بسم الله الرحمن الرحيم

Palestine Polytechnic University

Mechanical Engineering Department

Graduation Project

Automated Olive Press for Household Use

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Abstract

Many households and hoppy farmers have limited number of olive trees and reap yearly only small amounts of olives. Such amounts are usually too small to be sent to the public press and at the same time for many farmers too large to be cured, and they are very interested to use these olives to extract even small amount of the relatively expensive oil.

In this project a down-scaled olive press was designed and build, which is in its weight, dimension, and costs suitable for household utilization. A further importance of this press is that and despite of modern control systems, the traditional method of olive oil pressing will be used which guarantees a high quality olive oil

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Introduction & Motivation

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1.1 Introduction

Middle-east is the primary centre for olive in the Mediterrancan basin. Olive is probably the most important agricultural product in Palestine, it has also regional place, because it is mentioned 7 times in the holy Quran, so it is known as a blessed tree.

Olive tree cultivated areas account for more than 80% of the fruit trees area in Palestine, namely about 93,000 hectares (PCBS, 2009) [1]. Olive trees are grown everywhere in Palestine, but the greatest productive areas are located in the western and northern West Bank.

Olive production plays a very important role in the Palestinian economy, and used in many important local and regional specialties, according to Palestinian Central Bureau of Statistics, the value added of olive pressing activities totaled US$7 million in 2011 while intermediate consumption and output of olive presses totaled US$2.5 and US$9.5 million respectively. A total of 272 olive presses were operating in the Palestinian Territory, of which 240 were fully automatic presses and 32 were half automatic and traditional presses, employ 1,326 persons participated in olive pressing activities in 2011[2].

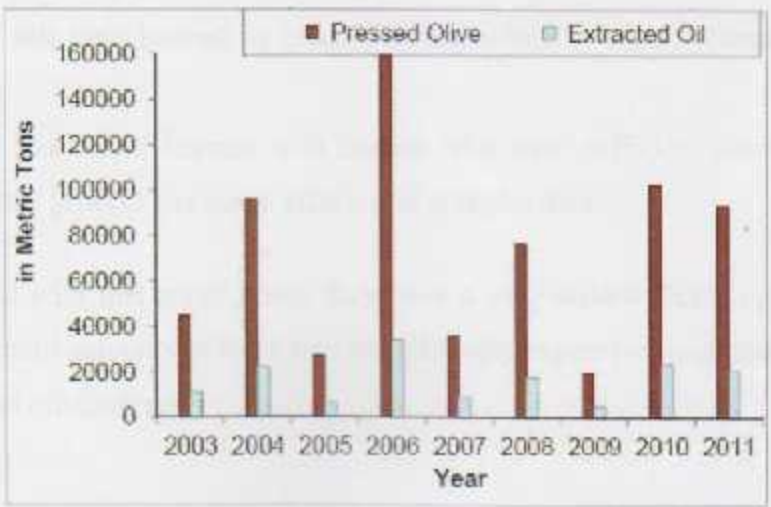


Figure-1.1: The production quantities of olive and extraction of oil from 2003 to 2011

The demand of olive continues to grow not only because of its distinct flavor, but also because of an increased awareness of its health benefits. But The production of olive differs from year to year according to climate conditions and pedo-climatic characteristics of the cultivated area. Figure-1.1 shows the production quantities of olive and extraction of oil from 2003 to 2011[2]

As shown in the figure-1.1 The quantity of oil extracted in the Palestinian Territory in 2011 fell by 12.6% compared with 2010 to 20,754 tons.[2]

1.2 Project Idea and Importance

Large olive press will usually refuse pressing small amount of olive, due to economical reliability, but at the same time it was noticed that many small farmers are interested in pressing these small amount into oil. These small farmer have currently only three options:

1. They may themselves obliged to pickling there olives, which produces unwanted large amount of pickled olive .
2. They sell their harvest as green product, which is usually financially not of profit .
3. They share their harvest with friends who have sufficient amount of olive, also this process has many efforts and complexities.

But now and with this small press, they have a long waited fourth option, namely pressing of small amounts of olive into the relatively expensive, high quality olive oil in economical efficient way.

1.3 Recognition of the Need

1.3.1 A need of press for household use:

The group made a questionnaire took (100) purposeful sample of farmers who have olive trees, to decide if there is an importance of the project?, and if there is really a need for an automated olive press for household use?.

The analysis of the questionnaire is attached in Appendix A. And here some of the results:

26% of the participants (who have olive trees) there trees give them less than10 Kg of oil yearly, as shown in Figure A.4.2. This is a large percentage, so we decide to work with them, and solve their problem.

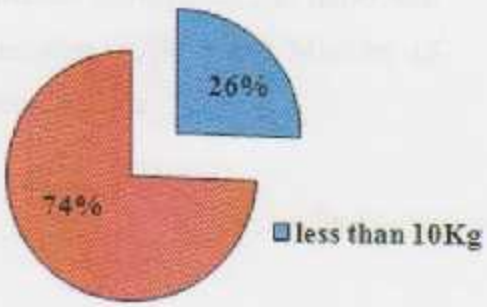


Figure A.4.2: Quantity of olive oil

Also according to the questioner results about 55% don't press there's olive, because of small quantity Figure A.4.4, which the project come with the solution of it.

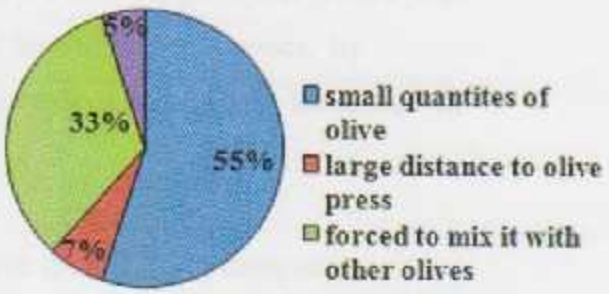


Figure A.4.4: Reason of not press the olive

As shown in Figure A.4.6 ,50% says they are ready to buy the press and 20% say yes but, if the cost was good.

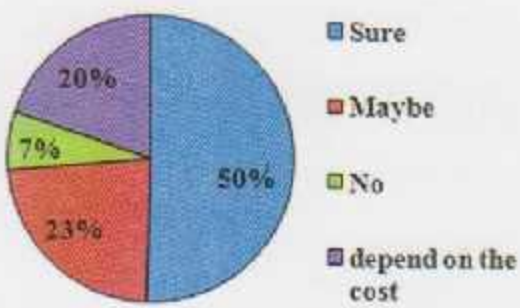


Figure A.4.6: The desire to buy the press

This results is good for us to start our project and build it as we can with smallest cost .

1.3.2 A Need of a Press for Research Use:

There is a need for a small olive press for research use in our country, because our country is a land of olive, and according to Dr.Rezeq Salimia , the dean of agriculture college, in Hebron university: " we need this machine to make different tests on different samples of oil, in different times of harvesting, different types of fertilizers....etc". And he told us that he is interested in the project and ready to buy the machine after building it. And also there are different universities and those who work with olive oil like Agricultural Relief Committee (PARC) and Ministry of Agricultural are interested in small olive press for research use.

1.3.3.Quality of olive oil

In Palestine and other Arab Ward countries, there's a need for press that gives a high quality of oil, our project will give higher quality than all current presses, by combined between the modern and traditional methods of pressing, so the press will not add heat or water at all in the process.

According to the questionnaire the press must have the following features:

1. No noise.
2. Portable, easy to move.
3. Ease for use.
4. High safety factor, safe for children.

1.4 Project Objectives

1. To build an automated olive press for household use.
2. To introduce a new technology for the local market.
3. To introduce a press for research use.
3. To make a combination from traditional and automated methods for oil press.
4. To try to achieve high quality oil (extra virgin or virgin).

1.5 Total Cost for the Project

Table- 1.1: Total Cost

Components	Price (NIS)	Quantity	Total (NIS)
Motor (AC)	300	2	600
Gear box	350	2	700
Stainless steel	1000	-	1000
Lathe working	2000	-	2000
Separator funnel	100	1	100
Transformer 24V DC	120	1	120
Relays	50	5	250
Overloads	50	3	150
Optical Sensor	160	1	160
Heater	100	1	100
Temperature Sensor	100	1	100
Push buttons & switches	From the University (Previous project)		
Limit switches	From the University (Previous project)		
DC motor	From the University (Previous project)		
PLC	From the University (Previous project)		
Temperature controller	From the University (Previous project)		
	5280 NIS		

Chapter 2

Olive Oil Production

2.1 Introduction

Olive oil refers to the juices extracted from olives removed from the trees, and is sought after by many due to its health benefits. If you want natural, go for a good olive oil that extracted without any addition of chemical substances that cause fragmentation, so due to these reason the production of olive oil require the use of Mechanical means.

2.2 An Olive Structure

An olive consists of three basic parts the skin, the pulp and the pit as shown in figure-2.2. It is made up of solid and liquid which are (30%), (70%) respectively the liquid consists of (10-30%) oil and (40-60%) water.

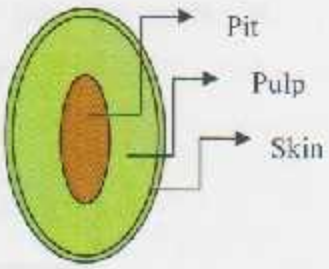


Figure-2.1: An olive parts

The solids consist of (12-25%) pit solids, (8-10%) skin and pulp solids, (1-3%) seeds, (8-10%) skin and pulp solids, (3%) sugar, (2%) proteins, and (2%) other components like acids, vitamins, minerals, and pestines.

The higher percentage of oil concentrate in the pulp of the olive, but in this project it wad decided to press the hole fruit including the pit which has the lower percentage of oil.

2.3 Quality of the Oil

The quality of the oil starts from the quality of the fruit itself ,you can't make a good oil from poor fruit. On the other hand, the quality also depend on Harvesting, transport method, fruit storage, processing, and finally oil storage techniques.

The overall quality of the oil from production to consumption is strongly related to oxidative stability and its impact on the evolution of flavor, taste, color, and the content of endogenous antioxidants and other minor constituents beneficial to health[5].

The most important component in measuring oil quality is the fatty acids, its percentage in the oil must be in the allowable ranges shown in the Table-2.1

Table -2.1: Allowable fatty acid ranges for extra virgin olive oil (IOC)[4].

Fatty acid	Allowable range %
Myristic acid	≤ 0.05
Palmitic acid	7.5 - 20.0
Palmitoleic acid	0.3 - 3.5
Heptadecanoic acid	≤ 0.3
Heptadecenoic acid	≤ 0.3
Stearic acid	0.5 - 5.0
Oleic acid	55.0 - 83.0
Linoleic acid	3.5 - 21.0
Linolenic acid	≤ 1.0
Arachidic acid	≤ 0.6
Gadoleic acid (eicosenoic)	≤ 0.4
Behenic acid	≤ 0.2
Lignoceric acid	≤ 0.2

According to the IOC (International Olive Council) standards, the olive oil sorts to many kinds, here we are interested in the virgin olive oil.

Virgin olive oils: are the oils obtained from the fruit of the olive tree solely by mechanical or other physical means under conditions, particularly thermal conditions, that do not lead to alterations in the oil, and which have not undergone any treatment other than washing, decantation, centrifugation and filtration.

Virgin olive oils fit for consumption as they are include:

1. Extra virgin olive oil: virgin olive oil which has a free acidity, expressed as oleic acid, of not more than 0.8 grams per 100 grams, and the other characteristics of which correspond to those fixed for this category in this standard.
2. Virgin olive oil: virgin olive oil which has a free acidity, expressed as oleic acid, of not more than 2 grams per 100 grams and the other characteristics of which correspond to those fixed for this category in this standard.
3. Ordinary virgin olive oil: virgin olive oil which has a free acidity, expressed as oleic acid, of not more than 3.3 grams per 100 grams and the other characteristics of which correspond to those fixed for this category in this standard.

We can extract a high quality olive oil (virgin or extra virgin) by preventing the usage of heat above room temperature (25-30) in the whole process. By not using too much water, and finally by not allowing the oil to be oxidated [6]

2.4 Stages of Olive Production

Marie-Claire Anpurrti thought that the first use of the agricultural machine was for produced olive oil because of its properties[1]. Olive oil production consists of three

stages: crushing (milling), pressing and decantation as shown in Figure-2.2, these stages are the basic of all methods that was used until now. The production of olive oil was developing with time and many systems and ways were used. This chapter will cover the structure of olive and methods used to produce oil from ancient time to the current time and the advantage and disadvantage of each one.

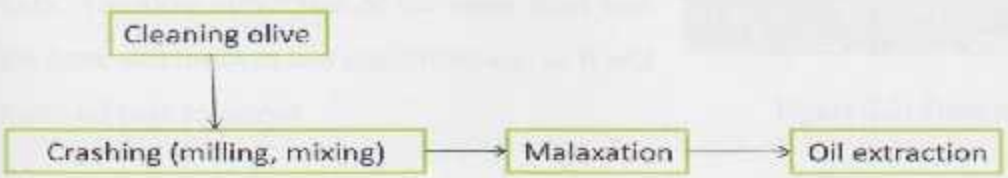


Figure-2.2: Stages of olive production

2.4.1 Milling

The first step in producing oil after washing and cleaning the fruit is crushing (milling). The objective of crushing olive is to break the cells of the fruits and prepare the paste to make the oil easy to extract. Olive paste preparation is the most important phase of the process whereby oil is mechanically extracted from the olives. The use of different machines in olive oil production has inevitable repercussions on the cost-effectiveness of the oil-making process, on the amounts of oil extracted and especially on the quality of the oil obtained[3]. There are many types of milling machine that was used in this process over the time such as: the stone mill, hammer mill and the disc mill.

- **Stone Mill:** is the oldest type of apparatus used to crush olives, there is often a tendency to think that the "old-fashioned" way is always better than modern methods. This is a common belief when it comes to the use of stone mills to crush olives during the olive oil extraction process. Stone mills use rollers or wheels, rolled

in circles on a slab of granite, to grind the olives into a paste. Mills are sold in different configurations, with two, three, or even four stones. The fact is that using stone mills to crush olives does not yield better results, just different ones. The slow movement of the stone don't heat the paste and result in less emulsification, so it will make oil easy to extract.

Figure-2.3: Stone mill

The disadvantages of this method is the slowness of operation, its inability to be continuous, the stone is expensive and difficult to clean, and the slow milling time can increase oxidization.

-Hammer Mill: this method use metal body with blades which rotate with high speed crushing the olives against and through a metal screen. The hammer mill crusher offers a continuous and clean method. The crushing is done quickly, resulting in less heat build-up and exposure to oxygen than with stone mills. The disadvantages of this method are: the paste may heat up and there is some wear and tear of the metal parts.

Figure-2.4: Hammer mill

-Disc Mill: A disk mill can produce paste that is more similar to a stone mill's in texture, but it is continuous, easy to clean and results in less oxidation. The olives are fed into the center of the grinder. An electric motor attached to a toothed

Figure-2.5: Disc mill

grinder pulverizes the olives as they are flung away from the center. It produce a paste that is less coarse and less emulsified than hammer mill.

Disc mills are relatively expensive to run and maintain and they consume much more power than other shredding machines, and are not used where ball mills or hammer mills produce the desired results at a lower cost.

- The selection for milling

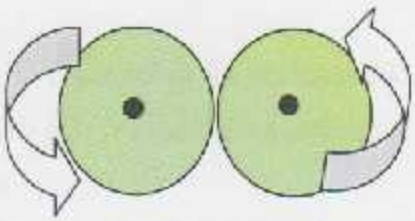


Figure-2.6: Milling method used

It was decided to make a new technique (not used for this purpose) in olive milling shown in figure-2.6, which are using two cylinders (gears) having a little contact and rotates opposite to each other (one of cylinders rotate CW and the another one rotate CCW); so can crash the olive with its content. The reason for choosing this method shown in table-2.2

Table-2.2: Milling method selection

	stone mill	Hammer mill	Disc mill	Contacts cylinders
Cold press	✓			✓
No oxidation		✓	✓	✓
High quality	✓			✓
Less Cost		✓		✓
Less Time		✓	✓	
Easy to clean			✓	✓

2.4.2 Malaxation

Malaxation (also mentioned as beating or kneading) is used for increasing extraction yields. It is designed to enhance the effect of crushing and to make the paste uniform. The prime aim is to break up the oil/water emulsion, so that the droplets of oil join together to form larger drops[4].

The oil to be extracted by mechanical means has to be released from the tissues in such a way that the droplets can merge into larger drops until they form what are known as "pockets."

Not all the oil in the olives can be released: some remains enclosed in the unshattered cells, some is spread through the colloidal system (micro gels) of the olive paste, and some is bound in an emulsion with the vegetable water.

The main difficulty in recovering this "bound" oil is that the droplets of dispersed or emulsified oil are surrounded by a lipoprotein membrane (phospholipids and proteins) which stabilizes the oil's emulsification or dispersion. The smaller the size of the droplets the greater their degree of stabilization, which means that they are prevented from fusing to form larger drops. When millstones are employed to crush the olives, the oil emulsion is optimally broken up after 10-15 minutes of mixing at room temperature. In mills where continuous centrifugation is employed, which are normally equipped with metal crushers, malaxation, either in 2 or 3 stages, takes 60 to 90 min. Raising the temperature makes the olive paste less viscous and it is easier to separate the liquid phases by centrifugation. It is well known that an increase of the duration and temperature of the malaxing followed by direct centrifugation of olive pastes, results in higher extraction yields, especially in the case of "difficult" olives.

Malaxing vats are made of stainless steel inside, and are semi-cylindrical or semispherical. They have upright or horizontal rotors and a heating system using hot water (45-50°C) running through an outer chamber. The rotating arms are fitted with specially designed stainless steel blades of varying shapes and sizes, which mix the

paste by slowly spinning at 15-20 rpm. To protect against any oxidation of the olive paste during the malaxing process, machines are also designed to work with an inert gas (nitrogen) under light pressure, if required. Sometimes, malaxing can make the paste emulsify more and may have a negative effect on oil yields. This happens when the movement of the blades is too fast and the temperature and times are not properly adjusted to the rheological characteristics of the paste being processed.

It was decided to use a part of meat grinder for malaxiation stage as shown in figure-2.7.

Figure-2.7: Malaxing method used

2.4.3 Oil Extraction Method

The next step is to separate the oil from the water and the paste. This can be done (or was historically done) in the many ways described below. Most systems fall into two main categories: presses and centrifugation. Nowadays, centrifuges are used almost exclusively, aside from old operations.

- **Traditional press:** This method has been used for thousands of years, such as when Greeks first began pressing olives over 5000 years ago. An olive press works by applying pressure to olive paste to separate the liquid oil and vegetation water from the solid material. The oil and vegetation water are then separated by standard decantation.

