GOVERNMENT OF WESTERN AUSTRALIA

TAFE WA South Metropolitan

LATHE AUTOMATION

FINAL PERSONAL PROGRESS REPORT

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CNC Lathe project Group

28/11/2017

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ABSTRACT

The following information are about a personal contribution of a certain member of a group that is responsible on making an old manually operated lathe into a CNC lathe. This report contains research, hand written designs, CAD modelling, and other group activities.

INTRODUCTION

The Lathe machine is one of the most used machinery in metal work industries and also for wood workers. This machine is very important to have in a workshop, if any round material needs to be shaped, cut, or smoothen this machine is the answer.

A CNC Lathe is a type of machinery that is used to shape hard materials by turning. With the use of computers this particular machine is automated and is able to work using command codes in a computer. The task of the group is to use an old manually operated lathe (Brand: Colchester-Student-1800) and transform it into a CNC Lathe.

The purpose of this report is to evaluate all the work and participation of an individual that is part of a certain group. The information that is in this report is placed in an order from the first part of the project into the final finished date of the project.

1. RESEARCH
2. CAD MODELLING
3. LATHE COVER
4. MANUFACTURING
5. CONCLUSIONS

CNC Lathe Research

Before all the work was done, the group did some research about important information about the lathe to get familiar with it and to minimize the rate of failure of the project. Research includes functions of the lathe, forces on x and z axis, and other important information that can help the group progress and create a sustainable CNC lathe.

Personal research that I've found that helped us find the right forces needed to obtain the right servomotor to move the ball screws in the lathe.

Properties of Mild Steel

http://mechanicalinventions.blogspot.com.au/2014/08/mild-steel-properties-of-mild-steel.htm

I've done some research on the properties of mild steel and found out its characteristics such as being tough, ductile and malleable, it also has good tensile strength but poor corrosion resistance. It is mainly used as an all-purpose engineering material. These information are necessary to be able to know more about this material and identify the necessary force that we need to apply to be able to cut this metal into our CNC lathe.

Lathe tool bit

Also searched about different kinds of tool bit such as chamfering tool and Grooving & Cut-off Tool. Even though we seem to have enough tool bit that are in a good condition, it is still good to have extra information about it and where we can get it.

Kinds of Lathe tool bit

http://littlemachineshop.com/products/product_focus.php?Focus=Cutting%20Tools%20Lathe

Chamfering tool, ½" Indexable, SCSCR-08-3A, Tormach

- Designation: SCSCR-08-3A
- Steel shank ½" x 4"
- Designed for CCMT and CCGT 32.51 inserts
- Approach 45® , 7® relief angle
- Insert Shape: 80® (C)
- Price, $39.83

Grooving & Cut-off Tool, ½" indexable HHS Inserts, A R Warner

- For external grooving and cut-off operations

- Includes two 1/16” (.062”) groover T-15 high speed steel inserts
- Includes two 1/32” (.031”) groover T-15 high speed steel inserts
- Includes two 1/64” (.016”) groover T-15 high speed steel inserts
- Includes two IS 3007 screws and one T-9 wrench
- Price, $135.00

Colchester-Student-1800 Basic Operation

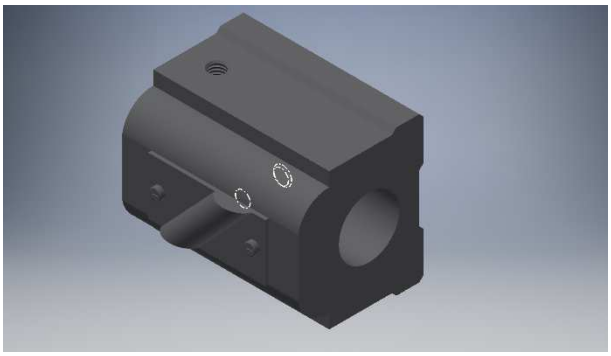
http://www.powershow.com/view4/6efb60-MDUxO/Colchester_Student_1800_Basic_Operation_Manual_powerpoint_ppt_presentation

I found some good information online on how to use the lathe step by step. It is necessary for us to know the basic operation of the kind of lathe that we are converting into a CNC machine, because it will give us ideas on how to make the controls better and the purpose of the parts that we are still using.

