MECH-289 Assignment CAD3

Handed out: **March 1st, 2006** Due: **March 13th, 2006**

NOTE: You are being given extra time for this assignment because of the amount of work involved. Due to the fact that this assignment will be submitted electronically, you are STRONGLY urged to attempt submission before the deadline. More details about file submission will be made available as needed.

As a shiny new graduate of McGill, one of the first tasks you are given as the new intern of ***DesignCo*** is to make modifications to a CAD assembly model that a recently departed employee had created. In industry terminology this is known as "cleaning up someone else's mess".

The design is for a wooden frame to support sensor hardware within a portable enclosure. (See attached drawings of the frame). The reason for the required changes is that the available material is a different thickness than originally planned. The model uses material 12.7mm thick, while the actual part thickness is to be 11.***X*** mm, where ***X*** is the last digit of your student number. In order for the frame to properly support the hardware, certain dimensions must be respected in the modified model. These dimensions are shown on Sheet 2 of the drawing "frame assembly".

In addition, the existing model does not have provisions for appropriate clearances necessary for assembly. You are told that a total clearance of 0.4mm is required for the slots. You are to model the assembly with a 0.2mm gap on each side of the parts where required. You are to decide where this is necessary. Once assembled, the top and bottom edges of the frame must remain flush with each other. Set the height of the "tongues" in Parts 1-3 to 12.5mm. Adjust slots accordingly.

Upon opening the files you will discover that your predecessor did not have a proper understanding of important parameters that drive the design. As such, many more changes than necessary are required to update the model. This gives you a clue as to their early departure from ***DesignCo***.

Not wanting to meet the same fate, you apply your considerable intellect to modify the part sketches and features to make use of some or all of the following: symmetry, sketch relations, hidden lines, equations, and part-and-assembly-driven features to streamline future modifications. You will start by modifying Parts 1-5, as seen in Sheet 1 of the drawing "frame assembly". (See *hints*)

In your frustration, you will understand the importance of taking the time to think about which are the important design parameters that can be used to define the CAD model. This will be very important when you use FEA analysis in later courses to optimize part thicknesses and fillet radii. It is all too easy to take shortcuts when modeling parts. These shortcuts inevitably come back to bite you when design iterations are required.

You are given:

1. Five part files.
2. One assembly file.
3. One drawing file containing seven sheets, two for the assembly, and one each for the parts.
4. A sample eDrawings file.
5. This .pdf file with instructions and a printout of the drawings for reference.

Full marks can be received if:

1. The correct required assembly dimensions and gaps are in evidence
2. Appropriate use of symmetry has been used to create sketches and features
3. The dimensions and default tolerances are modified to indicate a global tolerance of +/- 0.1mm for the part drawings.
4. Your name and student number appear in all drawings.
5. The part thicknesses match your student number as indicated on the first page of this document.

Notes:

- The part drawings have been provided for you to save you time. You will likely need <20 minutes to replace dangling dimensions. The dimensions will get "broken" when you compress the model into a single feature. Dangling dimensions are highlighted in gold/brown to indicate that there is a problem. Please delete and replace all dimensions as needed to match the attached pages.

Hints:

- The most efficient way to create a part model is to use the minimum number of features to create the part. The parts to be modified in this assignment can all be modeled using a single feature.
- The part features themselves should be then redefined to take advantage of part symmetry about the origin
- In the assembly model, you will find that a number of assembly constraints need to be corrected. It is faster to first delete all broken constraints, and then add new constraints as needed. The new constraints should make use of part symmetry.
- Elements in part sketches can be used as assembly constraints.
- Assembly constraints using dimensions should be avoided where possible, these will be just more numbers to change when iterating a design.
- Once the assembly constraints have been modified to center parts in their slots, use the assembly model to find which other part dimensions need to be changed in order to respect the original assembly drawing.

Submission:

- To submit your work, you need to do the following:

