
Dedicated track car build

Posted by Head Ball - 2007/10/16 19:29

I am going to move my track car project into this forum. Most of the information below was copied from the "Projects" tab on the forum. From now on, all updates will be posted here.

Background

For years, I have had thoughts of building my own car. In college I designed a single seat, mid-engine, VW powered car with a group of buddies. Ever since, I have told myself I would build the car. After sitting out a few track days because of various issues with the Vette and Camaro I decided the time had come to follow through. My original plan was to make a single seat car powered by a SRT-4 engine/trans combo positioned in the middle of the car. Think Ariel Atom. Then, I saw a car at a golf course that changed my mind for the better. What I saw was a homebuilt car based on a C5 Corvette powertrain and suspension. I stared at that car for 20 minutes taking in all the details I could. Afterward, I knew I had to have a V8. So, the current plan is to build a mid-engine, two seat, LSx powered car for the track.

Trans

The key to a V8 powered mid-engine car is the transaxle. There were/are very few cars from which to pull a transaxle that can handle the torque of a V8. The options include Audi, Porsche, VW, Ford GT40, Ford GT, Corvair, and a few other European makes that weren't really imported to the US. All of them have some sort of weakness. The Audi transaxles are not easy to find now that the replica GT40 people know about them, and many people question their ability to handle a V8. The Porsche transaxles have to be flipped up side down, so the half shafts have to run at a larger than desired angle. The VW based transaxles can be made to take the torque, but you pay the price. Starting price for a VW based transaxle for this power level is \$9500. Price is what excludes the Ford examples as well. Apparently, Ford will sell you a brand new GT trans...for \$14,000. I am still researching my options, but right now I am leaning towards the Porsche G50 transaxle from a 911. The entry fee is higher, but it should hold up to the LS engine with no problems. I will see what I can do with the rear trackwidth to reduce the angle of the half shafts.

CAD

As much as I want to just buy some tubing and start cutting and welding, I figure, as an engineer, I should probably do some design work first. I decided to take a CAD class because I don't have much experience with the modern CAD packages. I chose Unigraphics because I have access to it and people that use it regularly for those times I run into problems. I'm about half way through the class at OCC, and I have picked up a lot of tips and techniques, but we still haven't gotten to what I want. So, I have been trying some things on my own.

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/rotorvanes.jpg>

This is the first part for the car that I have modeled. I made the vanes curved for no other reason than I wanted to learn how to do that. Making the vane curved wasn't difficult. What was difficult was constraining it so that I could change the overall shape of the rotor and the vanes would change as well. I went through about 4 iterations before I came up with something that worked. Now, I can change the diameter and thickness of the rotor and the complete model updates without crashing. The next item will be modeling a C5 spindle. I ordered it from a Vette parts place, and I will get started as soon as it shows up.

Post edited by: Head Ball, at: 2007/10/16 19:33

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Re:Dedicated track car build

Posted by Head Ball - 2007/10/16 19:45

Update 2/20/07

I haven't been working on the car much at all lately due to work. I just returned from 3 weeks in Europe, and I am headed back for another 7. However, I think this trip will be more productive for the car. I just picked up a laptop capable of running UG. Now, when I'm sitting in my hotel with nothing to do, I can work on the model.

A month or so ago I did buy the driver's seat. It's a Kirkey intermediate road racing aluminum seat. I am pretty happy with it, but I was expecting they would have TIG welded it. Instead, all the welds were done with MIG. I'm sure they are plenty strong, but they aren't the best looking. Once the cover is on, no one will see, though.

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/PICT0151.jpg>

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Update April 1, 2007

Posted by Head Ball - 2007/10/16 19:49

Thought it was time for an update. I tried a few times, but the internet connection I have here in Germany is a little sketchy. Anyway, probably the biggest update is I think I have finalized the trans problem. I am going to go with a paddle shifted automatic and use some of the new features being developed for the Megasquirt computer to control it all. I will bolt the auto from a C5 Vette directly to the engine, and the diff to that. The package is longer than I want, but it's strong, available, and paddle shifting is just plain cool. I found a guy that has done the physical part of this before, so I know that can all be done. I have talked with the guy developing the code for running the trans, and the paddle shifting can also be done. Now, it's just a matter of buying the parts. My latest modeling reflects this trans choice.

I have spent most of the time making models of the pieces that are most important to the overall dimensions of the car. I made a very rough engine model based on the LS1 bore, stroke, deck height, and bore spacing. Here it is:

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/EngineBlock1.jpg>

The block model, combined with some measurements of the trans and diff, allowed me to position the rear wheels. That was key to my main goal of determining the overall wheelbase. I would like the wheelbase to be as short as a C5, but I don't think that is going to happen. Oh well, I will gain some high speed stability in exchange for a slower turn in. I am hoping most of that will be offset by centering all the mass between the axle centerlines.

I am learning how to make assemblies in UG as I go, so the progress is not as fast as I would like. I end up repositioning new components several times. At least, I am learning. Once I had the front and rear wheels set in position, I started thinking of ways to shorten the chassis and cockpit area. The relation between pedal position and seatback is key here, so I modeled up a brake pedal. Nothing too fancy, but I learned some more tricks in UG, so I was happy. Here are some pics:

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/Pedalassy2.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/Pedalassy1.jpg>

With the pedal, seats, and wheels in place, the car is starting to take some shape. I am also realizing that my cockpit area is probably too big. Looking at other cars like the Ultima GTR, the Factory Five GTM, etc, I notice they position the main "A" pillar between the pedal and seat. The frame then angles inward. I didn't think this would matter, until I started placing some more tubes in the model. I quickly saw that the one of the main diagonal braces in the front will interfere with the wheel.

