Final Project: Toaster

MEMS 202 Computer-Aided Design

12/04/2024

Team Members:
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Brian Hau
Duyen Nyguen
Alex Lee

Write Up:

In our project we designed a toasting device that looks similar to a regular toaster for bread, but is used to toast marshmallows to get a gooey middle and roasted outside. This is needed because when searching for past designs of marshmallow toasters, the majority of toasters looks like a single heat source that requires the users to manually turn the toaster. In our design the toaster spins by itself. All that the user is required to do is set a heat setting and push the toaster lever down similar to common toasters used in households. There is a pin that keeps the toaster toasting between two sheets filled with nichrome wires. We used 200 ft of nichrome wires To release the lever to retrieve a toasted marshmallow, the pin just needs to be pushed in to release a spring that pushes the lever above the plateau where one can get the marshmallow without using any tools. One side where the lever goes up and down is taller than the other three walls. We used a conductive material for the nichrome wire because that is where a current will run through giving off infrared radiation heating the intended food (similar to other toasters). We decided against having a lever move up and down or at an angle fixed close to the wall of the lever. Also, we debated whether to use two or one spike to put the marshmallow on when toasted. After research, we concluded that while toasting a marshmallow, the melted marshmallow is viscous enough to stay on a single spike. The Final turned out identical to our concept sketch. Due to the timing of the project, we ran into problems involving creating a spring, so we downloaded it off McMaster. Learning how to choose which parts in our mechanism is important to create a drawing for. We also learned how to strategize design and materials based on how expensive it would be. I learned that applying a design to the world is just as crucial as making the part and disagreements in teams can be good in finding the best outcome for our project.

Calculations:

SHELL HOLE:

Axle Diameters based on FREE-RUNNING fit from Table 2 on M-13 of Engineering Graphics book.

For a hole size of .3in (=7.62mm) I will use the same limit for 8mm.

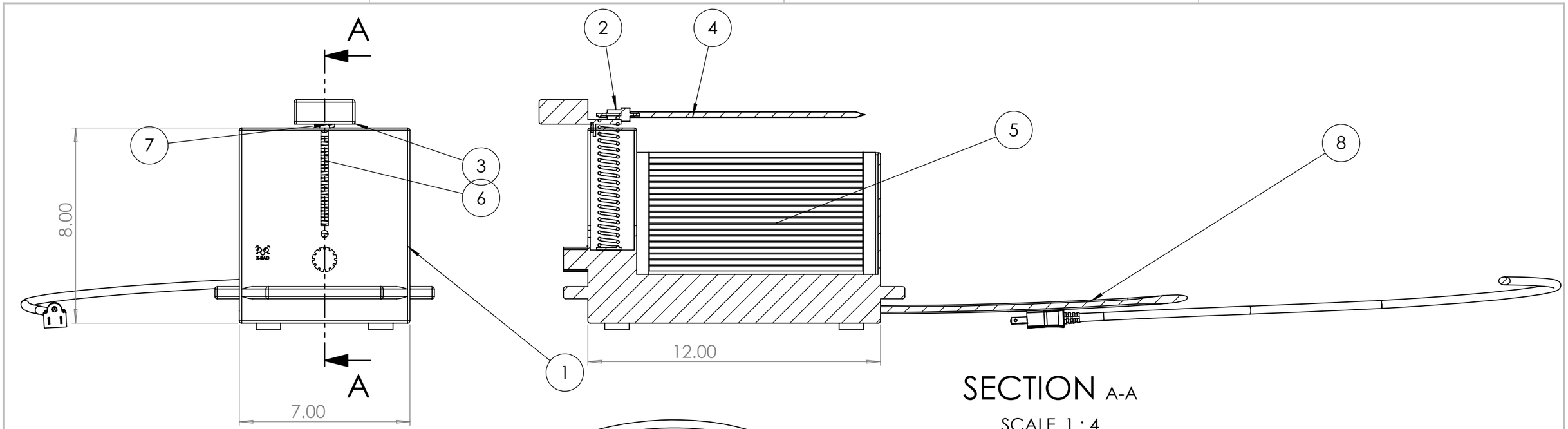
Max: 8.52mm Min: 7.62mm

STICK:

Axle Diameters based on FREE-RUNNING fit from Table 2 on M-13 of Engineering Graphics book.

