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### Evolution and Innerworking of a Car Differential

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## Abstract

- Create interactive demonstration pieces that display basic concepts of a car differential using visual aids as in the educational video 'Around the Corner (1937): How differential Steering Works'.
- Fabricate a custom stand for an open ended car differential. The final design of the car differential will be run by an on/off switch and a motor.

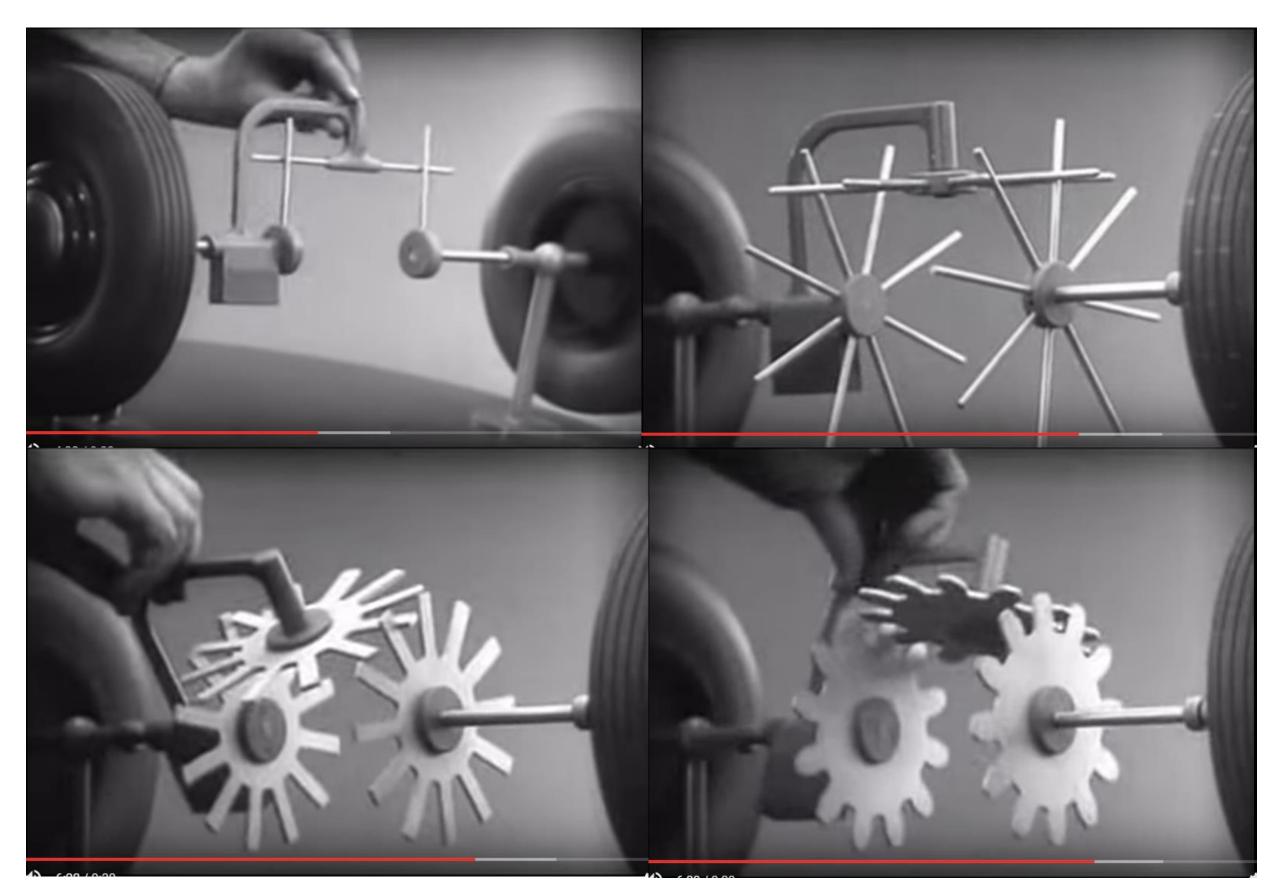


Figure 1. Snap shots from 'Around the Corner (1937) How Differential Steering Works'.

## Introduction and Background

A car differential is used to transmit power from the drive shaft to two separate outputs; wheels. A complex gear system allows the active wheels of a car to turn at different velocities. This is the solution to cars not being able to turn if they were to have a solid axel. Our project demonstrate how the differential allows a vehicle to turn without binding its wheels.