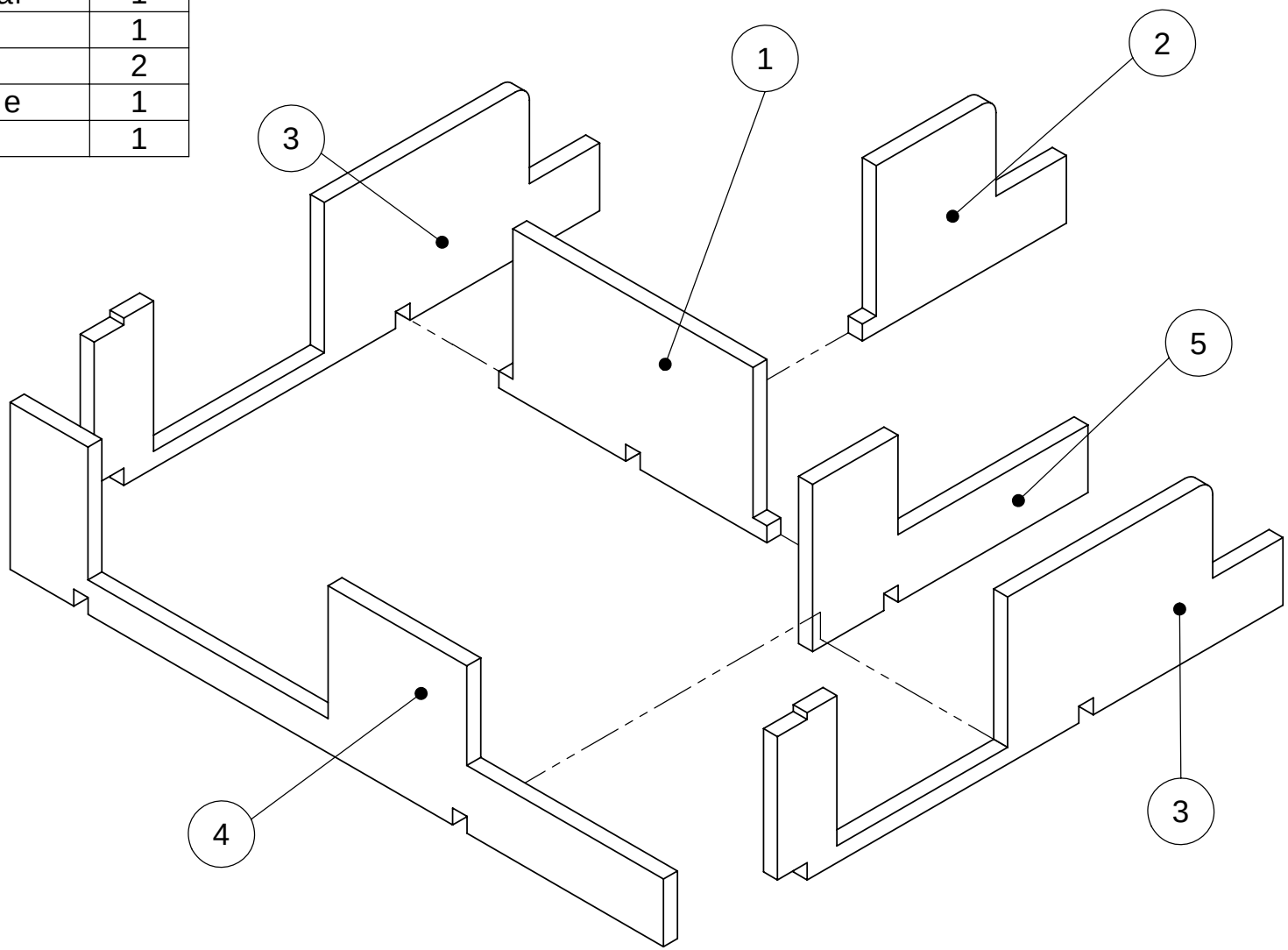
1. Modify, verify and save your model and part drawings according to the instructions above.
2. Once you have verified your work and are ready to submit, open the part drawing and click **File/Save As**. Under **Save as Type,** select **eDrawings (*.edrw).**
3. Click **Options**, and make sure that "**Okay to measure this eDrawings file"** and "**Save as shaded…"** are enabled.

4. Click **Ok**, then rename the file to include your last name and ID number (i.e Smith_110412345.edrw), click **Save**.
5. Open the eDrawings file and test that you can measure the parts using the eDrawings "measuring tape".
6. eDrawings offers two versions of their GUI, *Simplified*, and *Complete*. Only the Complete mode allows drawings to be measured. To enable the Complete GUI, click **View, UI Mode, Complete**. This setting is independent of the method used to save files.
7. Submit this file via WebCT.
8. If the parts can't be measured in eDrawings, <u>your work won't get marked.</u>

Good Luck! ☺

ITEM NO.	PART NUMBER	QTY
1	between_Batt_Char	1
2	middle_batterie	1
3	front_to_back	2
4	middle_side_to_side	1
5	batt_side	1

REVISIONS		
REV.	DESCRIPTION	DATE
		YY/MM/DD



	NAME	DATE
DRAWN	Student X	2005/07/27
CHECKED	X	YYYY/MM/DD
ENG APPR.	X	YYYY/MM/DD

DIMENSIONS ARE IN mm
TOLERANCES:
ANGULAR:
MACH ± 0.5°
BEND ± 1°
ONE PLACE DECIMAL ± .3
TWO PLACE DECIMAL ± .03

DO NOT SCALE DRAWING

MATERIAL: Wood

FINISH: --

APPLICATION: Frame 1.0

COMMENTS:

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DESIGN GRAPHICS
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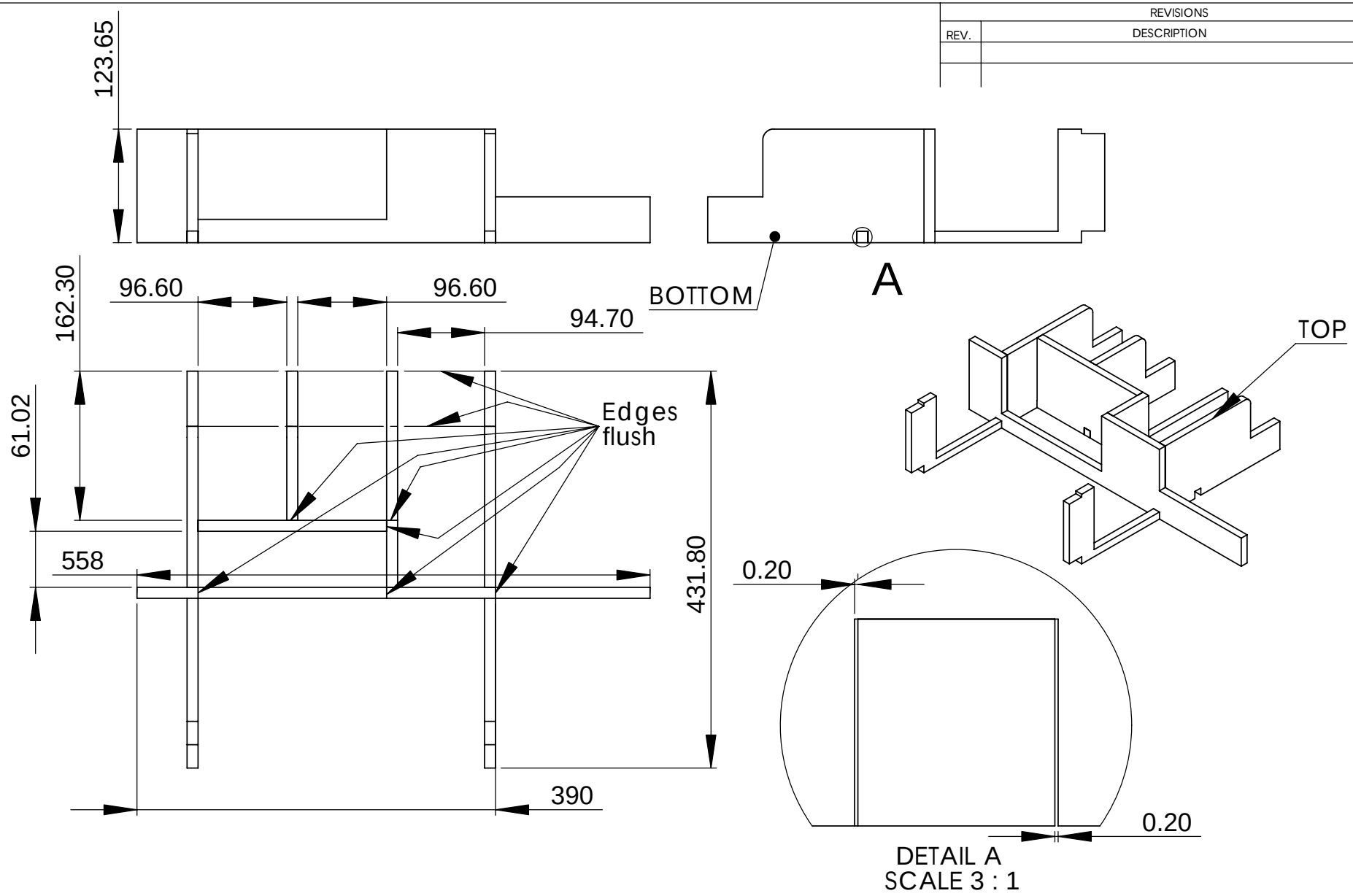
SIZE	DWG. NO.	REV.
A	frame assembly	NC

SCALE:1:10 | WEIGHT: | SHEET 1 OF 2

REVISIONS		
REV.	DESCRIPTION	DATE
		YY/MM/DD



DETAIL A
SCALE 3 : 1

		NAME	DATE
DIMENSIONS ARE IN mm	DRAWN	Student X	2005/07/27
TOLERANCES:	CHECKED	X	YYYY/MM/DD
ANGULAR: MACH ± 0.5° BEND ± 1°	ENG APPR.	X	YYYY/MM/DD
ONE PLACE DECIMAL ± .3	DO NOT SCALE DRAWING		
TWO PLACE DECIMAL ± .03			

MATERIAL: Wood
FINISH: --
APPLICATION: Frame 1.0
COMMENTS:

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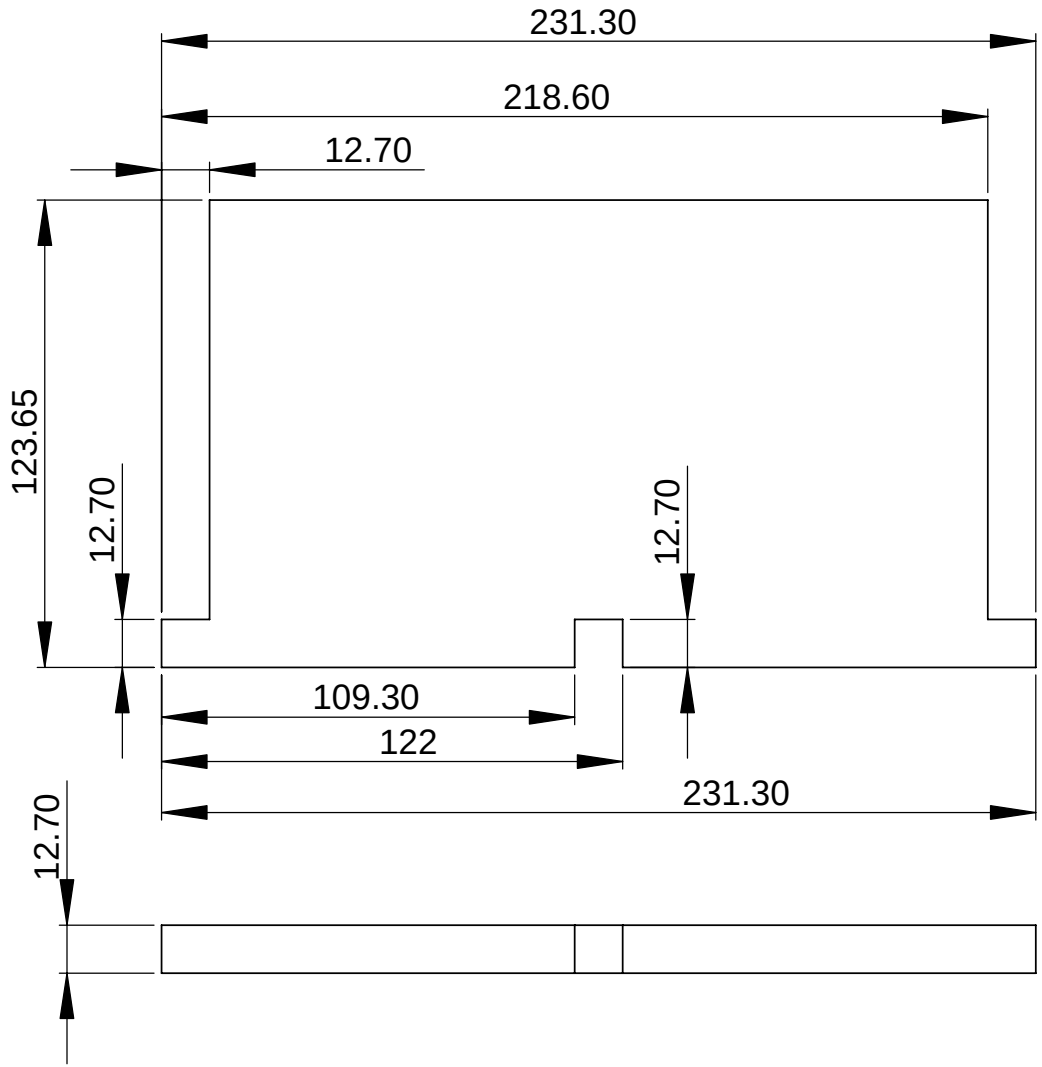
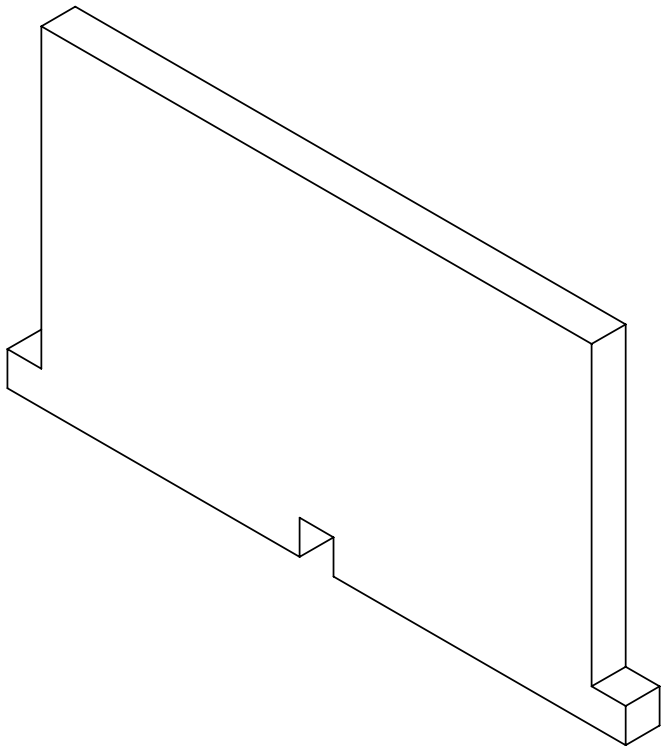
SIZE	DWG. NO.	REV.
A	frame assembly	NC