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/frontwheelclearance.jpg>

It looks like I will shorten the cockpit and add on a narrowed footwell. That should make more room for the front wheels. Back to the drawing board.

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/Layout1.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/Layout2.jpg>

A quick shot showing the lower control arms. I know the left arm is crashing into the wheel. I still need to confirm the angle the arms will be at using my desired ground clearance of 3 inches.

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/Layout3.jpg>

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Update April 2, 2007

Posted by Head Ball - 2007/10/16 19:51

After two solid days of sitting in front of the computer, here is what I have to show for it. It may look like I went backwards a little, but I made progress...really. As I started to modify the chassis in the assembly, all the mistakes I had made in the models previously came to light. The only way I was going to be able to continue was to make a new chassis model and a new assembly. The good news is that I am getting much better as using the assembly feature. For me, that means that I don't have to manually reposition components when I make a change to the frame. That alone will save me hours down the road.

My main concern now is getting the suspension points correct. I know where the pickup points are for a C5, but I'm concerned what will happen to the geometry in my application. Not only will this car sit lower than a C5, it will require more negative camber. I would like to use a competition tire, and from reading some information from Hoosier, their DOT R compound tire runs best at 2 degrees of negative camber. It looks like I now need to spend some time with the various suspension programs I have to see how I can modify the pickup points to get the camber.

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/NewChassisAssy1.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/NewChassisAssy2.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/NewChassisAssy3.jpg>

Post edited by: Head Ball, at: 2008/01/09 15:02

Re:Update April 2, 2007

Posted by Head Ball - 2007/10/17 12:05

I feel bad for not posting updates along the way. Now that I reorganized the forums a little, I will be more regular with the updates.

It's not that I haven't been working on the car, I just haven't posted much about it. The biggest step came sometime near the end of April: I went to the metal supply store and bought a bunch of steel tubing to make a build table. The table consists of a simple ladder structure made of 1.5" square tubing covered by 3/4" MDF. All this sits on top of some 4x4 wood posts I had, and those are held up off the floor by jackstands. The surface is pretty level, and it means I'm not working at ground level. Overall, the table is 12' long and 6' wide.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0002.jpg>

Shortly after finishing the build table, I went back to the metal supply store to buy the first pieces of metal for the actual car. That's when my plans took a turn. I had designed the basic frame rails using 2x4 rectangular tubing with .095 wall thickness. It turns out that it's near impossible to find this particular cross section. None of the local vendors carry rectangular tubing with less than .120 wall thickness. Back to the drawing board. Using Unigraphics, I was able to calculate the weight penalty going from .095 wall to .120 wall tubing. The weight gain was more than I thought was acceptable. After calculating the weight for linear foot of the tubing the store did have, I settled on 1.5x3 tubing with .120 wall. I bought one 24' stick of this; two 24' sticks of 1.5" OD DOM round tubing; and two sheets of 18 gauge sheetmetal. I haven't had sticker shock like that since I saw my first paycheck and realized how much the MAN takes every month.

Some time when I was in Europe, I won a rear subframe from a C5 on eBay. I decided that it would be much easier to integrate the subframe into my design than it would be to locate all the rear suspension pickups in space. The subframe also provides the mounting point for the differential. I still need to figure out exactly how I am going to mount the subframe. My original idea was to make some steel blocks that mate to the locating pins on the sub and then weld tubes to the steel blocks. Lately, I have been starting to look at acquiring sections of the rear frame from a wrecked C5. They aren't easy to find; I understand they are actually bonded to the body on the Vette. If anyone knows where I can get some frame sections for cheap, let me know.

Not long after I got the build table built, I bought some suspension pieces from the local salvage yard. I got basically everything to build the left rear corner of the suspension except the spring, shock, and toe rod. The C5 suspension

components are unbelievably light. Not that I have weight them, they just feel very light for how large they are. My goal was to get the rear subframe positioned at the correct ride height, and then mock up the a-arms so I could figure out where the upper arms would need to mount. I haven't made much progress there.

The last two pieces I picked up were some scrap powertrain pieces I found on the net. Someone local sold me a LS1 block and oil pan that had some custom ventilation points courtesy of a healthy dose of NO2. When I am done mocking the powertrain up, I should be able to get my money back by taking it to the recycling center. I also found a scrap differential case for the price of shipping. Once I find a transmission case, I can bolt them all together and start finalizing the layout. Once again, if anyone has a bead on a 4L60E case for cheap, let me know.

Ok, so where does that leave me? The pics below were taken last night. I have cut and tacked together the lower frame rails for the cockpit area. The engine is sitting about where it will when finished, as is the seat, and the rear subframe. The wheelbase is coming out longer than I would have liked at 120". For comparison, the C5 is 104.5" and the C6 is 106". Of course, a Formula 1 car is about 126" so I'm in good company. Enjoy the pics:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0112.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0111.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0105.jpg>

Post edited by: Head Ball, at: 2007/10/29 14:29

Post edited by: Head Ball, at: 2007/12/13 18:10

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Update October 29

Posted by Head Ball - 2007/10/29 15:10

Made some more progress this week. I bought some rear frame rail sections from a C5 last week. They showed up on Friday. I spent yesterday cutting and grinding off the pieces I don't need. The rails still need some more clean up, but I now have a great way to mount the rear subframe and controls arms. I was struggling with how to mount the upper controls arms, so getting these rails helps a lot.

