68K Turbine Blade Handling
Spring Midterm

Team 14

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Sponsor

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Advisors

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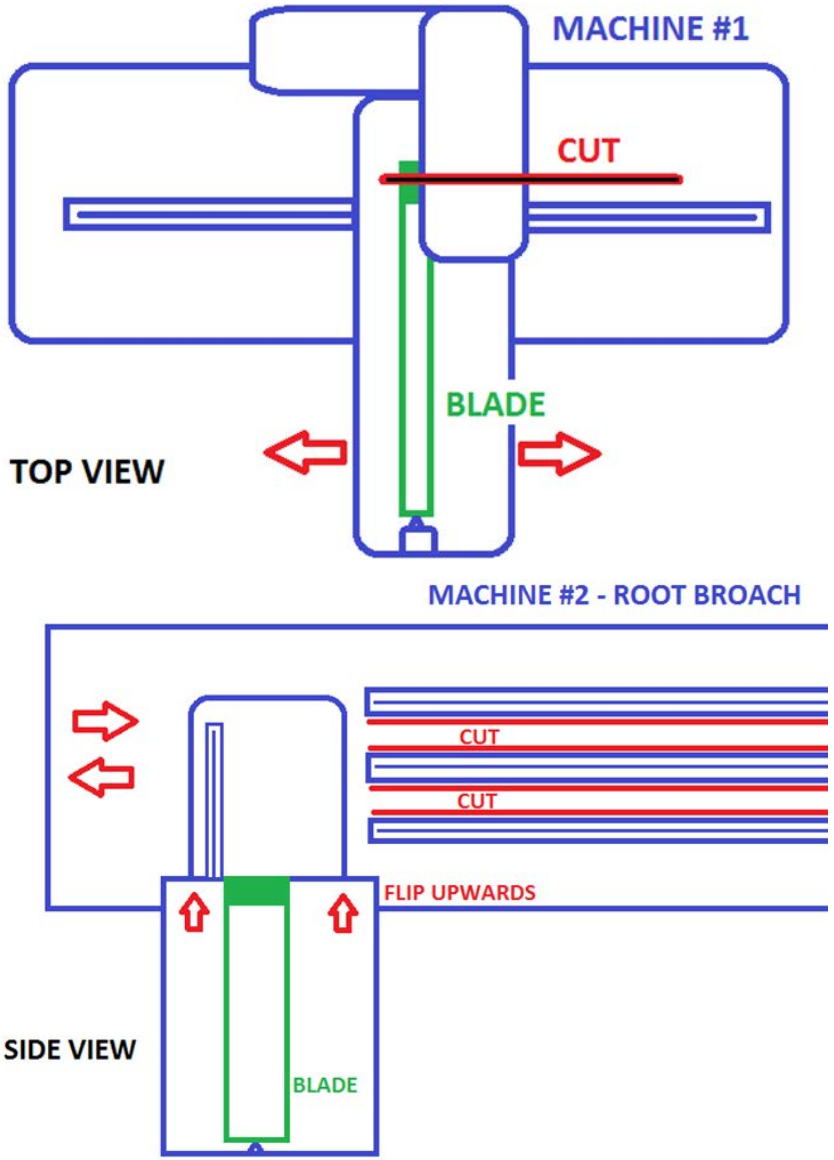
Project Scope

- The Blade
  - 45 lb Titanium aluminide
  - 3ft x 1ft x 0.125in
  - Received as a raw forging
    - Only basic geometry
  - Geometry
    - Root, tip, twist, midspan
- Goal
  - Must transport and orient for placement in mills
    - Differing angles and placement in machines



Obstacles

- Manual lifting of the 68K turbine blade
  - Risk of injury
  - Straining workers
  - Difficult for new workers
  - Needs to be **eliminated**
- The blade moves through several machines
  - Each machine unique
    - Obstructions
    - Placement
    - Orientation

Project Focus

- **Safety**
  - Ergonomics
  - Part-friendly
- Modify current cart
- Orientation and 3D position of the blade
  - Machine-friendly
    - Loading and unloading
  - Time efficiency
  - Cost effectiveness

Design Changes

- Optimized shape of structure
  - Slender
  - Less material
- Use of multiple materials
- Minor changes to mechanisms and electronics
  - Not “reinventing the wheel”

Final Designs

- Base
  - Hydraulic lift cart
    - Carries system and blades
- Structure
  - Crane Design
    - 2-line system
    - Electric motors
- Orientation Device
  - Nylon Harness
    - Optional hooking positions