Ball Screw Inventor Drawing

Found a webpage that could help us add a ball screw and nut to our inventor assembly. This webpage allows us to download a 3d cad model of the selected ball screw nut that we needed, it made it easier for us and saved us time of doing it ourselves. Of course we’ll have to change it up just in case it doesn’t meet our needs but so far it was a good help for us.

Website link: http://www.thkstore.com/bnt-nut.html

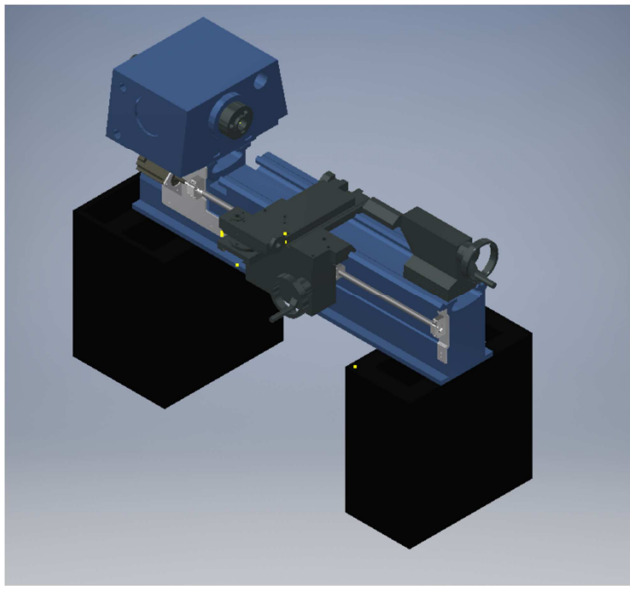


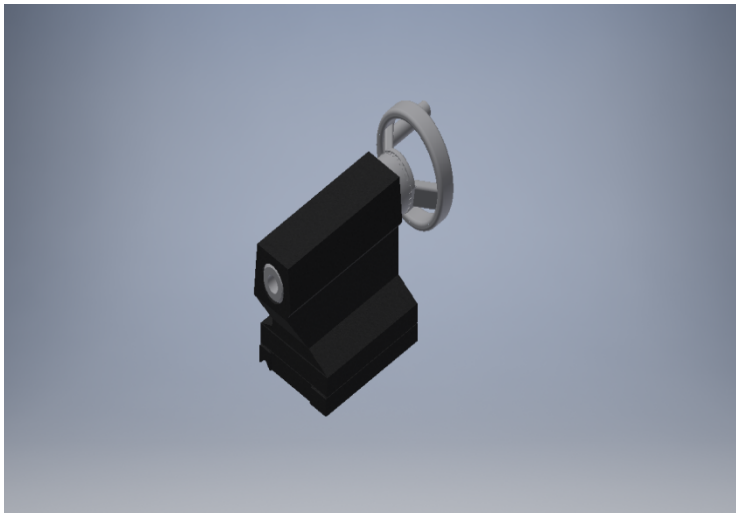
These ball screw and nut are not the actual design that we used for our CNC lathe Model, we used these designs as reference to the actual ball screw and nit that we have into our lathe machine.

CAD Modelling (Inventor)

The group decided to pull the old lathe apart and decided what parts will be kept for CAD modelling. Then we assigned each member of the group to pick a part that they are confident to draw using inventor, and as soon as each of us have done this we will do an assembly file of all the parts done together. For my personal CAD modelling I decided to do the tailstock of the lathe.