This basic method is still widely used today, and it's still a valid way of producing high quality Olive Oil if adequate precautions are taken. After grinding, the

Figure-2.8: Traditional press

olive paste is spread on fiber disks, which are stacked on top of each other, then placed into the press. Traditionally the disks were made of fibers from hemp or coconut, but today they are made of synthetic fibers for easier maintenance. These disks are then put on a hydraulic piston, forming a pile. Pressure is applied on the disks, thus compacting the solid phase of the olive paste and percolating the liquid phases (oil and vegetation water).

To facilitate separation of the liquid phases, water is run down the sides of the disks to increase the speed of percolation. The liquids are then separated either by a standard process of decantation or by the means of a faster vertical centrifuge. The traditional method is a valid form of producing high quality Olive Oil, if after each extraction the disks are properly cleaned from the remains of paste; if not, the leftover paste will begin to ferment and produce inconsistencies of flavors (called defects) that will contaminate the Olive Oil. A similar problem can affect the grindstones, so these also require cleaning after each usage to ensure perfect quality.

- **Selective Filtration (Sinolea Process):** The Sinolea method is a cold pressing milling system, which employs no pressure or added water and was first introduced in 1972. It consists of a stainless steel comb or set of blades that dip into the olive paste. At every dip the comb (or blades) is covered in a thin layer of oil, which then gets wiped off into a bowl. It's based on the different surface tension of the vegetation water (water that is naturally within the olive – not added) and the oil.

Figure-2.9: Selective filtration

The concept is borrowed from a very simple law of physics: liquids with different molecular cohesion have different surface tensions.

The advantages of the Sinolea Method are: it produces an oil of higher polyphenol content, it results in lower acidity levels in the oil, the Olive Oil paste is not subjected to any temperature increase and a higher olive oil quality.

Olive Oils extracted with the Sinolea Method tend to be more costly because of the time involved, the small quantity of high quality oil produced, and the larger amounts of olives required compared to the other methods.

-Three-Phase and Two-Phase Centrifugal Decanters: Historically, olive paste, or olive juice containing both water and oil was allowed to sit in containers until the oil, with a lower specific gravity, rose to the top naturally. The oil was then decanted away from the remaining water and solid material. This natural separation takes considerable time and the contact of oil with enzymes, breakdown products and fermenting fruit water produced defective oils.

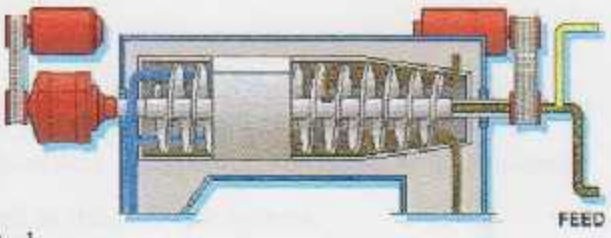


Figure-2.10: Centrifugal Decanters

Modern decanters are large horizontal centrifuges that separate the oil from the solids and water in the same process as in a decantation tank, just faster. The savings in time increases the efficiency of the system, but also decreases the time the oil is in contact with the fermenting fruit water.

The decanters spin at approximately 3.000 rpm. Centrifugal force moves the heavier solid materials to the outside; a lighter water layer is formed in the middle with the lightest oil layer on the inside. There is no exact line of separation between the three phases of solid, water, and oil so the solid phase usually has some water in it, the water has some oil in it and the oil contains some water. In the latter case, which extracts the maximum quantity of oil, an additional vertical centrifugation is used to remove more of the vegetation water from the oil.

- **3-Phase system:** Decanters separate the paste into a relatively dry solid, fruit-water, and oil. Water is added to this system to get it to flow through the decanter. A minimum quantity of water is added to separate the solid material better and to retain water-soluble polyphenols as much as possible.

The system should be run at approximately 65 to 70% of maximum capacity to get good separation of phases. Samples should be taken every hour and analyzed daily to determine the status of the separation. Preferably, the solid should have an oil content of no more than 6-7% and 50% moisture while the vegetation water should not contain over 0.3% oil and-8% solids.

- **2-Phase system:** Decanters were introduced in the early 1990's. They function under the same principle as 3-Phase decanters except that the solid and fruit-water exit together. No water needs to be added to the 2-Phase system.

Experience with the two olive oil extraction processes shows that the 2-Phase system has some advantages, i.e., better retention of polyphenols because no water is added and less loss of oil if the system is operated properly.

One problem with the 2-Phase system is a greater potential to lose oil when the olives are low in moisture because there is a thinner interface between the two phases during centrifugation. Another difficulty is less visual evidence of what is happening with waste characteristics because the solid and vegetation water phases are mixed.

Water can be added to the paste just prior to entering the 2-Phase decanter if the moisture content of the olives falls below 42%. Talc (a water absorbing neutral compound) can beaded to the paste early in the season, if the olives have an excessive moisture content, to help extract a greater quantity of oil with no negative effect on quality.

The 2-phase system produces the greatest weight of solid waste because it has the highest moisture content. It also produces the least amount of wastewater with the lowest Biological Oxygen Demand (BOD). The polyphenol content of the oil is lowest in the 3-phase system because of the addition of water.

When very clean oil (containing no water) is obtained from a 2-Phase system, it means that there is a loss of oil to the waste solids because of the limited separation area within the decanter. The solution is to extract oil with some water in it and immediately run it through a vertical centrifuge to clean the oil further.

2.4.4 The selection for oil extraction method

It was decided to use traditional press according to table-2.3, also we will use power screw rather than hydraulic press because the cost of power screw less than hydraulic.

Table-2.3: Oil extraction method selection

	Traditional press	Selective Filtration	Centrifugal Decanters
Cold press	✓	✓	
Good yielding	✓		✓
High quality	✓	✓	
Less Cost	✓		
Less Time			✓

For sorting the oil from the water it was decided to perform it by gravity (using Separator funnel) as shown in figure-2.11

Figure-2.11: Separator funnel

The selection methods for olive oil production that was used in this project are summarized in figure-2.12.

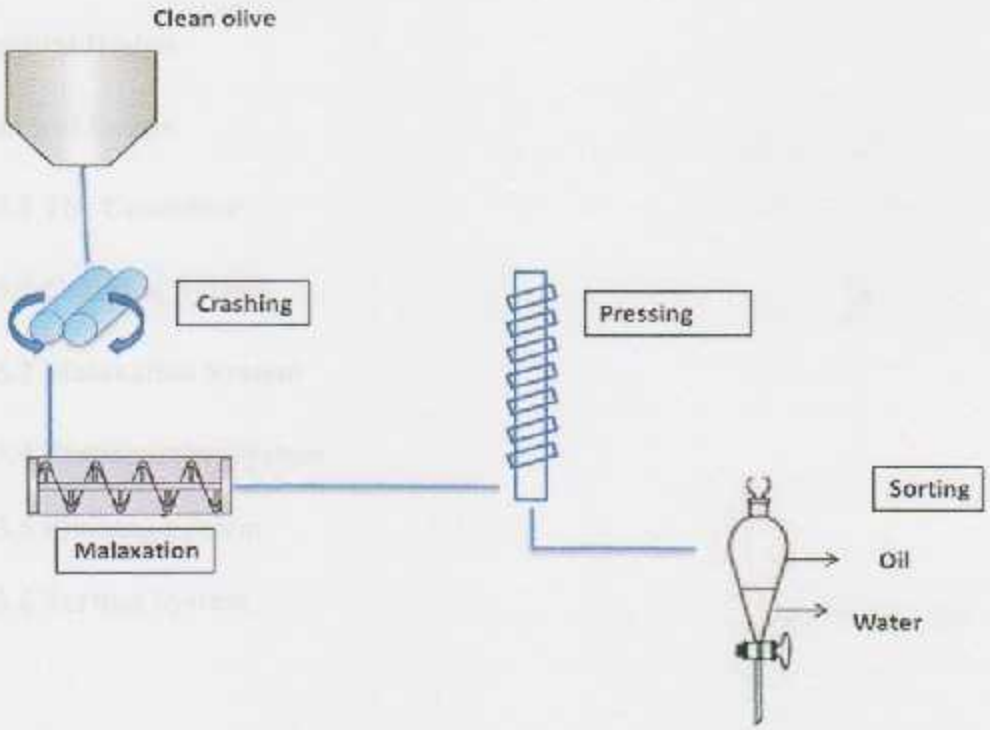


Figure-2.12: Selection for olive production process

Chapter 3

Mechanical Design

3.1 Introduction

The production of olive oil passes through three stages (Crashing, Malaxation, Oil extraction), oil extraction stage in our design divide in two stages (Pressing and Liquid sorting) and have an assistant system to transport the pressing cylinder from malaxation stage to pressing stage, so the machine is divided into five parts and components in which they are connected to each other to cover all stages needed. These parts have different types and shapes with different properties. The design must compromise between these properties to achieve the required shape and performance without affecting safety.

Since the olive press is for household use, a set of parameters must be considered in order to obtain a good and simple design. These parameters are related to the machine itself such as: safety, portability, cost, design simplicity, workspace availability, volume occupied by the device, easy to move. On the other hand, the design must be able to produce a high quality olive oil related to the international standard.

3.2 Conceptual Design

It is desired to produce a small olive oil press which is fully automated and controlled. The process starts when the user puts the clean olives in its place and press start button, the olives will be crushed and the paste will be prepared, then the process will be sequentially continue to the next stage in which the paste is mixed for a specific time, then it will be transferred to the screw which applying pressure to olive paste to separate the liquid oil and vegetation water from the solid material. The last stage is the separation of oil from the water and this will done by gravity in a Separator funnel with assist of heat until the temperature of liquid reaches 28C then after a time the oil will be separated.

The machine divided into subsystems, these are:

1. Crushing system.
2. Malaxation System.
3. Transporting System.
4. Pressing system.
5. Sorting system.

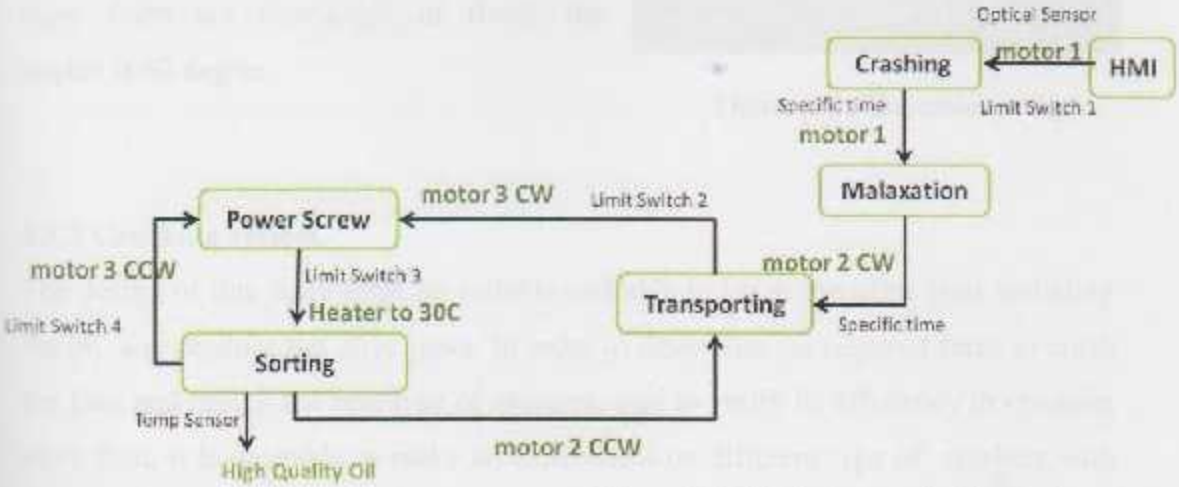


Figure-3.1: Block diagram for the whole system

3.3 Mechanical Design

In this section each block will be explained in details, the used material for all parts in this project is stainless steel (304L) suitable for food uses.

3.3.1 The container

The first step in the hole operation start in the container which designed to hold (5 kg) of olive.

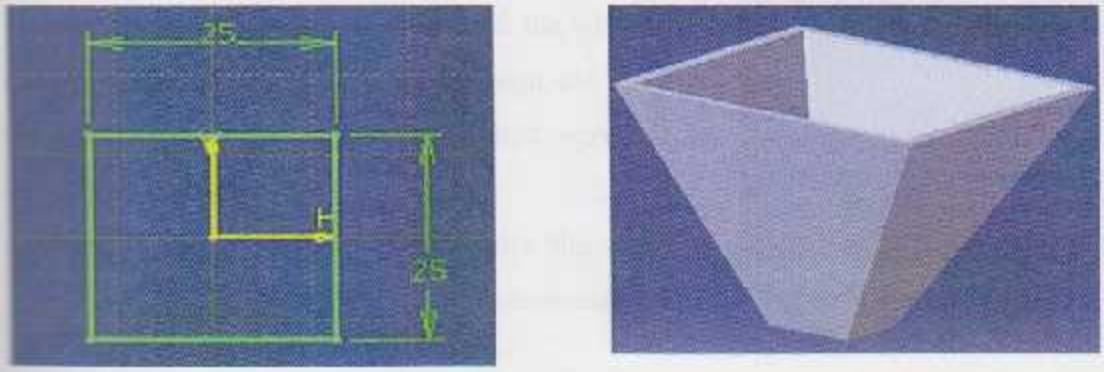


Figure-3.2: Olive container in the right side, and its dimensions in the left.

The chosen angle is 67.2 in order to satesfay the needed volume for 5 Kg olive.
The angle of the containar is chosen by an experimant on a plate of stainless steel (304L), to calculat the anglue at which the olive fruits are flow(angle of flow), the anglue is 60 degree.

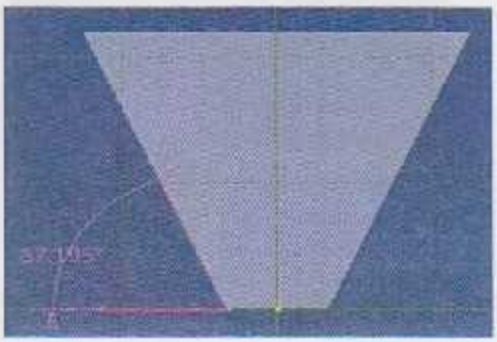


Figure-3.3: The container angle

3.3.2 Crushing system.

The design of this stage must be suitable and able to break the olive fruit including the pit, and produce the olive paste. In order to determine the required force to crash the fruit and design the best type of crashers, also to verify its efficiency in crushing olive fruit, it is desirable to make an experiment on different type of crashers with different forces.

The first experiment was on meat machine with started value of force 100 N, the hole fruit crashed, but the pit broken just in to 4 pieces.

The second experiment was on a machine which making just a split in the fruit in order to be pickling, which was consist of two cylinder rotated opposite to each other with a little distance between them the force of this machine was 200 N.

The selected force for this stage to crash the whole fruit including the pit was 400N. The design chosen was two contacted cylinders (gears) rotated opposite to each other as shown in the figure-3.4.
The length of the toothed cylinders also the crushing part equal 10 cm, which allowed approximately 6 of olive fruit to crash each time.

Figure-3.4: Crushing cylinders

Figure-3.5: Crushing (rotating cylinders) container in the right side,

and its dimensions in the left.

The crushing operation start when the start switch is pressed and the optical sensor give a signal to the controller that there is an olive in the container.

In order to select the suitable motor to drive the system with suitable gear box some calculation was made:

The required force to crash the olive including the pit equal 400N

F= 400N, N=280rev/min, W=29.32rad/sec

T=F*R

=400*2.3*10^-2 =9.2 N.m

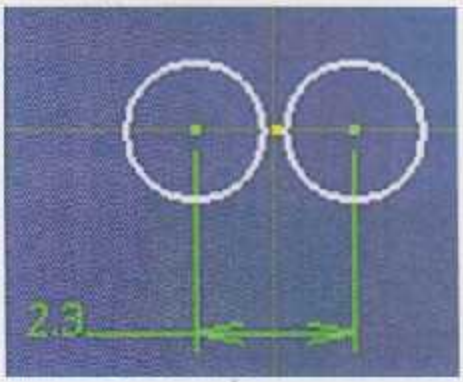


Figure-3.6: Distance between the center of cylinders

P=T*W

=9.2*29.32=269.74WATT

=269.744/746=0.361hp

T: Torque (N.m)

F:force (N)

R:force arm (m)

P:Power (W)

W:rotational speed(rad/sec)

The chosen safety factor equal 1.6, so the used force equal 640N

F= 640N, N=280rev/min, W=29.32rad/sec

T=F*R

=640*2.3*10^-2 =14.72N.m

P=T*W

=14.72*29.32=431.6 WATT

=269.744/746=0.58 hp

Eff(%)=Pout/Pin

=0.33/0.58=57%

The chosen gear box (worm gear) has a reduction ratio equal to (1:10)has these specification:

NMRV050 Speed Reducer
Model Size:NMRV50
Speed Ratio: 1/10
Aluminium housing
Color: Blue

T before=T after *(1/10)

=9.2/10=0.92 N.M

W before= W after /(1/10)

= 29.32*10=293.2 rad/sec=2801.273 rpm

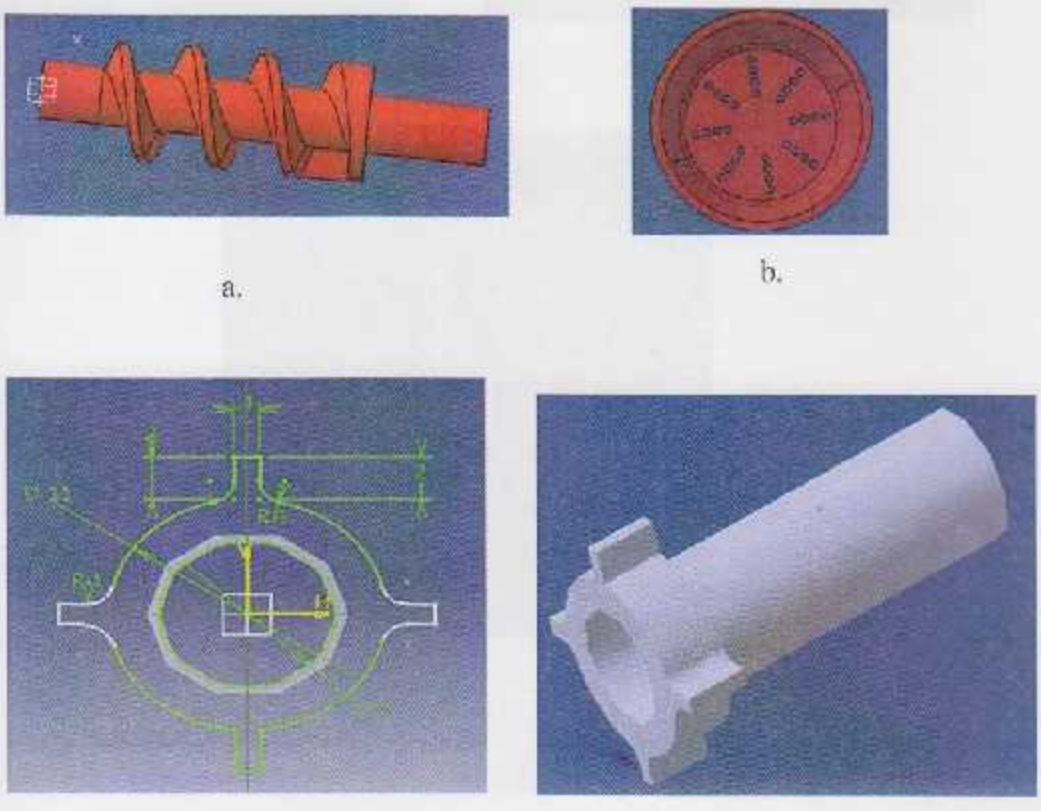
The motor with this char. Has been chosen which fit the calculation of the crashing method.