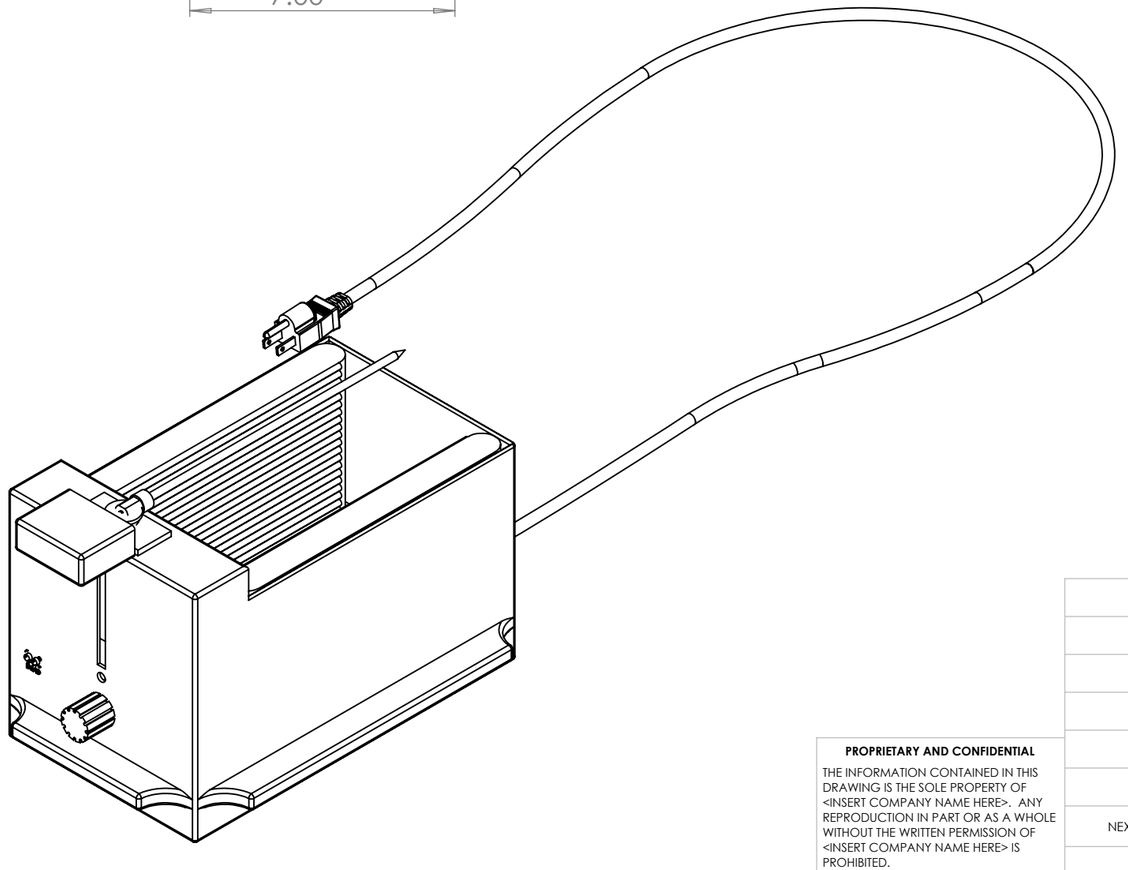
For stick shaft size 241.30mm I will use the same limit for 250mm

Max: 241.13mm Min: 241.015mm



SECTION A-A

SCALE 1 : 4



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Toaster Shell	Cast Stainless Steel	1
2	Motor	Cast Stainless Steel	1
3	Lever	Cast Stainless Steel	1
4	stick	Cast Stainless Steel	1
5	Nichrome sheet	Nichrome	2
6	9657K471	Compression Spring	1
7	Button Spring	Compression Spring	1
8	70355K107	Power Cord	1

		UNLESS OTHERWISE SPECIFIED:
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±
		INTERPRET GEOMETRIC TOLERANCING PER:
		MATERIAL
NEXT ASSY	USED ON	FINISH
APPLICATION		DO NOT SCALE DRAWING

