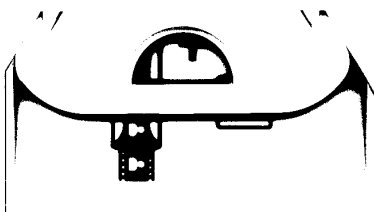


# Cadott High School

Mr. Schneider

Jacob Frank, Josh Sedleck, Dan West,

Jason Pogodzinski, Anthony Smoczyk



## Captains Log

For the first few days in class we went over the rules and regulations for the high performance cars. After we got the regulations down, we proceeded to tear apart the cars.

9-18: We began to make our sponsorship packet.

9-24: We bent our square tubing.

10-1 through 10-8: We worked on our sponsorship packet more, practiced welding on Al, and worked on frame design.

10-9: We got round tubing worked on frame

10-15: We ground down welds on frame continued to work on frame calculated top loop

10-16: We reinforced the frame. We finished calculations on top loop

10-17: We reinforced the frame ground off welds

10-18: We welded the cross pieces in frame.

10-22: We worked on the linkage of our CVT clutch.

10-23: We worked on bracket going from engine to frame.

10-24: through 10-25: We worked to get the engine mounted and running.

10-28: We found out that the bolts on the cvt were bent because of the torque from the cvt so we removed the cvt and replaced the bolts and work on a better way to brace the cvt to the frame we also measured out how big the notch would be in the back of the frame for the tire

10-29: We finished bracing the frame

10-30: We cut out the notch where the tire was going to go

11-2: We made the bracket to hold the back tire on.

11-5: We measured and cut out the pieces that we will use to make the wheel mount

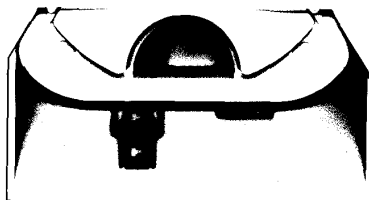
11-6: We welded on the pieces that we cut yesterday and measured the other pieces

11-7: We welded and ground down welds then measured out the next pieces we are going to put on

11-8: We continued to work on the wheel mount.

11-9: We started to mount the wheel

11-12: We got tire spinning



11-13: We made final adjustments on the tire

11-16: We calculated top loop and work on it

11-29-12-10: We worked on roll cage

12-11: We welded roll cage braces

12-12: We welded another brace up between braces on the roll cage above the motor

12-17: We put the side rails on the cockpit and the braces going down to the bottom of the frame

12-22-1-9: We designed our A arms and almost finished construction on A arms built and designed our spindles we decided that we would use shocks so we ordered them

1-14: We figured out how we would connect our A arms to our car and started to build our hinges to connect our A arms to our frame.

1-18: We continued manufacturing our hinges

1-22: We continued work on our hinges and got one A arms mounted

1-24 We started to mount our Front tires.

1-25: We mounted our spindles

1-28: We mounted our left tire and we started to mount our right

1-31: We continued to work on front tires

2-1: We worked on mounting shocks.

2-4 through 2-2-6: We made braces our shocks. we also mounted our shocks

2-7: We mounted our tires

2-11: We discussed our firewall and plan if something breaks

2-13 through 2-21: We continued work on steering

2-26: We are now working on a steering wheel

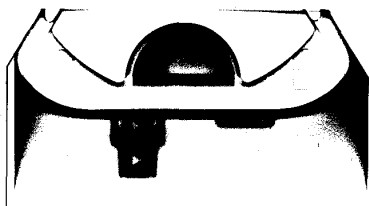
3-3: We worked on floor pan and firewall. We also squared up our steering.