TAILSTOCK





Calculations

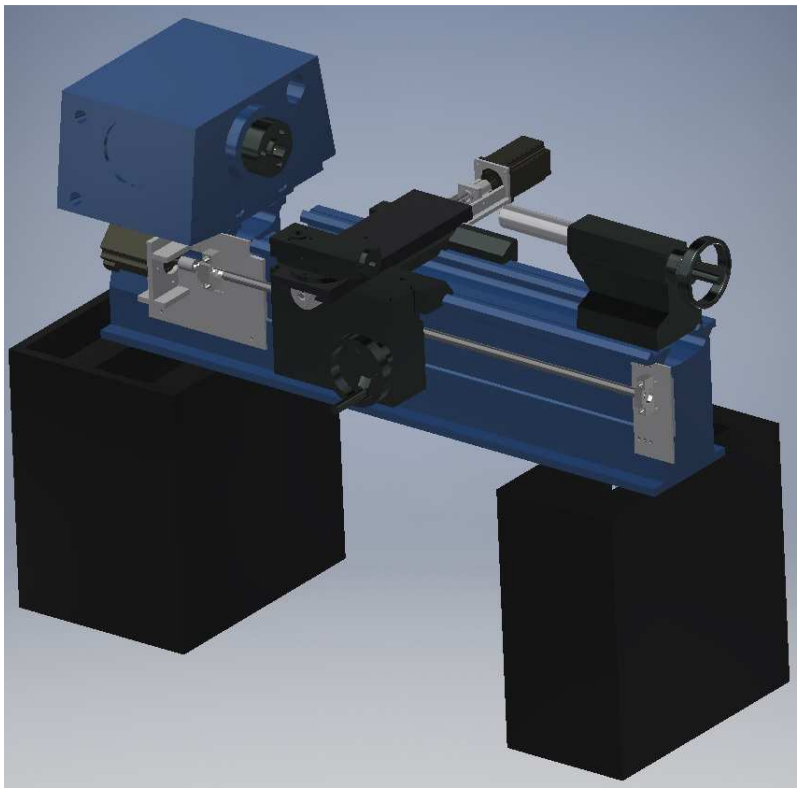
The calculations needed for selecting the proper motors for the lathe were done by “The Human calculator” Miguel Martins and group’s very own Assistant manager, sadly our very own manager Corey Wise could not be able to do it himself because of being sick and not being able to attend most of the classes. We tried to help of course but Miguel Martins was enough for the job.

Lathe Final Assembly

Due to uncertain events the final assembly have only been completed on a 3D Model (Cover not included) because the machinists and lecturers were unable due to absence and shortage of materials and also because they moved most of their materials into another campus.

But the design looks amazing and ready for manufacturing; parts have arrived and prepped for the machinist to start work anytime.

3D Model Lathe

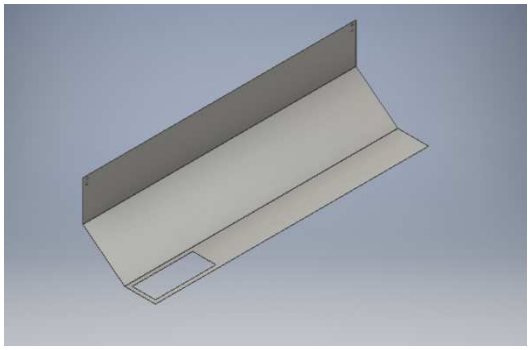


LATHE COVER

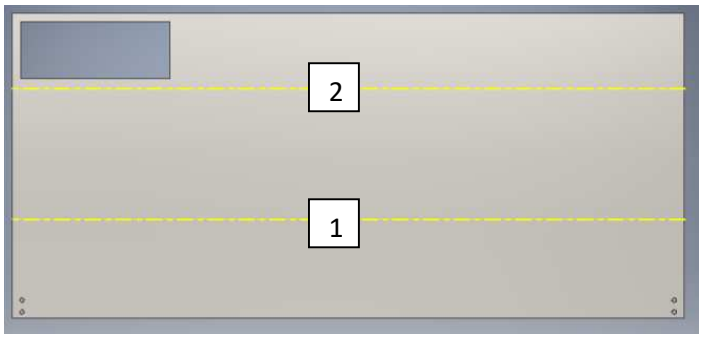
For my personal participation I was one of the members assigned to design the Cover along with Alex Rubstov who is doing the Door of the Cover. Unfortunately the ends of the covers were not finished because I was unable to do them in inventor.

