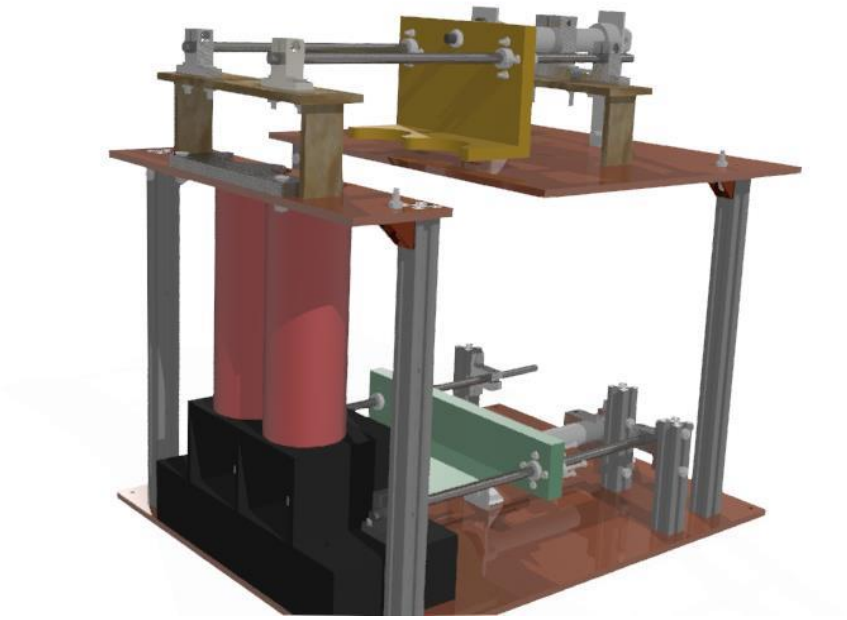
Feeding Station



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Introduction :

The feeding station Is the first station in the project and the last too ,where it supplies the other stations with the product and receive the final product in the end .

It is a crucial part in factories where parts are inserted and are required to be turned to Products .

The feeding station will accept parts from the top of the station and pushes it to fall into tubes which then is pushed to the conveyer belt to start the working process and go to the assembly station .

The feeding station works on pneumatic cylinders which actuates the pusher on the top and bottom of the station.

When the part comes from the disassembly station 2 IR sensors are placed in order to know when to stop the conveyer belt and start the pusher , then the pusher pushes the disassembled parts into tubes then the parts wait until the IR sensor sense them ,when that happens the pusher in the base is then actuated by the pneumatic cylinders and pushes the parts to the conveyer belts which the start the motor of the conveyer

Cad Model :

BASE :

The base has holes and grooves in it to inform the assembler where to put the parts and help in the fixation of the supports

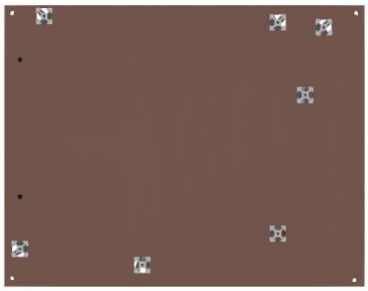


Figure 1 : Base

SHAFT FIXATIONS :

The shafts are being held by the shaft end supports (SK8) ,which are fixed on the wood by screws and there are ball bearing on both shaft for better performance

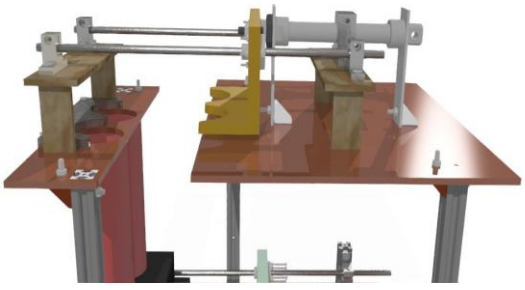


Figure 2 : Upper Shafts

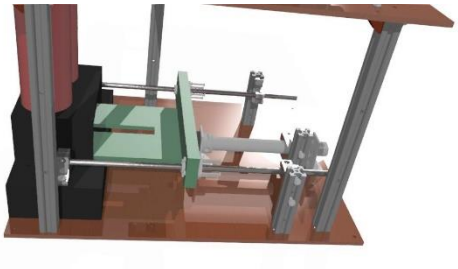


Figure 3 : Lower Shafts

PNEUMATICS :