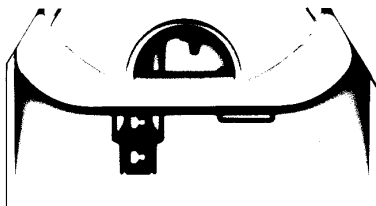
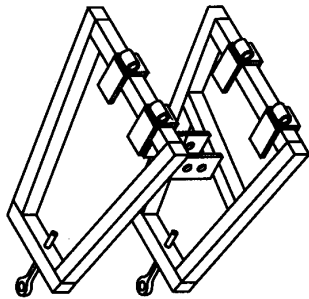
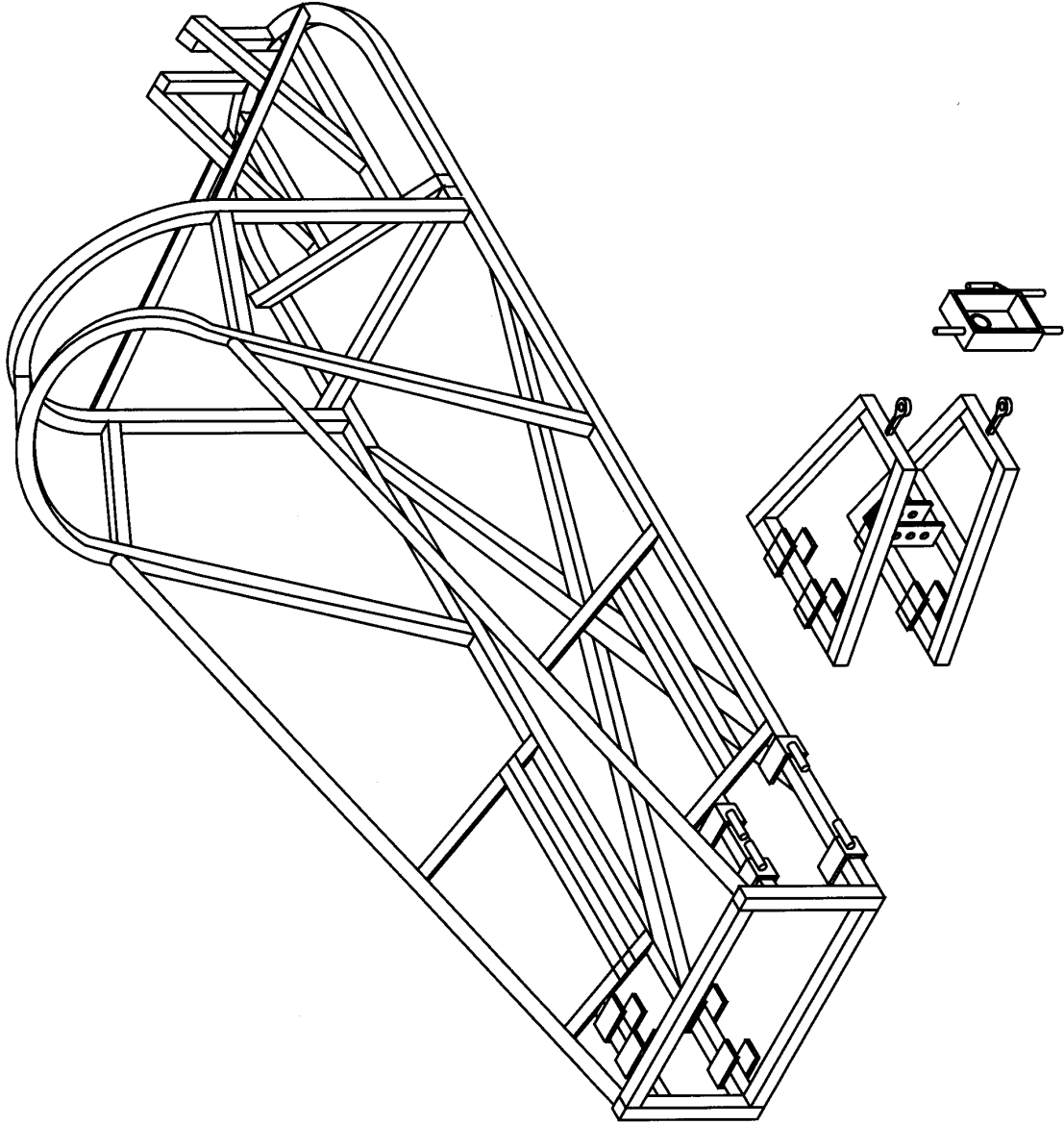
3-5: We patched our firewall and decided on using polycarbonate.

3-6: We started working on packet proposal.

3-7: We welded braces for a seat in our car. We got seatbelts mounted.