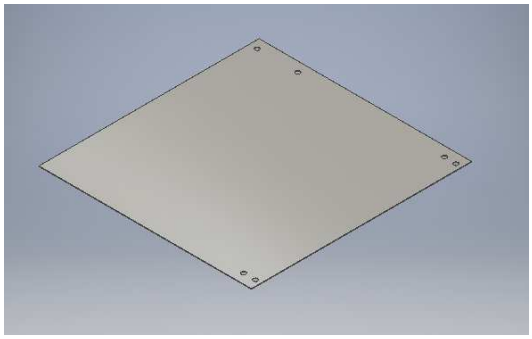
In order to fit the cover into three sheets of metal (mild steel), I divided the cover into 5 parts, the figures below shows the bended and flat form view of the parts:

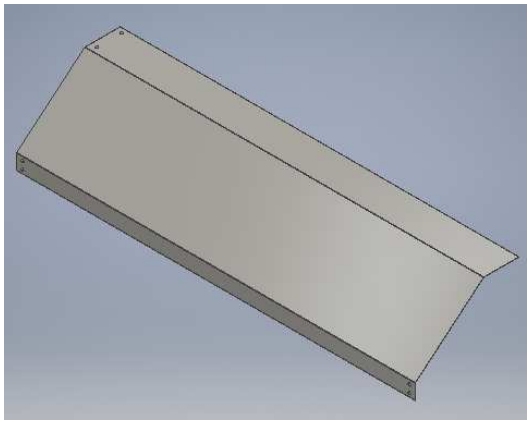
FOLDED PART

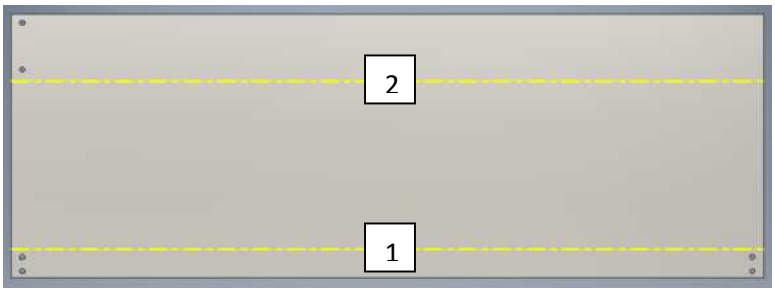


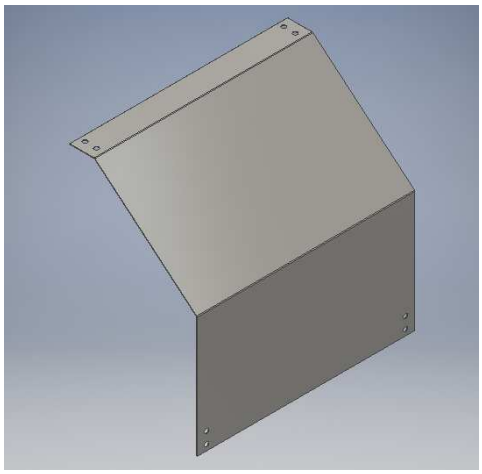
FLAT PATTERN (with bend order annotations)

