Prototype and Testing

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Presentation Outline

• Specifications met

• Differences between the Prototype and Final Design
  • Swing Arm and shaft
  • Suspension and Braking
  • Drive Train

• Testing Plans

• Current Status
Prototype Specifications

Size

Length: 5’ 8” (6’) √

Width (3’) √
  with tires: 3’ 6” X
  without tires: 2’ 4” √

Height: 5’ 6” (6’) √

Storage: 2.01 ft³ (2 ft³) √
  -after tank was attached
Specifications cont.

Safety
- Spring Loaded Bumper
- Seat Belt
- Headlights, taillights, mirrors

Estimations
- Speed: 21 mph (19.5)
- Acceleration: 2 m/s² (1.5)
- Weight: 565 lbs
Prototype/Final Design Similarities

Steering

Storage Compartment

ATV Engine

Frame:
  • Design
  • Low Carbon Steel Tubing
Swing Arm Differences

**Final Design:**
- Square Tubing
- Two Bracket Mounts
- Two Pillow-Block Bearings

**Prototype:**
- Round Tubing
- Single Bracket Mount
- Chain Tension Adjuster Mounted Beneath Bearing House
Shaft Differences

4340 Steel
Sut = 140 kpsi
Sy = 124 kpsi

Same Length and Diameter
Bearings Closer to Wheels
Prototype Material Unknown
Suspension Differences

**Front Suspension**
Prototype spring constant
150 lbs/in
Final design Spring Constant
225 lbs/in

**Rear Suspension**
Prototype Spring Constant
185 and 230 lbs/in
Final Design Spring Constant
two 230 lbs/in
Braking Differences

Prototype:
Two Active Front Drum Brakes
One Emergency Disc Brake in Rear

Final Design:
Three “Comet” DC Brake Calipers and Rotors
Drive Train Differences

Prototype
Sprocket Ratio: 2.4:1
.428 Metric Chain
Estimations
  Velocity = 21 mph
  Acceleration = 2 m/s²

Final Design
Sprocket Ratio: 3.5:1
ANSI 40 Roller Chain
Estimations
  Velocity = 31 mph
  Acceleration = 2.9 m/s²

Static Factor of Safety for Chain/Sprocket = 2.9

Dynamic Factor of Safety = 6.16
Alternative Fuel Group

Fuel Measurement

Determine and Provide Reference Line
Run Competition
Fill Tank using Graduated Cylinder
Performance Measurement

Determine:

- Miles per Gallon
- Fuel Consumption at Different Speeds
- Velocities While Ascending Grades

**Cycle Computer Functions:**
- Speedometer
- Odometer
- Tripmeter
- Speed Tendency
Spring Loaded Bumper
Alternative Fuel Group

Future Testing

Convert E85 ATV to Propane
Purchase Propane Tank Level Indicator
Perform Identical Test Using Propane
"Best" Vehicle Determination

- Meets Specifications
- Lowest Energy Consumption
- Energy Storage
- Cost of Vehicle
Current Status

Task to complete by Wednesday

Fix Spring Loaded Bumper
Fix Breaking Cable
Tune ATV Engine
Secure Storage Compartment
Mount Battery
Mount Dashboard
Mount Mirrors and Taillight
Mount Seatbelt