SCALE:1:6 | WEIGHT: | SHEET 2 OF 2

REVISIONS		
REV.	DESCRIPTION	DATE
		YY/MM/DD





between_Batt_Char

DIMENSIONS ARE IN mm TOLERANCES: ANGULAR: MACH ± 0.5° BEND ± 1° ONE PLACE DECIMAL ± .3 TWO PLACE DECIMAL ± .03		NAME	ID
	DRAWN	Student X	110XXXXXX
	CHECKED	X	110XXXXXX
	ENG APPR.	X	110XXXXXX
	DO NOT SCALE DRAWING		
MATERIAL: Wood	COMMENTS:		
FINISH: --			
APPLICATION: Assignment X			

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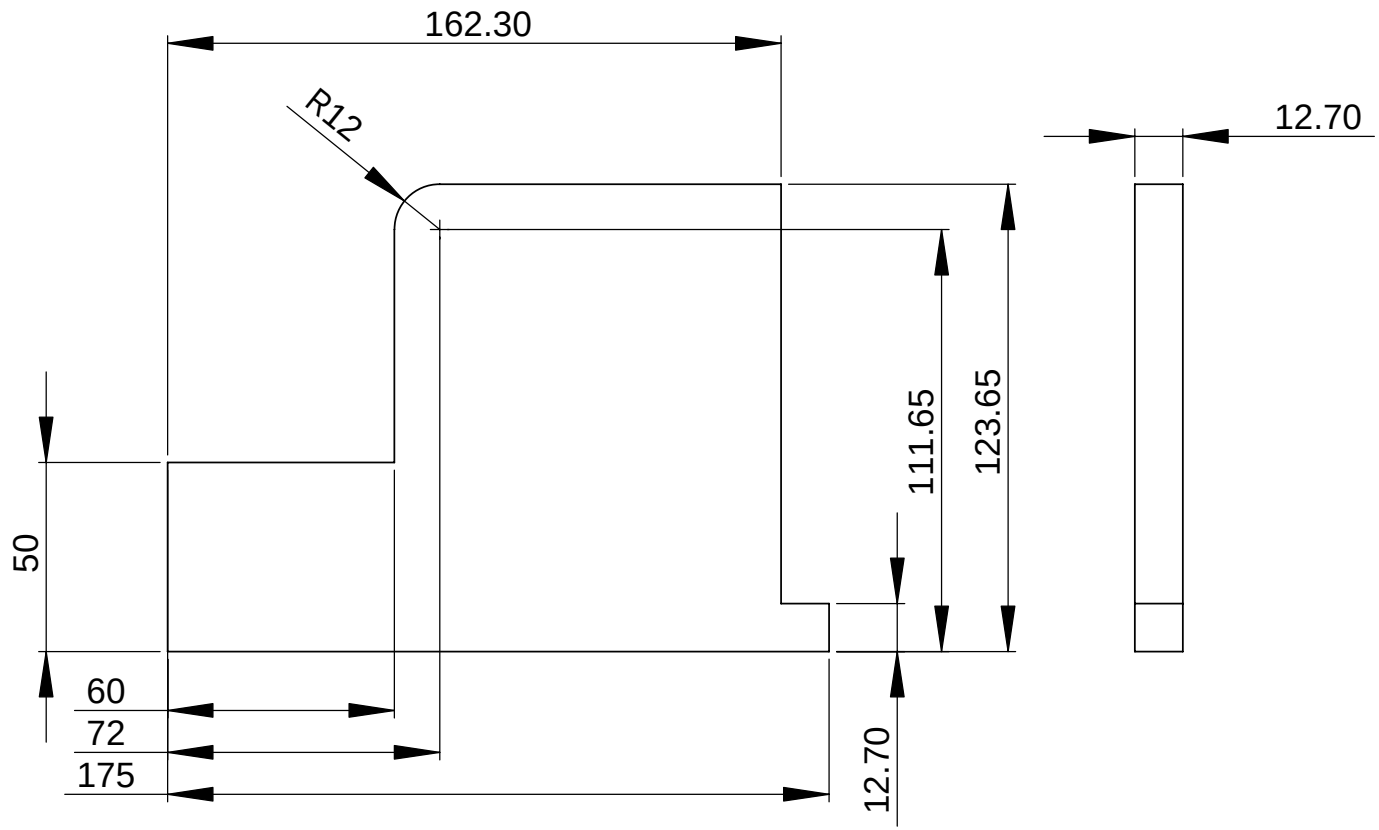
SIZE	DWG. NO.	REV.
A	frame assembly	NC
SCALE:1:2	WEIGHT:	SHEET 3 OF 7

