

SOLAR COMMUTER VEHICLE MOTOR INTEGRATION REDESIGN

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Introduction

During the 2012-2013 academic year, the decision was made to substitute the 1999 solar race car motor for the 1997 version that had been the power plant for the Solar Commuter Vehicle. This exchange presented this project team with several new problems to solve. The 2013-2014 academic year's work focused on revising the rear end support hardware to accept the new motor with its different mounting points and restrictions. The most significant obstacle to successful integration was the fact that the new motor was unable to receive a "through-all" axle as is typical on motorcycles. The new motor required development of a mounting system with a "half-axle" that could be supported on only one side. The work presented herein describes the hardware developed to accept and support the "half-axle" from the left side of the Solar Commuter Vehicle swingarm.

Results

Problem: 1999 Solar Car motor does not allow for an axle to pass entirely through the motor.

Solution: The team decided to develop a mounting system that does not need a through-all axle

- Right side mount connects directly to load-bearing bolt holes on motor
- Right side mounting plate is welded to existing swingarm
- Left side mount supports "half axle" that passes through wheel bearing
- Left side mount is removable using standard quarter-inch hex wrench
- Combined supports prevent one side of swingarm from taking all the load
- Mounting points allow for development of variable gap system



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Project Team:

Zachariah Steeves
Matthew Bergey
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Project Advisor:

Dr. Donald Pratt



Fabrication Process

Axle block was milled to dimensions of swingarm mounting location



Axle bushing was turned on lathe to proper diameter

Axle bushing was precision bored to match inside diameter of wheel bearing

Axle bushing was faced on lathe in order to obtain a smooth surface finish and to make the bushing the proper length