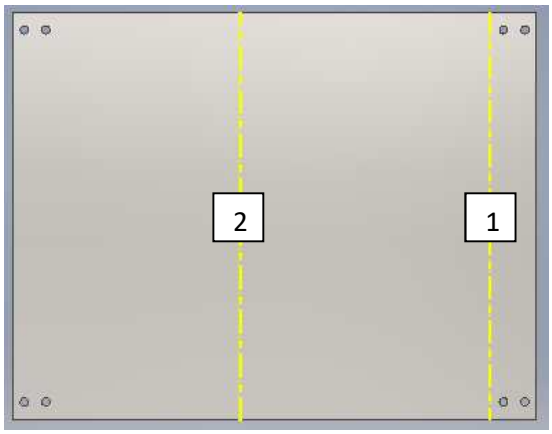


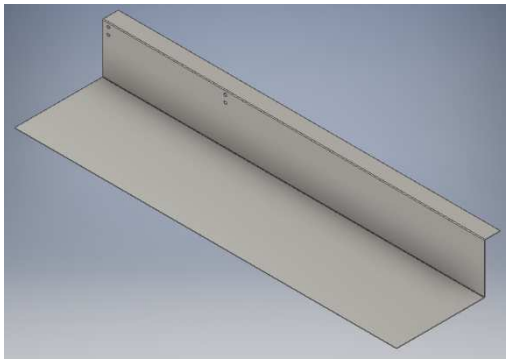


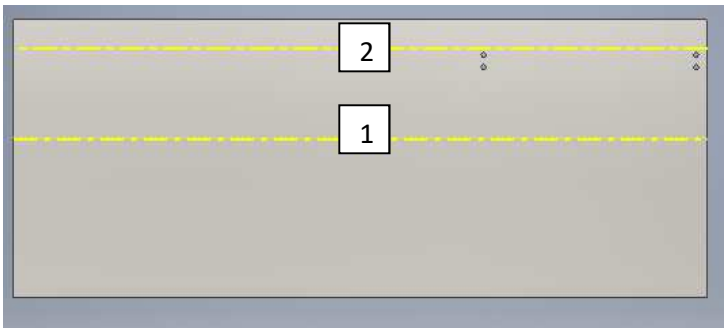






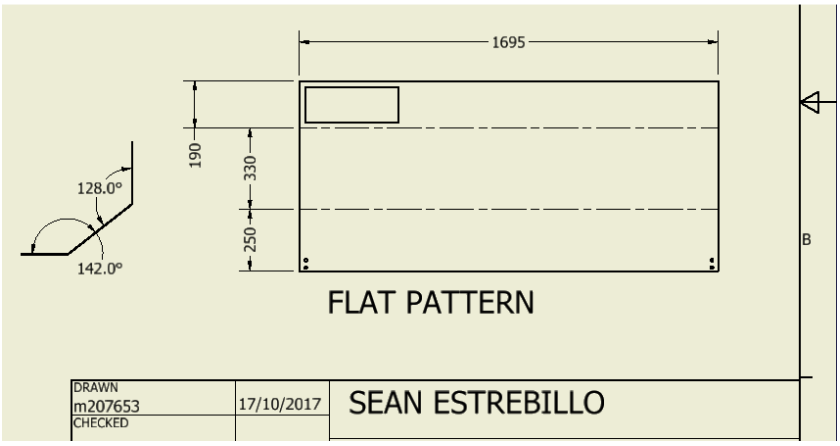


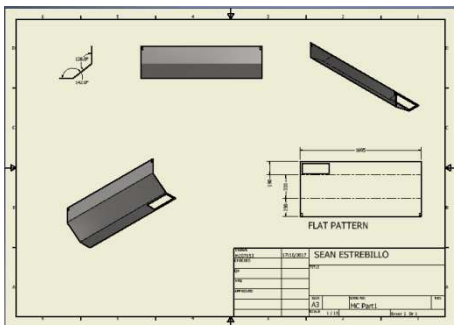


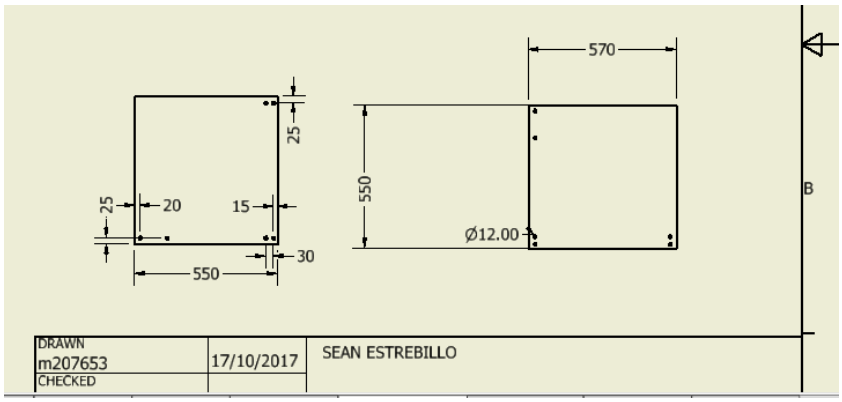


MANUFACTURING

The following figures are the work plan or detailed drawing of the lathe cover parts.(Note: Every drilled holes are measured **12mm Diameter**)