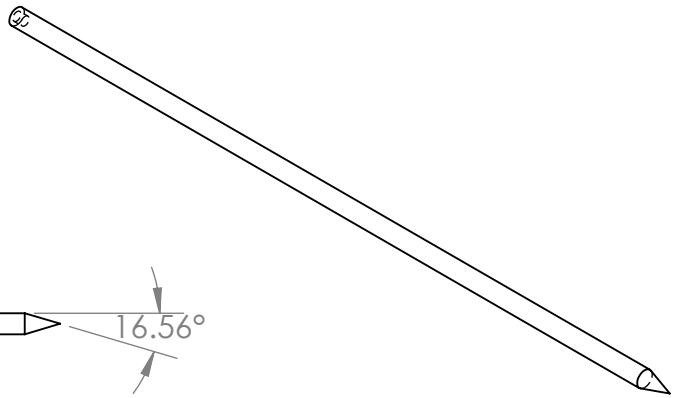
	NAME	DATE
DRAWN		
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		

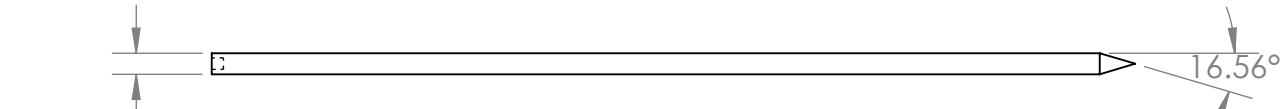
COMMENTS:

