for them. Cheap and poor quality raw materials usage makes 33% of the 50% level additional profit also. Unhealthy and unreliable production of these materials can be done by the domestic TSE registered producers. But the domestic producers have the responsibilities for their country. It is very important to support the R&D works on process and raw materials of these companies for the high quality and cheaper production of the goods domestically. Besides these, there must be some quality regulations for the imported materials from the Far East Countries or the others to keep the health and reliability.

The 8.76% of annual cost comes from the poor quality production; the cost of it is 35,389 TL. Only the 54% of the 403,972 TL total costs is the molding cost. It is forecasted that, this loss can be removed by aluminum injection molding method. When the aluminum injection method is applied instead of the iron molding to produce the fittings, the weight will be 63 - 65 grams instead of 130. The cost of it is calculated approximately 0.65 TL for 500.000 pieces. By this way, the corrosion resistive, physical resistance improvement, and reliable water system can be achieved in the buildings.

500.000 pieces of fittings can be manufactured in 5 years. In the light of this work ERP study is performed. The requirements for the labor, energy, and raw materials are calculated for the firm. Then the production plans are done according to the findings of this study.

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