Simple & Effective Project Management

* Image from http://5alfa.com

1. Define the Project

- Clarify the vision:
  - What problem does it solve? What are its key benefits?
  - What will it do? What are its key functions?
  - What is unique and what engineering can be "borrowed?"
  - Does everyone agree with this vision?

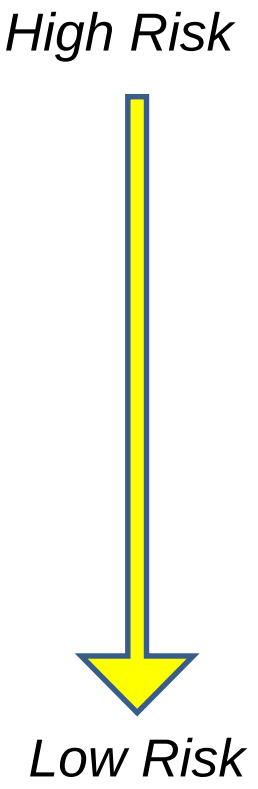
- Clarify the scope:
  - Time (deadlines and deliverables)
  - $
  - Resources (e.g. people, skills, equipment, information)?

2. Plan the Project → create sub-goals

- This project vision can be split up into how many sub-goals?
  - Can these sub-goals can be further split up?
  - Can there be multiple approaches (or solutions) for some sub-goals?
  - Which sub-goals can be done simultaneously?
  - Which sub-goals depend upon others being finished first?
  - Who will be responsible for each “subgroup” working on each sub-goal?

3. Plan the Project → parts list

- Each subgroup creates a parts list
- Color code EVERY part (or part group)
  - Red: *parts to be made* that require a new design, or high failure risk components
  - Blue: *parts to be made* that require a long time or are expensive to make
  - Green: *parts to be made* that can be done quickly and modified easily
  - Brown: *commercially available* parts that are expensive or take a while to get
  - Black: *commercially available* parts that can be obtain quickly and inexpensively



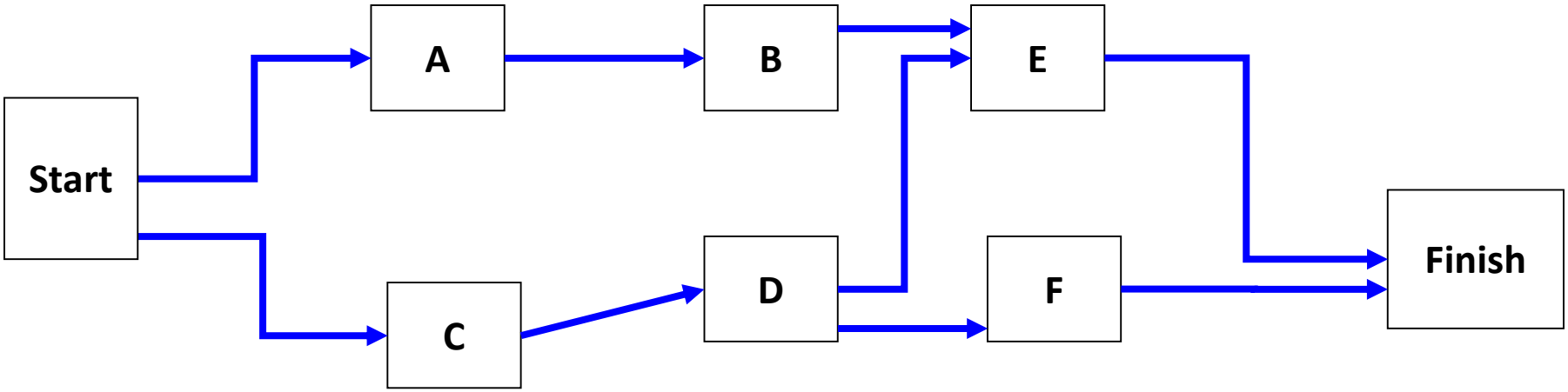
3. Plan the Project → consider each part

- Estimate how long each might take and determine what needs to be done prior to making this part.
- With the red parts → consider multiple sub-groups working on different approaches and decide what test (or criteria) will determine the best approach?
- What are the key attributes for each part? Light weight? Small size? Fast? Accurate?
- If a previous model (or prototype) has been made, go through each part and determine what (if anything) needs to be improved or changed?