Figure 2. car differential before customization

# EVOLUTION AND INNERWORKINGS OF A CAR DIFFERENTIAL

Process and objectives Simulate a working differential with brakes and an input power from an electric motor. •Create different generational steps of gear systems using SolidWorks to demonstrate the purpose and evolution of a car differential.

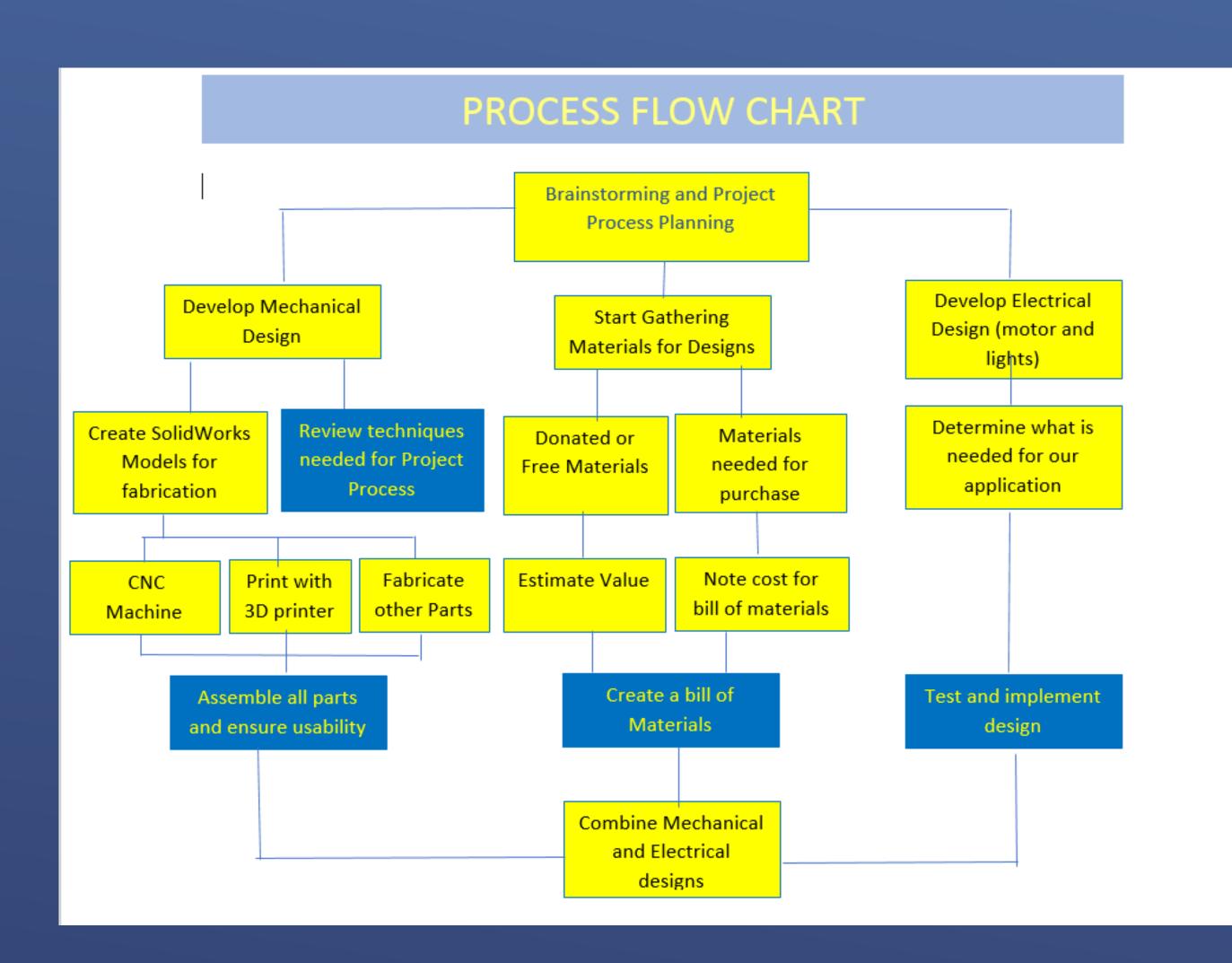


Figure 3. Process Flow Chart of the project development

### Hardware/Software Operations •Hardware:

- •Welding
- •Plasma cutting
- •Right angle grinder
- Lathe technology
- •3D printing technology
- •CNC machine
- Abrasive chop saw
- •Milling
- •Heat forming
- •Software:
  - SolidWorks 3D Design
  - SolidWorks Drawings
- SolidWorks Motion Analysis

## Conclusion

There are two final products: 1). A mini differential set that, in a classroom setting, demonstrates how the spider gears can transform one rotational input to two separate variable rotational outputs.