I also won the right rear lower control arm on ebay. Next is to get a set of front control arms so I can start making the necessary brackets. I do not plan on using the front subframe. It includes a bunch of mounts I won't be using, and they never seem to sell for cheap on ebay, like the rears do.

Last weekend a buddy and I started bending some tubing. We got the first bend done when it started raining. The bender actually mounts in a trailer hitch, so we were outside and could not continue in the rain for fear of the exposed metal on the bender rusting. Anyway, when we pulled the tube out, we realized we had not bent it far enough. In an effort to put the tube back in the bender, we actually broke the steel tube the bender mounts on. I guess we used a little too much leverage. I fixed that this weekend as well. I am now ready to try some more bends. Hopefully, I will get some of that done next weekend.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0113.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0118.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0119.jpg>

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Update November 10, 2007

Posted by Head Ball - 2007/11/10 21:18

It's time for another update. I feel like I got a lot done since the last update. Ebay came through again, this time with a 4L60E trans case that just happened to have a LS1 bellhousing on it. That was the last piece I needed to bolt the drivetrain together. It appears I was wrong about all the 4L60E cases being the same though. This case does not match the bolt pattern of the C5 differential. It's the same basic bolt circle, so I was able to bolt them together. That is all I needed from this case. The bellhousing should work with no problems. Here is the complete drivetrain bolted together

and sitting on the build table. It is really long.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0137.jpg>

Another positive step over the last couple of weeks was finding Mongoose Motorsports. They are kit car maker based in Ohio. I stumbled on them while stress testing the internet at work. Anyway, they are making a Corvette GTP replica. I don't know that they are the first to do this, but what makes them different is how they are doing it. Mongoose is using the C5 transaxle bolted to a LSx engine just like I am. My car is basically identical to theirs, except for the beautiful body on theirs. And the fact that it's done. Just little things. Through the wonders of the net, I talked with one of the guys that drives the car for Mongoose at competitions. Long story short, I am going to meet them in Ohio to take a look at their car and see how they sorted out some of the things I am struggling with. For instance, they have somehow reduced their wheelbase to 106 inches; 14 inches shorter than where I thought I was. I am looking forward to the trip, and I should be able to get some good pics of their car.

Today was nice enough weather, so I headed for the garage. My first task was to make some motor mounts so I could get the drivetrain position finalized. I used some plate I had laying around. Here are some pics of the mounts in progress:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0124.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0123.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0131.jpg>

While I was mocking up the mounts, I realized that if I put the mounts in the same plane as the main roll hoop, I could tie it all together pretty easily. I figure that will help provide some lateral stiffness to the chassis. A builder I talked to when I first started designing the car said I should always try and find ways to have parts serve more than one purpose. He said that was key to making a light, and strong, chassis. We'll see how that works out. The consequence of doing this is that the engine is intruding on the cockpit even more than before. I tried to take some pics of the relationship between the engine and seat, but it's a little tough with the camera. I still need to pick up a set of heads and covers to see how much there will be with a complete engine. I am already envisioning a heatshield between the engine and seats to keep the heat reasonable. It should be quite a sound sitting right next to the engine. I am debating having the intake between the driver and passenger, or flipping the manifold so the intake is facing backwards. I have a lot of time before I have to make that decision.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0135.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0134.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0133.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0132.jpg>

Something else that has been bothering me is the design of the front down bars on the roll cage. I was afraid that they would be in my line of sight. I didn't want to bend up a bunch of tubing and find this out, so I mocked up the cage using some metal racks I had laying around. Obviously, the metal rod is not the same size as the tubing, but it is really helping me visualize how the cage will come together. I sat in the seat, and the down tube looks like it will be out of my main field of vision. Here are some pics of the mocked up cage. I know it's not pretty, but it works for what I need.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0130.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0128.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0126.jpg>

My next big task is to take measurements from the mocked up cage and put them into the CAD model. That will confirm the lengths of the tubes and where the bends need to be. Maybe next week I will have some more CAD pics.

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Update November 19, 2007

Posted by Head Ball - 2007/11/19 13:17

Another week, another update. While I don't have CAD pics to show this week, I have something better: actual tubing

bent up and tacked in place. With the help of a couple of my buddies, Jesse and Brandon, we bent up the main roll hoop, the top hoop, and the A-pillar down tubes. Jesse has a lot of previous experience with the bender, so he showed me how to set it up and mark the tube correctly. It's not very easy to visualize the first time you do it. Without someone else that has done it before, you could end up wasting a lot of tube. I am proud to report I only made one wrong bend. (I guess I should admit that was when I was working by myself on the down tubes.)

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0142.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0140.jpg>

I ended up changing the design of the main roll hoop. I made the legs of the "A" frame a little taller to make sure the cross bar will clear the intake manifold. The main roll hoop came out a little too narrow, but that was nothing some good old fashioned brute strength, and accompanying back pain, couldn't fix. It will take a keen eye to see it, but the vertical legs are tilted inward a few degrees. I think it makes for a more custom look. Here are some pics of the bending process and the cage as it comes together:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0144.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0149.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0150.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0151.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0152.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0158.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0157.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0156.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0155.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0153.jpg>

The joints were made with another wonderful purchase from Harbor Freight, their take on the hole saw notcher. As with most any multi-part pieces of equipment from HF, it needed some adjustment. As you can see here, the centerlines of the hole saw and tube were anything but aligned. It took a few tries, but we were able to get it shimmed up to the point it made pretty good cuts. The cuts would have been even better if the hole saw were actually round. The truly ironic part is that I bought the hole saw from Home Depot because I thought it would be of better quality than Harbor Freight. Oh well, it still managed to make some decent notches even though it wobbled like an egg.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0148.jpg>