4. Plan the Project → time line the project

- Take each sub-goal parts list and map out an order for the quickest build that results in testing.
- This can be done a number of ways. Examples:
  - Network Logic Diagram
  - Gantt Chart
- For each red and blue part, can a smaller (or less complicated) green part be made to test the design feasibility or to optimize the fabrication process?
- Add Testing Milestones as purple

Example: Network Logic Diagram

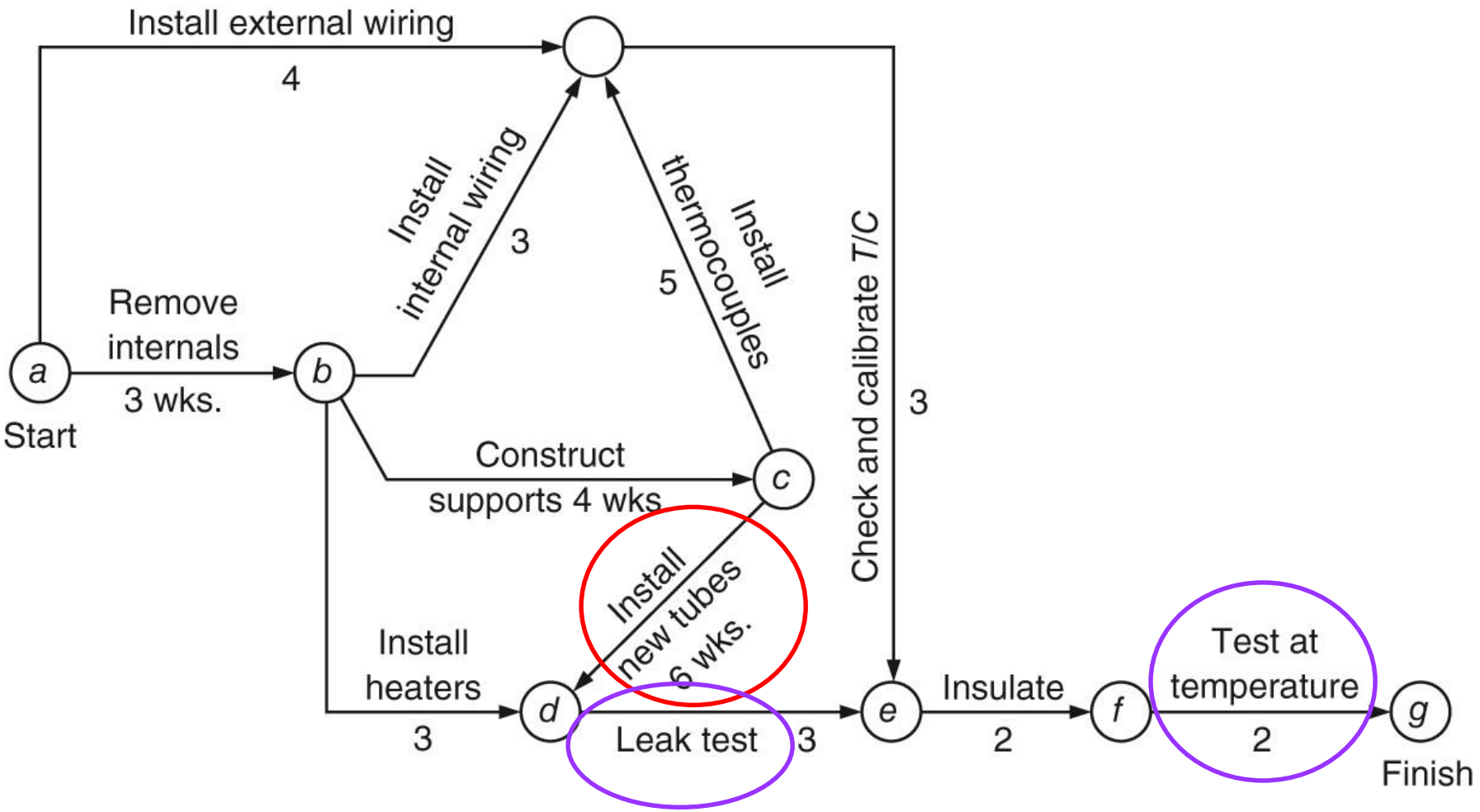


- A, B, C, D, E, F are tasks (goals) to be completed
- Add estimated times for each blue arrow
- It is generally easier to visualize the critical path with NLD

