

Maintainability and Designing For it

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Date: 9-8-2013

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How do you design for Maintainability

- Designing with Repairs in mind
- Ease of access
- Ease of repair
- Tool Usage



Maintainability Benefits

- Decrease Down Time
- Increase Availability
- Save Money
- Pit stops
- Increase Moral Of Maintenance Workers
- Not Taught in Standard Curriculum

NASA's Great Moonbuggy Race

- Design Competition held in Huntsville AL
- Design Build and Test a Human Powered Vehicle
- To be driven over .7 mile all terrain course
- Design Reports, Safety Reports, and Scientific payloads are optional



UAH Moonbuggy

- Student Run Organization
- Award Winning
 - Safety Award 2013
 - Race Winner 2012
 - Race Runner up 2011
 - Design And Safety Award 2010
- Open To all Students
- Cradle to Grave Experience for a project
- Manufacturing, Design, Testing



Lessons Learned

- 2008
 - Team Restarts and goes to competition
 - No Thought Placed into maintainability
- 2009
 - Design Evolved greatly but designing for maintainability was not implemented



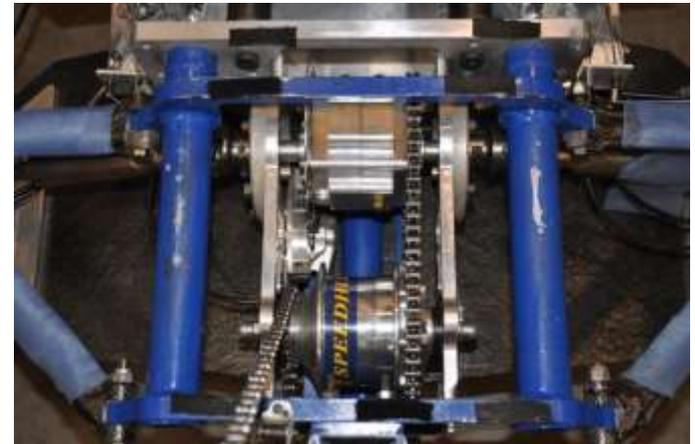
Lessons Learned

- 2010
 - First year Maintainability became a concern
 - Modular power train section implemented
 - Ground work for modular frame implemented
- 2013
 - Modular Frame design implemented
 - Double D mounting system developed and implemented

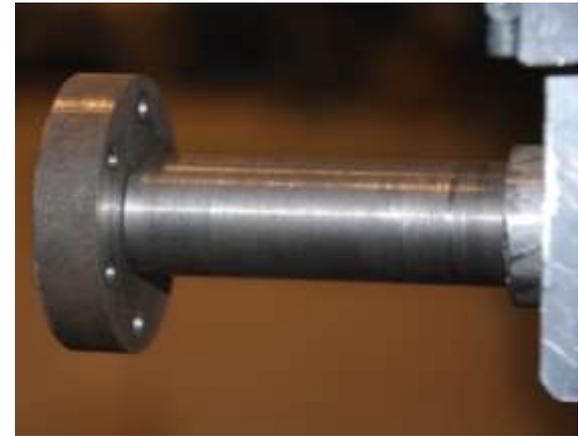
Design Changes to Improve Maintainability

- Modular Design
- Double D Mounting System
- Removed Welded Connections

Modular Frame



Double D shaft Mounting



Benefits of Designing for Maintainability

- Reduced Repair time
- Increased Reliability
- Higher Torque Ratings
- Allowed For quicker development

Conclusion

- Maintainability must be considered early on in the Design process
- In some Cases this focus on Maintain ability can increase your Reliability
- Student Projects such as moonbuggy are great teaching tools when it come to Reliability engineering