REVISIONS		
REV.	DESCRIPTION	DATE
		YY/MM/DD



middle_batterie

DIMENSIONS ARE IN mm TOLERANCES: ANGULAR: MACH ± 0.5° BEND ± 1° ONE PLACE DECIMAL ± .3 TWO PLACE DECIMAL ± .03		NAME	ID
	DRAWN	Student X	110XXXXXX
	CHECKED	X	110XXXXXX
	ENG APPR.	X	110XXXXXX
	DO NOT SCALE DRAWING		
MATERIAL --	COMMENTS:		
FINISH --			
APPLICATION Assignment X			

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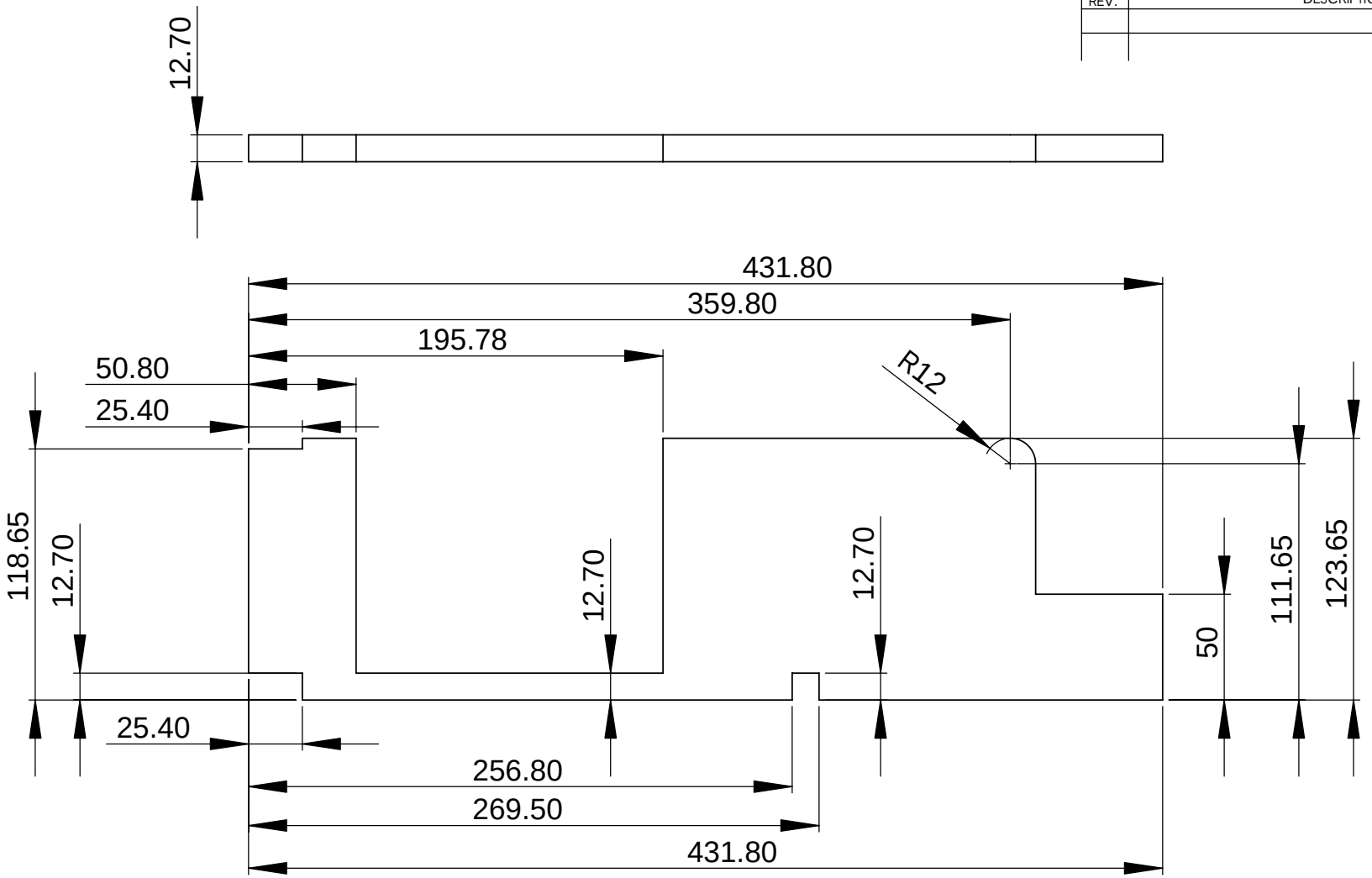
SIZE	DWG. NO.	REV.
A	frame assembly	NC
SCALE:1:2	WEIGHT:	SHEET 4 OF 7

REVISIONS		
REV.	DESCRIPTION	DATE
		YY/MM/DD



front_to_back

		NAME	ID
DIMENSIONS ARE IN mm	DRAWN	Student X	110XXXXXX
TOLERANCES:	CHECKED	X	110XXXXXX
ANGULAR: MACH ± 0.5° BEND ± 1°	ENG APPR.	X	110XXXXXX
ONE PLACE DECIMAL ± .3	DO NOT SCALE DRAWING		
TWO PLACE DECIMAL ± .03	COMMENTS:		
MATERIAL --			
FINISH --			
APPLICATION Assignment X			