After getting the cage together, I spent a lot of time sitting in the seat trying to figure out where it will eventually go. With the seat in the position I showed in the last update, the down tube is not really in my line of site, but it could be better. I think for this coming week, I am going to cut out the rectangular tubing going across the cockpit so I can move the seat around. By moving the seat closer to the middle of the car, I feel like I will have more protection from a roll over; my head is completely inside the top tube. I still plan on adding tubes for side impact protection, but I think keeping my head inside the top tube and the side of the seat inside the main roll hoop is a better overall way to stay safe. It also lessens the effect of seeing the down tube in my peripheral vision. I think I will have to move the seat forward to clear the engine, but I feel I will still have enough legroom. Another buddy is going to let me borrow some LS heads this week so I can confirm the clearance between the seat and engine. By this time next week I should have the position of the seat and engine all set.

Post edited by: Head Ball, at: 2007/11/19 13:21

Re:Update November 19, 2007

Posted by JScottGT - 2007/11/19 17:43

Looking good Ken! Do you think it will be ready for some runs in the spring? The main roll hoop assembly is looking very

truck-like though. You should think about skinning it with a truck body and make a Craftsman Truck look-alike.

IIRC when setting up clearance from the roll hoop halo to your helmet, there should be at least 2" clearance.

Post edited by: JScottGT, at: 2007/11/19 17:46

Re:Update November 19, 2007

Posted by Head Ball - 2007/11/19 18:02

Jason, thanks. I don't think the car will be running by the spring. It's possible it could be ready for the last event of the year, though. It's amazing how quickly things come to a halt for something that seems so simple. Right now, I am trying to plan out where the seat really needs to be. After that, I have to figure out where the brake pedal will go. I can't really do any more work towards the front of the car until I settle those questions. For that matter, I can't do anything on the rear either, because if I have to move the engine back, it would mean cutting off any tubing I added.

I wanted to make the main hoop a little more eye catching, but I also wanted the main cross piece to clear the intake manifold. It would be interesting with a truck body on it, but I don't have that kind of skill at this point. Not to mention, we don't allow trucks at the events.:P

The roll hoop gives plenty of clearance with the seat so low. This was something I made sure of. I think I have about 6-8" the way it sits right now. I also had my buddy, who is much taller than me, sit in it and he has plenty of clearance.

Ken

Post edited by: Head Ball, at: 2007/11/19 18:04

Update December 3, 2007

Posted by Head Ball - 2007/12/03 15:24

I finally have some more CAD pics of the chassis. Right now, I am doing some research trying to figure out the most efficient use of tubing. When I say efficient, I want the chassis to be as stiff as possible, especially in torsion, for the lightest weight. The nice thing about UG is it calculates the weight of the frame so I can keep track of how much the extra tubes are adding.

I found a link to a SAE paper on increasing the torsional stiffness of a NASCAR Cup car. It was done almost 10 years ago, but it's still relevant. When I read through the article, I realized the Cup car chassis is very similar to what I am designing. The paper analyzes every change they make for added stiffness and weight. It is serving as a great guide for me. Here is the link for anyone interested: <http://www.ces.clemson.edu/%7Elonny/pubs/journal/sae983053.pdf>

And, here are some pics of where I stand right now:

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/DecChassis2.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/DecChassis1.jpg>

In this configuration, the chassis weighs 173 lbs. I still need to add all the tubes connecting the main cockpit to the rear subframe; the side impact protection tubing; bracing for the front suspension area; cross-bracing for the lower frame rails in the cockpit; and the sheetmetal. I plan to make a single piece sheetmetal floor as well as front and rear firewalls. In addition to this, I am planning on bonding/welding sheetmetal between key tubes to make some vertical shear panels. From my research, these should add a fair amount of stiffness. I will try and get some pics of that this weekend.

On the side, I started making a balsa wood model of the chassis. I did this because I don't know how to use the FEA package on UG. It didn't take long to realize it will probably be easier to learn to use the FEA. So, that's what I am doing. It might take a while, but it will allow me to try a lot more ideas. The wife will be happy too, because there won't be balsa wood and glue all over the kitchen table. :laugh:

Post edited by: Head Ball, at: 2007/12/03 15:25

Post edited by: Head Ball, at: 2007/12/13 18:19

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Re:Update December 3, 2007

Posted by Smitty - 2007/12/04 16:24

Looks Good Ken! You've more balls than !!! (is that why it's named 3Balls?) When I'm done with the GTO, I've considered tackling building a kit car myself - a PREFABBED kit car! It'll be fun to watch you build/engineer one from the ground up!

Hey, I don't know which direction you're gonna go when building that engine, but I've got a pair of the factory 241 casting heads that came on our '04 GTO's (same as base model C5 vette) sitting all boxed up in the attic. They are fully assembled as from the factory, only have 9K miles on them. I also have the original cam and lifters, same mileage, specs for this model year were 197/207 .479/.467 on a 116.5LSA. I'd like to get \$150 for the heads, you can have the cam & lifters for free if you want them.

I just thought if you were gonna go for an econo-build of the motor, you might be interested. '04 LS1's were rated at 350HP/365TQ with this combo. I grew up near Holly, have family in the area and best friend lives near Imlay City, so I might be coming over that way for the Holidays and could drop them off.

Let me know if you're interested...