The pneumatics is fixated by two woods from the front and the back and is fixed to them by using nuts

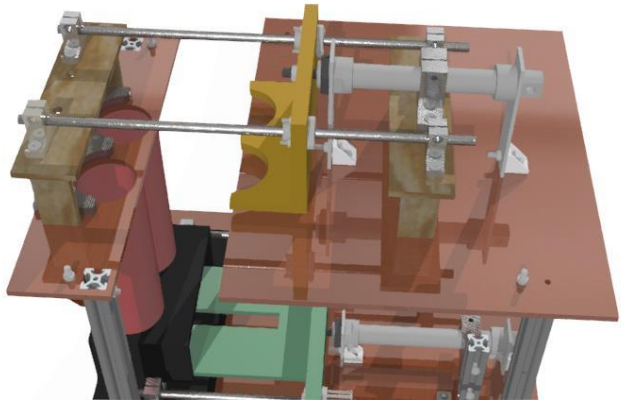
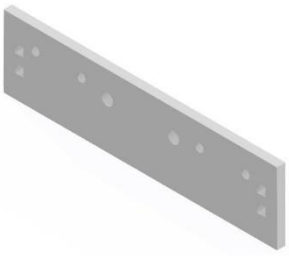
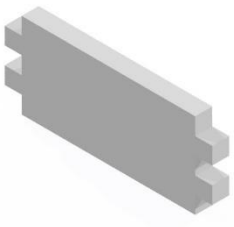


Figure 4 : Pneumatics

SHAFT END FIXATION :

The shaft end supports are fixed to a piece of wood with screws ,while the wood itself is fixed by grooves between it and another one





V RAILS FIXATION :

The v rails are fixed to the ground and the upper part by using corner brackets and bolting them to the rails

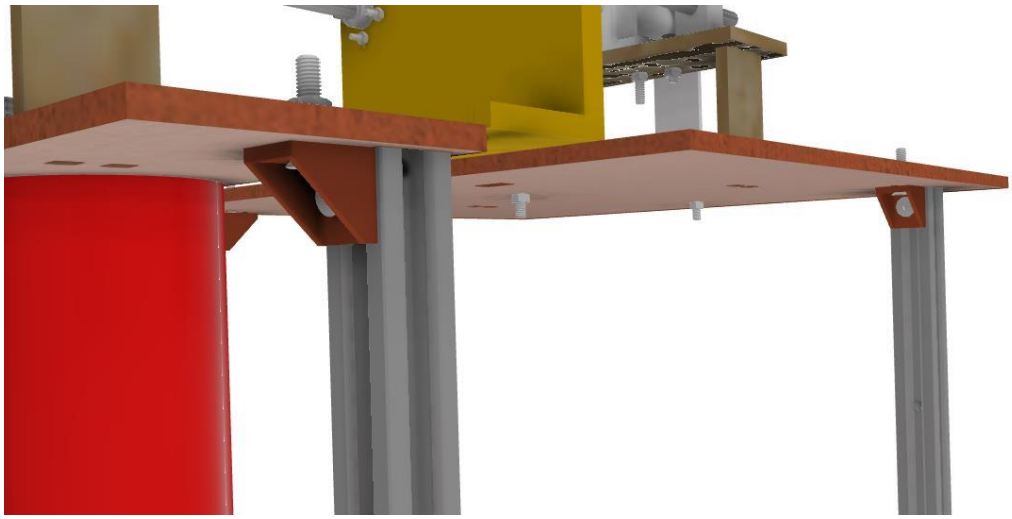


Figure 5 : Corner Brackets

ASSEMBELED CAD :