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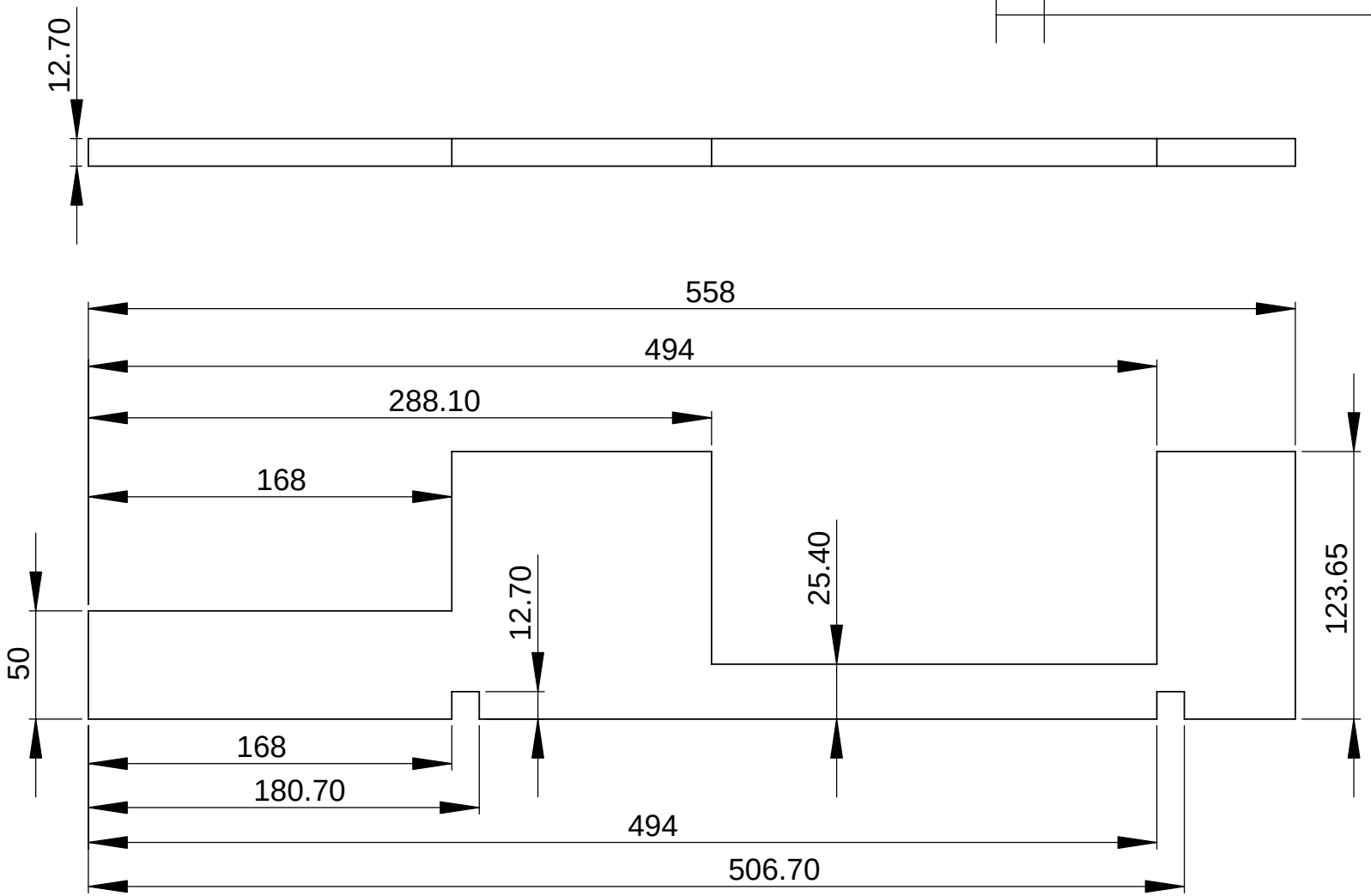
SIZE	DWG. NO.	REV.
A	frame assembly	NC
SCALE:1:3	WEIGHT:	SHEET 5 OF 7

REVISIONS		
REV.	DESCRIPTION	DATE
		YY/MM/DD



middle_side_to_side

DIMENSIONS ARE IN mm TOLERANCES: ANGULAR: MACH ± 0.5° BEND ± 1° ONE PLACE DECIMAL ± .3 TWO PLACE DECIMAL ± .03		NAME	ID
	DRAWN	Student X	110XXXXXX
	CHECKED	X	110XXXXXX
	ENG APPR.	X	110XXXXXX
	DO NOT SCALE DRAWING		
MATERIAL --	COMMENTS:		
FINISH --			
APPLICATION Assignment X			

