

Team Ford First



Robot Weight Management

*“Nothing is particularly hard if you divide
It into small jobs”*

Henry Ford

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Ken Snodgrass
Engineering Mentor
Cooley High School – Team #557
Flaming Cardinals



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Agenda:

- Why worry about weight?
- People/organization
- Tools
- Procedures
- Roles/Responsibilities
- Work plan



Why worry about weight?

“If you don’t weigh, you can’t play”

anonymous
FIRST Robot Inspector

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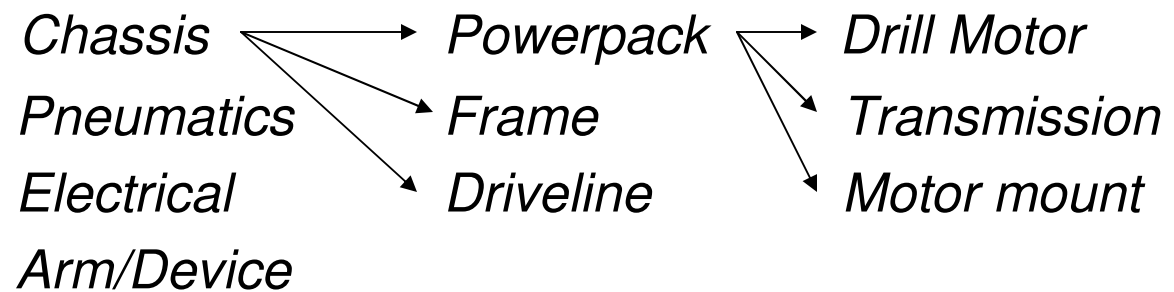
Why worry about weight?

1. Make overall weight target – avoid last minute panic – you just can't drill enough holes
2. Use weight to your advantage to improve stability, acceleration, maneuverability, gradability and traction



Time out for a definition:

Robot → Systems → Assemblies → Parts





People/Organization:

Robot Weight Team

- Weight team leader
- Weight person from each system design team – chassis, electrical, pneumatics, arm/device

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Tools:

- Benchmarks – weight data from actual robots
– total weight, weight distribution, system weights, assembly weights, part weight
- Part weights – weight of typical robot parts
- Bill of Material (BOM) – List of all parts in the robot organized by system, assembly, part
- Weight Budget – weight target for robot broken down to system, assembly, part

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Tools:

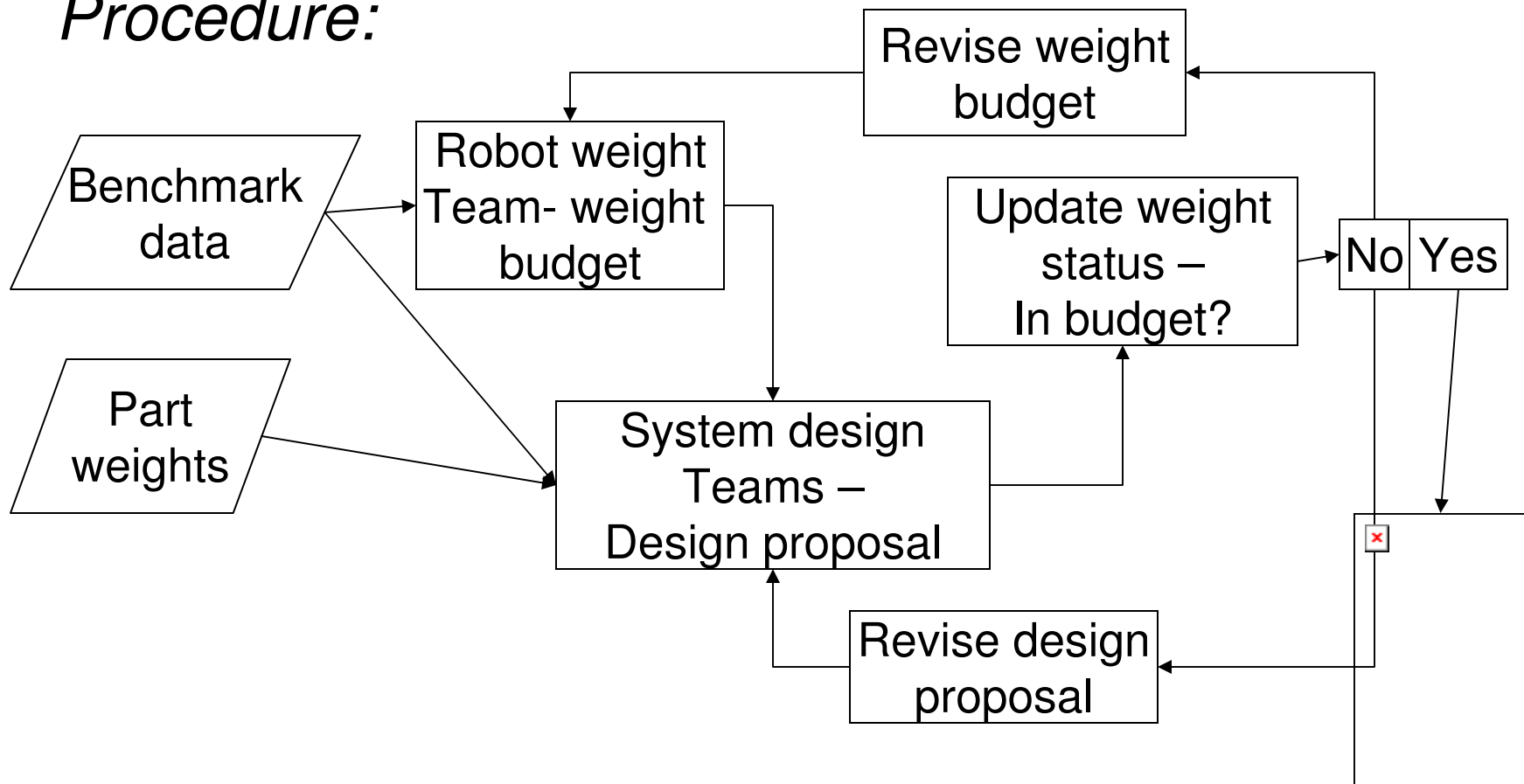
- Excel spread sheet – combining BOM, weight budget and weight status
- Scale - with 0.5# accuracy
- Paint pencil – write weight on each part
- Lead bars - add weight and change weight distribution of the robot



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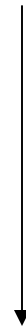
Procedure:





Weight Budget

Weight Status



Robot
System
Assembly
Parts



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Roles and Responsibilities:

Weight Team Leader

- Obtain benchmark data and part wt data
- Setup Excel spread sheet
- Lead team in setting wt budget
- Update robot wt status
- Lead team in revising wt budget (if req'd)
- Weigh parts/assemblies as robot is built and confirm “as built” robot weight

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Roles and Responsibilities:

System Design Team Wt Person

- Provide design team with wt data
- Participate in setting wt budget on wt team
- Provide wt team leader with system wt status
- Participate in revising wt budget (if req'd)
- Lead design team in meeting wt budget

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Roles and Responsibilities:

System Design Team

- The system design teams are responsible for meeting the system weight budget
- If they can't meet their budget, they must immediately inform the wt team leader and negotiate a revised weight budget

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Work plan:

November

- Organize system design teams
- Select the system design team wt person
- Select the weight team leader
- Learn how to use Excel

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Work plan:

December

- Acquire benchmark and part weight data
- Complete BOM “stub”

January – Week 1

- Weigh & mark each part in kit and record weight on parts list
- Start developing weight budget

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Work plan:

January – Week 2

- Complete weight budget and distribute

January – Week 3

- System design teams provide weight status to weight team leader
- Update robot weight status and revise budget (if req'd)
- Weigh parts/assemblies as robot is built

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Work plan:

January – Week 4

- System design teams provide final wt status
- Update robot weight status and revise weight budget (if req'd)
- Weigh parts/assemblies as robot is built and confirm “as built” robot weight

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Work plan:

February Week 5

- Weigh new/revised parts before they are installed and update robot weight status
- Check robot weight to confirm weight status

February Week 6

- Weigh robot before shipment
- Finalize BOM

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Review:

- Why worry about weight?
- People/organization
- Tools
- Procedures
- Roles/Responsibilities
- Work plan



*“Coming together is the beginning.
Keeping together is progress.
Working together is success”*

Henry Ford