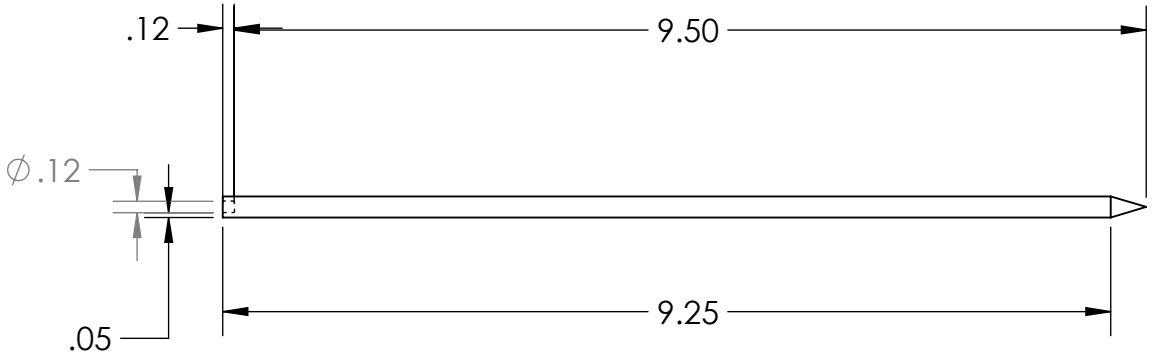
Korean Baddies

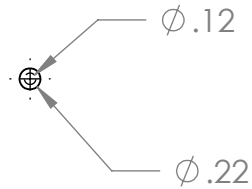
TITLE: Marshmallow Toaster

SIZE	DWG. NO.	REV
B	Final Assembly	
SCALE: 1:10	WEIGHT:	SHEET 1 OF 1









		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
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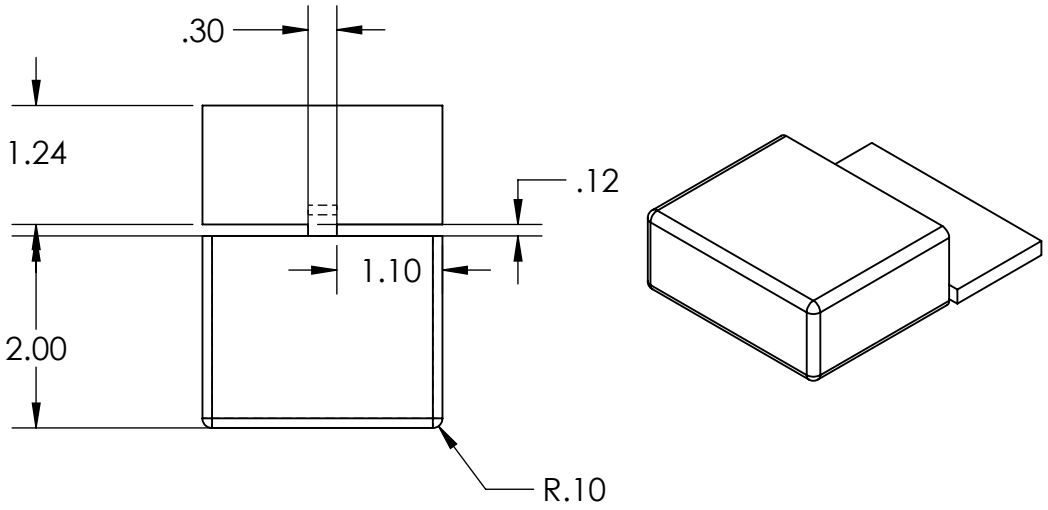
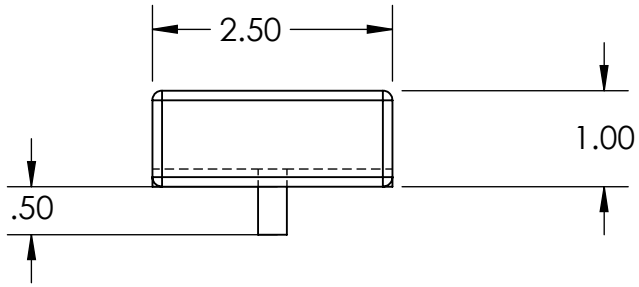
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

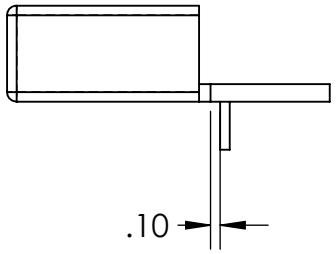
Korean Baddies

TITLE:

SIZE	DWG. NO.	REV
A	stick (3)	
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1







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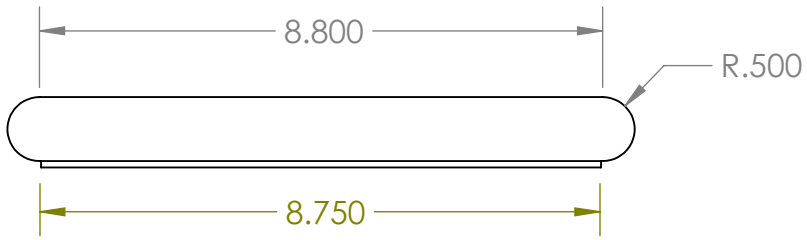
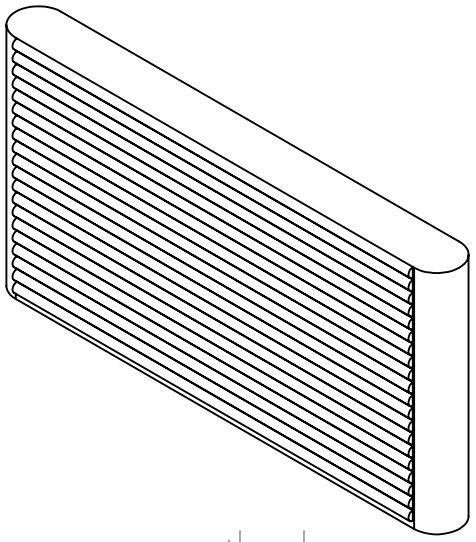
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

