Target Lifter and Turner Bracket



Team 16

Variable Angle Target Training System (V.A.T.T.S.)



Ashar Abdullah – aa12t Andrew Bellstrom - ajb10k Ryan D'Ambrosia - rd11s Jordan Lominac – JLL11f Fernando Rodriguez – fr12c

Contact: Chris Isler

Advisors: Dr. Patrick Hollis

Dr. Chiang Shih

Instructor: Dr. Nikhil Gupta



Background



- SITs (Stationary Infantry Target) are used to train military in combat situations
- SITs include many features that help provide a more realistic experience
 - o Muzzle Flash
 - Hit Detection
 - Friend/Foe Identification
- Flips up and down to present targets
- A variety of targets can be used with the SIT
 - o Ivan
 - o Figure 11
 - o Figure 12
 - o E-Type







Scope

- The team needs to design a new lifter arm bracket
- A new innovative design that allows for quick change of targets
 - Must be able to accommodate provided targets
- Implement a system to turn the targets to a specified position/angle

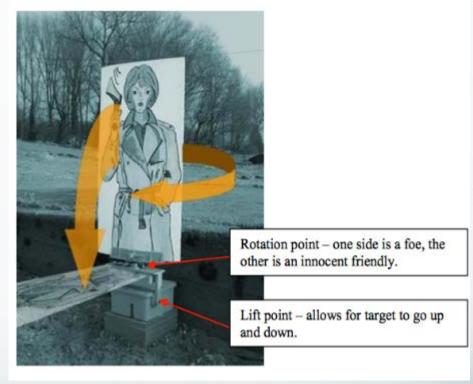


Figure 2

Lifter Bracket Target

Team 16 Ashar Abdullah 2



Objectives



- Lift and rotate targets on command
- Firmware interface with FASIT 2.0
- Create a universal mount for variety of targets
- Easily attach and detach various types of targets
- Withstand 35 mph cross winds
- The motor may not be back driven
- Motor will be unaffected by heat, sand, dust, and rain
- Use Figure 11, Figure 12, Ivan, "E" type and "F" type targets.

Concealed Neutral Hostile Simple Hostile Restricted Hostile Left Restricted Hostile Right Hostile Neutral Simple Neutral Restricted Neutral Left Restricted Neutral Right

Figure 3

Needs Statement

"Lockheed-Marin's current Stationary Infantry Target does not allow for suitable target presentations."

Team 16 Ashar Abdullah 3





Concept Selection

Design Matrix

Target Bracket decision matrix													
	weighted	Design A	Design B	Design C	Design D	Design E	Design F	D					
Simplicity	5	3	4	4	4	3	4	ecis					
Cost	3	4	2	3	3	4	3	9					
Size	1	4	2	4	4	4	3	base					
Weight	2	4	2	4	4	4	3	o bi					
# of parts	4	1	4	2	2	3	4	a					
Loading time	4	3	4	4	2 3		4	5					
Reliability	5	2	3	1	2	2	3	sca					
Total point value		65	79	70	67	73	85	Ф					

Table 1

Design E (split)



Figure 4

Design F (Gate)







Design E (Split)

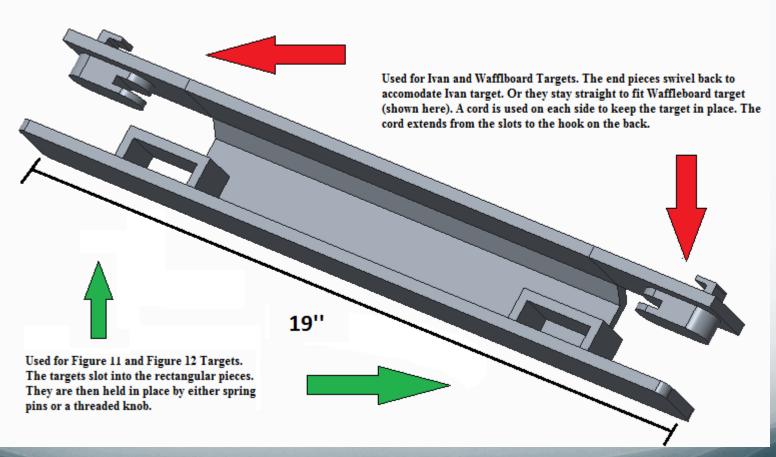


Figure 4





Design E (Split)

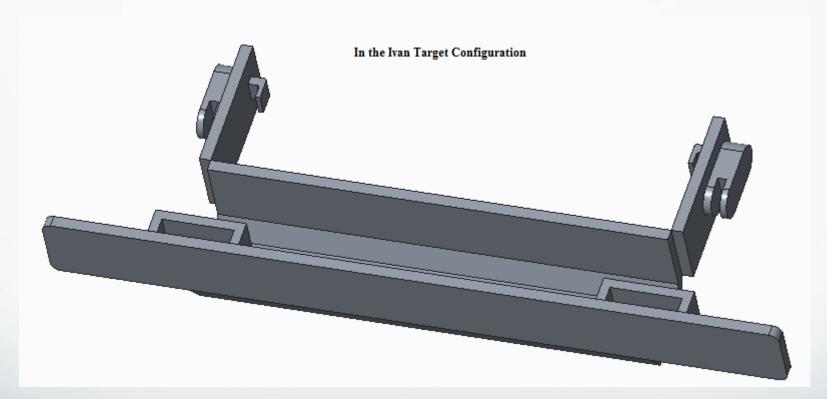


Figure 6

Team 16 Ashar Abdullah 6





Design F (Gate)