TYPE	RATED OUTPUT		Full Load				Locked rotor current(A)	Tst /TN	Tmax /TN
	kW	Hp	Speed (r/min)	Current (A)	Eff (%)	Power Factor			
YC712-2	0.25	1/3	2800	2.9	64	0.74	15	3	1.8

3.3.3 Malaxation System

Ordinary meat grinder used to mix the paste of olive in order to join the cells of olive to extract more quantity of oil.

Olive fruits inter the malexer as crushed olive and leave as a paste, the paste will dropped through small holes, which is 5 mm diameter shown in figure-3.6 (b), at the end of the crusher .



a. b.

c. d.

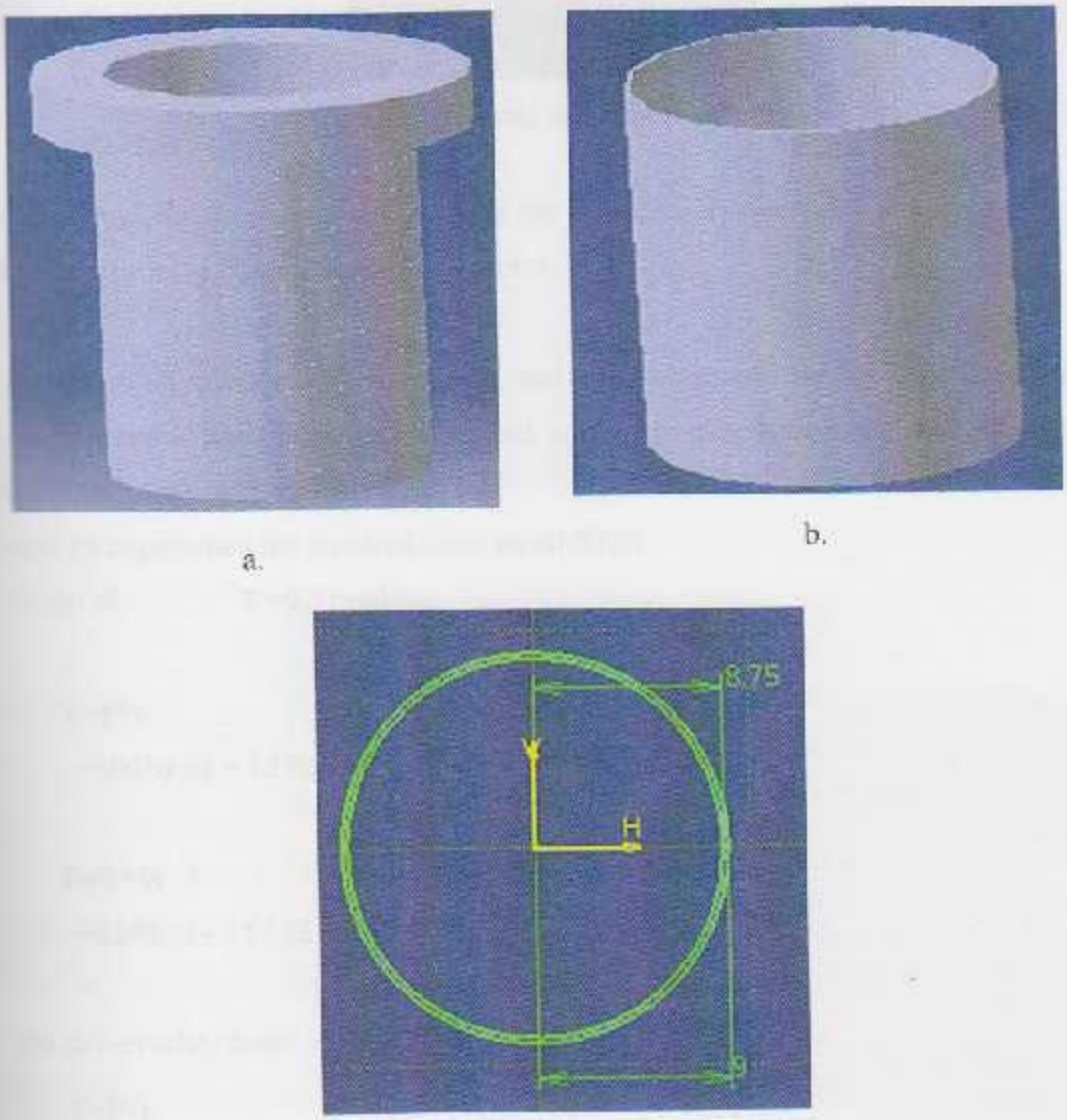
Figure-3.7: Malaxition components

a.malaxation part

3.3.4 Transporting System

to transport the cylinder shown in figure-3.7 from the malaxation system to the pressing system. This done by using a power screw driven by a motor

The inner cylinder figure-3.7 (a) has holes to let the liquid(oil and water) leave to cylinder in figure-3.7 (b) after pressing and the solid remain in the holed cylinders.



a. b. c.

Figure-3.8: transporting cylinder

a. inner cylinder, b. outer cylinder, c. cylinder dimensions

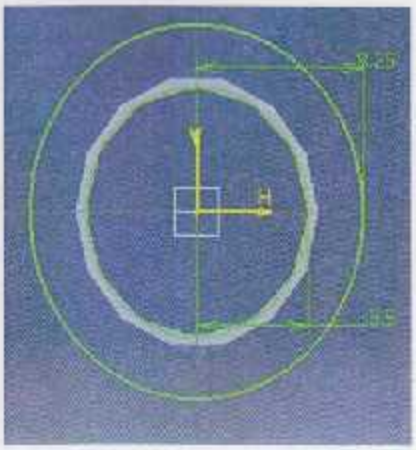


Figure-3.9: Pressing part dimension

Calculation for force required to move the cylinders in figure-3.7 along the power screw in order to choose the suitable motor.

The length of power screw equal 60cm, and the pitch equal 1 cm, by experiments the power screw rotate 60 rev per 40 second, so the speed is 90 rev/min, and rotational speed (w) equal 9.51 rad/sec.

Also by experiment the required force equal 300N.

F=300 N, W=9.51 rad/sec

T=F*r

=300*0.04 = 12 N.m

P=T*W

=12*9.51= 114.12 Watt

The chosen safety factor equal 1.67, so the used force equal 500N

T=F*r

=500*0.04 = 20 N.m

P=T*W

=20*9.51= 190.2 Watt

The chosen motor has these characteristics

V=24V, I=2 A

P=IV

=2*24= 48 Watt

T: Torque (N.m)

F:force (N)

R:force arm (the radius of the gear) (m)

P:Power (W)

W:rotational speed(rad/sec)

3.3.5 Pressing system.

In this stage the olive paste will be pressed by applying a force using power screw mechanism which will be derived by a motor like figure-3.8. The system consists of a power screw and stainless steel (304L) container.

When the container figure-3.7 (a) is filled with paste the motor will start to rotate the screw and move the load toward the paste to apply a pressure on it. the pressing operation is done through two stages each stage takes a time of ten minutes, this will be controlled by the controller.

The power screw which is chosen is a single threaded square power screw(M16) with a diameter of 16mm, and pitch diameter of 2mm.

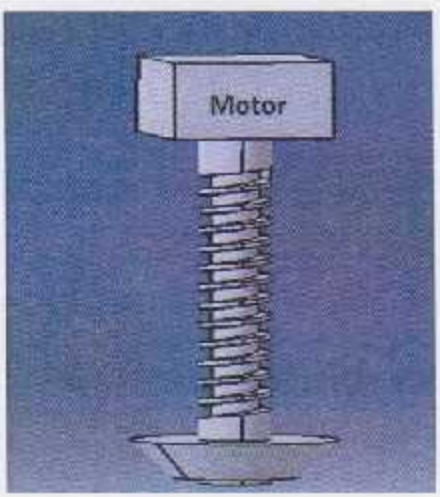


Figure-3.10: Power Screw

By experiment the required force to crash the olive

including the pit equal 3KN.

F=3 KN , N=17rev/min, W=1.8 rad/sec

T=F*R

=3*10^3*3.5*10^-2 =105 N.m

P=T*W

=105*1.8=189 WATT

=189/746=0.25 hp

T: Torque (N.m)

F:force (N)

R:force arm (the worm gear radius) (m)

P:Power (W)

W:rotational speed(rad/sec)

The chosen safety factor was equal 1.7, so the used force equal 4KN

F=5 KN, N=17rev/min, W=1.8 rad/sec

T=F*R

=5*10^3*3.5*10^-2 =175 N.m

P=T*W

=175*1.8=315 WATT

=315/746=0.42 hp

Pressure =F/A

$= \frac{F}{\pi R^2}$

$$\frac{5000}{\pi*0.035^2}$$

=1250000 PASCAl =12.5 Patm

The chosen gear box (worm gear) has a reduction ratio equal to (1:80)has these specification:

NMRV050 Worm Motor Reducer
Model Size: NMRV 50
Speed Ratio: 1/80,
Aluminum housing
Color: Blue

T before=T after *(1/80)

=175/80 =2.18 N.M

W before= W after /(1/80)

= 1.8*80=144 rad/sec=1376 rpm

The motor with this char. Has been chosen which fit the calculation of the pressing method.

TYPE	RATED OUTPUT		Full Load				Locked rotor current(A)	Tst/ TN	Tmax/ TN
	kW	Hp	Speed (r/min)	Current (A)	Eff (%)	Power Factor			
YC712-4	0.18	1/4	1400	2.49	53	0.62	12	2.8	1.8

Power screw analysis:

A single threaded power screw having a mean diameter dm ,a pitch p,a lead angle λ.

l=n*p

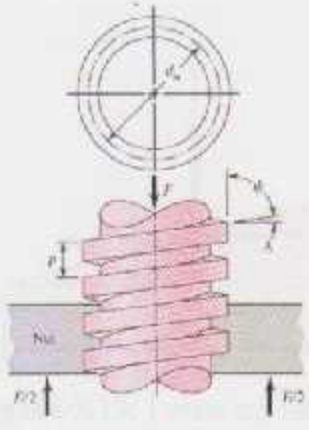


Figure-3.11: Portion of a power screw.

=1*0.002

=0.002 m

n:type threaded power screw

p:pitch (m)

$$Fx = PR - N\sin\lambda - fN\cos\lambda = 0$$

$$Fy = -F - fN\sin\lambda + N\cos\lambda = 0$$

$\tan\lambda = l/(\pi * dm)$

But dm=0.02 m so λ=2

$$\sum FX = PR - N\sin\lambda - fN\cos\lambda = 0$$

$$N = \frac{PR}{\sin\lambda + f\cos\lambda}$$

$$= \frac{744.7}{0.034+0.15*0.966} = 4160\ N$$

N* f= 624 N

For rising the load, the force PR acts on the screw

$PR = F(\sin\lambda + f\cos\lambda)/(\cos\lambda - f\sin\lambda)$

=4000(0.034+0.15*0.966)/(0.966-0.15*0.034)

=744.7 N

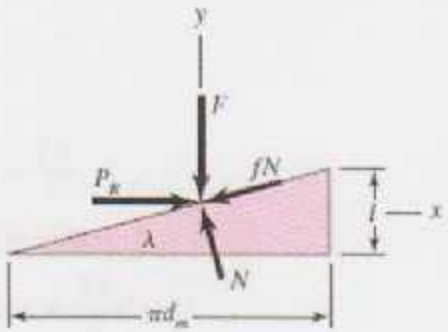


Figure-3.12: Lifting the load

For lowering the load, the force PL acts on the screw

$PL = F(-\sin\lambda + f\cos\lambda)/(\cos\lambda + f\sin\lambda)$

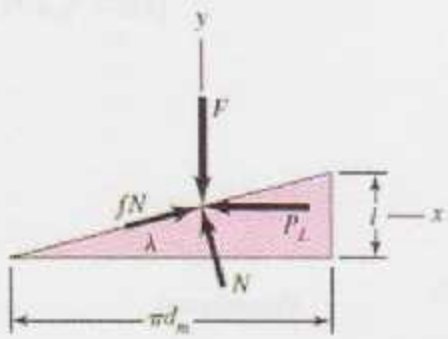


Figure-3.13: Lowering the load

=4000(-0.034+0.15*0.966)/(0.966+0.15*0.034)

–456.8 N

The maximum nominal shear stress t'

t'=16* T/(π*dr^3)

=16*220/(π*0.019^3) –58971.1 Pascal

The axial stress б in the body of the screw due to force F:

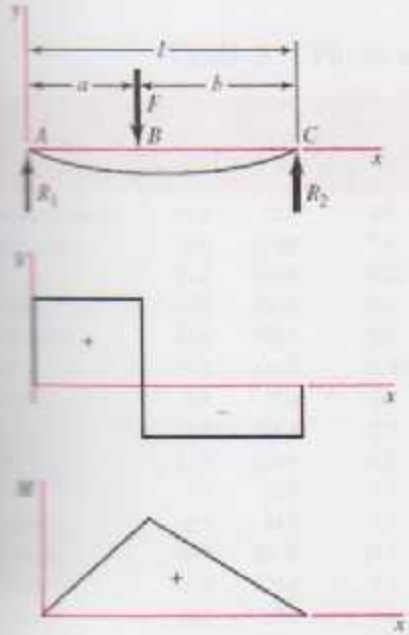
б=F/A

=4*F/(π*dr^2)

=4*4000/(π*0.019^2) =14.11 MPa

SF=276/14.11=19.5

Shear ,moment and deflection of the beam



$$R_1 = \frac{Fb}{l} \qquad R_2 = \frac{Fa}{l}$$

$$V_{AB} = R_1 \qquad V_{BC} = -R_2$$

$$M_{AB} = \frac{Fbx}{l} \qquad M_{BC} = \frac{Fa}{l}(l - x)$$

$$y_{AB} = \frac{Fbx}{6EIl}(x^2 + b^2 - l^2)$$

$$y_{BC} = \frac{Fa(l - x)}{6EIl}(x^2 + a^2 - 2lx)$$

(continued)

Figure-3.14: Shear, Moment, and Deflection of Beams

a = 0.05 m , b=0.55m , L=0.6m

$R_1=F*b/l$

$-4000*0.55/0.60=3666.7$ N

$R_2=F*a/l$

$-4000*0.05/0.60=333.3$ N

$V_{AB}=R_1 \quad V_{BC}=-R_2$

$M_{AB}=F*b*x/l$

$M_{BC}=F*a*(l-x)/l$

When x=0→ $M_{AB}=0$ N.m, and when x=a → $M_{AB}=183.3$ N.m

When x=a → $M_{BC}=183.3$N.m , and when x=l → $M_{BC}=0$ N.m

$y_{AB}=-3.5$, $y_{BC}=-1.8$

304L stainless steel has this characteristics:

$S_y=276$ MPa. $S_u=568$ MPa and other characteristic shown in table3-2.

Table-3.1: Physical Constants of Materials

Material	Modulus of Elasticity E		Modulus of Rigidity G		Poisson's Ratio ν	Unit Weight w		
	Mpsi	GPa	Mpsi	GPa		lbf/in³	lbf/ft³	kN/m³
Aluminum (all alloys)	10.4	71.7	3.9	26.9	0.333	0.098	169	26.6
Beryllium copper	18.0	124.0	7.0	48.3	0.285	0.297	513	80.6
Brass	15.4	106.0	5.82	40.1	0.324	0.309	534	83.8
Carbon steel	30.0	207.0	11.5	79.3	0.292	0.282	487	76.5
Cast iron (gray)	14.5	100.0	6.0	41.4	0.211	0.260	450	70.6
Copper	17.2	119.0	6.49	44.7	0.326	0.322	556	87.3
Douglas fir	1.6	11.0	0.6	4.1	0.33	0.016	28	4.3
Glass	6.7	46.2	2.7	18.6	0.245	0.094	162	25.4
Inconel	31.0	214.0	11.0	75.8	0.290	0.307	530	83.3
Lead	5.3	36.5	1.9	13.1	0.425	0.411	710	111.5
Magnesium	6.5	44.8	2.4	16.5	0.350	0.065	112	17.6
Molybdenum	48.0	331.0	17.0	117.0	0.307	0.368	636	100.0
Monel metal	26.0	179.0	9.5	65.5	0.320	0.319	551	86.6
Nickel silver	18.5	127.0	7.0	48.3	0.322	0.316	546	85.8
Nickel steel	30.0	207.0	11.5	79.3	0.291	0.280	484	76.0
Phosphor bronze	16.1	111.0	6.0	41.4	0.349	0.295	510	80.1
Stainless steel (18-8)	27.6	190.0	10.6	73.1	0.305	0.280	484	76.0
Titanium alloys	16.5	114.0	6.2	42.4	0.340	0.160	276	43.4

Table-3.2: Results of Tensile Tests of Some Metals 7th raw for stainless steel 3304I.

Number	Material	Condition	Strength (Tensile) Yield S_y, MPa (kpsi)	Ultimate S_u, MPa (kpsi)	Fracture, σ_f, MPa (kpsi)	Coefficient σ_0, MPa (kpsi)	Strain Strength, Exponent m	Fracture Strain ϵ_f
[illegible]	Steel	Annealed	220 (32.0)	341 (49.5)	628 (91.1)†	620 (90.0)	0.25	1.05
[illegible]	Steel	Annealed	358 (52.0)	646 (93.7)	898 (130)†	992 (144)	0.14	0.49
[illegible]	Steel	HR	193 (28.0)	424 (61.5)	729 (106)†	758 (110)	0.24	0.85
[illegible]	Steel	Q&T 600°F	1520 (220)	1580 (230)	2380 (345)	1880 (273)†	0.041	0.81
[illegible]	Steel	Q&T 600°F	1720 (250)	1930 (210)	2340 (340)	1760 (255)†	0.048	0.43
303	Stainless steel	Annealed	241 (35.0)	601 (87.3)	1520 (221)†	1410 (205)	0.51	1.16
304	Stainless steel	Annealed	276 (40.0)	568 (82.4)	1600 (233)†	1270 (185)	0.45	1.67
2011	Aluminum alloy	T6	169 (24.5)	324 (47.0)	325 (47.2)†	620 (90)	0.28	0.10
2024	Aluminum alloy	T4	296 (43.0)	446 (64.8)	533 (77.3)†	689 (100)	0.15	0.18
7075	Aluminum alloy	T6	542 (78.6)	593 (86.0)	706 (102)†	882 (128)	0.13	0.18

3.3.6 Sorting system.

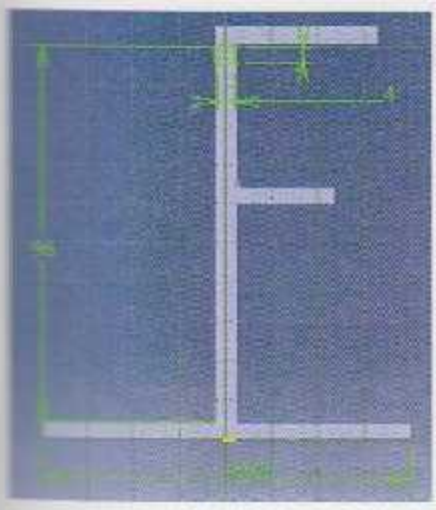
After pressing is finished the producing liquid (a mixture of oil and water) will be collected automatically in a heating system figure-3.14 in order to increase the speed of the separation process. Temperature will weakens the bonds between oil and water, also it will decrease the density of oil so it can easily separated due to gravity .