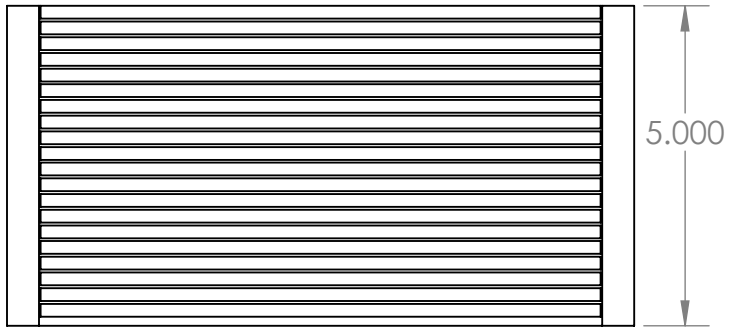
Korean Baddies

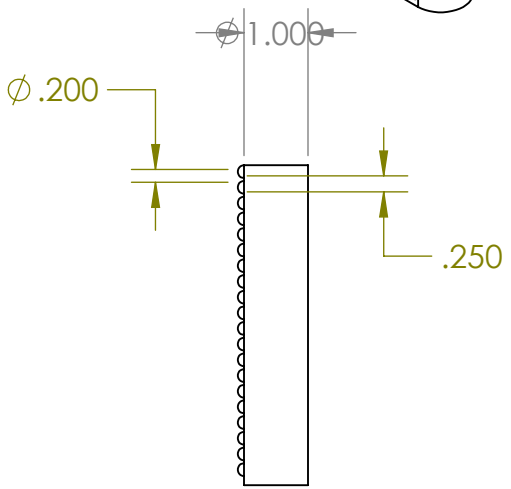
TITLE:

SIZE	DWG. NO.	REV
A	Lever (1)	
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1









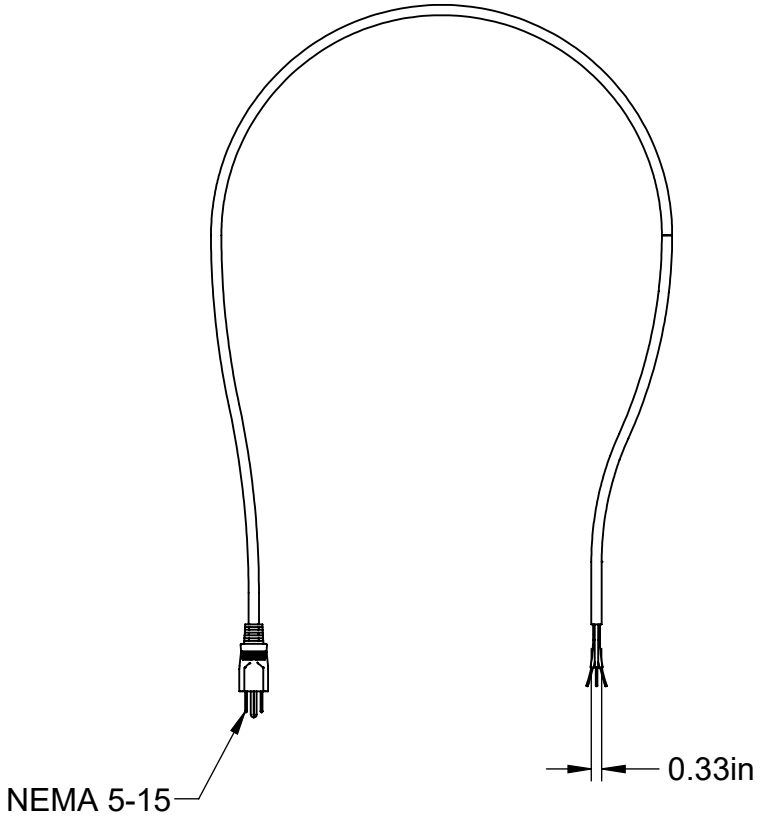
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL: Use	DRAWN	KO	12/5/24
			CHECKED		
			ENG APPR.		
			MFG APPR.		
		INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

Korean Baddies

TITLE:

Wire Sheet Plate

SIZE	DWG. NO.	REV
A		
SCALE: 1:2	WEIGHT:	SHEET 1 OF 1



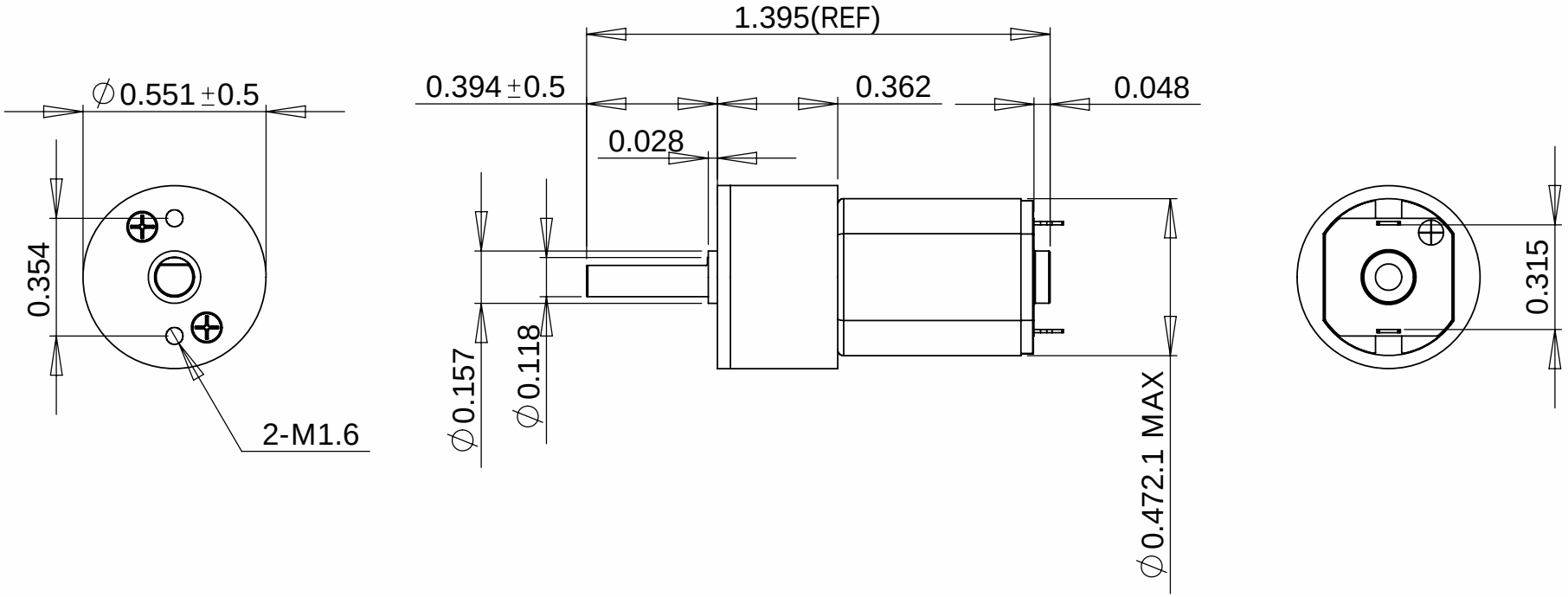
Length: 3ft
Wire Gauge: 16

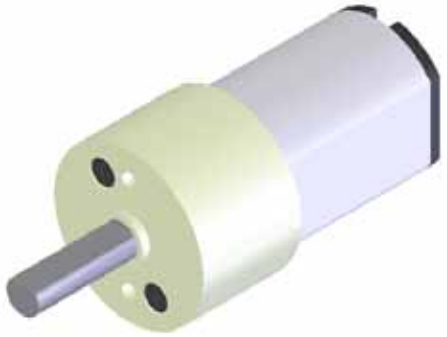
McMASTER-CARR® CAD

PART NUMBER **70355K107**

Power Cord

Solarbotics GM20/22





Rev.	Date	Revision Details

DIMENSIONS ARE IN mm
TOLERANCES:
FRACTIONAL ± 0.1mm"
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ± 0.1
THREE PLACE DECIMAL ± 0.05