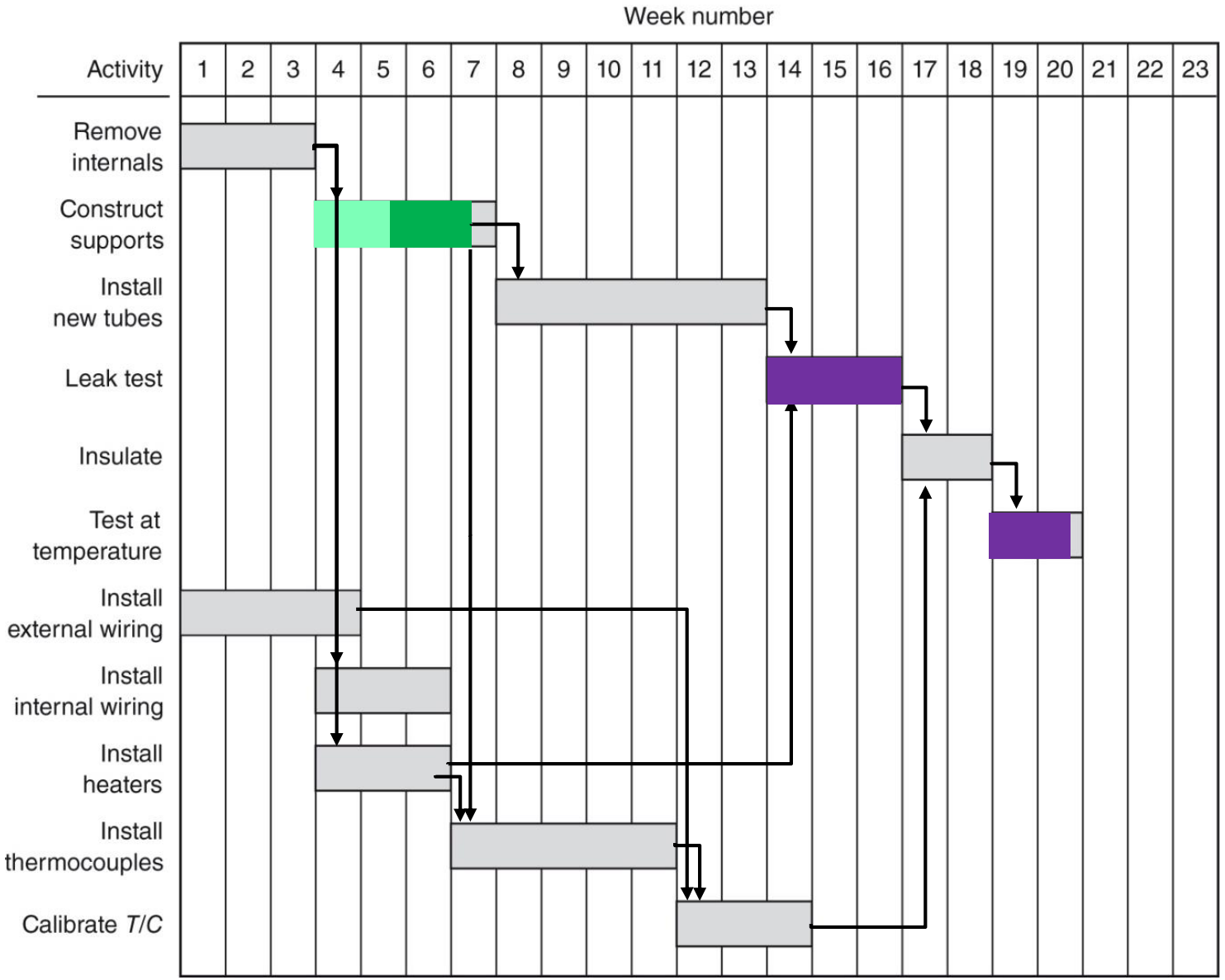
  Critical path – the series of activities which determines the minimum duration of a project

Example: Network Logic Diagram

Installation of a new prototype heat transfer device:



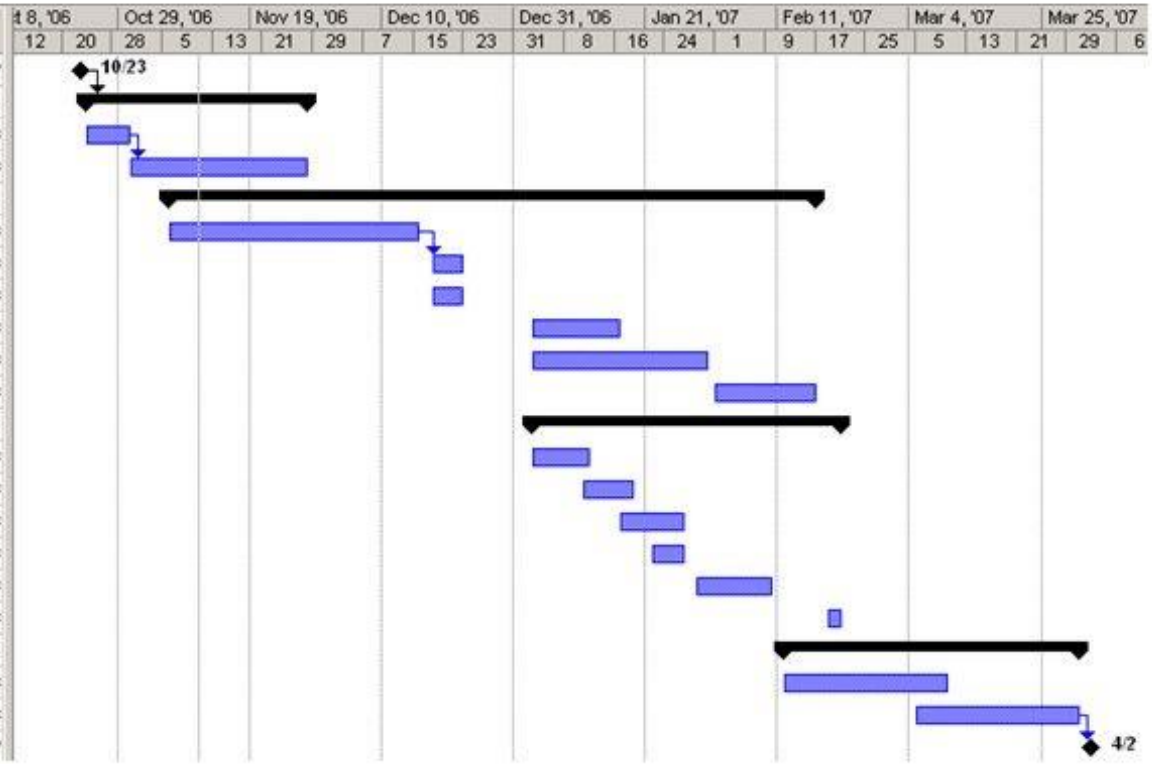
Modified Gantt Chart – Project Scheduling



Example: Baja Gantt Chart

Gantt Chart: Mechanical Design

	Task Name	Duration
1	CDR	1 day
2	**Parts Acquisition**	**25 days**
3	Place Basic Part Orders	5 days
4	Part Lead Time	20 days
5	**System Building**	**75 days**
6	Chassis Build	30 days
7	Chassis Paint	5 days
8	Suspension Build	5 days
9	Mount Build (motor, controller, diff, etc)	10 days
10	Battery Pack Build	20 days
11	Body Build	12 days
12	**Assembly**	**35 days**
13	Assemble Chassis/Suspension	7 days
14	Assemble Wheels/Brakes	6 days
15	Assemble Electrical components	8 days
16	Assemble Driver System	5 days
17	Optimize assemblies	10 days
18	Assemble Body	2 days
19	**Final Testing and Integration**	**35 days**
20	Modify mechanical parts	20 days
21	Testing and Optimization	20 days
22	Final Product	1 day



* Image from Florida Institute of Technology

5. Execute the Plan → time management

- Allocate resources to each subgroup. Be wary of "deadline drift." Who is responsible for monitoring this over the entire project?
- Leave as much time as possible for "critical tasks" (i.e. red and blue parts)
- Try to start the red and blue part design and fabrication as early as feasible.
- With sufficient resources consider simultaneous efforts on different approaches to "critical tasks" and use green parts to test out novel ideas first.

6. Repeat

- After EVERY prototype or test, re-evaluate the Plan and its Scope (resources, time, and $ left).

* Image from http://www.wealthbuildingworld.com

ME 199 Students - Presentations

1. Determine your subgroup
2. Color code a list of all the parts currently used
3. Determine the previous year's timeline and compare that to the current estimated timeline
4. Each student will need to make a ~5-8 minute presentation during your group's meeting time:
   - Introduce your subgroup and what improvement were being attempted this year (what are you changing and why)
   - Show CAD of the entire assembly, then mention each part.
   - Present a Gantt chart showing every color coded part with it's bar having a lighter color indicate design time, bold color for fabrication time, and grey for any "slop" or "cushion" time.

Proposed Yearly Timeline for Each Team

- Fall semester – subgroup projects worked on and finished. Individually tested as much as possible.
- Spring semester – subgroup projects assembled into the final product and tested, optimized, tested, optimized, etc. etc. Everything must work by EOH.
- Spring semester – as things are learned from testing, next year's subgroup projects should be designed by younger students. Some "experimental" projects started.
- Summer – the team leadership takes time to go over all the subgroup designs and finish the project final design, as well as determines any "green" experimental projects to start for the future

A Skill You Can Master!

Project Management creates the bridge between your dreams and the reality you desire.