Figure-3.15 Separator funnel

The temperature will be increased until it reaches (30C)then the heating operation will stop, and the liquid will be separated after a specific time(30min by experiment) into two components: oil in the top of the heater and water in the bottom. Finally, the oil can be stored manually by the user. The heater contains a faucet in the bottom which can be opened manually, after the separation process is finished a lamp will turn on this gives the user a massage to open the faucet and stored the olive.

In order to get a good result a separator funnel is used, which is has a special shape suitable for separation process.

Overview for the press



a.

b.

Figure-3.16: Automated olive press

a. The base, b. Dimensions of the base, c. The press

Chapter 4

Control System

4.1 Introduction

4.2 PLC Characteristic

4.3 PLC State Graph

4.1 Introduction

As it has been mentioned before the olive press machine is fully automated and the process is performed sequentially, this can be performed by using PLC (programmable logic controller). This made adding automation capability and safety precautions possible, which is explained through this chapter.

The PLC is chosen to be used on the machine rather than the microcontroller, because of its ability to operate with the voltage used at home (220v) without the need of other component, where the microcontroller can operate only with 5v and needs other component which has a high cost. A comparison between PLC and microcontroller is made in the table-4.1.

Table 4.1: PLC VS Microcontroller

	PLC	Microcontroller
Less initial Cost		✓
Ease in Programming	✓	
Work at 220 V	✓	
Build in modules	✓	
Faster response		✓
Less total cost	✓	

4.2 PLC Characteristic

Programmable logic Controller (PLC) is a digital computer used for automation of electromechanical process, such as control of machinery on factory assembly lines. PLCs are used in many industries and machines. Unlike general-purpose computers, the PLC is designed for multiple inputs and output arrangements, extended temperature ranges, immunity to electrical noise, and resistance to vibration and

impact. Programs to control machine operation are typically stored in battery-backed-up or non-volatile memory. A PLC is an example of a hard real time system since output results must be produced in response to input conditions within a limited time, otherwise unintended operation will result. In our controlling design it is desirable to use a PLC with 13 input and 6 output as mention in the table-4.2 below. It must be compatible to use with 220 volt.

Table 4.2: Logic allocation

Inputs	Symbol	Logic Allocation	Address
Container sensor(NO)	S_m	S_m=1, there is olive	I0.1
Selection switch	S_s	S_s=1, for automatic mode S_s=0, for manual mode	I0.0
Pressing stop NC push button	S_0	S_0=0, the motor stop	I0.2
Emergency switch	EM	Turn off all process	I1.4
Limit swich1	LM1	LM1=0, when the cylinder is in position1	I0.3
Limit swich2	LM2	LM2=0, when the cylinder is in position2	I0.4
Limit switch3	LM3	LM3=0, when the power screw in last position	I0.5
Limit switch4	LM4	LM4=0, when the power screw in first position	I0.6
Temperature sensor	BT	BT=1, the heat = 30°	I1.3
Push button motor1	Sm1	Sm1=1, Motor1 ON manual	I0.7
Push button motor2	Sm2	Sm2=1, Motor2 ON manual	I1.0
Push button motor3	Sm3	Sm3=1, Motor3 ON manual	I1.1
Selection Switch	Sreverse	Sreverse=1, CCW for motor manual	I1.2

Output	Symbol	Logic Allocation	Address
Motor2 CW	K2	K2=1, Motor2 rotate CW	Q0.2
Motor2 CCW	K3	K3=1, Motor2 rotate CCW	Q0.3
Motor 1	K1	K1=1, Motor1 rotate	Q0.1
Motor 3 CW	K4	K4=1, Motor3 rotate CW	Q0.4
Motor3 CCW	K5	K5=1, Motor3 rotate CCW	Q0.5
Heater	K6	K6=1, Heater on	Q0.6

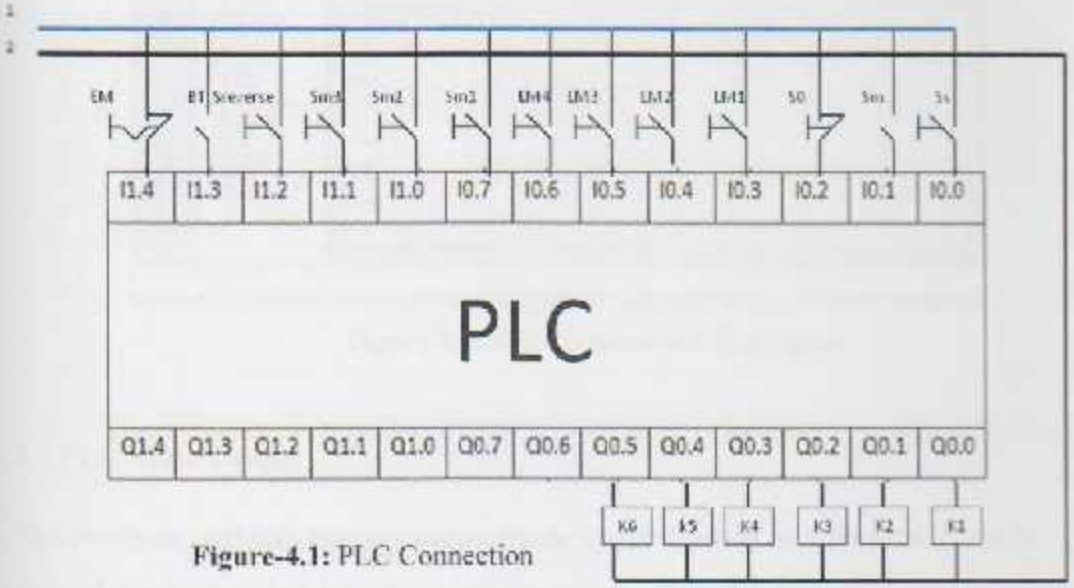


Figure-4.1: PLC Connection

The used PLC is Siemens S7_200 own in as shown in figure-4.2. with 13 input and 7 output the data sheet of it is in the appendix.

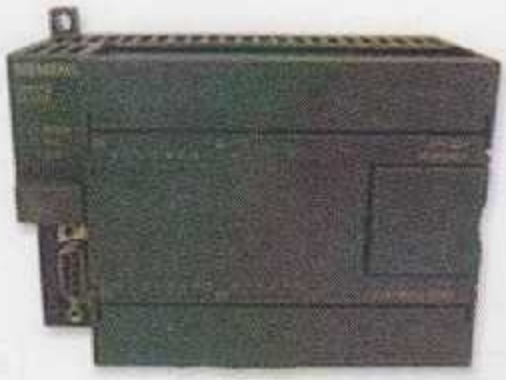


Figure 4.2: PLC S7200

The Software for s7-200 is the program STEP7 micro/win32 as shown in figure-4.3

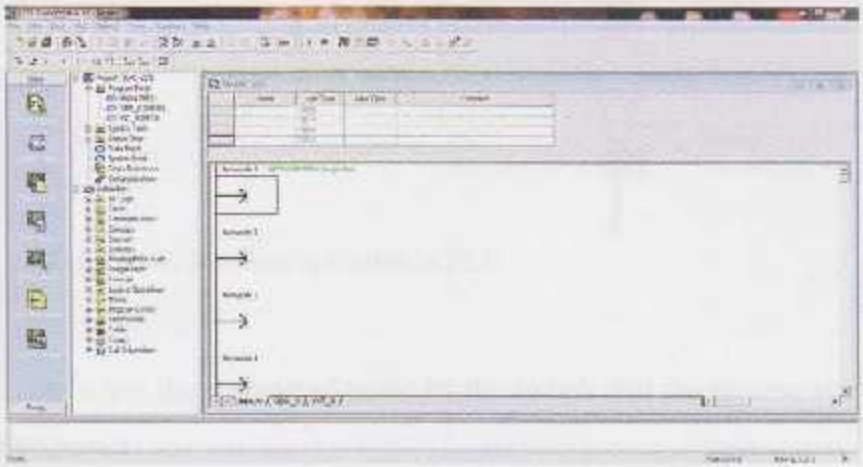


Figure 4.3: STEP7-micro/win 32 program

4.3 PLC State Graph

The machine will has two operation mode manual mode and automatic mode. The manual mode is added for increasing the safety of the machine with the addition of the emergency switch and to allow the user to clean the machine. The selection between two modes can be made by using the switch Ss, the transformation between the two modes can be implemented at any stage if an errors are happened. The machine stages and operation is shown in the figure-4.4 and the state graph shown in figure-4.5.

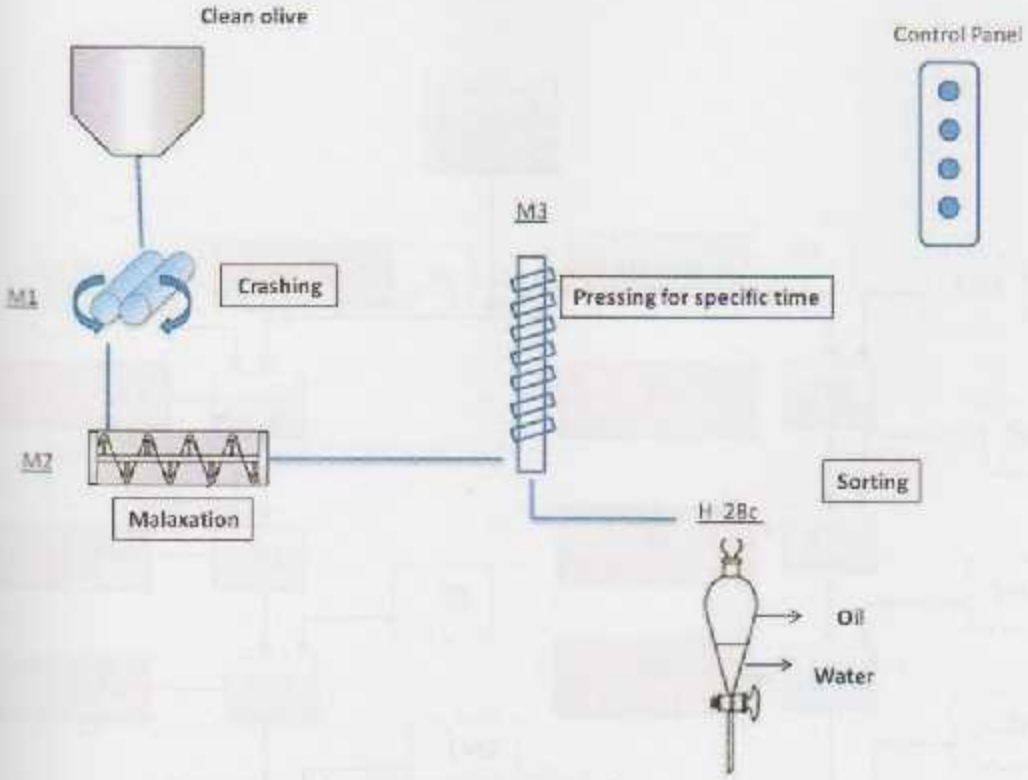


Figure 4.4: Machine operation in PLC

When the user select the automated mode by the switch (Ss) the process start in the following sequence:

1.Containar sensor(Sm), check if there is an olive in the container or not. Sm=1 when there is olive in the container.

2. Motor1(M1) starts if LM1&Sm give a signal .

3. When Sm off, M1 work to 10 sec to ensure that all olive are crashed, then M1 turn off.

3. Motor 2 (M2) starts in the forward direction until LM2=1.

4. Motor3 move the power screw to press the olive (K1) until LM3=1.

5. Motor3 move in reverse direction until LM4=1.

6. Motor2 start again in the reverse direction until LM1=1.

7. The heater turns on until the temperature sensor (H) achieved 30 C(BT=1).

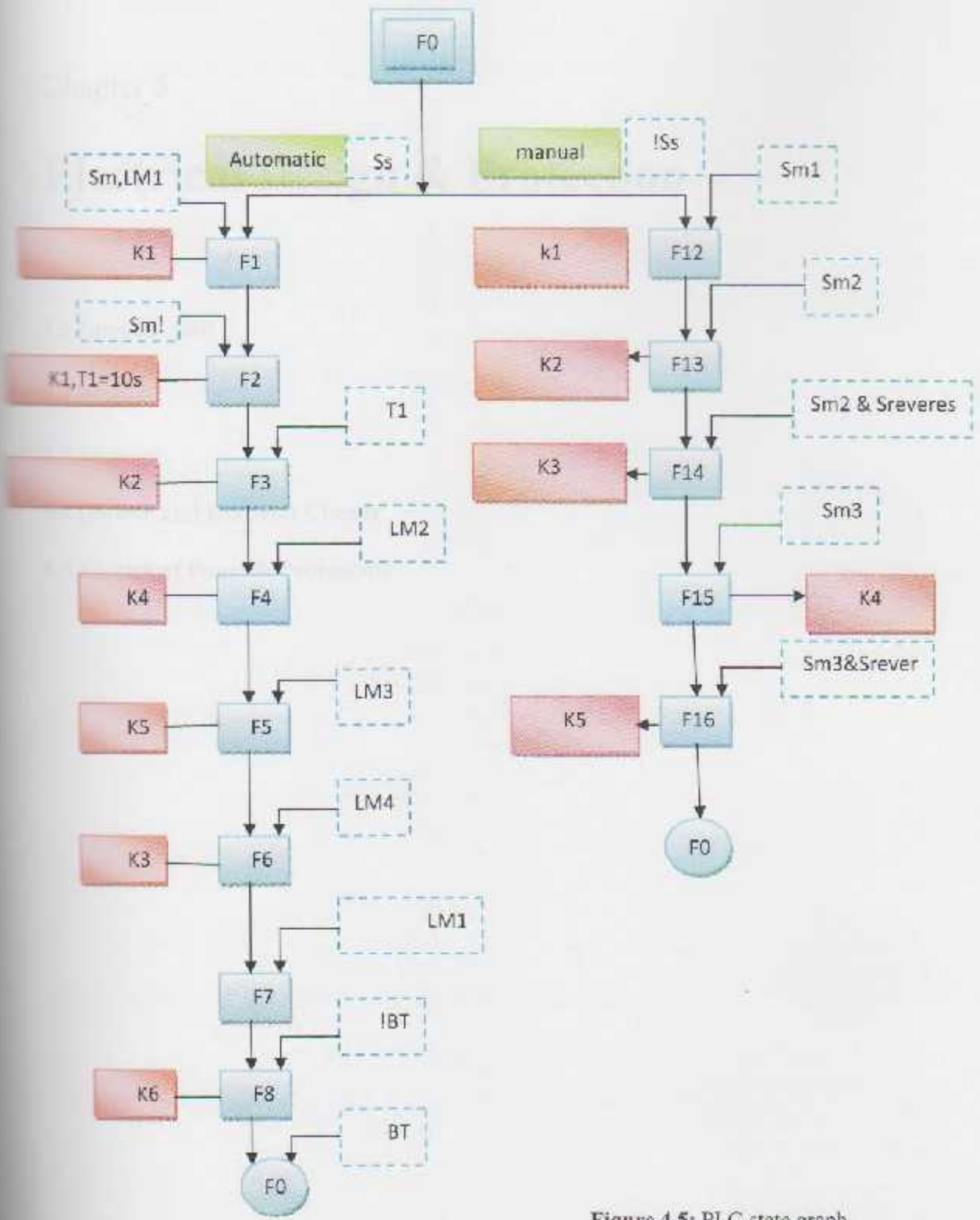


Figure 4.5: PLC state graph

Chapter 5

Electrical Design & Protection

5.1 Introduction

5.2 Motors

5.3 Sensors

5.4 (Power and Control) Circuit

5.5 Electrical Panel & Protection

5.1 Introduction

This chapter contain the electrical component specifications (motors, sensors, transformer overload… etc) , power & control circuit, and protection.

5.2 Motors:

In this project there are three motors, 2 AC motor (crashing motor, pressing motor), and one DC (transporting motor).

5.2.1 Crashing motor

Single phase Ac motor (220V 50Hz)/ IDEAL electric machine Co

TYPE	RATED OUTPUT		Full Load				Locked rotor current(A)	Tst /TN	Tmax /TN
	kW	Hp	Speed (r/min)	Current (A)	Eff (%)	Power Factor			
YC712-2	0.25	1/3	2800	2.9	64	0.74	15	3	1.8

5.2.2 Pressing motor

Single phase Ac motor (220V 50Hz)/ IDEAL electric machine Co

TYPE	RATED OUTPUT		Full Load				Locked rotor current(A)	Tst/ TN	Tmax/ TN
	kW	Hp	Speed (r/min)	Current (A)	Eff (%)	Power Factor			
YC712-4	0.18	1/4	1400	2.49	53	0.62	12	2.8	1.8

5.2.3 Transporting motor

Dc motor, 24V, unloading current =1.5 A

5.3 Sensors

5.3.1 Optical Sensor

Used to detect if there is olive in the container or not, the displacement between the range for the sensor (22 cm) Figure-5.1

Figure 5.1: Optical Sensor

Table 5.1: Sensor Specifications

Housing size	M18*1*30
Power supply	10...30VDC
Mode	Diffuse reflection
SN [mm]	10cm 40cm
Light source	Infrared LED (880nm)
Output	NPN/PNPNO/NC/NO+NC
Response time	Max.8.2ms
Hysteresis [%/Sr]	3...20%
Repeat accuracy	≤5%
Load current [mA]	≤200mA
Residual voltage	≤2.5V
Consumption current [mA]	≤25mA
Protection circuit	Surge, reverse polarityand short-circuit
Indicator	Yellow LED
Ambient temp.[°C]	-15...55°C
Ambient RH	35...95%
Protection degree	IP67
Housing material	Nickel-copper Alloy
Connection	PVC Cable 2m

5.3.2 Limit Switch

limit switch is a switch operated by the motion of a machine part or presence of an object. They are used for control of a machine, as safety interlocks, or to count objects passing a point.

In this project there is 4 limit switches, 2 in the transporting stage, and 2 in the pressing stage.