3-13: We worked on brake and gas cables



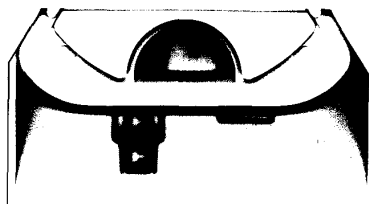
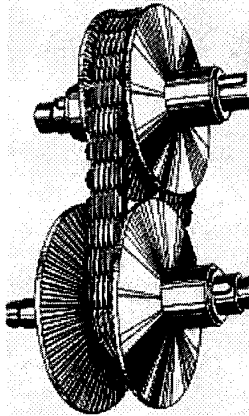


### Basic Vehicle Configuration

Basically, our car is a triangular design with front A-arm suspension and a fully enclosed roll cage. All the materials we use to construct the frame are various aluminum tubes ranging from 1" X 1" X 1/16" square to a 1" X 1/8" round tubing. The basic design of our car, other than using triangles to help strengthen the design, we used bent aluminum in as many places we could due to the fact that bent aluminum is stronger than flat aluminum. For example, our roll cage is a bent, half-circle design not just because it looks cool helps the vehicle right itself in a roll over, but also because it's about 300% or more strong than a square design.

### Power Train Configuration

The engine is attached to the drive wheel through a CVT (Continuously-Variable Transmission) clutch. The gear ratio is 6:1. The gear in the front turns six times before the back gear turns one time at maximum engage. The minimum gear ratio is incalculable. The ratio on the CVT is one to one.

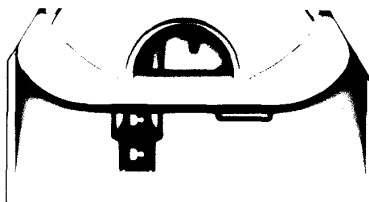


## Performance

Due to the parameters of the class we're running in, we knew that the only way to increase the performance and fuel efficiency of the vehicle was through conservation of weight and momentum. The tricky part about this concept is that, the heavier an object is, the more momentum it has against friction at any given velocity. The only problem with this, is that the heavier an object is, the more it resists being put into motion. In other words, a brick will want to keep moving more than a feather will, but the bricks going to require more force to get moving than the feather. In our case, the force is coming from a combustion engine that requires the use of gasoline, which is what we're desperately trying to conserve. So basically, our game plan was to make our vehicle as light as possible and doing everything we could to help aid in conserving the momentum of the vehicle.

As far as conserving weight goes, we took information from two different types of vehicles, top fuel dragsters and snowmobiles. As funny as it may be, the application of these two high-performance vehicles both require the vehicle to be as light as possible, yet be strong enough to suffer severe impacts and still protect vital pieces to the vehicle. In the sleds case, it has to be strong enough to survive constant impacts with the ground or in a worse case, a minor impact with a tree or rock and still function long enough to get the operator to a safe location and in the dragsters case, it has to protect the driver from a 300 mph car crash. In both instances, they must do their job while maintaining the lightest weights possible.

So when you look at our car, it's obvious where we got the idea for the frame from; it pretty much looks like a dragster with front suspension and only one rear wheel. As far as the suspension components go, we took a heavy influence from modern A-arm and spindle designs from the snowmobile industry. We are also using a Constant Variable Transmission or "CVT"

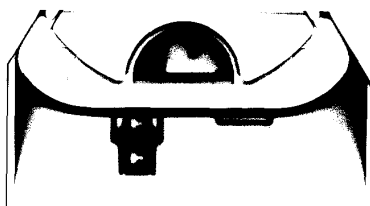


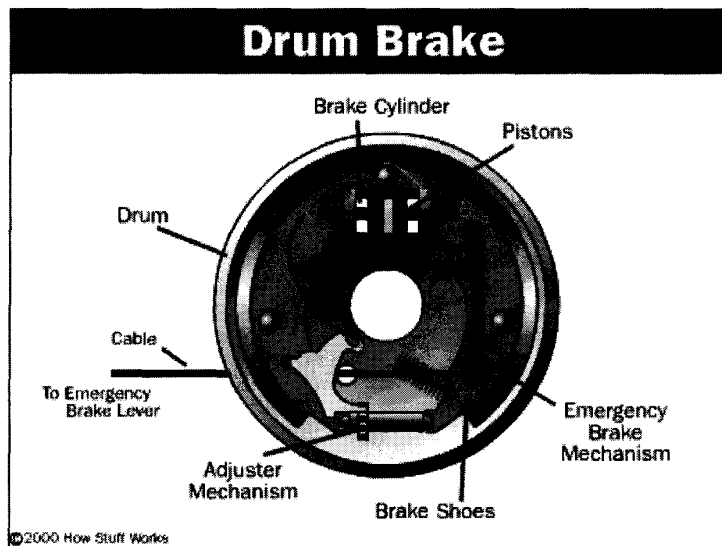
such as the one off of a snowmobile due to their superior efficiency and tune-ability.