Sean

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Re:Update December 3, 2007

Posted by Head Ball - 2007/12/04 18:36

Smitty,

Thanks for the compliments. This project is something I have thought about and wanted to do for years. I most likely would not have done it without the internet. I have found so much information and inspiration on the net; it helps keep me going. That's why I am trying to post updates. Hopefully, I can give other people some ideas, and others can give me ideas and support.

I appreciate the offer on the heads. I may go that way, and I will contact you if I do. My plan right now is to focus on the chassis during the winter and then try to buy/build the drivetrain in the spring/summer.

I think a kit car is a great way to go. From what I have seen, they are still a huge amount of work, but it's more like fit and finish work. I am staying away from bodywork on purpose. I don't like it. Or interior work for that matter. I think anyone that has seen the inside of the Vette will attest to that. What kind of kit were you thinking about?

Ken

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Update December 4, 2007

Posted by Head Ball - 2007/12/04 18:40

I finally figured out how to run FEA in UG. I had to install some components that were not installed the first time around. Once that was done, I gave it a try. I still have a long way to go before I can start testing the chassis, but at least I know the solver works. I'm pretty happy about that, because the balsa wood model was turning into a mess.

Here are two screen shots of my first two attempts at FEA:

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/FirsttryatFEA.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/FEAStressResults.jpg>

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Re:Update December 3, 2007

Posted by Smitty - 2007/12/06 15:43

Hey Ken,

I know what you mean about the internet stoking the dreams of shade-tree hotrodders like ourselves. Much of the work I've done with the GTO wouldn't have been possible without it...

As for the heads, I only offered them now cause you mentioned needing some to help with the mock-up while designing motor mounts, engine/chassis location, etc. I ain't trying to get rid of them, they've set quietly in the attic since I did the H/C swap last March. They are there if you need them...

As for the GTO, I can see the light at the end of the tunnel, so I've begun to consider what I'd like to do next... I concur with you in my approach to bodywork - it's one of the very few things I've hired out with the Goat, and would do with a kit as well. As much fun as the GTO has been, it'll never be an exceptional track car - it's just too damn heavy! I refuse to strip it down to bare bones in an effort to shed weight, so I'll enjoy it for what it is - a modern day incarnation of an American musclecar (regardless of it's birthplace!)

Mine is a toy, only sees about 3-4K miles a season, stored winters, etc., etc. (I can count on one hand the # of times it's seen raindrops, unfortunately most of them have been at our trackdays!) Sometimes when I think "If I had it to do all over again", I think that a light weight, rear drive, convertible with a big torquey V-8 would be just the ticket. I've taken a hard look at the Factory Five AC Cobra and while I've been a fan of the bodystyle since I was a kid, I'm not at all familiar with Ford power or drivetrain. Something tells me that an LSx in an AC Cobra is something tantamount to heresy.

The kit that has captured my fancy as of late is that of the Gardner Douglas T70 http://www.gdcars.com/gdt70/gdt70_index.htm, (actually, the engine/drivetrain has some similarities with your design) though the price tag is a bit steep.

Anyway, I'm gonna continue to play with the GTO and maybe a couple years down the road I'll decide to sell off a couple of the toys to raise the funds to begin a new project...!

Good Luck with yours! We'll look forward to updates and to seeing it on track one day!

Sean

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Re:Update December 3, 2007

Posted by Head Ball - 2007/12/13 03:42

Finally, after countless attempts, I was able to run a successful FEA on the basic cockpit frame. I am very new to FEA, and I have a lot to learn. I struggled getting this very simple analysis to run for several days. I thought the problem was related to the way I was constraining the model. I tried all different combinations of loads and constraints and got the same errors. Tonight, I realized the problem was related to how the part was meshed. I'm no expert, but I think I was using elements that were too small for the tubing walls. Of course, when I started using smaller elements, I started running into problems with memory. Running the FEA takes HUGE amounts of memory. I am going to have to figure out how to reduce the number of processes running in the background of the computer to free up some memory. Oh well, at least I was able to make some pretty pics. My goal is to start with the most basic frame shape, and then start adding the rest of the structure and see how that changes the stiffness and weight. I've had it for tonight, but I'm feeling good. Here are the results:

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/Anotherchassisunitedanimation.gif>

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Re:Update December 3, 2007

Posted by JScottGT - 2007/12/14 17:58

Instead of modelling everything as a solid tubular structure, you should be able to model everything as a stick model. Then you just apply the cross-sectional moments of inertia to each "stick." This will greatly reduce computation time as

well as how much memory is used up by the model. Just remember every time you reduce the mesh size, the file size (memory usage and computation time) goes up exponentially.

If you are still having difficulty you can model everything as solid tubes. That will give you a relative chassis stiffness (torsional). Then as you make changes you can evaluate is as a % increase/decrease. I'm not familiar with the FEA package with UG at all, so I couldnt even begin to tell you where to start... now if you were using CatiaV5 I could help.

I created a simple model using shell elements to demonstrate the theory...

<http://picasion.com/pic1/99acf76d90bcaad77aa1cbc91a7bb030.gif>

I found the commands to set up a stick model, but could not figure out how to apply the cross-sectional properties into the model. Once I figure that out, this becomes a much simpler model and will calculate very fast.

Post edited by: JScottGT, at: 2007/12/14 19:15

Post edited by: JScottGT, at: 2007/12/14 19:18

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Re:Update December 3, 2007

Posted by Head Ball - 2007/12/14 23:37

Jason,
Thanks for the tips. I will give them a shot. What kind of constraints did you use in your example?

Thanks for the advice, and keep it coming. I know I have a lot to learn in this area.

