

A MOE University Course

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The Miracle Workerz, FIRST Team 365

First State Robotics, Inc. Wilmington, Delaware www.moe365.org





MIRACLE WORKERZ TRAINING COURSE

Introduction to SHEET METAL

Introduction to SHEETMETAL

- What is sheetmetal
- Materials
- Fabrication Machinery
- Design and Layout
- Hands on Project

What is Sheetmetal?

 Material that is in sheet form rather than block or rod

Materials <u>Types</u>

Aluminum

1/32", 1/16", 3/32", 1/8"

Steel

1/32", 1/16", 3/32"

Polycarbonate

1/16", 1/8", 3/16"

MATERIAL PROPERTIES WEIGHT (lbs/sq. ft)

	Steel	Al	Poly
1/32"	1.38	.46	.19
1/16"	2.80	.91	.38
3/32"	3.75	1.37	.59
1/8"	5.10	1.80	.78



Materials strength

	Modulus psi	Yield lbs	Strength/Weight
Steel	30 x 10 ⁶	67,000	239,000
Aluminum	15 x 10 ⁶	40,000	408,000
Polycarbonate	.5 x 10 ⁶	10,000	200,000

Material selection

- Aluminum
 - best strength/weight ratio
 - easy to machine and bend
 - most common material in MOE
- Steel
 - used where strength is critical
 - stiffest material, use it to reduce flexing
 - use it to make springs
- Polycarbonate
 - mostly used for decorative panels
 - use where optical clarity is important

Safety rules

- Gloves must be worn during fabrication of sheetmetal parts
- All parts must be deburred before use on MOE
- Parts to be securely clamped to the bench or in a vise before drilling any holes

Sheetmetal fabrication brake

• Bending sheetmetal parts



Sheetmetal fabrication shear

• Cutting a sheet to size



Sheetmetal fabrication Punch



Sheetmetal fabrication Notcher

• Notches right angle corners



Layout

- Layout the part flat
- Allow bend radius equal to material thickness
- After shearing to size, use Dykem to "blue" part
- Use scribe to create lines on part
- Center punch hole centers
- After part is finished, use Dykem remover to clean off blueing

Layout example



Layout example



t = thickness of the metal up to 3/32" then .090" thereafter

Problem

• Create a battery box to hold the MOE battery



Battery Box Drawing