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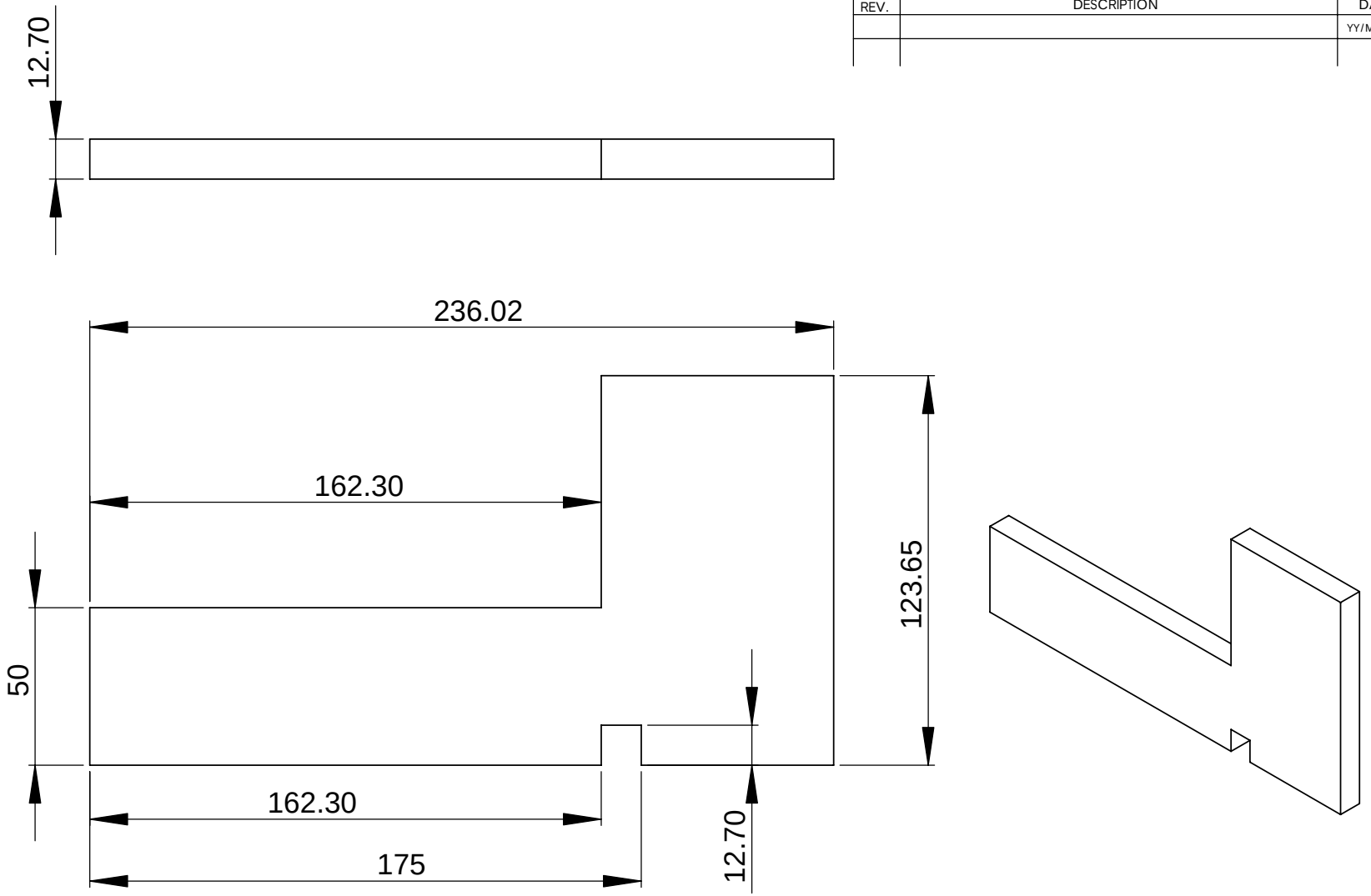
SIZE	DWG. NO.	REV.
A	frame assembly	NC

SCALE:1:3	WEIGHT:	SHEET 6 OF 7

REVISIONS		
REV.	DESCRIPTION	DATE
		YY/MM/DD



batt_side

		NAME	ID
DIMENSIONS ARE IN mm	DRAWN	Student X	110XXXXXX
TOLERANCES:	CHECKED	X	110XXXXXX
ANGULAR: MACH ± 0.5° BEND ± 1°	ENG APPR.	X	110XXXXXX
ONE PLACE DECIMAL ± .3	DO NOT SCALE DRAWING		
TWO PLACE DECIMAL ± .03			

MATERIAL: --

FINISH: --

APPLICATION: Assignment X

COMMENTS:

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MECH 289

SIZE	DWG. NO.	REV.
A	frame assembly	NC

SCALE:1:2 | WEIGHT: | SHEET 7 OF 7