Ken

=====

Re:Update December 3, 2007

Posted by JScottGT - 2007/12/15 00:17

I clamped the far end and put an up force on the right front, and a down force on the left front.

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Re:Update December 3, 2007

Posted by JScottGT - 2007/12/17 20:02

Okay, so I did some playing around with modelling and solving 1-D beam elements for structural analysis and finally figured it out (for CATIA anyway). I created a series of lines to create a box. Each line was meshed using 1-D beam elements. Each beam was given a tubular cross section with OD & ID specified. I then used a clamp restraint on one plane, then added a couple-load to the other plane. See the amination below for the final result. For a quick comparison, the analysis I showed above was a simple "H" structure using shell (2-D) elements with a given thickness, and each joint had a seam weld applied. The above model took about 5 minutes to solve on my UNIX machine. The wireframe model with 1-D elements was somewhat more complex (structure-wise) and it took 4 seconds to solve. If you can get that figured out on UG, that would be the way to go.

<http://picasion.com/pic1/84fb0ea00e8e79107f8c97cc30b68fe6.gif>

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Re:Update December 3, 2007

Posted by scooter70 - 2007/12/18 01:03

Hey Jay - How about we start a Catia consulting company and Ken can be our first customer? I already have the C5/C6 suspension modeled parametrically so that I can move pickup points (and/or change arm lengths/angles) and view the changes in the kinematics module. Maybe I'll have some time to touch it up some more this week.

Ken - What's it worth to you? :evil: Free track time? ;)

=====

Re:Update December 3, 2007

Posted by Head Ball - 2008/01/02 13:54

scooter70 wrote:

Hey Jay - How about we start a Catia consulting company and Ken can be our first customer? I already have the C5/C6 suspension modeled parametrically so that I can move pickup points (and/or change arm lengths/angles) and view the changes in the kinematics module. Maybe I'll have some time to touch it up some more this week.

Ken - What's it worth to you? :evil: Free track time? ;)

Now that I have access to V5, we might have to make a deal. I didn't do much modeling or FEA work over the last two weeks, but I will get started again. It was nice to take a little break and work on some other things. I may very well give you guys a call about V5.

Thanks
Ken

Update January 2, 2008

Posted by Head Ball - 2008/01/02 14:11

Happy New Year to everyone. I used the new year as motivation to make some progress on the car. The two weeks previous to that were spend relaxing with family and friends. Now, it's time to get back on track. Yesterday, I got two big things done. First, I moved the engine back about an inch on the motor mounts. The engine was just too close to the seat. I could have simply moved the seat further forward, but every time I move the seat forward, I reduce the legroom and the amount of room available to climb into the seat. Below, you can see the revised mounts. It wasn't that much work, but I tossed the idea around in my head for a long time.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0244.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0243.jpg>

The other major accomplishment was connecting the rear frame rail sections with the rest of the car. Once I made the decision to move the engine back, I figured I was all set to start connecting the pieces. I had a lot of plans to tie down the rear suspension and make sure it was all square to within millimeters. Then, I realized that GM doesn't get it that close, and the main goal of this project is to actually get something on the track. So, I checked the rear frame rails to make sure they were straight and level, and started welding. I still have to attach the frame rails in a few more places, but at least now they don't move too much. I will continue to check the position of the rear suspension as I add the other connections.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0240.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0234.jpg>

A problem I was facing was how to attach the rear down bars to the frame rails. My chop saw would not cut the sharp angle easily. I had some cutoff pieces of rectangular tubing available, so I used them to mount the down bars. I still need to add some reinforcement, but I think it came out well.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0237.jpg>

The Harbor Freight tubing notcher continues to do good work.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0239.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0238.jpg>

With this done, I am now out of tubing. It's time to head for the store and order some more so I can finish the rear section and start working on mounting the front suspension. While I am waiting on the tubing, I will try to get some more work

done on the CAD model and FEA. I need to update the CAD model to reflect these down tubes as they are in a slightly different position.

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Update January 6, 2008

Posted by Head Ball - 2008/01/06 16:16

One of the design elements I want to figure out using FEA is how to reinforce the top hoop. My first thought was an X because it makes sense. However, when I was reading through the paper on strengthening the NASCAR chassis, they used a V formation. The point of the V attached where the middle windshield bar came up, and went back to the corners. Below are the two different scenarios. I will have to run the second one with the windshield bar, because I do intend to run the bar either way.

http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/TopX_sim1.gif

http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/topv_sim1front.gif

The actual displacement numbers are pretty much useless because they don't really represent the chassis. I am still struggling to learn how to set up the FEA. It hasn't been going very well. As a result, I have been using solid tubes for the model. However, I am keeping the constraints and loads the same, so the comparisons should be accurate. The rear of the model is being held fixed at the two rear corners. Each front corner has a load of 500 lbs, but is opposite directions to create twisting.

The animations are fun to look at, but they make it a little harder to see how the different geometry effects the areas of interest. In the above cases, I am most interested in the upper front corners of the main cage. That isn't where the max deflection is, so I made the following still pics to compare the areas. The V shape actually shows less deflection, which is opposite of how I thought it would go. My gut tells me that the windshield bar is a large part of the difference, so I will rerun the X with the bar.

EDIT: I have now added the X with the windshield bar. The deflection at the front upper corner is slightly reduced, but the deflection at the rear upper corner is more than the V. The overall max deflection is also reduced. The difference between the deflections is pretty small, but remember I am using solid tubes. When I finally figure out how to run hollow tubes, I expect the difference will be greater. For now, I am going to plan on using the X.

http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/TopXwwsbar_sim1.jpg

http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/TopX_sim1-1.jpg

http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/topv_sim1-1.jpg

The pictures above show a model that is not finished. I will rerun the same analysis when I get all the door bars, front end structure, etc. built into the model. Just for comparison, here is the basic cage structure without any bracing.