Figure 5.2: Limit Switch

5.4 Power & Control circuits

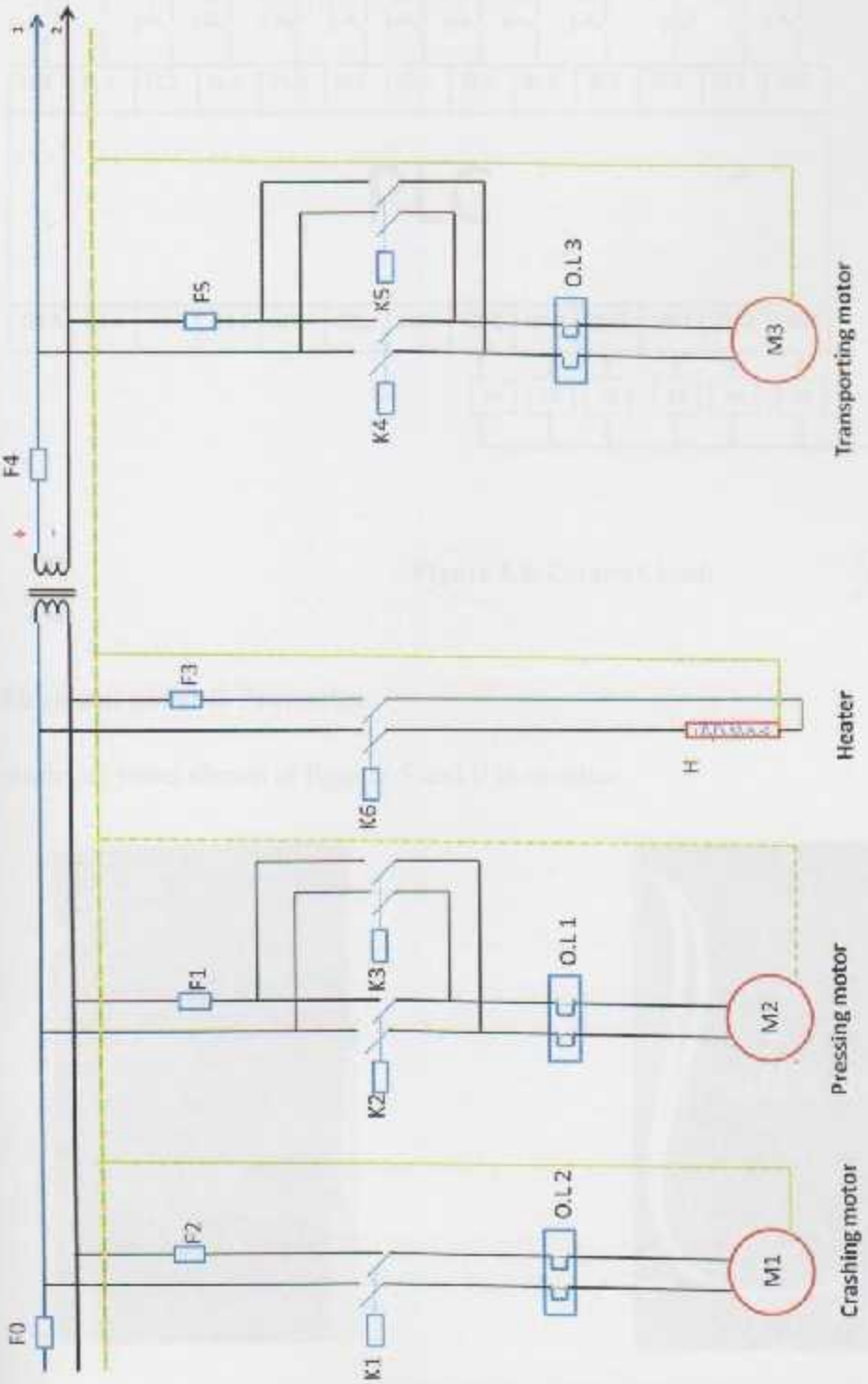


Figure 5.3: Power Circuit

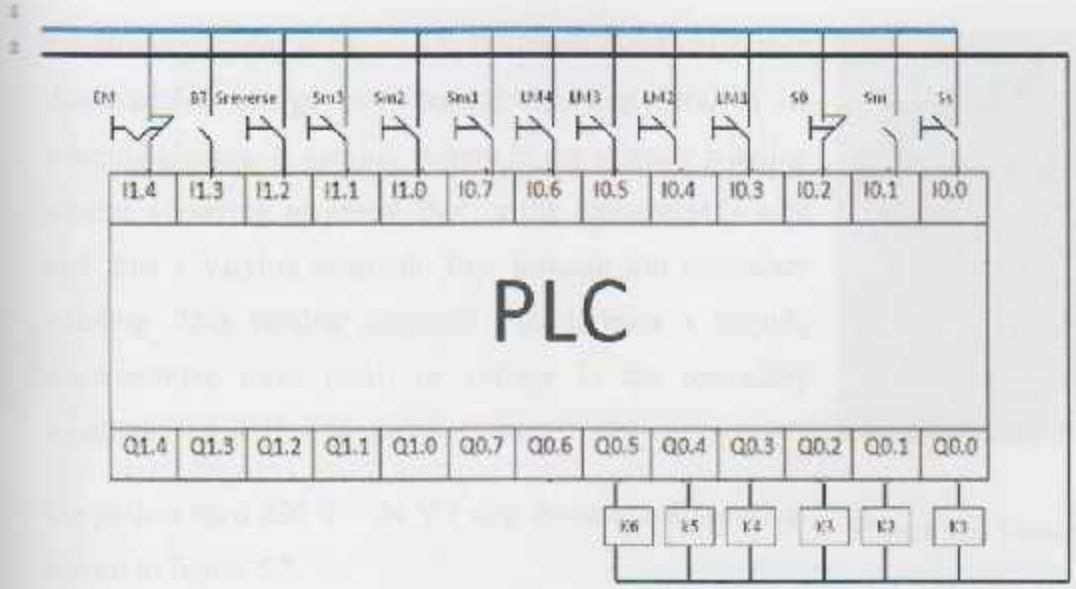


Figure 5.4: Control Circuit

5.5 Electrical panel & Protection

The electrical panel shown in figure5.5 and it is contain:

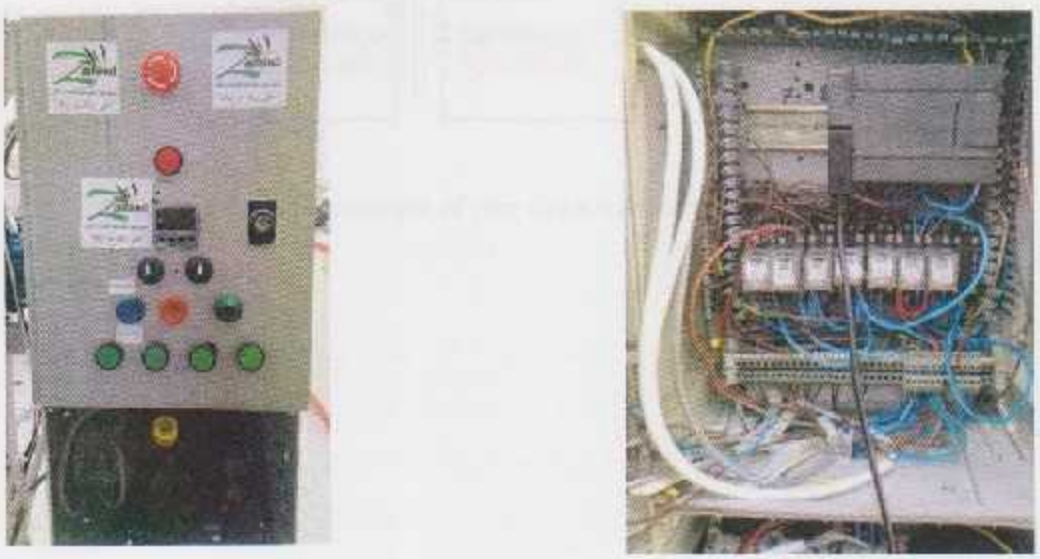


Figure 5.5: Electrical Panel

5.5.1 Transformer

transformer shown in figure-5.6, is a static electrical device that transfers energy by inductive coupling between its winding circuits. A varying current in the primary winding creates a varying magnetic flux in the transformer's core and thus a varying magnetic flux through the secondary winding. This varying magnetic flux induces a varying electromotive force (emf) or voltage in the secondary winding.

Figure 5.6: Transformer

the project used 220 V – 24 V (step down transformer) as shown in figure-5.7.

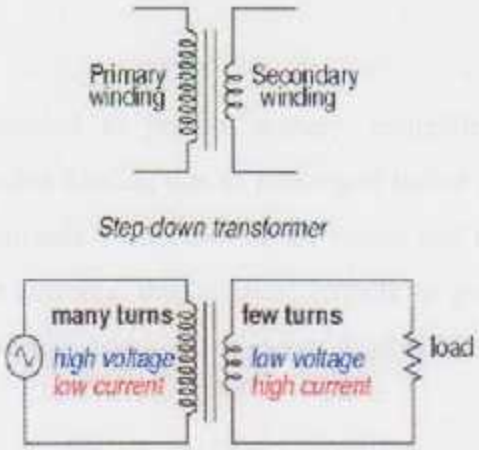


Figure 5.7: The principle of step down transformer

Table 5.1: Loading table

component	Current (A)
PLC	1
4 Contactors	1.5
DC motor	3
lamps	0.5
Total	6

We need to use 6 A transformer:

Running factor= 0.7, 6*0.7= 4.2 (A)

5.5.2 Motor Overload

Overload relays are intended to protect motors, controllers, and branch-circuit conductors against excessive heating due to prolonged motor over currents up to and including locked rotor currents. Protection of the motor and the other branch-circuit components from higher currents, due to short circuits or grounds, is a function of the branch-circuit fuses, circuit breakers, or motor short-circuit protectors.

5.5.3 Fuse

Figure 5.8: Fuse

Fuse is a type of low resistance resistor that acts as a sacrificial device to provide over current protection, of either the load or source circuit. Its essential component is a metal wire or strip that melts when too much current flows, which interrupts the circuit in which it is connected. Short circuit, overloading, mismatched loads or device failure are the prime reasons for excessive current.

5.5.4 Contactors

A contactor is an electrically controlled switch used for switching a power circuit, similar to a relay except with higher current ratings. A contactor is controlled by a circuit which has a much lower power level than the switched circuit.

Figure 5.9: Contactors

Contactors come in many forms with varying capacities and features. Unlike a circuit breaker, a contactor is not intended to interrupt a short circuit current. Contactors range from those having a breaking current of several amperes to thousands of amperes and 24 V DC to many kilovolts. The physical size of contactors ranges from a device small enough to pick up with one hand, to large devices approximately a meter (yard) on a side. Contactors are used to control electric motors, lighting, heating, capacitor banks, thermal evaporators, and other electrical loads.

In this project we used 6 contactors for (1 for crashing motor, 2 for pressing motor, 2 for transporting motor, and 1 for heater).

5.5.5 Switches

Figure 5.10: Switches

5.5.6 klemens

Used to connect wires and a rang the connections

Figure 5.11: Klemens

Chapter 6

Experimental Result & Recommendations

6.1 Introduction

This chapter provides experimental result and, some recommendations from the work team for this project. In this chapter we are listing some goals hope to be accomplished or_ at least_ under attention .

6.2 Experimental Result:

We made some experiments on parts of our project and these are some of results:

1.Crashing system: we put a small quantity of olive(1 kgm) on this part ,and it became pasta in 2 minutes, so the crashing part grinds the olive successfully.

2.Pressing system: after we get the pasta from the crashing part, we tried to press it in this system and _as previous stage_ the pasta was pressed to become a liquid of water and oil.

3.Sorting system: the team separated the liquid to water and oil by using the heat(30 C) the time that taken to separate them completely was about 30 minutes on the other hand when we separate it with gravity alone (no heat) it took 1.5 days.

4.Transporting the pressing cylinder from crashing stage to pressing stage by using the conveyer took 40 seconds.

Figure 6.1: Oil test

6.3 Recommendations

These recommendations are recorded to people who can create opportunities for students to make something new and useful, in order to make difference in our country Palestine:

1.Such projects should be handled among different departments according to the project nature (we had lots of electrical problems that might solve without having enough previous knowledge).

2. Once the university administration financially supported graduation projects, this support must be provided at the beginning of the project work, to enable students to do their projects according to the time plan, and to test them at the proper time.

3. The metal workshops must have highly trained technician to read the plans, and to perform the design.

4. The university should provide the proper toolsets, which enable the student to assemble his project and to test it the university campus, so he could get benefit of experiences in the university.

5. The Applied Chemistry Department should use our project, to produce samples of oil in order to make study and research on them.

6.3 Future Work

The following tasks are suggested as future works:

1. Testing and evaluating the machine with different types of olive.
2. Compare the improvement of our oil with other oil which is produced by public press.

Appendix A

Questionnaire Analysis

A.1. Environmental Samples.

A.2. The purpose of questionnaire.

A.3. Hypotheses of the questionnaire.

A.4. The results of questionnaire.

A.5. Discussion of results.

A.6. Questionnaire form.

A.1. Environmental Samples

This questionnaire took (100) purposeful sample of farmers who have olive trees .

A.2. The purpose of questionnaire

This questionnaire aims to :

1.To know the percentage of those who own small quantities of olive.

(for example less than 10Kg).

2.To know the percentage of farmers who press theirs olive to make oil.

3.Determine the reason of not pressing the olive to get oil.

4.Determine the importance of the idea "an olive press for household use".

5.know the percentage of those interested in buying the aforementioned press.

6. Determine which of these characteristics (quality, cost, ease of use) come first according to the farmers.

A.3. Hypotheses of the questionnaire

- Hypothesis no 1:

Those who owns an olive trees which give them small quantities of oil ,form a large percentage from the whole farmers.

- Hypothesis no 2:

The reason for not pressing the olive and taking the oil, is the small quantity of olive.

- Hypothesis no 3:

There are large group of farmers who need an olive press for house hold use, and they are ready to buy it.

- Hypothesis no 4:

The quality of the oil comes in the first degree to farmers, and it is more important than the cost.

A.4. The results of questionnaire

The questionnaire has 8 questions and they are:

- **Q1**:How many olive trees do you own?

The results in figure A.4.1 show that approximately 43% of farmers own small number of trees.

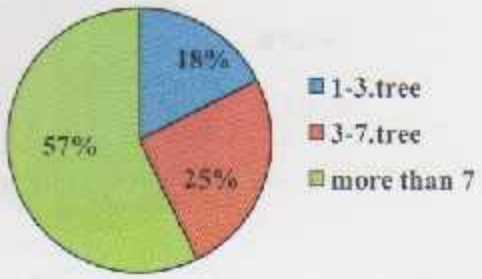


Figure A.4.1: Quantity of olive tree they owns

-**Q2**: What is the quantity of olive oil do you produce from your trees?

The results in figure A.4.2 show that approximately the quarter of farmers there's trees give them less than 10Kg.

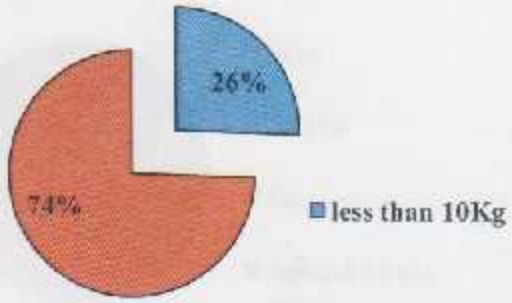


Figure A.4.2: Quantity of olive oil

-**Q3**: Who do you benefit from your olive?

About 71% of farmers are pressing theirs olive, and the others don't ; they sell it and pickling it, that clear in Figure A.4.3.

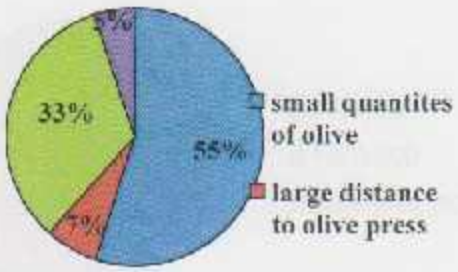


Figure A.4.3: The uses of olive oil

- **Q4**: Determine the reason for not pressing your olives?

According to figureA.4.4 more than a half of farmers doesn't press theirs olive, because of small quantity.

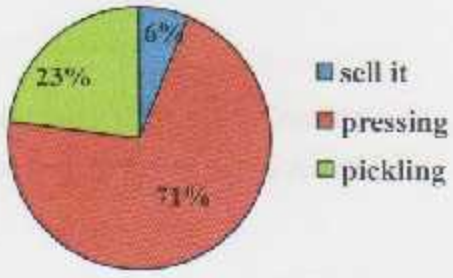


Figure A.4.4: Reason of not pressing the olive

- **Q5**: If you have an opportunity to press your small quantity of olive ,do you press it?

In figure A.4.5 About 61% says they will press their small quantity of olive if they can .And about 6% don't want to press it.

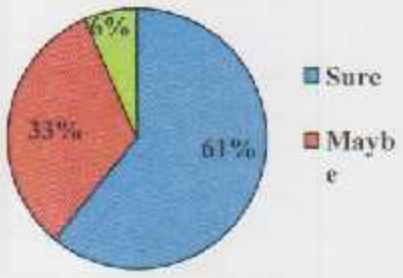


Figure A.4.5: The desire to press the olive

-**Q6**: If there is an olive oil press for house hold use, are you concerned with buying it?

A half of farmers say they want to buy it, and about 20% say that it depends on the cost as shown in the figure A.4.6

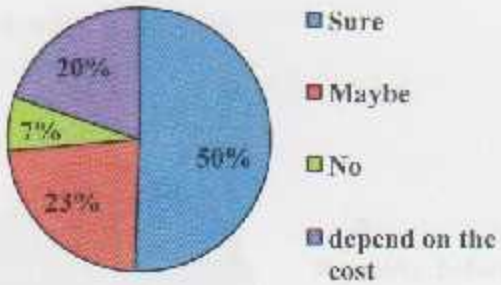


Figure A.4.6: The desire to buy the press

Q7:What is the good price for an automated olive press for household use?

About 42% give an automated olive press a price between 100-500 NIS. And just 9% give it a price more than 1000 NIS, as shown in figure A.4.7.

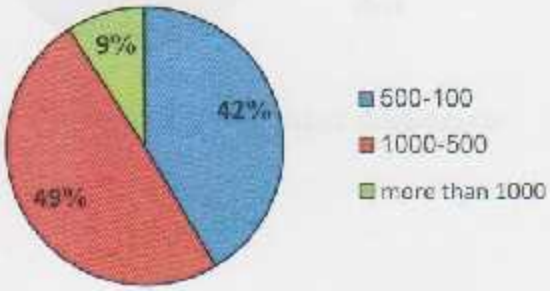


Figure A.4.7: Rang of price according to farmers

The minimum cost was 100 NIS, and the maximum cost 5000NIS, and the average 705.844 NIS. The distribution of prices chosen by the farmers shown in figure A.4.8.