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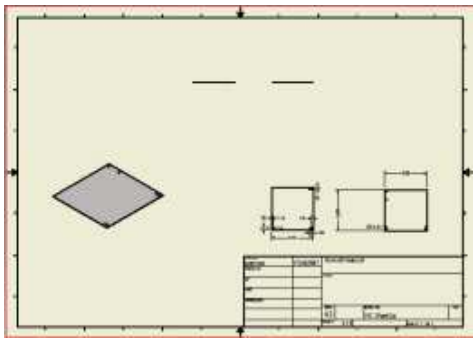

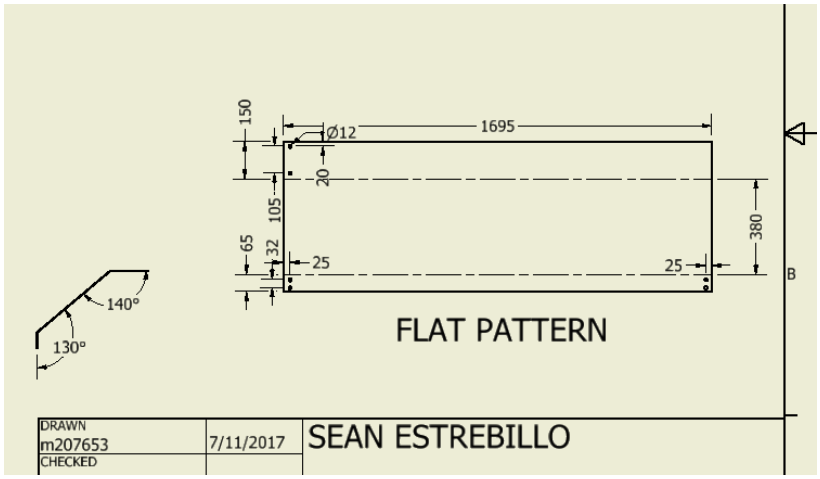
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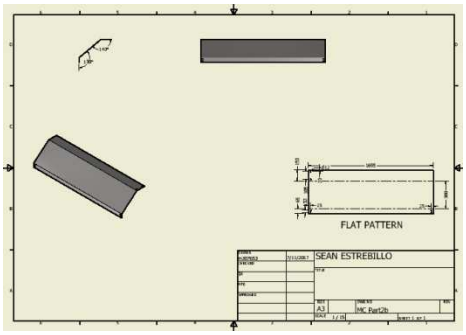
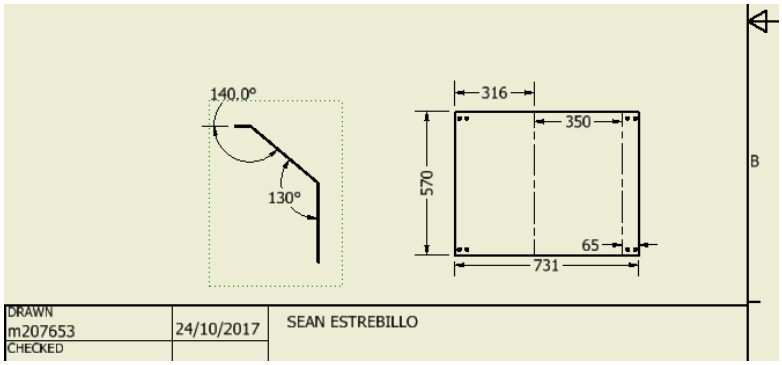