MATERIAL

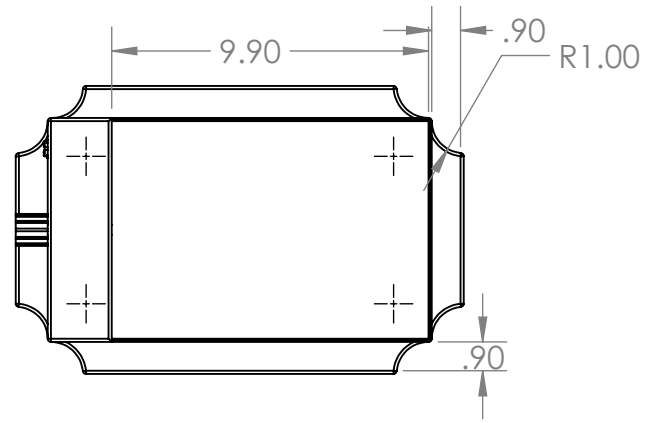
DO NOT SCALE DRAWING

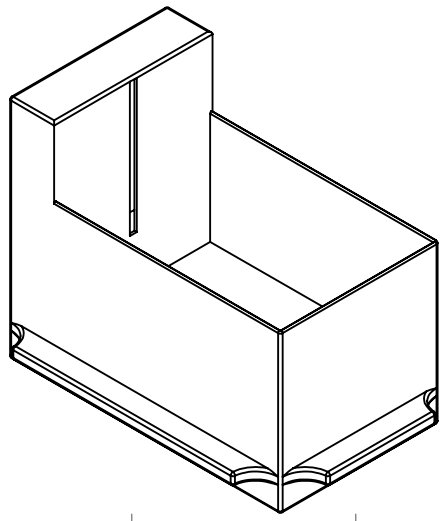
	NAME	DATE
DRAWN	DDG	Nov0708
CHECKED		
ENG APPR.		
MFG APPR.		
PRINTED	11/7/2008	

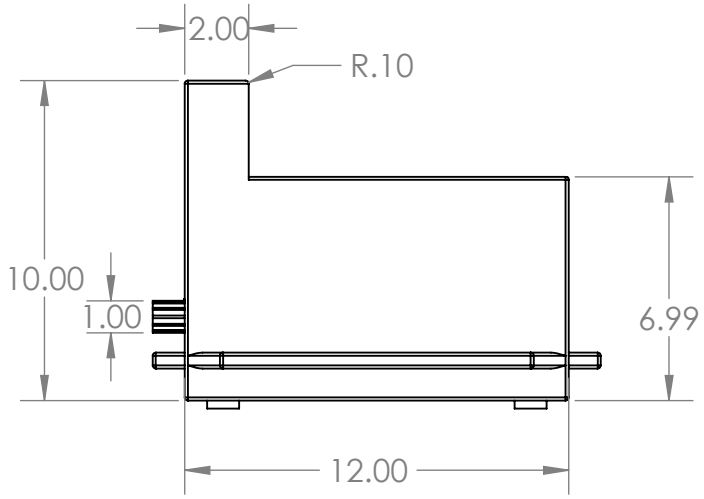
SOLARBOTICS Ltd

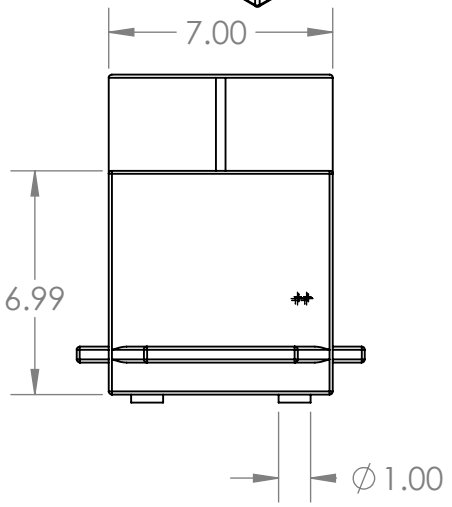
Solarbotics Ltd.
201 35th Ave N.E.
Calgary, Alberta, Canada
T2E-2K5
Ph: (403) 232-6268
Fax: (403) 226-3741

SIZE	DWG. NO.	REV.
A	GM20	
SCALE:2:1	WEIGHT:	SHEET 1/ 1









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			MFG APPR.		
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		MATERIAL	COMMENTS:		
NEXT ASSY	USED ON	FINISH			
APPLICATION		DO NOT SCALE DRAWING			

Washington University in St. Louis

TITLE:

Toaster Shell

SIZE	DWG. NO.	REV
A		

SCALE: 1:8	WEIGHT:	SHEET 1 OF 1