Figure A.4.8: The distribution of prices

-Q8: What characteristics must the press have?

About 76% choose the quality rather than the cost and ease of use. After quality become the ease of use, and at last the cost. That clear in figure A.4.9.

Figure A.4.9: The most important characteristic

A.5. Discussion of results.

- The results confirm hypothesis number 1:

The percentage of those own small quantities of olive form more than quarter of whole farmers, and this percentage is enough for us to start our project.

- The results confirm hypothesis number 2:

More than the half of farmers don't press theirs olive, because of small quantity.

- The results confirm hypothesis number 3:

The percentage of farmers who are in idea of the project, and ready to buy it, are more than the half.

- The results confirm hypothesis number 4:

The quality of the oil comes in the first degree according to farmers, about 76% chose the quality before the cost and ease of use.

جامعة بوليتكنك فلسطين

كلية الهندسة

Palestine Polytechnic University

College of Engineering & Technology

استبيان مع المستفيدين من معاصر الزيتون:

نحن طالبات في جامعة بوليتكنك فلسطين – الطلبة في مرحلة مشروع التخرج نعمل حتى بناء معصرة زيتون منزلية أوتوماتيكية وفي نفس الوقت تستخدم الطريقة التقليدية لضمان جودة عالية لزيت هذه المعصرة الصغيرة موجهة لمن يمتلكون كميات زيتون تقل عن 10 كيلوغرام ويريدون مستوى في عصر الزيت في السنوات الحالية، لصغر الكمية التي يحوزونها وفي نفس الوقت لا يرغبون في تخليل او كبس هذه الكمية من الزيتون لذا نرجو من مشاركتكم مساعدتنا للتطلق في مشروعنا بالإجابة عن الأسئلة التالية.

المنطقة:.....

تعبئة:

- كم عدد شجرات الزيتون التي تمتلكها؟

أ. (1-3) ب. (3-7) ج. أكثر من 7

- ما هي كمية الزيت التي تحصل عليها من الأشجار التي تمتلكها؟

أ. أقل من 10 لتر ب. أكثر من 10 لتر

-الزيتون الذي تنتجه هل تقوم؟

أ. بيعه ب. عصره ج.تخليله

- إذا لم تقم بعصر الزيتون حدد السبب لذلك

أ.سعر كمية الزيتون ب. بعد المعصرة ج.اضطراري لعدم مع الآخرين د. عدم رغبتي في عصره.

فكرة المشروع

-هل تفضل تقليل تكلفة عصر كمية زيتون قليلة على معصرة بيتية، هل ستقوم بذلك؟

أ.نعم لكي ب. ربما ج.لا

-هل تفضل معصرة زيتون منزلية فهل ستكون معني بذلك؟

أ.نعم لكي ب. ربما ج.لا

-السعر الذي تشعر انه مناسب لتقوم بشراء هذه الآلة.....

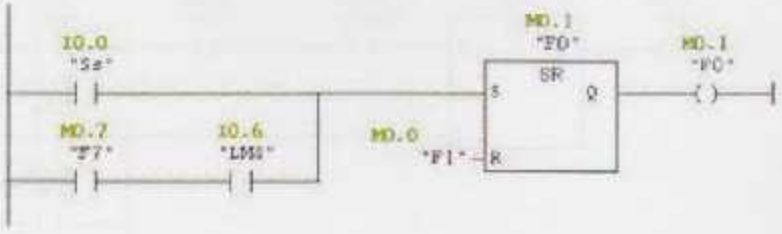
-ما هي الخصائص التي يجب ان تتوافر في هذه المعصرة؟

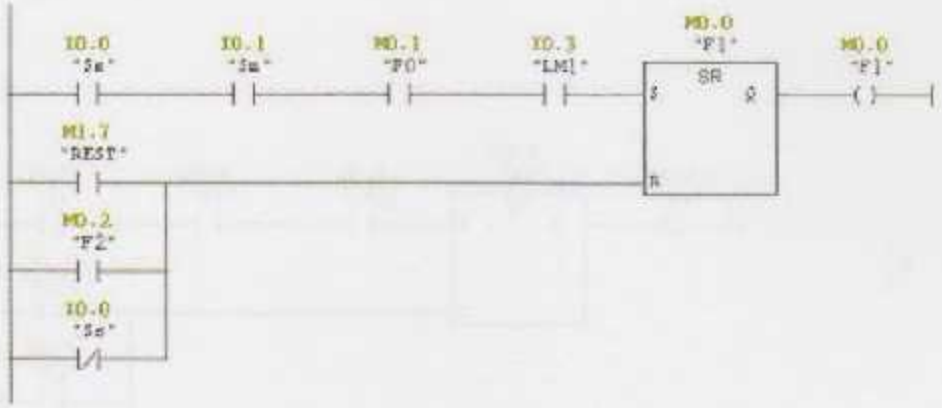
أ. جودة الزيت أهم من السعر ب. السعر له أولوية على الجودة ج. سهولة الاستخدام لها أولوية على السعر والجودة.

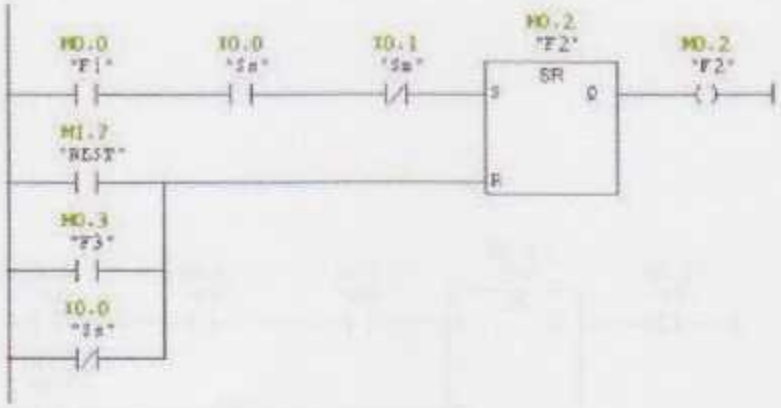
Appendix B..

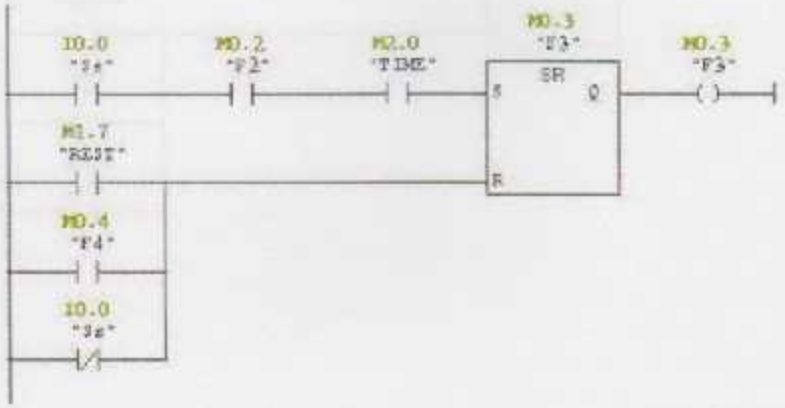
PLC Programming

B.1 Ladder Language:





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SR
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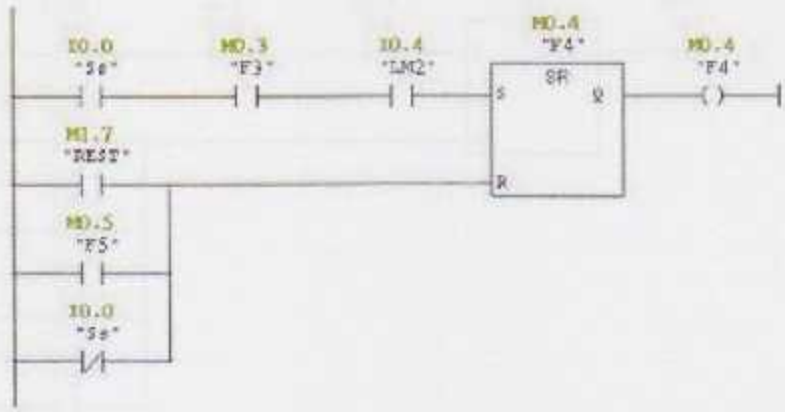
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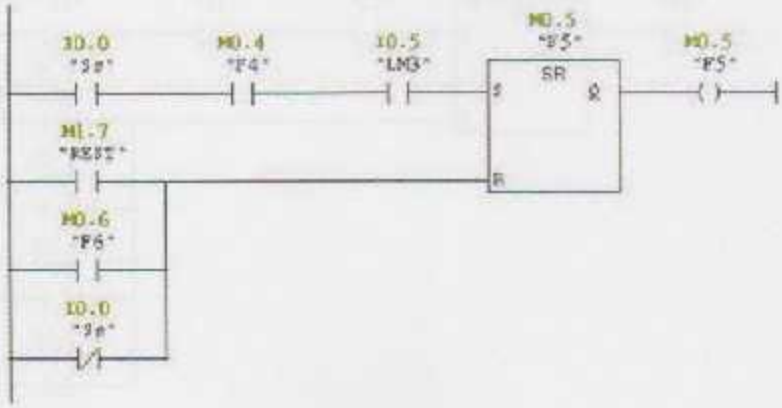
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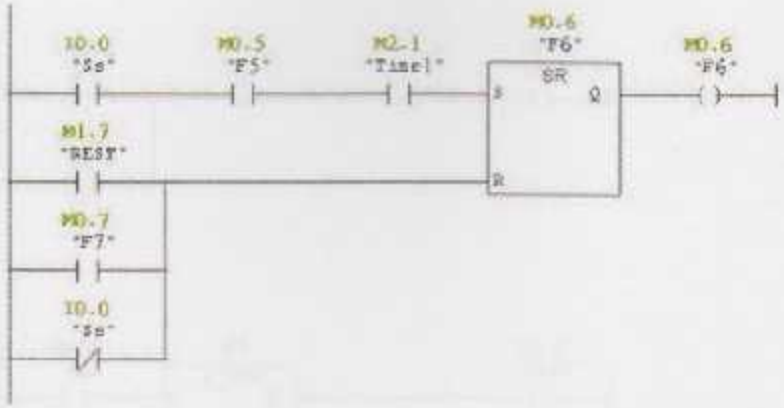
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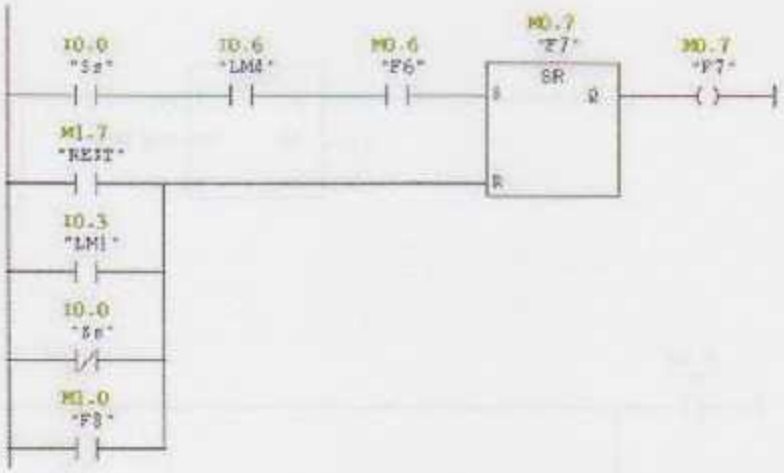
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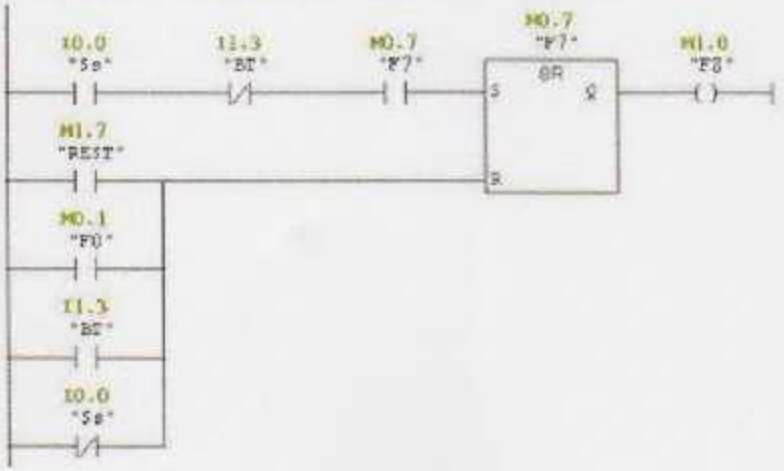
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M1.7
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"BI"
I0.0
"Se"


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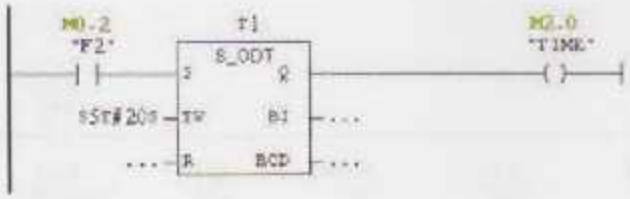
"RESET"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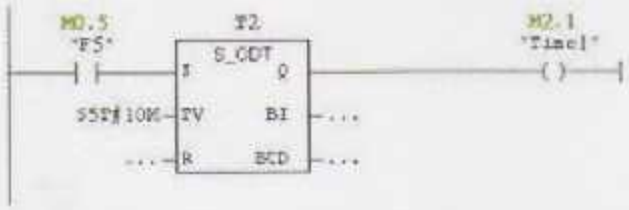
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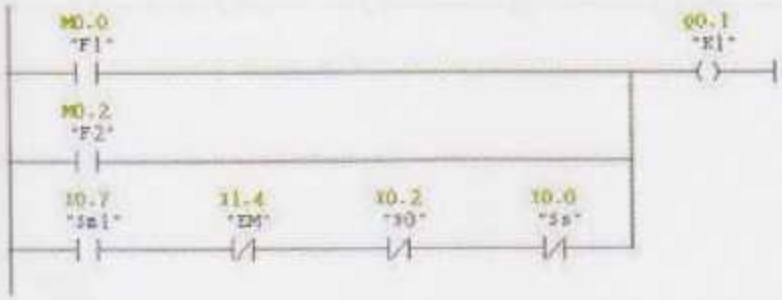
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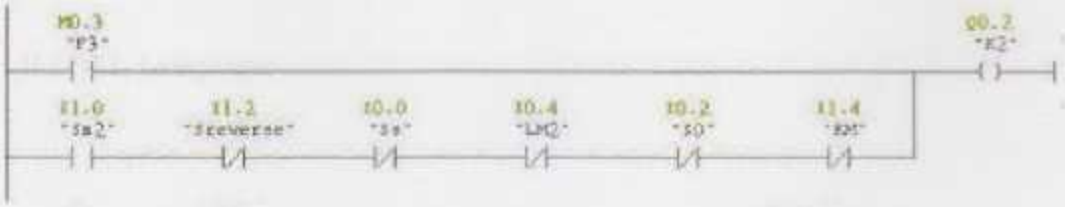
"K1"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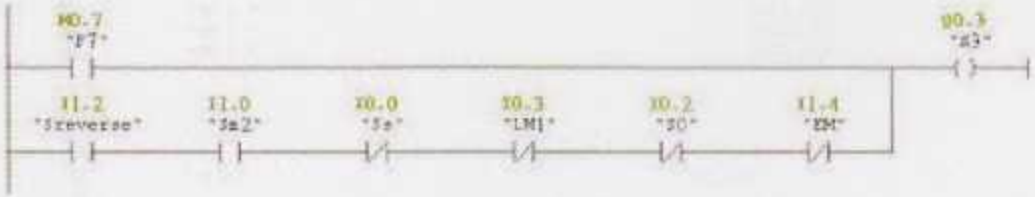
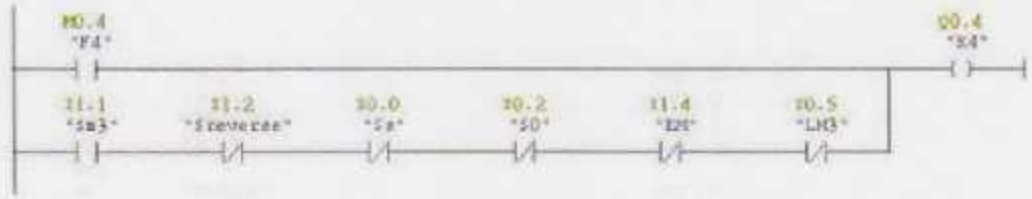
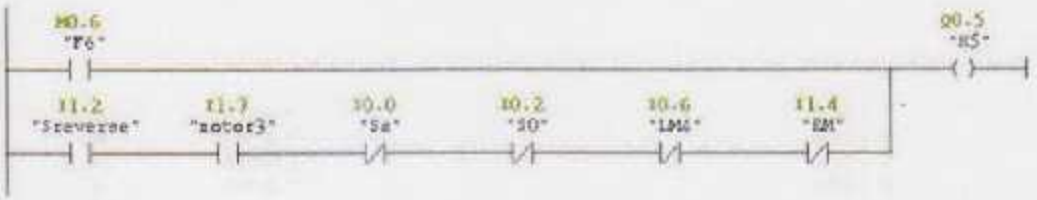
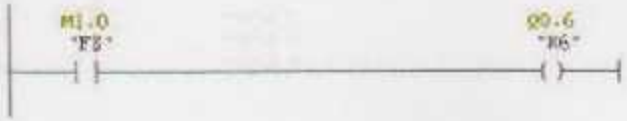
I0.2
"SO"
I1.4
"EM"


M0.7
"F7"
Q0.3
"K3"
I1.2
"Sreverse"
I1.0
"Sm2"
I0.0
"Sa"
I0.3
"LM1"
I0.2
"SO"
I1.4
"EM"


M0.4
"F4"
Q0.4
"K4"
I1.1
"Sm3"
I1.2
"Sreverse"
I0.0
"Sa"
I0.2
"SO"
I1.4
"EM"
I0.5
"LM3"


M0.6
"F6"
Q0.5
"K5"
I1.2
"Sreverse"
I1.7
"motor3"
I0.0
"Sa"
I0.2
"SO"
I0.6
"LM4"
I1.4
"EM"


M1.0
"F8"
Q0.6
"K6"