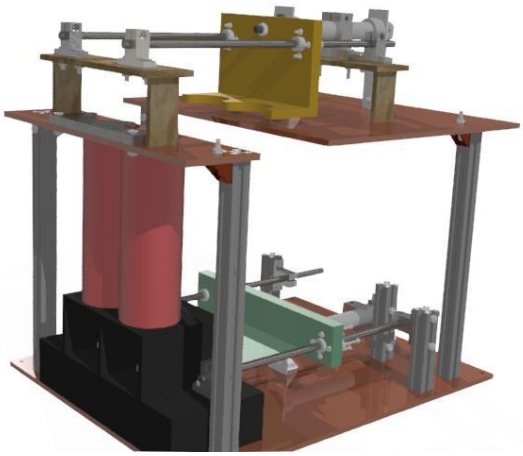


Figure 6 : Assembled CAD

Matlab :

MODEL :

The model for the matlab is simplified in order to make matlab easier to use and faster

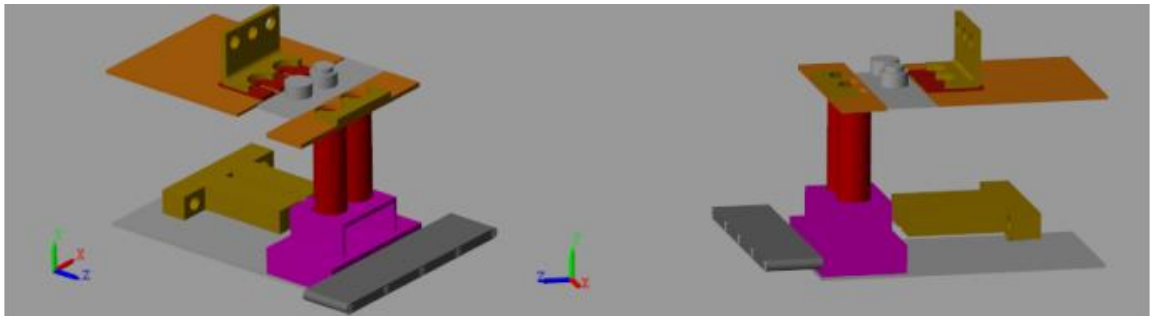
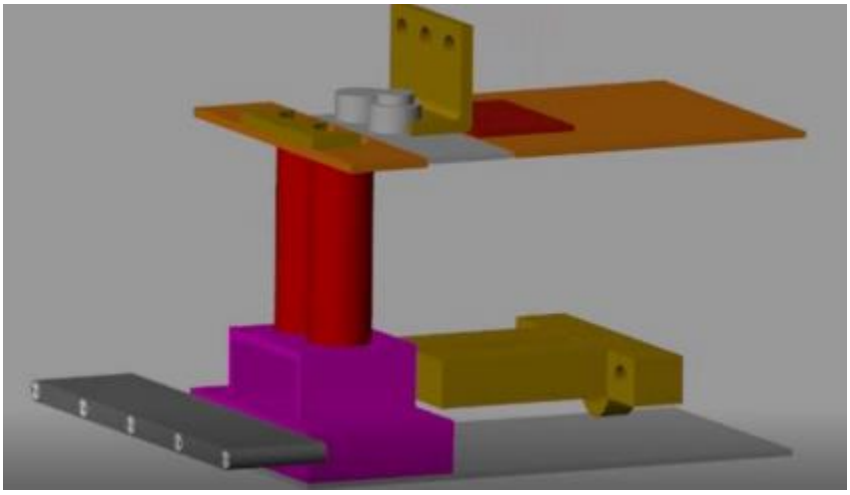


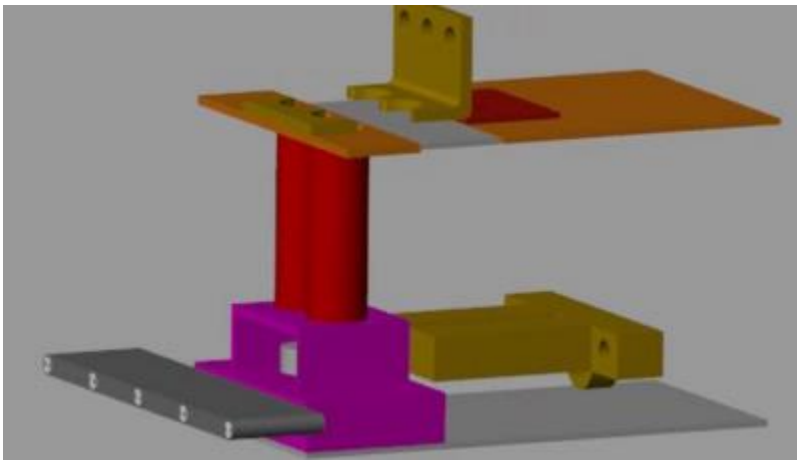
Figure 7 : Matlab Model

SEQUENCE :