FLAT PATTERN
SEAN ESTREBILLO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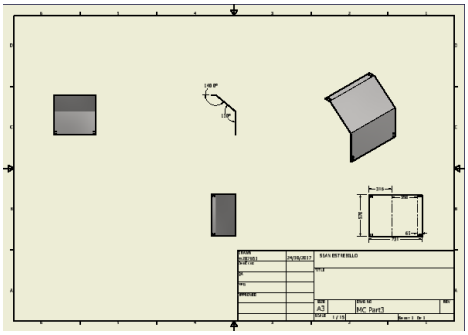
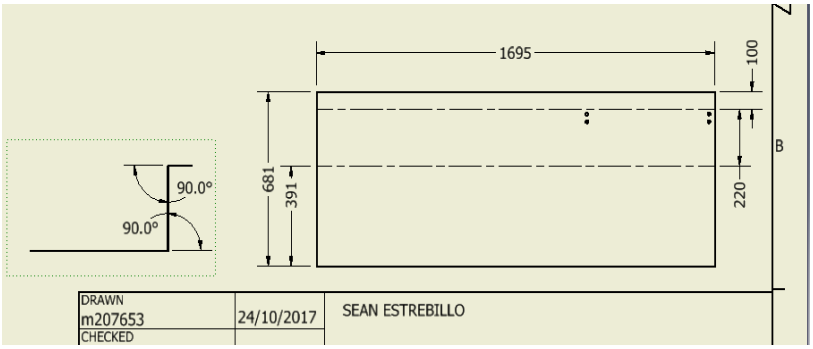
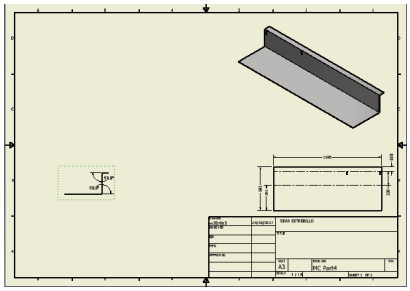
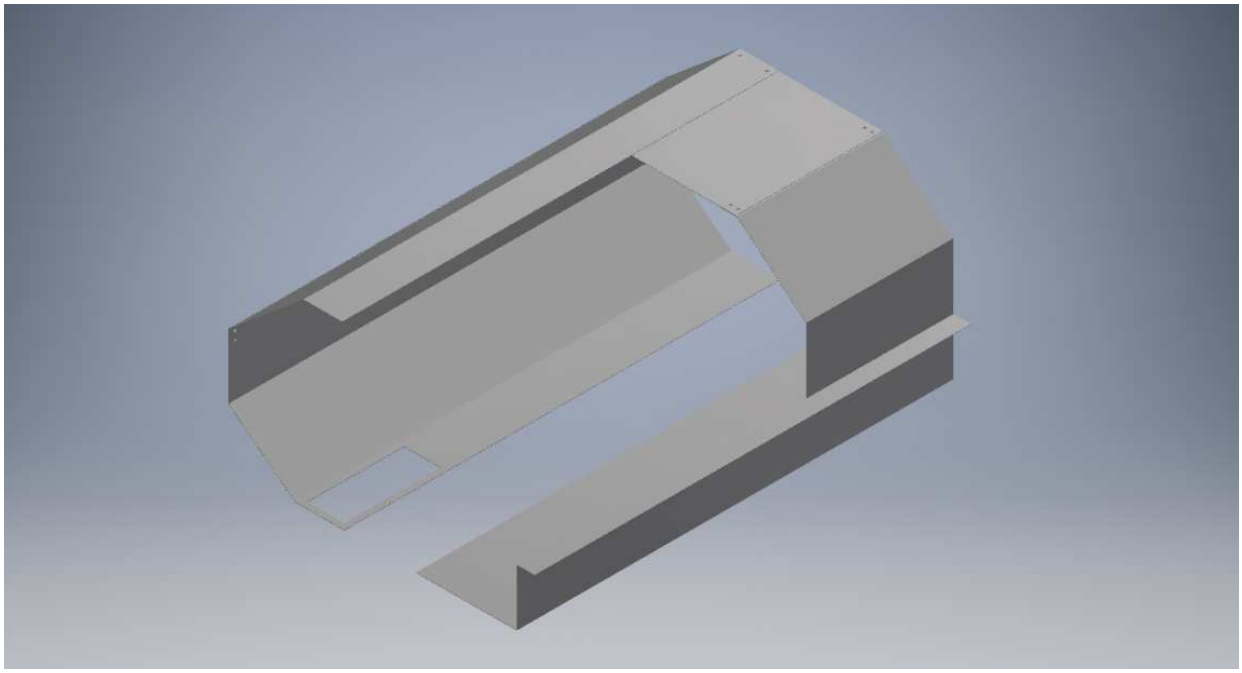




