Motorcycle Drivetrain Conversion of a Formula Car

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Motivation

Barrier for entry into any amateur racing motorsport is extremely high due to initial vehicle costs. Costs for vehicles range from $20,000 to $100,000, and replacement parts are often costly and difficult to locate.
While budget classes exist, they are often not up to par with the standard of higher classes.

Objective

Provide a cost effective alternative for formula car racing, specifically the F1600 class to ultimately reduce the barrier to entry.

Methodology

- Design subframe and drivetrain to integrate mounts for the engine, differential, and suspension.
- Analyze in loading scenarios:
  - Acceleration
  - Braking
  - Sustained Cornering
- Finalize design & manufacture components

Design Requirements

Subframe

- Withstand worst case loading scenarios
- Provide torsional rigidity and strength to the chassis
- Retain stock suspension mounting, and provide mounting for engine and drivetrain

Suspension

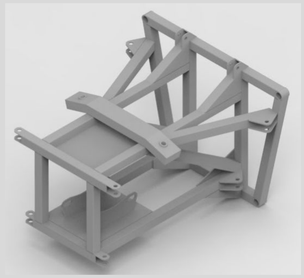
- Maintain stock geometry
- Allow use of integrated OEM (Original Equipment Manufacturer) components

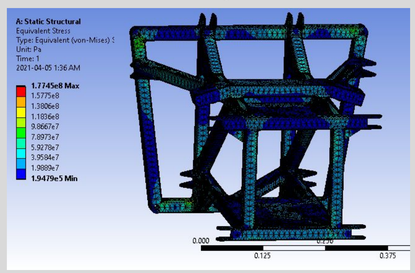
Powertrain

- Effectively transfer motorcycle engine power to wheels

Custom Subframe Design

- Calculations & FEA under loading scenarios & mounting reached a minimum design safety factor of 2.
- Frame Material: 1020 Steel 1" ,100 wall square tube.



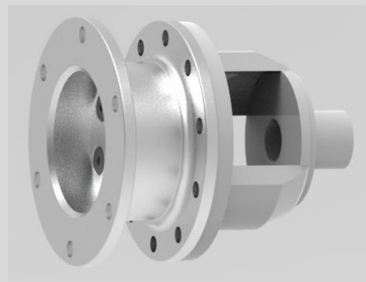


Custom Suspension Uprights

- Allows use of Honda hub, wheel bearing & CV axle assemblies.
- Includes suspension arm mounting locations & retains stock geometry.
- Constructed out of ⅛" 1020 Steel plate

Custom Differential Adaptor Plate

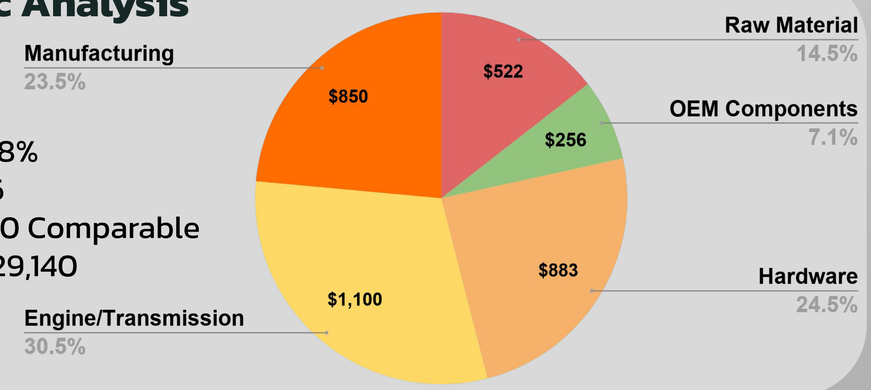
- Integrates Honda OEM differential and CV axles
- Machined from T6-6061 aluminum
- Max Torque transfer = 1025 Nm produced by engine and gearing



Cost Breakdown	
Differential Drive	$937
Subframe	$497
Suspension	$1075
Engine & Transmission	$1,100
Total	$3,609

Economic Analysis

- Reduced costs by 88%
- Project Cost: $3,906
- Approximated F1600 Comparable Component Cost: $29,140



Conclusions/Recommendations

- A Motorcycle Drivetrain Conversion greatly decreases the startup costs of racing while maintaining performance.
- Components used are easier and less costly to replace.
- Prototype is to be tested on track summer 2021.
- Recommend a new affordable class within racing community.