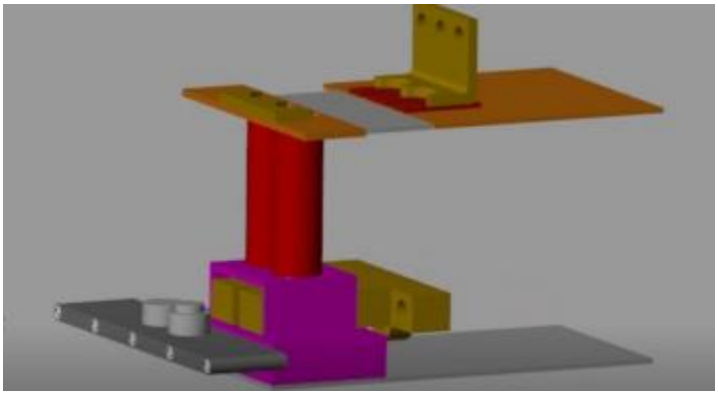
1- First thing is the part gets pushed into the tubes



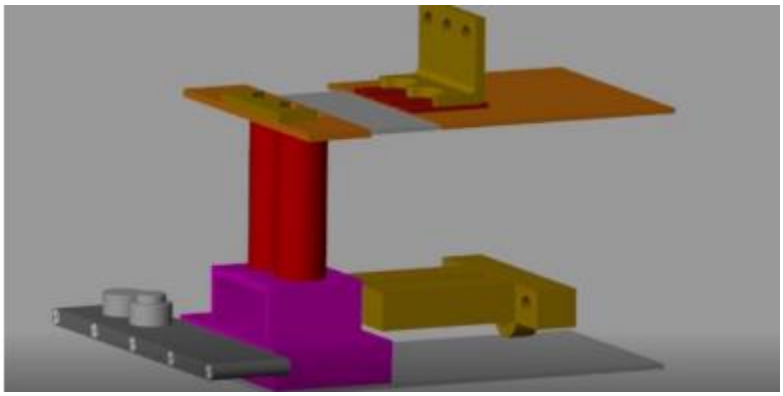
2- The parts fall in the tubes



3- The parts get pushed again by the other pusher



4- The part gets pushed by the conveyer belt



ACTUATOR SIZING :

We assumed the velocity profile of the pneumatic cylinder

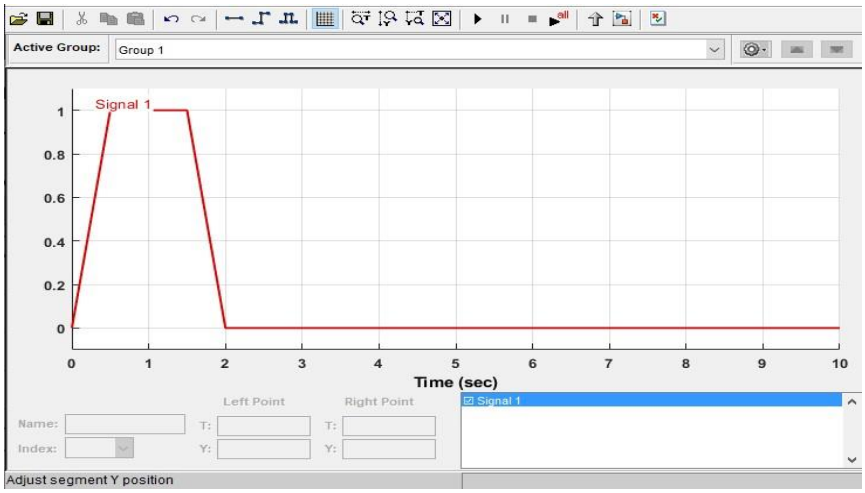


Figure 8 : Velocity Profile of Pneumatic Cylinder

Then we measured the output signals then determined the needed force for the cylinder

