

Robot Weight Management

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

Henry Ford

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Flaming Cardinals



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"

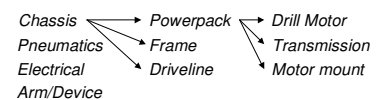
anonymous
FIRST Robot Inspector

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



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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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2003 Coolery HS Robot Bill of Material	Quantity	Weight Each	Weight Total	Cost	Source	Weight Budget
TEAM #557 4/4/03						
System Component						
Drive						
Each drill motor with transmission and flow coupling	2	2.00	4.00		K&N	
Motor gear with hand drive with mounting brackets and shafts	2	2.00	4.00		K&N	
Drive wheels with friction material	2	1.00	2.00	\$11.27	McMaster Carr	15.00
Total		5.00	10.00			
Chassis						
Chassis frame	1	12.30	12.30		K&N	
Castor wheels	2	0.30	0.72	\$11.21	K&N/Plastics	
Bumper	1	0.18	0.18			
Aluminum floor	1	11.14	11.14	\$51.39	Aluma Supermarket	
Legs for	1	11.00	11.00	\$30.00	Donated by T. Clark	
Chain floor	1	8.50	8.50	\$60.00	K&N/Plastics	25.00
Total		33.66	48.92			

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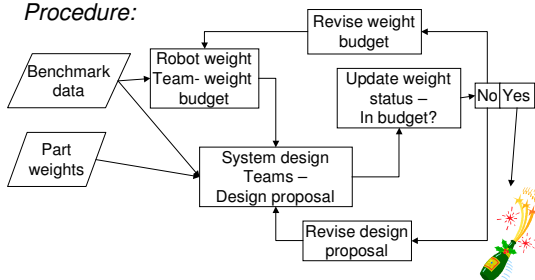
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10

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Procedure:

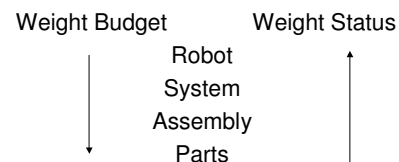


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12

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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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14

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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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20

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Review:

- Why worry about weight?
- People/organization
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21

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

Henry Ford

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22