2). Custom-fabricated differential that displays the innerworkings of a vehicle differential in motion using viewing ports.







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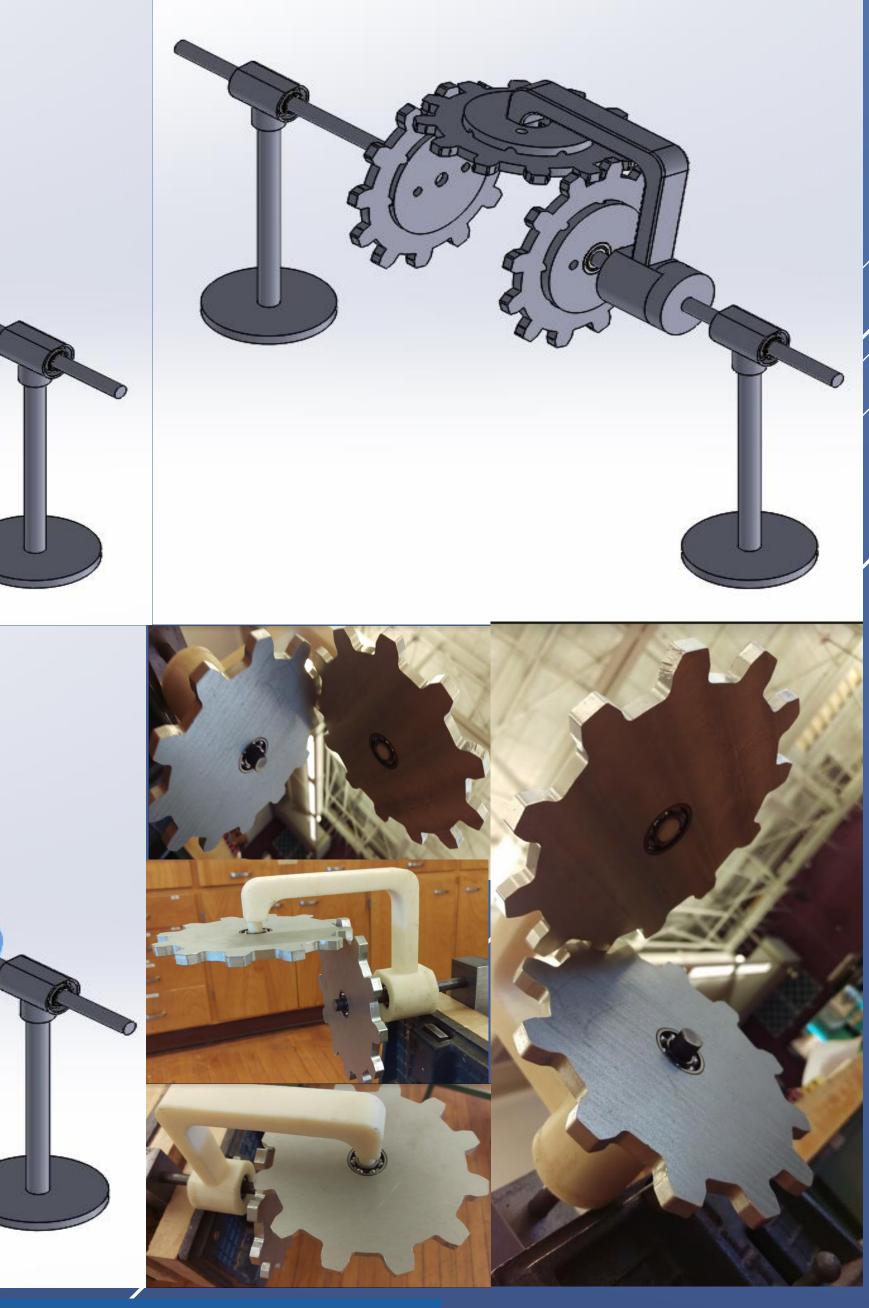


Figure 4. Generational steps of a car differential

Figure 5. Custom-fabricated differential display

Acknowledgements: Chad Seeley, Carl Sanza, Adrian Prindle

References: Around the Corner (1937) How a Car Differential Works (https://youtu.be/yYAw79386WI)