Acquired Parts

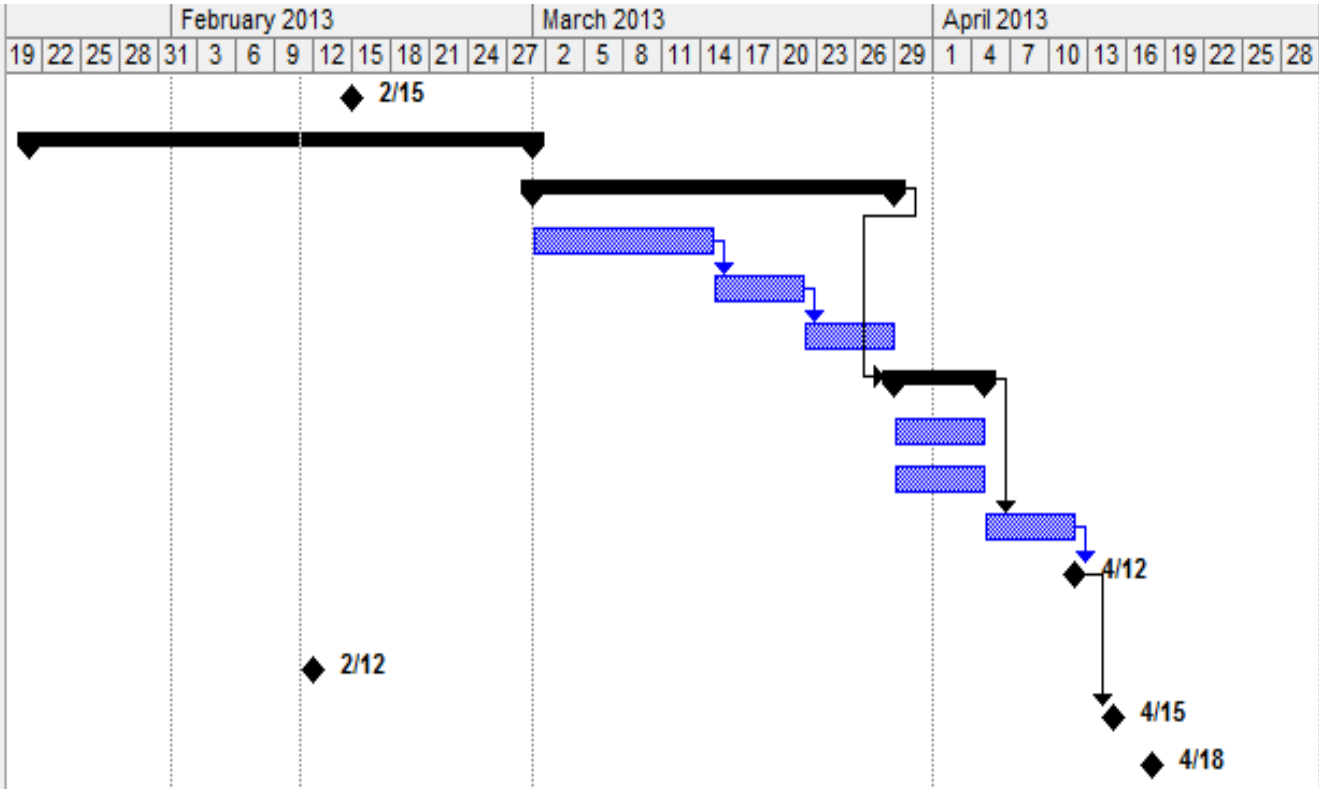
- Machined Parts
  - Small structures
- Winches
  - And controllers
- Small Parts
  - Wheels
  - Pulleys

Expected Parts

- Ordered Parts
  - Batteries and chargers
    - 1 week arrival time
  - Large machined structure
    - 2 week arrival time
- Additional Components
  - Harness Materials
    - Canvas (Nylon)
    - Hooks
  - Paint
    - Purchasing off-shelf

Schedule

	Task Name	Duration
1	Vist TECT	1 day
2	**Orders**	**29 days**
7	**Assembly**	**20 days**
8	Structure Assembly	2 wks
9	Harness Assembly	1 wk
10	Electrical System Assembly	1 wk
11	**Testing**	**5 days**
12	Weight Testing	1 wk
13	Orientation Testing	1 wk
14	Painting	1 wk
15	Prototype Finished	1 day
16	**Presentations**	**48 days**
17	Midterm Presentation	1 day
18	Presentation to TECT	1 day
19	Final Presentation	1 day



Summary

- All parts will be received before March
  - Waiting on overall structure
- Assembly will begin immediately after parts arrive
  - Minor adjustments
- Testing will commence after assembly
  - Carrying capacity
  - Ability to orient blades properly

Questions?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