B.2 STL Language:

```
A       "Se"        I0.0
A       "Sa"        I0.1
A       "F0"        M0.1
A       "LM1"       I0.3
S       "F1"        M0.0
A(
O       "REST"      M1.7
O       "F2"        M0.2
ON      "Se"        I0.0
)
R       "F1"        M0.0
A       "F1"        M0.0
=       "F1"        M0.0
```

```
A(
O       "Se"        I0.0
O
A       "F7"        M0.7
A       "LM4"       I0.6
)
S       "F0"        M0.1
A       "F1"        M0.0
R       "F0"        M0.1
A       "F0"        M0.1
=       "F0"        M0.1
```

```
A       "F1"        M0.0
A       "Se"        I0.0
AN      "Sa"        I0.1
S       "F2"        M0.2
A(
O       "REST"      M1.7
O       "F3"        M0.3
ON      "Se"        I0.0
)
R       "F2"        M0.2
A       "F2"        M0.2
=       "F2"        M0.2
```

```
A       "Se"        I0.0
A       "F3"        M0.3
A       "LM2"       I0.4
S       "F4"        M0.4
A(
O       "REST"      M1.7
O       "F5"        M0.5
ON      "Se"        I0.0
)
R       "F4"        M0.4
A       "F4"        M0.4
=       "F4"        M0.4
```

```
A       "Se"                    I0.0
A       "F2"                    M0.2
A       "TIME"                  M2.0
S       "F3"                    M0.3
A(
O       "REST"                  M1.7
O       "F4"                    M0.4
ON      "Se"                    I0.0
)
R       "F3"                    M0.3
A       "F3"                    M0.3
=       "F3"                    M0.3
```

```
A       "Se"                    I0.0
A       "F4"                    M0.4
A       "LM3"                   I0.5
S       "F5"                    M0.5
A(
O       "REST"                  M1.7
O       "F6"                    M0.6
ON      "Se"                    I0.0
)
R       "F5"                    M0.5
A       "F5"                    M0.5
=       "F5"                    M0.5
```

```
A       "Se"                    I0.0
A       "F5"                    M0.5
A       "Time1"                 M2.1
S       "F6"                    M0.6
A(
O       "REST"                  M1.7
O       "F7"                    M0.7
ON      "Se"                    I0.0
)
R       "F6"                    M0.6
A       "F6"                    M0.6
=       "F6"                    M0.6
```

```
A       "Se"                    I0.0
A       "LM4"                   I0.6
A       "F6"                    M0.6
S       "F7"                    M0.7
A(
O       "RESI"                  M1.7
O       "LM1"                   I0.3
ON      "Se"                    I0.0
O       "F8"                    M1.0
)
R       "F7"                    M0.7
A       "F7"                    M0.7
=       "F7"                    M0.7


O       "SEMR"                  I1.6
O       "Sm1"                   I0.7
=       "RESI"                  M1.7


A       "Se"                    I0.0
AN      "BI"                    I1.3
A       "F7"                    M0.7
S       "F7"                    M0.7
A(
O       "RESI"                  M1.7
O       "F0"                    M0.1
O       "BI"                    I1.3
ON      "Se"                    I0.0
)
R       "F7"                    M0.7
A       "F7"                    M0.7
=       "F8"                    M1.0


A       "F2"                    M0.2
L       S5T#20S
SD      T       1
NOP     0
NOP     0
NOP     0
A       T       1
=       "TIME"                  M2.0
```

```
A       "F5"                    M0.5
L       S5T#10M
SD      T       2
NOP     0
NOP     0
NOP     0
A       T       2
=       "Time1"                 M2.1
```

```
O       "F1"                    M0.0
O       "F2"                    M0.2
O
A       "Sa1"                   I0.7
AN      "EM"                    I1.4
AN      "SO"                    I0.2
AN      "Se"                    I0.0
=       "K1"                    Q0.1
```

```
O       "F3"                    M0.3
O
A       "Sa2"                   I1.0
AN      "Sreverse"              I1.2
AN      "Se"                    I0.0
AN      "LM2"                   I0.4
AN      "SO"                    I0.2
AN      "EM"                    I1.4
=       "K2"                    Q0.2
```

```
O       "F4"                    M0.4
O
A       "Sa3"                   I1.1
AN      "Sreverse"              I1.2
AN      "Se"                    I0.0
AN      "SO"                    I0.2
AN      "EM"                    I1.4
AN      "LM3"                   I0.5
=       "K4"                    Q0.4
```

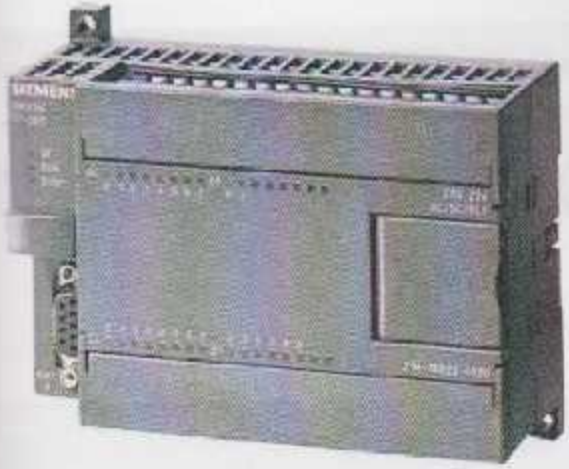
```
O       "F6"                    M0.6
O
A       "Sreverse"              I1.2
A       "motor3"                I1.7
AN      "Se"                    I0.0
AN      "S0"                    I0.2
AN      "LM4"                   I0.6
AN      "EM"                    I1.4
=       "K5"                    Q0.5
```

```
O       "F7"                    M0.7
O
A       "Sreverse"              I1.2
A       "Sm2"                   I1.0
AN      "Se"                    I0.0
AN      "LM3"                   I0.3
AN      "S0"                    I0.2
AN      "EM"                    I1.4
=       "K3"                    Q0.3
```

SIEMENS

Product data sheet 6ES7214-1BD23-0XB0

SIMATIC S7-200, CPU 224, COMPACT UNIT,
AC POWER SUPPLY 14 DI DC/10 DO, RELAY,
8/12 KB CODE/8 KB DATA,
PROFIBUS DP EXTENDABLE



Supply voltage	
120 V AC	Yes
230 V AC	Yes
Line frequency	
Frequency of the supply voltage	83 Hz
Load voltage L+	
Rated value (DC)	24 V
permissible range, lower limit (DC)	5 V
permissible range, upper limit (DC)	30 V
Load voltage L1	
Rated value (AC)	100 V ; 100 to 230 V AC
permissible range, lower limit (AC)	5 V
permissible range, upper limit (AC)	250 V
permissible frequency range, lower limit	47 Hz
permissible frequency range, upper limit	63 Hz
Input current	
Inrush current, max.	20 A ; at 264 V
from supply voltage L1, max.	200 mA ; 30 to 100 mA (240 V); 60 to 200 mA (120 V); output current for expansion modules (5 V DC) 600 mA

Encoder supply	
24 V encoder supply	
24 V	Yes ; Permissible range: 20.4 to 28.8 V
Short-circuit protection	Yes ; electronic at 280 mA
Output current, max.	280 mA
Memory	
Number of memory modules (optional)	1 ; pluggable memory module, content identical with integral EEPROM; can additionally store recipes, data logs and other files
Data and program memory	
Data memory, max.	8 kbyte
Program memory, max.	12 kbyte ; 8 KB with active run-time edit
Backup	
present	Yes ; Program: Entire program maintenance-free on integral EEPROM, programmable via CPU; data: Entire DB 1 loaded from PG/PC maintenance-free on integral EEPROM, current values of DB 1 in RAM, retentive memory bits, timers, counters, etc. maintenance free via high-performance capacitor; optional battery for long-term buffering
Nicht versorgt: TAK_ABX692_001_000]	
Backup battery	
Battery operation	
Backup time, max.	100 h ; (min. 70 h at 40 °C), 200 days (typ.) with optional battery module
CPU processing times	
for bit operations, max.	0.22 µs
Counters, timers and their retentivity	
S7 counter	
Number	256
of which retentive with battery	
adjustable	Yes ; via high-performance capacitor or battery
lower limit	1
upper limit	256
Counting range	
lower limit	0
upper limit	32767
S7 times	
Number	256
of which retentive with battery	
adjustable	Yes ; via high-performance capacitor or battery
upper limit	64

Time range	
lower limit	1 ms
upper limit	54 min ; 4 timers: 1 ms to 30 s; 16 timers: 10 ms to 5 min; 236 timers: 100 ms to 54 min
s areas and their retentivity	
Flag	
Number, max.	32 byte
Retentivity available	Yes ; M 0.0 to M 31.7
of which retentive with battery	0 to 255, via high performance capacitor or battery, adjustable
of which retentive without battery	0 to 112 in EEPROM, adjustable
dware configuration	
Expansion devices, max.	7 ; Only expansion modules of the S7-22x series can be used. Due to the limited output current, the use of expansion modules may be limited.
Connectable programming devices/PCs	SIMATIC PG/PC, standard PC
Expansion modules	
Analog inputs/outputs, max.	35 ; max. 28 inputs and 7 outputs (EM) or max. 0 inputs and 14 outputs (EM)
Digital inputs/outputs, max.	168 ; max. 94 inputs and 74 outputs (CPU + EM)
AS-Interface inputs/outputs max.	62 ; AS-Interface A/B slaves (CP 243-2)
gital inputs	
Number/binary inputs	14
m/p-reading	Yes ; optionally, per group
Input voltage	
Rated value, DC	24 V
for signal "0"	0 to 5 V
for signal "1"	min. 15 V
Input current	
for signal "1", typ.	2.5 mA
Input delay (for rated value of input voltage)	
for standard inputs	
Parameterizable	Yes ; all
at "0" to "1", min.	0.2 ms
at "0" to "1", max.	12.8 ms
for interrupt inputs	
Parameterizable	Yes ; I 0.0 to I 0.3
for counter/technological functions	
Parameterizable	Yes ; (E0.0 to E1.5) 30 kHz
Cable length	

Cable length, shielded, max.	500 m ; Standard input: 500 m, high-speed counters: 50 m
Cable length unshielded, max.	300 m ; not for high-speed signals
Digital outputs	
Number/binary outputs	10 ; Relay
Functionality/short-circuit strength	No ; to be provided externally
Switching capacity of the outputs	
with resistive load, max.	2 A
on lamp load, max.	200 W ; 30 W with DC, 200 W with AC
Output voltage	
for signal "1", min.	L+/L1
Output current	
for signal "1" rated value	2 A
for signal "0" residual current, max.	0 mA
Output delay with resistive load	
"0" to "1", max.	10 ms ; all outputs
"1" to "0", max.	10 ms ; all outputs
Parallel switching of 2 outputs	
for increased power	No
Switching frequency	
of the pulse outputs, with resistive load, max.	1 Hz
Aggregate current of outputs (per group)	
all mounting positions	
up to 40 °C, max.	10 A
horizontal installation	
up to 55 °C, max.	10 A
Relay outputs	
Max. number of relay outputs, integrated	10
Number of operating cycles, max.	10000000 ; mechanically 10 million, at rated load voltage 100,000
Cable length	
Cable length, shielded, max.	500 m
Cable length unshielded, max.	150 m
Analog inputs	
Number of analog potentiometers	2 ; Analog potentiometer; resolution 8 bit
Encoder	
Connectable encoders	
2-wire sensor	Yes
Permissible quiescent current (2-wire sensor), max.	1 mA
PtP interface	

Type of interface	Integrated RS 485 interface
Physics	RS 485
Functionality	
MPI	Yes ; As MPI slave for data exchange with MPI masters (S7-300/S7-400 CPUs, OPs, TDs, Push Button Panels); S7-200-internal CPU/CPU communication is possible in the MPI network with restrictions; transmission rates: 19.2/187.5 kbit/s
PPI	Yes ; with PPI protocol for program functions, HMI functions (TD 200, OP), S7-200-internal CPU/CPU communication ; transmission rates 9.6/19.2/187.5 kbit/s
Serial data exchange	Yes ; As freely programmable interface with interrupt facility for serial data exchange with third-party devices with ASCII protocol transfer rates: 1.2 / 2.4 / 4.8 / 9.6 / 19.2 / 38.4 / 57.6 / 115.2 kbit/s; the PC/PPI cable can also be used as RS232/RS485 converter
MPI	
Transmission rate, max.	187.5 kbit/s
Transmission rate, min.	19.2 kbit/s
Integrated Functions	
Number of counters	6 ; High-speed counters (30 kHz each), 32 bits (incl. sign), can be used as up/down counters or for connecting 2 incremental encoders with 2 pulse trains offset by 90° (max. 20 kHz (A/B counters)); parameterizable enable and reset input; interrupt facilities (incl. call of subroutine with any content) when the setpoint is reached; reversal in counting direction, etc.
Counter frequency (counter) max.	30 kHz
Number of alarm inputs	4 ; 4 rising edges and/or 4 falling edges
Galvanic isolation	
Galvanic isolation digital inputs	
between the channels	Yes
between the channels, in groups of	6 and 8
Galvanic isolation digital outputs	
between the channels	Yes ; Relay
between the channels, in groups of	3 and 4
Permissible potential difference	
between different circuits	500 V DC between 24 V DC and 5 V DC; 1500 V AC between 24 V DC and 230 V AC
Degree and class of protection	
IP20	Yes
Ambient conditions	
Environmental conditions	For further environmental conditions, see "Automation System S7-200, System Manual"
Operating temperature	
horizontal installation, min.	0 °C
horizontal installation, max.	55 °C

vertical installation, min.	0 °C
vertical installation, max.	45 °C
Air pressure	
permissible range, min.	660 hPa
permissible range, max.	1080 hPa
Relative humidity	
Operation, min.	5 %
Operation, max.	95 % ; RH class 2 in accordance with IEC 1131-2
Configuration	
programming	
Command set	Bit logic instructions, compare instructions, timer instructions, counter instructions, clock instructions, transmissions instructions, table instructions, logic instructions, shift and rotate instructions, conversion instructions, program control instructions, interrupt and communications instructions, logic stack instructions, integer maths, floating-point math instructions, numerical functions
Program processing	free cycle (OB 1), interrupt-controller, time-controlled (1 to 255 ms)
Program organization	1 OB, 1 DB, 1 SDB subroutines with/without parameter transfer
Number of subroutines, max.	64
Programming language	
LAD	Yes
FBD	Yes
STL	Yes
Know-how protection	
User program protection/password protection	Yes ; 3-stage password protection
Connection method	
Plug-in I/O terminals	Yes
Dimensions	
Width	120.5 mm
Height	80 mm
Depth	62 mm
Weight	
Weight, approx.	410 g
Status	Jun 15, 2013

Appendix C..

Business Plan

خطة عمل لـ

شركة زيتونة لإنتاج معاصر الزيتون المنزلية

خلي زيتك من بيتك

فلسطين–الخليل

zaitona@live.com

0598519820

2013

تمت هذه الخطة ضمن البرنامج التدريبي :

بدعم من:

تم التدريب في:

اشراف الدكتور موسى إرفاعيه

فهرس المحتويات

"لو عرف الزيتون غارسه لصار الزيت دمعاً"

خطة العمل من اعداد مؤسسي الشركة:

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0599135794

شركتنا :

شركة ناشئة فلسطينية لإنتاج معاصر زيتون منزلية، الأولى من نوعها في فلسطينوالشرق الاوسط في هذا المجال..

نحن نرى صناعة الزيت على خلاف ما يراه الآخرون فهي هوية وهواية. تراث ومعاصرة، ماض ومستقبل .فلما يقتصر انتاج الزيت على عدد محدود من المعاصر الكبيرة في كل مدينة ؟! لذلك اختصرنا لكم مراحل عصر الزيتون الطويلة في معصرة بيتية صغيرة، واتحنا الفرصة لمن يمتلكون كميات قليلة من الزيتون الحصول على زيت عالي الجودة بطريقة سريعة ومريحة.

نحن جعلنا استخراج الزيت في المنزل.. من المصدر نفسه وبأيدي قاطفيه، من الشجرة الى المعصرة مباشرة دون نقل او تخزين او انتظار في طوابير .. دون ان يخلط زيت المزارعين بعضهم ببعض.. بالمختصر المفيد :

" خلي زيتك من بيتك"

منتجنا : ..

منتجنا الأول والرئيس معصرةزيتون للاستخدام المنزلي

(Automated Olive Press for Household Use)، تقوم بعصر ثمار الزيتون واستخراج الزيت منها بسرعة وكفاءة عالية وبذلك يكون منتجنا هو المنتج الوحيد من نوعه في السوق من حيث الغرض المنزلي، والكمية التي يستقبلها، والكفاءة العالية ،وصغرالحجم، وكذلك جودة الزيت العالية.

فكرة هذا المنتج اتت من خلال مشروع تخرج فريق العمل:

"ابتهال محمود الحروب. غدير تيسير سويطي، هاجر ايمن ابورميلة " المقدم لكلية الهندسةوالتكنولوجيا –دائرة هندسة ميكاترونكس – جامعة بوليتكنك فلسطين/ اشراف الدكتور رائد عمرو. ونحن حاليا في المراحل النهائية من انتاج اولمعصرة حيث ستكون جاهزةبشكل نهائي بتاريخ2013/4/26 ..

رؤيتنا:..

ان تصبح شركتنا الاولى عالميا في مجال المعاصر الزراعية..

رسالتنا:..

– النهوض بقطاع زراعة الزيتون في فلسطين، وجعل استخراج الزيت عملية اسهل، واوفر وذا جودة اعلى للمنافسة عالمياً..

ما يميزنا..

– تتناسب معصرتنا مع كميات زيتون قليلة في كل مرة، على عكس المعاصر الكبيرة الموجودة حالياً التي تتطلب كميات كبيرة للتشغيل..

– المعصرة الوحيدة من نوعها التي تعتمد العصر على البارد(Cold Press) دون حرارة اضافية ،مما يضمن زيت ذا جودة عالية عالميا(Extra virgins olive oil) حسب المواصفات والمقاييس الفلسطينية والمجلس الاعلى للزيت، على عكس المعاصر الموجودة..

- معصرتنا صغيرة الحجم وانيقة الشكل تتناسب مع الاستخدام المنزلي..

-اسعارنا منافسة للاسواق العالمية، اذ اننا نقدم منتج فريد من نوعه وبسعر مناسب..

أهدافنا العامة:

- تقديم منتج جديد للسوق المحلي والعربي يدمج بين الطريقة التقليدية والحديثة في استخراج الزيت باخذ مميزات كل طريقة..

- الحصول على ثقة المزارع الفلسطيني وربة المنزل الفلسطينية، وبذلك تحقيق نسبة مبيعات عالية تقود الى الربح..

- إيجاد فرص عمل جديدة للمزارعين وربات المنازل من خلال عصر الزيتون لأقاربهم وجيرانهم مقابل مبلغ زهيد يحددونه. وأيضا من خلال التجمعات والجمعيات الزراعية الريفية.

- الرد على محاولات عدونا الاسرائيلي لطمس هويتنا الفلسطينية ومحاربة الانسان والشجر والحجر .

أهدافنا الخاصة..

- انتاج10 معاصر زيتون منزلية وبيعها خلال الثلاث اشهر الأولى..
- الوصول الى200 منتج في السوق خلال السنة الاولى..
- دخول الاسواق العربية خلال 3 سنوات من بدء العمل..
- دخول السوق العالمي ووصول المنتج لكل دول حوض البحر المتوسط -المشتهرة بزراعة الزيتون- خلال 5 سنوات..