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/Solidchassis1.gif>

Post edited by: Head Ball, at: 2008/01/06 16:18

Post edited by: Head Ball, at: 2008/01/06 16:36

Post edited by: Head Ball, at: 2008/01/06 17:09

Post edited by: Head Ball, at: 2008/01/06 17:29

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Update January 6, 2008 Con't

Posted by Head Ball - 2008/01/06 17:27

Here are some more good comparisons. The last pic in the reply above shows the basic chassis structure. The animation below shows the same chassis but with the addition of two tubes (on each side) between the rear subframe

and the roll hoop.

http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/Baseplusrearsupport_sim1.gif

These two tubes reduce the max deflection by 21% but with only a 5% weight increase.

Here is another animation with the addition of an X brace between the rear down bars. This brace reduces the deflection another 29% over the two tubes, and 44% over the base. The increase in weight over the base chassis is about 9%. Over the two tube scenario, it only adds 4% more weight. That is the kind of efficiency I am looking for.

<http://i44.photobucket.com/albums/f25/grulich69/CAD%20Pics/Baserearplusxfromrear.gif>

Re:Update January 6, 2008 Con\t

Posted by Head Ball - 2008/02/19 02:17

Finally, some more progress. It has been a busy month doing anything except work on the car. I did make a little progress a few weeks ago, but nothing I thought worth updating. I simply welded on some plating that I needed for the work I did tonight. Using some 1.5" square .120 wall tubing, I connected the rear frame section to the main roll cage at two more spots. I used the square tubing because I plan to make a panel that is bonded or welded between the two pieces to make a vertical sheer panel. It didn't hurt that the square tubing was less than half what the DOM tubing cost. Here are some pics:

A pic of the plate I welded in and the two tubes coming into it:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0030.jpg>

Looking backwards from the main roll hoop:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0027.jpg>

A side view:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0025.jpg>

Top of the notch:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0028.jpg>

Bottom of the notch:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0029.jpg>

The Harbor Freight notcher continues to do good work. I think the key is to go slow and use plenty of cutting fluid (or WD40 if that's what you have).

Besides the work I did here, I purchased all the front suspension pieces on ebay. I can't wait for the delivery man. A friend of mine has agreed to machine up the front suspension mounting brackets as well. Finally, I bought a Wilwood brake pedal on ebay. Nobody else bid on it, so I got a good deal. It seems the deals on ebay are fewer and fewer every day, so I am happy to find one.

I expect to make a lot more progress in the next month, so stay tuned.

Ken

Post edited by: Head Ball, at: 2008/02/19 02:19

Update March 6, 2008

Posted by Head Ball - 2008/03/07 00:25

Time sure seems to fly between these updates. I haven't made much progress on actually building the car, but I have been buying parts like mad. As I said in the previous update, I ordered all the front suspension pieces. Well, they showed up in good shape and are waiting for some mounting brackets to be made. Here is a list of some of the other things I have purchased:

- Bilstein coilovers
- Transmission
- Gauges
- Steering wheel and quick disconnect
- Rear half shafts
- Rear toe control rods
- Right rear upper control arm
- All the rear suspension mounting hardware
- Z06 exhaust manifolds
- Differential
- Driver's seat cover
- Rear brakes

Below are pictures of some of these items. You will notice that the toe control rods and half shafts are not in the best shape. I wasn't happy when those showed up, because they were advertised as in good condition. The seller said they came from a car with 40k miles. After some back and forth, he agreed to refund me some of the purchase price. I will use the half shaft with the torn boot as a core for a rebuilt one. That still puts me ahead of buying a new one. As for the toe control rods, I am going to see about getting some new ends.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0047.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0046.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0045.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0044.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0043.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0039.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0038.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0033.jpg>

Post edited by: Head Ball, at: 2008/03/07 00:27

Update March 8, 2008

Posted by Head Ball - 2008/03/08 15:40

Big milestone: I picked up an engine last night. It's a 5.3L truck engine with about 61k miles. The engine I went to look at originally had fewer miles, but when we went to look at it, the water pump would not turn. This engine looks like it has a few oil leaks around the valve covers, but some new gaskets and a good cleaning should solve that. I now need to start stripping off the parts I am not going to use, and track down the replacements. The intake manifold won't clear the cage, so it has to go. The exhaust manifolds are also going. Here are some pictures of the engine as I pulled it out of the back of the truck:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0051.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0050.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0049.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0048.jpg>

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Update March 10, 2008

Posted by Head Ball - 2008/03/10 12:16

A couple more updates from the weekend. I picked up some nice wheels (from a 3 Balls participant) on Saturday, and am now looking for some tires to go with them. On Sunday, I fitted four more tubes on the cage. Getting the front dash tube on is important because it allows me to position the brake pedal and steering column. That is what I'm hoping to get done next weekend. Here are some pictures:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0052.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0053.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0054.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0055.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0057.jpg>

Post edited by: Head Ball, at: 2008/03/10 12:32

Re:Update March 10, 2008

Posted by Head Ball - 2008/03/25 01:58

Here are the latest pics of the construction. I got the side impact bars in this weekend which was a PITA. I also got the much of the front subframe put together. A friend is working on the lower control arm mounts for me. When those are done, I will finish up the subframe. In the meantime, I think I am going to start finish welding the frame.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/28.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/27.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/26.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/25.jpg>