As stated above, our car is equipped with A-arm or “wish bone” style front suspension. Now, one might wonder why we felt it was necessary to add all of the excess weight of a suspension system to our car. Well there are two main reasons, one being the fact the suspension really only adds about 4lbs to the overall weight due to the fact that the braces going out to the wheel would have been there anyway, we just made them move up and down and added a shock absorber to the mix. The second reason being that, when you make a turn with a vehicle without a suspension, it transfers some of its momentum into the ground which causes it to slow down. Where as with the suspension, it allows the vehicle to absorb the natural force exerted by the earth, thus conserving the momentum with in the car instead of transferring it to the ground.

## Brake System

In our super mileage vehicle the brake system is a drum-based brake. A drum brake is a brake in which the friction is caused by a set of shoes or pads that press against the inner surface of a rotating drum. The drum is connected to a rotating wheel off a Toros moped. We figured that our car weights about the same as a moped. We determined that with the brakes we are using our car would be able to stop from a speed of 15mph with in 25ft.





### Safety items

Seat belt- 3-point harness system bolted to the frame.

Fire extinguisher- above the driver's head on roll bar.

Kill Switches- one is located on the roll bar, and the other is mounted by the engine.

Roll bar- six inches above the driver when wearing the helmet.

Mirrors- in front of the driver on bolted on the frame so the driver can see behind him.

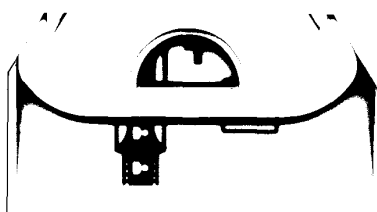
Firewall- a sheet of metal lying between the engine and the driver.

Floor Pan- a sheet of metal that the driver sits on.

Exhaust System- A muffler venting out of the engine compartment.

Fuel Systems- A 250mL tube that has a clear line running to the engine.

Helmet- A DOT approved cycling type helmet.

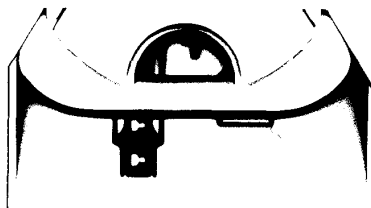


## Problem Solving Essay

The majority of the problems that we encountered during the construction of our vehicle mostly pertained to conflicts within our team and the fact that our school has limited manufacturing equipment. A few problems that we encountered were things such as arguments over the design of major components such as the frame and steering, and other problems such as how we were going to bend the loops for our frame and roll cage on our 60 year old pipe bender and how we were going to mount our brand new CVT to our 20ish year old motor.

As far as our group performance goes, we did everything with a passion, whether it was building something or discussing something, which is exactly where we had our problems. If we could manage to get a group consensus on something, and build it, what ever we were building went together efficiently and accurately. However, when it came down to proposing an idea, we had a tendency to over discuss things and ineffectively explain ideas to one another. Basically, the only solution to the problem we could come up with was that we would each mach up an idea using scrap materials and than we would decide as a group which design was the best design.

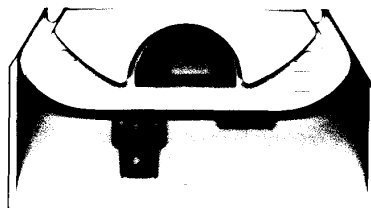
Another problem we encounter was that our school has very limited and old manufacturing equipment. So when it came to bending up the bottom piece of the frame, it literally took a team of about 5 people to keep the square tubing square with the bender, and than another 1 – 2 people to do the bending. So when it came time to bend the loops for the roll cage, we were lucky enough to find out that an old junk bicycle rim had the exact same circumference as the loops we wanted to bed. So instead of using the pipe bender, we just clamped the rim to a