نقاط قوتنا..

- منتجنا الأول والوحيد في الأسواق المحلية ..
- يشكل قطاع الزراعة بشكل عام و زراعة الزيتون بشكل خاص عامل مهم في الاقتصاد الفلسطيني والهوية الفلسطينية، والإقبال عليه عالي نسبياً..
- يملك فريق العمل القدرات والكفاءة العلمية لإنتاج المنتج..
- المواد الخاملإنتاج المنتج متوافرة محلياً بأسعار مناسبة فلن نعاني من مشاكل الجمارك والاغلاقات..
- وجود افكار وخطط مختلفة للاستثمار والتوسع في الاسواق المحلية والعالمية..

نقاط ضعفنا..

- نحن على مشارف التخرج وستكون هذه تجربتنا الاولى من نوعها في الانخراط بالسوق المحلي " نحتاج للاستفادة من خبرات المخضرمين في هذا المجال".
- نحتاج الى رأس مال للبدأ بمشروعنا..

" يمكننا البدأ بالاعتماد على انفسنا " ابتهال محمود الحروب، هاجر ايمن ابورميلة، غدير تيسير سويطي" بتجميع مبلغ للبدأ، او ايجاد مؤسسات داعمة للمشروع"

التهديدات

- هل سيحصل المنتج على ثقة المزارع الفلسطيني وربة المنزل الفلسطينية ؟
- هل سيقتنع المستهلك بمميزات المنتج عن المعاصر الموجودة؟

" من خلال لقائنا مع مزارعين محليين من مناطق مختلفة و توزيع استبيان عليهم، وجدنا انهم يفضلون معصرة منزلية على المعاصر الموجودة. وسنعمل على كسب ثقتهم من خلال عرض الميزات الموجودة لدينا وغير متوافرة عند غيرنا"

المنتج

- منتجنا عبارة عن معصرة زيتون منزلية تعمل بطريقة اوتوماتيكية: تناسب الكميات الصغيرة من الزيتون، بحيث يمكنها عصر 10 كيلو غرام في المرة الواحدة. وبهذا نكون قد خلقنا فرصة لمن يمتلكون كميات صغيرة من الزيتون بعصرها والحصول على الزيت .

المنتج المركب

- توفير امكانية الصيانة لأي جزء من المنتج وتوفر قطع غيار.

خدمات مجانية:

- دليل استخدام.
- الاجابة على استفسارات المستخدمين من خلال الاتصال بالشركة.
- توصيل المنتج للمستهلك.

وصف المنتج

(الجدول رقم- 1)

الصفة	الاهمية
حجم صغير	سهولة التخزين
سهولة الفك والتركيب	امكانية التنظيف والصيانة بسهولة
شكل مناسب وجميل	امكانية وضعها في اي جزء من المنزل
مصنوعة من ستانليس ستيل	كونها لغرض غذائي الاهتمام بالناحية الصحية

فل اتوماتيك(تحكم كامل)	توفير الجهد والعناء والحصول على الزيت بسهولة.
compact	لضمان عنصر الامان
تستخدم الطريقة التقليدية	للحصول على جودة عالية للزيت

التسعير

- قمنا بتحديد سعر منتجنا بناء على تحديد تكاليف إنتاجه وتسويقه، وإيصاله للمستهلك. وذلك موضح في (الجدول رقم-2) وقمنا بإضافة هامش ربح بنسبة 25٪ نراها مناسبة لاختراق السوق -سياسة الكشط- ليكون السعر مناسب للجميع للوصول الى اكبر عدد من المستهلكين ..

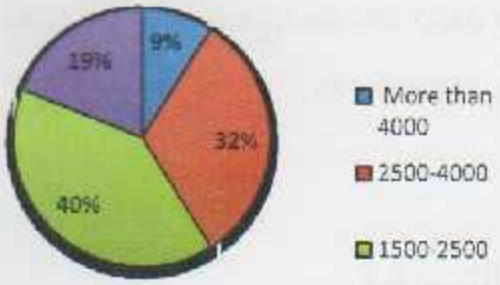
(الجدول رقم- 2)

المعدات	التكاليف
2 عدد motors	120 $
متحكم دقيق microcontroller	30 $
مواد خام واجزاء ميكانيكية وكهربائية	200 $
اعمال خراطة	200 $
مجموع تكاليف الانتاج	550 $
تكاليف تسويق ونقل للمنتج	20 $
مجموع التكاليف الكلية	570 $

نسبة الربح 25٪ = 142.5 $

فيكون سعر البيع= 712.5 $.

- وللتأكد من استعداد المزارعين على الشراء بهذا السعر تم طرح سؤال في استبيان قمنا بتوزيعه على المزارعين -مرفق- عن السعر الذي يجدونه مناسباً لشراء معصرة زيتون منزلية وحصلنا على النتائج التالية بالشيكل:



- النتائج تبين ان السعر الذي قمنا بتحديده مناسب بناء على نتائج الاستبيان

طريقة الدفع :

- الدفع سيكون اما نقدا او بالتقسيط لمدة سنة للتخفيف على المستهلك.

موقع الشركة:

- بالمرحلة الاولى لانطلاقة الشركة لن يكون لها موقعا جغرافيا. سيتم الوصول للمستهلك الى مكان وجوده من خلال مراسلتنا على الانترنت والجوال وسيصل له المنتج اليه عن طريق سيارة الشركة.

- أما بالنسبة لمكان التصنيع فهو مخرطة دنديس لصاحبها باسم دنديس الخليل- دويربان جوال رقم 0599376639

الخطة التسويقية

- الأهداف التسويقية

نهدف من خلال هذه الخطة التسويقية الى ايجاد جسر من التواصل بيننا وبين المستهلك وكسب ثقته، بحيث يصبح لديه معرفة كاملة بالمنتج ومميزاته. وتتولد لديه القناعه التامة بأهميته والرغبة في شراءه. كما ونهدف الى تحقيق أعلى نسبة من المبيعات والحصول على الربح.

الترويج

سنقوم بإتباع مجموعه من الوسائل المتاحة والمناسبة والتي تمنحنا امكانية الترويج للمنتج وبث الرغبة لدى المستهلك في الحصول على السلعة واقتنائها وذلك من خلال :

- التسويق المباشر: لقد قمنا بتوزيع استبيان على عينة عشوائية ممن يمتلكون اشجار زيتون وقاموا بتزويدنا بأرقام هواتفهم من أجل التواصل معهم فور البدء بعملية الإنتاج حيث سنعمل على الاتصال بهم وتزويدهم بالمعلومات الكافية عن المنتج والسعر والعروضات الموجودة لدى الشركة.

- العلاقات العامة: من خلال التوجه الى المزارعين في اماكنهم وتوزيع نشرة عن الشركة ومنتجاتها وطرق التواصل معها. والحديث معهم شخصيا، والاجابة عن استفساراتهم. وايضاً الحديث عن المنتج ومميزاته أمام المعارف والأصدقاء اللذين سيقومون بدورهم بتبادل الحديث عن المنتج مع الاخرين.

- التسويق الإلكتروني من خلال عمل صفحة خاصة بالشركة على الفيس بوك.

– من خلال كتابة اسم الشركة وارقام التواصل معها على السيارة الخاصة بالشركة المخصصة للتوزيع.

– المشاركة في الأنشطة والفعاليات الزراعية والمعارض التجارية المختلفة التي تقام في فترات وأماكن مختلفة.

صفحتنا على الفيس بوك

المبيعات

- استراتيجية البيع : كون المنتج موجه للمزارعين والمستهلكين الذين يمتلكون الزيتون وكذلك للمراكز والجهات المعنية بالبحث العلمي على الزيتون ستقوم الشركة بإتباع طرق مختلفة للبيع تناسب كافة الفئات، بحيث تسهل عملية الوصول للسلعة وكذلك انشاء صفحة الكترونية بحيث تتيح الفرصة لشراء المنتج من خلال الانترنت.
- تقدير حجم المبيعات: تستند الشركة في تقدير حجم مبيعاتها على نتائج الاستبيانات التي تم توزيعها على عينات عشوائية من المستهلكين وكذلك على احصائيات بعدد المراكز والكليات الزراعية المعنية بأغراض البحث العلمي على اشجار الزيتون والزيت الناتج منها.

التوزيع

عملية التوزيع سوف تكون من خلال طلب السلعة من الشركة عن طريق الهاتف او الإنترنت او زيارة مخرطة دنديس. وستقوم الشركة بتوفير إمكانية ايصال المنتج للمستهلك عن طريق سيارة خاصة للشركة مناسبة للنقل.

تحليل السوق:

الزيتون جزء من تراثنا ولا يكاد يخلو منه أي بيت فلسطيني لذلك مكاننا فلسطين بكاملها وايضاً منطقة حوض البحر المتوسط. فكل من أراد الحصول على سلعتنا سيجدها متوفرة بين يديه وبكل سهولة

تحليل السوق المحلي:

انتاج الزيتون حسب اخر الاحصاءات المسجلة لمركز الاحصاء الفلسطيني 93,565.7طن، استغلتها 272 معصرة موزعة على مناطق فلسطين – مرفق في الملاحق مسح عام 2011.

ولا شك ان انتاج الزيتون يقل في فلسطين بسبب ممارسات الاحتلال الهمجية ضد الحجر والبشر والإنسان، ومنع المزارعين من الوصول الى اراضيهم خلف جدارالفصل العنصري. لكننا جميعا يجب علينا مواجهة ذلك، ونحن "شركة زيتونة" سنعمل على ترغيب المزارعين بالمحافظة على الانتاجية العالية للزيت من خلال توفيرنا معصرة زيتون منزلية اوتوماتيكية سهلة الاستخدام، وتشجيعهم على زراعة حدائق المنزل في المدن والريف..

المنافسون

- المنافسة غير المباشرة:

لا يوجد لدينا منافسون مباشرون في السوق المحلي والعالم العربي، حيث لا يوجد منتج كمنتجنا" معصرة زيتون منزلية اوتوماتيكية تستقبل كميات زيتون قليلة"، فتقتصر المنافسة في هذا الاسواق على المنافسة غير المباشرة من معاصر الزيتون الكبيرة المنتشرة في المدن والقرى والتي تستقبل كميات زيتون كبيرة ولا تستقبل الكميات التي نعمل معها تكل منافسة اذا قام المستهلك بدمج كميات الزيتون الصغيرة التي لديه مع كميات الاخرين.

- المنافسة المباشرة :

من قبل شركات صينية وايطالية تنتج منتجات قريبة من منتجنا من حيث الغرض "معاصر زيتون منزلية تستقبل كميات صغيرة" ولكنها تختلف معه ويتميز عنها بكثير من الميزات الموضحة في (جدول رقم-3) :

(الجدول رقم- 3)

الميزة	منتجنا	منتجات المنافسين
تستقبل كميات قليلة	✓	✓
للاستخدام المنزلي	✓	✓
اوتوماتيكية بشكل كامل	✓	
تستخدم تقنية العصر على البارد	✓	
جودة الزيت اعلى	✓	
تكلفة الانتاج وسعر البيع اقل	✓	

من هذه الشركات :

شركة TEM الايطالية سعر المنتج المشابه لمنتجنا 25.000 شيكل، ولا توافر الميزات التي يوفرها منتجنا من حيث الجودة والعصر على البارد والعمل بشكل اوتوماتيكي بالكامل.

إدارة الشركة

م ابتهال محمود الحروب

المدير العام للشركة

م.هاجر ايمن ابورميلة

الشئون المالية

م.غدير تيسير سويطي

التسويق والإعلان

د. رائد عمرو

استشاري الشركة

مصعب محمود الحروب

النقليات والحركة

الخطة التنفيذية:

توزيع المهام لمرحلة انطلاقة الشركة – المرحلة التقيمية- (جدول رقم-4)

(الجدول رقم- 4)

المهمة	تاريخ البدء	تاريخ الانتهاء	المسئول
توزيع المهام	2013/2/20	2013/2/21	ابتهال الحروب
الاتفاق مع مخرطة دنديس (مكان العمل)	2013/3/1	2013/3/1	ابتهال الحروب
الاتفاق مع شركة ليمون للدعاية والإعلان	2013/3/15	2013/3/15	غدير سويطي
اعداد خطة العمل	2013/3/15	2013/4/15	فريق العمل
الانتهاء من صناعة النموذج الاولي	2013/3/1	2013/4/26	فريق العمل
البحث عن مصادر تمويل	2013/4/15	2013/5/1	هاجر ابورميلة
بدء مرحلة الدعاية والإعلان	2013/5/1	-	غدير سويطي
تسجيل الشركة بشكل قانوني	2013/5/1	2013/5/7	هاجر ابورميلة
بدء الانتاج	2013/6/1	-	مخرطة دنديس + فريق العمل

تكاليف بدء التشغيل :

تكاليف البدأ بإنتاج 10 معاصرلثلاث اشهر الاولى للشركة. " مرحلة تقيمية" موضحة في:

(الجدول رقم– 5)

انشطة بدء التشغيل	التكاليف
تكاليف انتاج 10 معاصر	5000$
دعاية واعلان	200 $
تكاليف نقل وتوزيع	130 $
المجموع	5330 $

مع الاخذ بعين الاعتبار ان مكان العمل في هذه المرحلة هو مخرطة دنديس. وسيتم تخزين المنتج في مستودع يعود ملكه لـ "غدير تيسير سويطي" احدى مؤسسي الشركة فلسنا بحاجة لتكلفة مستودع .

بناء على الجدول وتكاليف انتاج القطعة الواحدة وبناء على نتائج الاستبيانات التي تم توزيعها تم تحديد سعر المنتج ليكون 712$ كمبلغ يتناسب مع المستهلكين وبالوقت نفسه يحقق لنا هامش ربح جيد كبداية..

سعر المنتج الواحد= 712$

مجموع الايرادات لبيع 10 قطع في الشهور الاولى :

712. 10 = 7120$ خلال الشهور الاولى.

العائد على الاستثمار= $\frac{\text{اجمالي ايرادات الاستثمار}-\text{اجمالي تكاليف الاستثمار}}{\text{اجمالي تكاليف الاستثمار}}$

العائد على الاستثمار= $\frac{7120-5330}{5330}$ .100٪ = 33.5٪

رؤى مستقبلية..

- بعد انتهاء المرحلة التقيمية سنقوم بالإنتاج على مستوى اكبر واختراق السوق المحلي والعربي. ليكون لنا موقعا جغرافيا مستقلا تكون المخرطة، التخزين، سيارات النقل فيه ملك الشركة نفسها.

- نطمح بعد سنة من البدأ بتوسيع نطاق العمل لإنتاج معاصر متعددة الاستخدام (multi function presses) لأنواع متعددة من المحاصيل تقوم بعصر العنب والصبر وأيضا الحبوب بكافة انواعها. مع العلم ان هذه المعاصر يمكنها التوافق مع معصرة الزيتون ليشكلوا معا معصرة واحدة متعددة الاستخدام وبسعر واحد.

Palestine
Palestinian Central Bureau of Statistics

Issued on: 2012 /04/02

Press Release on Olive Press Survey in the Palestinian Territory, 2011

Olive oil production lower in 2011 than 2010:
The quantity of oil extracted in the Palestinian Territory in 2011 fell by 12.6% compared with 2010 to 20,754 tons.

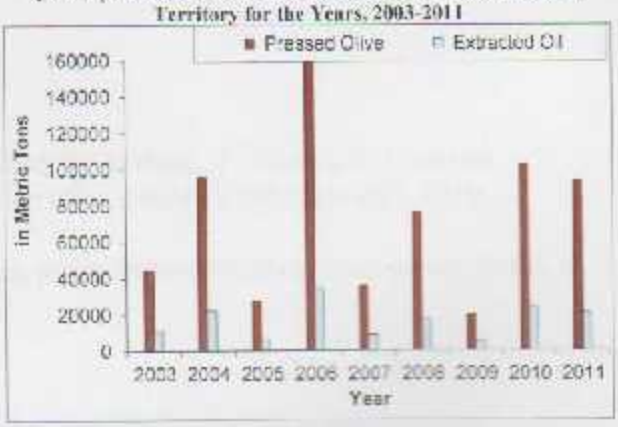
The total quantity of olives pressed in 2011 was 93,565.7 tons, 19.5% of these in Ramallah and Al_Bireh Governorate and 17.5% in Nablus Governorate.

The value added of olive pressing activities totaled US$7 million in 2011 while intermediate consumption and output of olive presses totaled US$2.5 and US$9.5 million respectively. The value added totaled US$8 million in 2010.

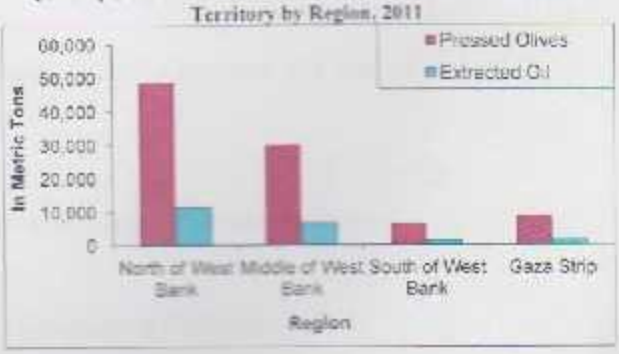
A total of 272 olive presses were operating in the Palestinian Territory, of which 240 were fully automatic presses and 32 were half automatic and traditional presses.

The results show that 1,326 persons participated in olive pressing activities in 2011, of which 70.8% were waged employees with compensation totaling one million US dollars.

Quantity of Pressed Olive and Extracted Oil in the Palestinian Territory for the Years, 2003-2011



Quantity of Pressed Olive and Extracted Oil in the Palestinian Territory by Region, 2011



For more information, please contact:
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- **References**

[1] M. Qutub, S. Ali , M. Mutawea ,M. Abed, T. Arabasi , F. Pierini, E. Lodolini "Characterization of the main Palestinian olive cultivars and olive oil", 2010.

[2] Palestinian Central Bureau of Statistics, press release on olive press survey in the Palestinian Territory, 2011.

[3] Pauel Vossen, Olive oil processing technology influences on quality.

[4] international olive council "trade standard applying to olive oils and olive-pomace oils" http://www.internationaloliveoil.org

[5] Dimotrus Beskuo, Olive oil chemistry and technology, 2nd edition, , 2006.

[6] Dimotrus Beskuo, Olive oil production, , University of California.

[7] Influence of the type of olive-crusher used on the quality of extra virgin olive.Technol.105(2003)

[8] Influence of malaxation conditions on virgin olive oil yield, overall quality and composition.

[9] Joseph shigley, Mechanical design engineering, 3rd edition

[10] http://www.ia.omron.com/product/item/e2k_5001f/index.html

[11] http://www.thermistor.com/productDetails.php?prodID=34

[12] http://www.pall.com/pdfs/Power-Generation/IMWS10EN.pdf

[13] http://www.alibaba.com/productgs/711512959/Low_rpm_single_phase_ac_electric.html