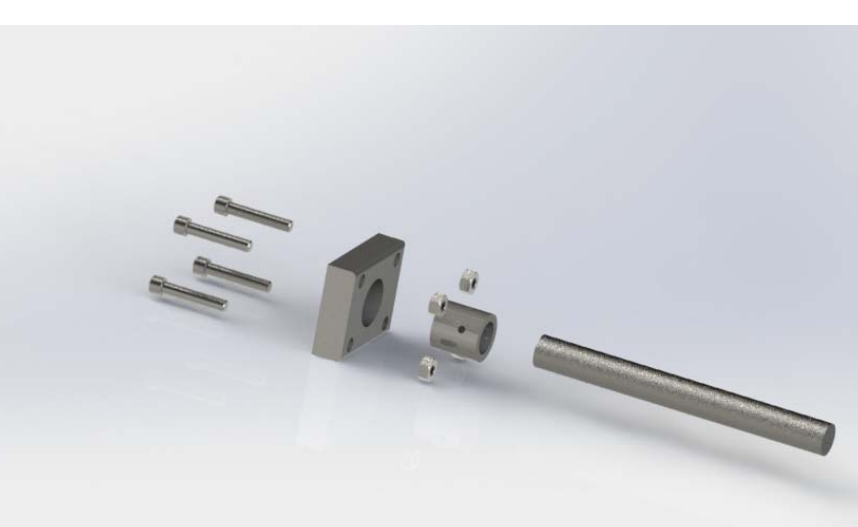


Axle block bushing pocket was precision milled on CNC machine



Axle block edge fillets were applied by hand to fit piece to swingarm location

Axle bushing was press fit into **axle block** pocket



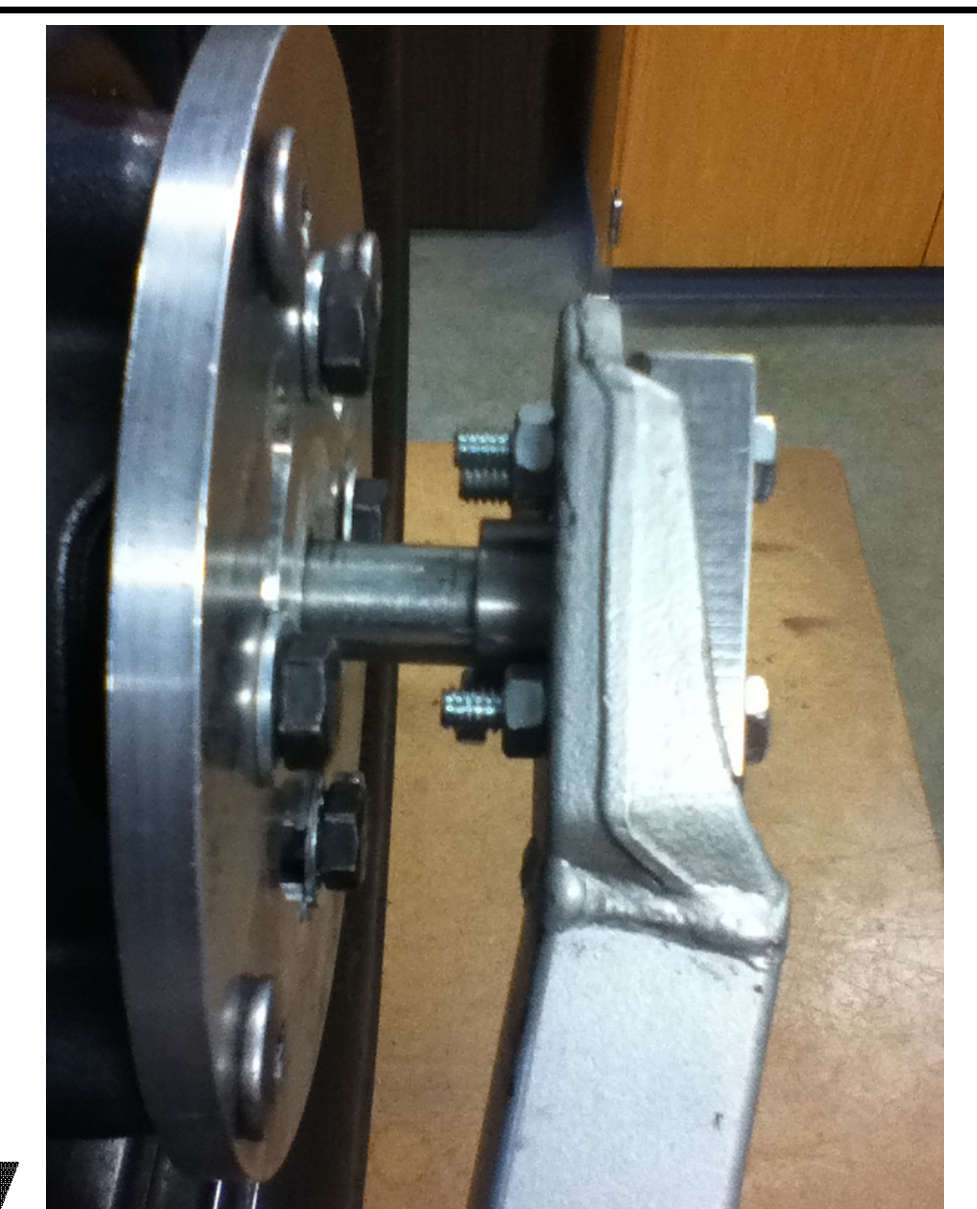
Specifications

- Must accept axle that is compatible with existing wheel bearing
- Must allow for wheel removal using one, standard tool
- Must fit into existing swingarm with minimal modification
- Must be able to support small bending loads
- Must be able to resist axial compression
- Fabrication process must not waste much material and cannot involve welding
- Must not protrude past outside of swingarm
- Installation must not compromise structural integrity of swingarm

Further Information

Information about the Solar Commuter Vehicle Project can be found at:

http://www.thecollaboratoryonline.org/wiki/Solar_Commuter_Vehicle_Project



Conclusions

Future revision of the left-side axle mounting system could potentially involve removal of the existing swingarm mounting point and replacement with a redesigned bracket that would accept the axle block and axle bushing combination more precisely and securely. The team also discussed the addition of several set screws to allow for adjustment of the alignment and axial position of axle.