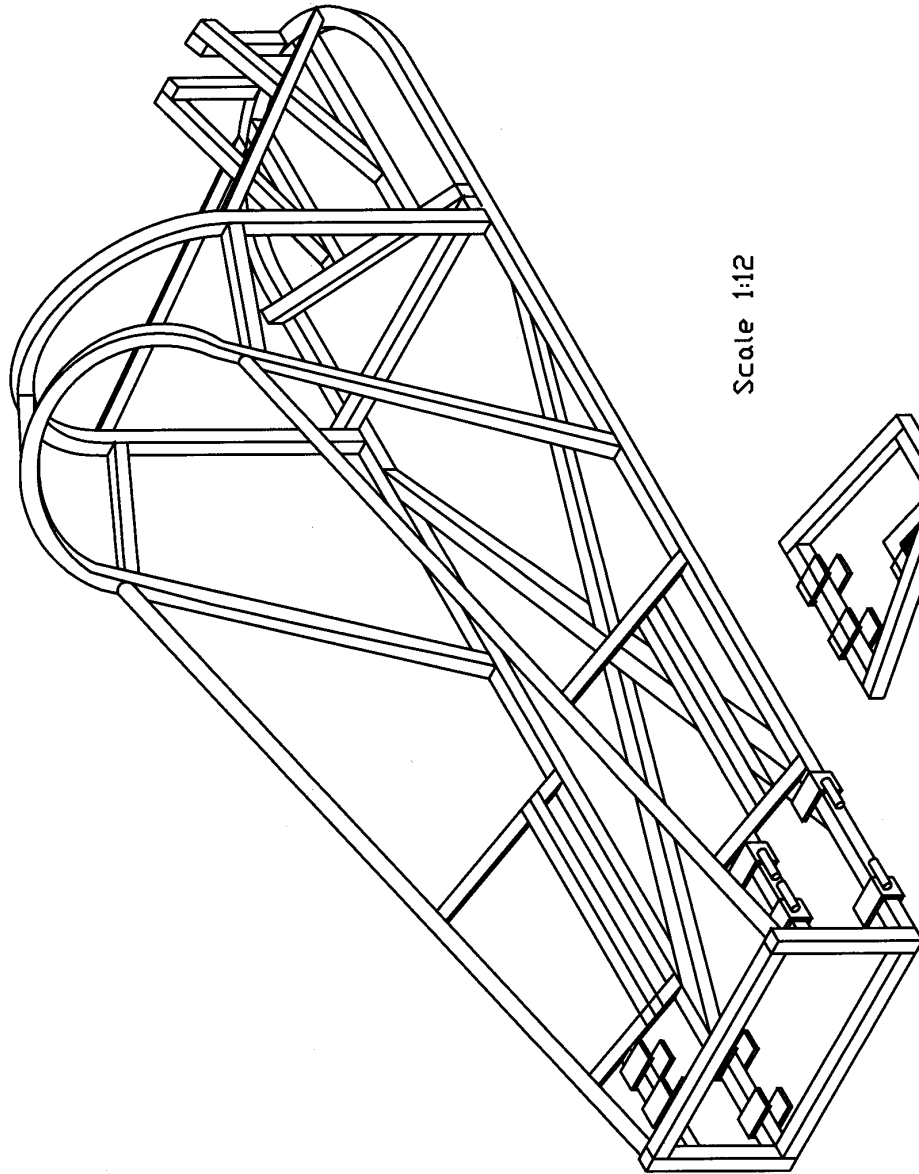


workbench and used clamps and elbow grease to bend the pipe around the rim.

The other major problem we had was that the CVT we ordered from comet racing didn't mount directly to the motor. Briggs and Stratton does offer a block with the correct mount for our clutch, but we lacked the time and budget to purchase and assemble one. So instead, we used two studs in the front of the block to support the drive clutch and an outboard mount to support the secondary half of the clutch plate.

So all in all we learned that teamwork isn't necessarily teamwork unless everyone gets along and that arguing is a bigger waste of time than procrastination. We also learned that even though aluminum is a softer metal than steel, it's still ridiculously hard to bend especially if it already has a bend or curve to it and that 20+ year old tools still get the job done, they just require more 'finesse' and sometimes a little persuasion from a shalaly. It's been a long road and building a "go-cart" was a much bigger challenge than we had initially thought.





Scale 1:12