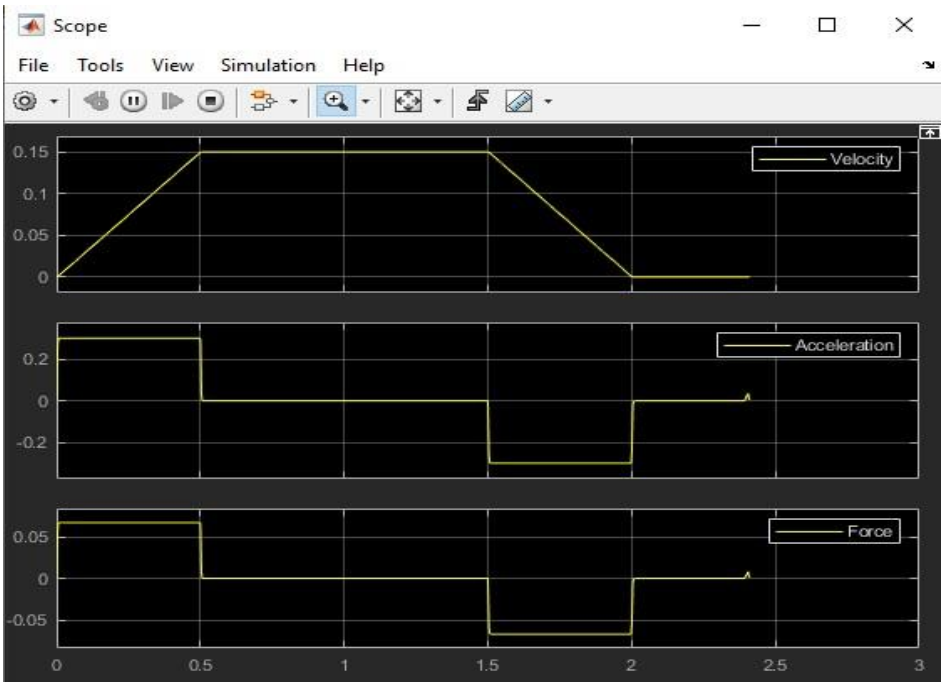


Figure 9 : Actuator Sizing

Components :

PNEUMATIC CYLINDERS :

We chose the pneumatic cylinder because we saw It easier than using a lead screw and because it is faster and has better force the only downside of the pneumatic cylinder is that it needs a compressor in order to work

5/2 SOLENOID VALVE :

We chose this 12V valve so we can freely control the double acting cylinder and we chose the solenoid one so we can control it by using a controller which in our case is the Arduino

RELAYS :

In order to control the solenoid valve we would need a voltage of 12V to open the valve and close it freely .

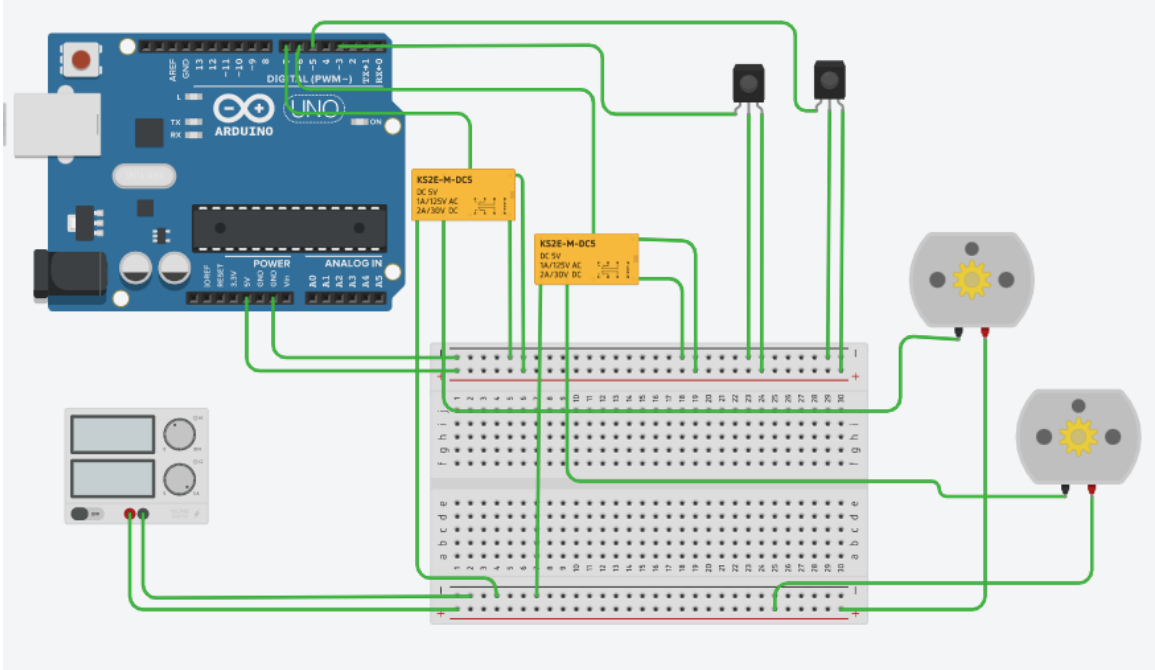
In our case the Arduino can't control the valve directly because it can only handle 5 v so we used a 5V relay in order to close or open according to the signal that comes from the Arduino