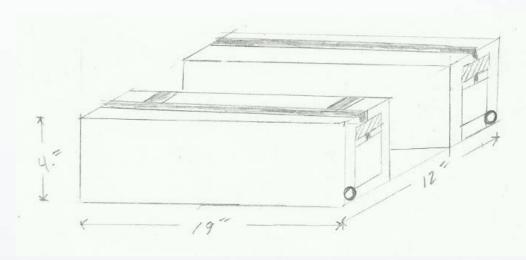


Figure 5

Team 16 Jordan Lominac





Design Evaluation

- Durability of the target bracket
- Securing the target
- Different rotational speeds
- Choosing the best locking mechanisms
- Pinching

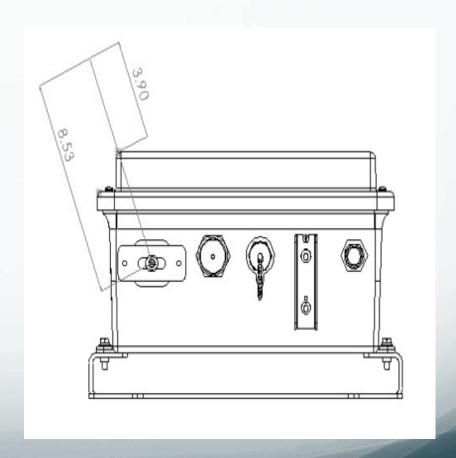
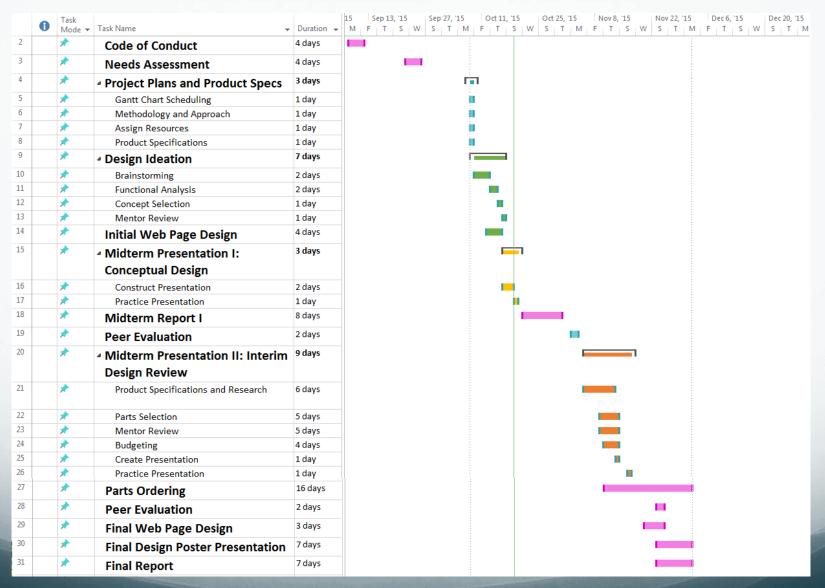


Figure 7





Gantt Chart









									X
	Customer Requirements	Weight Factor	Motor Speed/ Torque	Dimensions/ Shape	Weight	Materials	Manufacturing Cost	Clamp Force	Electronics/ Programming
Performance	Low Installation Time	5						2	
	Rotation Angle	4	3						1
	Compact Lifter Arm	3		3		2	2	1	2
	Low Weight		2	2	3	3	3	1	1
	Target Security			2		1	2	3	
	Rotation Time		3		2				
Features	Target Accommodation	5 2		3				2	
Durability	Wind-Resistant		1					1	
	Loose Cargo Test	1			1	2			2
	Temperature Resistance	3	1			2	1		3
	Weather Resistance	3				3	1		3
Serviceability FASIT 2.0 compatible		5 5							3
Conformance	Meets Firmware Standards								3
	SIT integration	5		3	2		1		
	Flash Feature of SIT	4		2					
	Motor Meets Standards	2	3				2		
	Mass Producibility	2	1		1	3	3		
Technical Priority			36	59	22	37	40	40	51





Review

- We identified the largest concern for our sponsor
- Produced multiple design concepts
- Identified what immediate problems we will face continuing the build
- Created a schedule to continue the design process

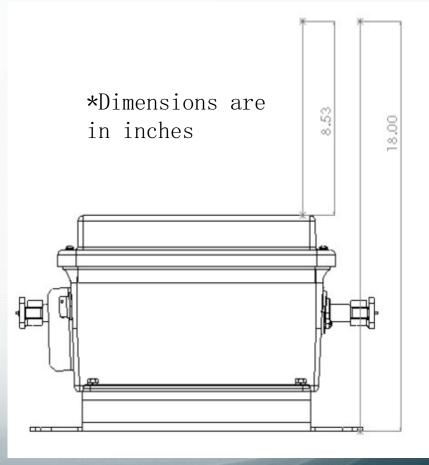
Team 16 Andrew Bellstrom 11





In the Future

- Finalize the target bracket selection
- Bracket and Motor Connection
 - Pin & Collar
- Motor and Board selection
 - Meets industrial standards
- Target Arm







References

- [1] Infantry Squad Battle Course, Army Engineers
- [2] Meggitt MF-SIT Specification Document
- [3] MS Instruments Stationary Infantry Target Specifications
- [4] Theissen GSA Federal Supply Schedule Price List
- [5] Future Army System of Integrated Targets: Presentation Devices Interface Control Document