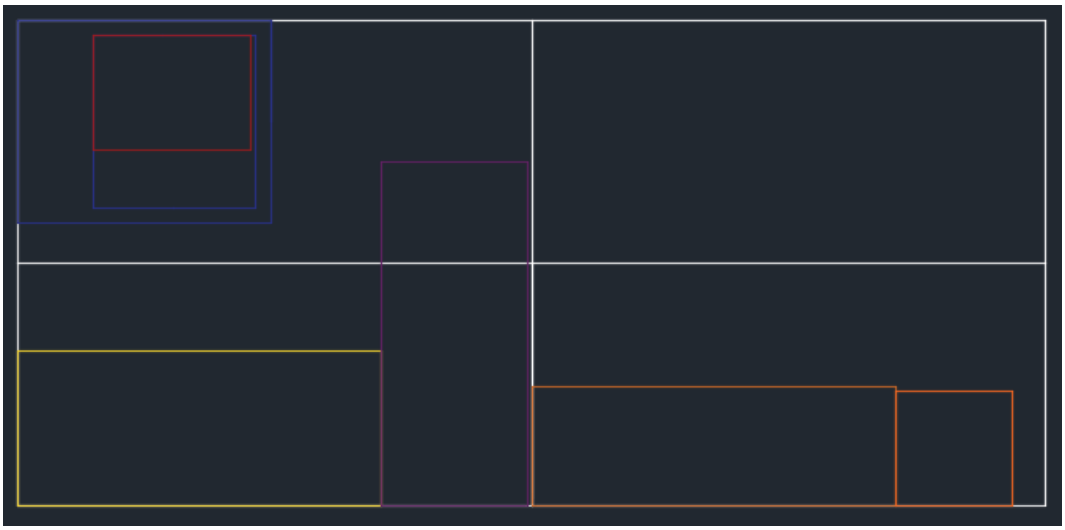


Lathe Cover Final Assembly (main body)

The cover is yet to be assembled practically, but it would very simple to assemble these parts with the right tools and machineries.



The figure bellow is a small representation of fitting the lathe cover parts into three sheets of 1.6mm thickness of mild steel with a dimension of 1200 x 2400 each sheet metal.



Note: the purple part which is part 5 can be welded together if possible, for us to be able to make room for the Ends of the lathe cover.

CONCLUSION

Even though we've finished all the virtual and 3D representations of the lathe, we still have not finished some of its other parts and practical work too actually assemble the project together, but the important parts such as the proper servo motor that we need for the lathe is done and bought, all that is need to be done is the practical assembly of all the parts that we currently have including the lathe cover if ready.

The lathe cover has not yet been assembled with the actual part virtually, because the final CNC lathe assembly is made through inventor 2018 and the cover is made with inventor 2016, which made them incompatible to each other.

In conclusion of all the things done in this project all of the researches, 3D models, and parts in the z and x axis such as the ball screws and nuts and servo motors are acquired and ready to be assembled to the lathe. None of the electrical and electronics have not had any progress at all, but this is because of unfortunate events that are out of our control. In my estimation the work done on this project is only 50% work.

Recommendations

In order to add another 10% work into this lathe the ball screws and nuts along with the servo motors are need to be manufactured into the lathe and assemble back the old parts needed for it to work, then start work on the lathe cover using the manufacturing sheets connecting each parts with 12mm screw and nut along with washers and gaskets for the cover to be water proof.

The cover's dimension shows that there are a lot of spaces in the cover to place sensors.

REFERENCE

http://www.midaliasteel.com/products/sheet-metal/ - a website where we can order the sheet metal we need.

Appendices

Appendix 1

ZINCANNEAL SHEET - AS1397 G2S ZF100							HIDE
THICKNESS (mm)	SIZE (mm x mm)	WEIGHT (kg/sht)	SHEETS / TONNE	$PRICE	UOM	QTY	ADD TO CART
1.00	1200 x 2400	22.98	43	$66.20	EA	1	+
1.20	1200 x 2400	27.5	36	$80.60	EA	1	+
1.60	1200 x 2400	36.54	27	$100.64	EA	1	+
		37.99	26		EA	1	+