IR SENSOR :

We used the 5V IR sensor because it is compatible with our Arduino

PCB :

We used proteus to design our pcb ,our goal was to make a common ground and 5 V from the Arduino and a common +12V from the power supply and a – 12 V by using a parallel connection to connect all the same voltage to the same node



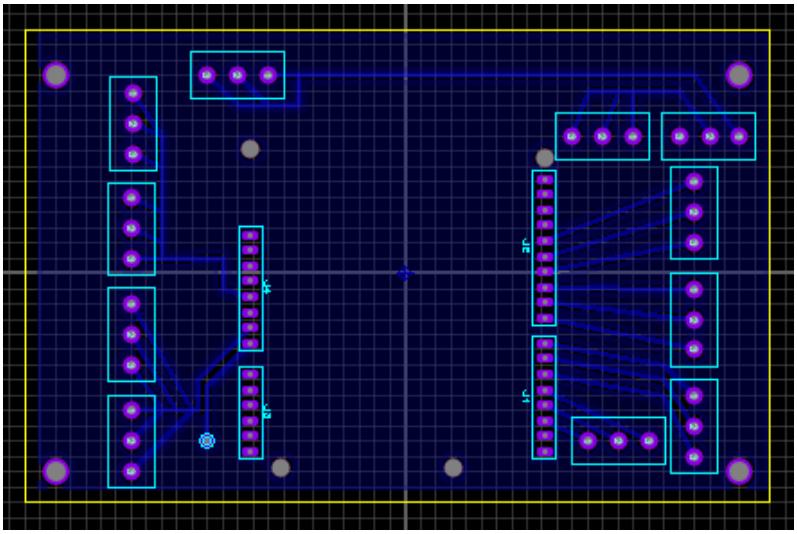


Figure 10 : PCB Layout

Bill Of Materials :

Item Name	Number	Price Each	Price Total	Total Paid
SK8 Linear Shaft Support Unit	8	25	200	**2103**
Flange Mounted Linear Bearing LMK8UU (8mm Día)	4	25	100	
5/2 Directional Valve	2	145	290	
V slot Beam (1m)	2	55	110	
Pneumatic Cylinder (20*100) with adjustable Fittings	1	200	200	
Drop in T-Nut for V-Slot Aluminum Bar (5mm)	20	2	40	
M5 1cm Bolt	20	0.5	10	
M5 Bolt 2cm or more	15	1	15	
M3 bolt 2cm	16	0.5	8	
Cast Corner Bracket	12	10	120	
5cm Wood	1	25	25	
V-Slot Beam Manufacturing	1	50	50	
8mm Shaft (1m)	2	85	170	
Pneumatic Cylinder (20*75) with adjustable Fittings	1	120	120	
Laser Cutting	1	450	450	
Ir sensor	3	40	120	
Relay module 5V 2ch	1	45	45	
Pin header 15mm height 2.54 pitch	2	5	10	
Screw terminal block 3pole 5 mm	10	2	20	