Re:Update March 10, 2008

Posted by Head Ball - 2008/05/21 17:16

Sorry for the lack of updates, I have been slacking in that area. The good news is that I have actually been making progress on the car. Here are some of the things I have done since the last update:

- Most of the welding has been completed
- Sheetmetal floor has been put in; I even bought a bead roller so I could put some beads in the front most piece

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/00032.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/30.jpg>

- Both driver and passenger seats have been mounted

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0072.jpg>

- Engine and transmission have been bolted together and put in the chassis

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/trans.jpg>

- Bought some Hoosier race rubber for the wheels (I stacked them next to some tires Daniele has, and they are a full tire higher, lots o rubber)
- Bought a wiring harness and started to get that sorted out
- Picked up a starter and alternator
- Bought a 3 quart Accusump system to make sure the engine always has oil pressure
- The Woodward custom steering rack showed up

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/rack4.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/rack5.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/rack2.jpg>

- Bought two sets of Simpson harnesses
- Bought a switch panel for ignition, starter, fans, etc
- Bought a new F-body oil pan and associated parts because the mock up pieces had a few "extra" holes that didn't come from the factory
- Pulled the stock truck balancer off the engine; it will be replaced with a Corvette or F-Body unit that is shorter and will allow the alternator to sit closer to the engine
- Redid the motor mounts for the 127th time
- Bought some poly bushings for the suspension (will be put in this weekend)

I'm sure there are some other things, but those are the main ones. I will add some pictures tonight when I get home.

I am planning on getting a lot done this weekend. My goal is to get the wiring setup and maybe crank the engine. I don't have the fuel system setup, but it would be good to see if I am getting spark and a little oil pressure.

Ken

Post edited by: Head Ball, at: 2008/05/21 17:22

Post edited by: Head Ball, at: 2008/06/02 00:57

Update June 1, 2008

Posted by Head Ball - 2008/06/02 00:55

I made some more progress over the weekend. After having the Corvette once again spend very little time on track at Grattan, I figured I need to spend a lot more time on this car.

Including last weekend, I got the rear poly bushings installed and put a lot of the rear suspension together.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0071.jpg>

I also added in some more diagonals in the front section of the car and put the X in the top. After that, I drilled and cut out the plates that Gramps made for the front upper control arms. I bolted on the front arms to see how the plates fit. They went together well, but there are two small areas that need to be clearanced a little. It also looks like I will have to move the mount plates forward a little. I won't know until the lower mounts are in place, but that's why I tack everything in at first.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0061.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0062.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0063.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0064.jpg>

Another big item was adding in some diagonals to the main hoop. Normally, a cage would have one diagonal that

stretched from a lower corner to the opposite upper corner. I can't do that because the engine is in the way. My solution is to use two diagonals that are angled forward and meet between the seats. They are very close to the crankshaft pulley though. I am in the process of getting another crank pulley, so the one in the pictures is the truck pulley. It is longer than the Vette/F-body one I am getting. Once I have that on, I can check to make sure the alternator belt clears. Until then, I will leave these bars tacked in.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0073.jpg>

Today I spent a long time getting the wiring harness straightened out. With the intake sitting backwards on the engine, I had to reroute some wires, move the temp sensor, and plug the stock oil pressure sensor. I plan to use an aftermarket oil adaptor plate for the cooler, and it comes with a port for a pressure sensor and a temp sender.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0067.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0068.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0069.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0070.jpg>

Hopefully, I can keep making progress every day.

Ken

Post edited by: Head Ball, at: 2008/06/02 01:02

Re:Update June 1, 2008

Posted by goddom - 2008/06/20 01:54

Wow. This is quite a project! Pretty cool. Have fun with it.

Update June 30th, 2008

Posted by Head Ball - 2008/06/30 15:29

It's time for another update. I spent all day Saturday in the garage working on this car. My good friends over at B&B sent me the lower control arm mounts. I designed these mounts with slots instead of holes so that I could have a wide range of adjustability for camber and castor. B&B did a great job machining them. With the mounts, I was able to build up most of the front end. I still have to figure out the best way to brace everything, but the front suspension is now located and tacked in. As soon as I finish up the upper coilover mount, the car will be on all four wheels.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0081.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0082.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0083.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0084.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0085.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0087.jpg>

I have also been working on the engine wiring and fluid plumbing. Here are some pics of the main fuse block I pulled from a Chevy Tahoe and some of the fittings. The fittings in this picture are the ones coming on the transmission for the cooler. I never would have guessed how much these things cost. It's my first time dealing with AN fittings.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0079.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0080.jpg>

More to come shortly.

Ken

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Update August 12, 2008

Posted by Head Ball - 2008/08/13 01:06

I have been making more progress. I didn't get it done for Grattan, and life has found a way to get in the way. I am now shooting for Waterford next month.

Since the last update, I have pretty much buttoned up the front end, including mounting the rack and pinion. Of course, on closer inspection tonight I realized the rack isn't completely level. I need to raise the driver's side about 1/8". Once the rack was in I was able to mock up the steering shaft. I was going to put in the final version until I found out the metal shop gave me the wrong size tubing.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0001.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0003.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0005.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0004.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0002-1.jpg>

Something else I got done that has been bothering me is the alternator mount. I wanted to keep the belt drive as simple as possible. Not only for weight reduction, but to minimize the space requirements and the number of pieces that can go bad. Even though the LSx parts are all supposed to interchange, there are some small differences. When I tried to mount the alt bracket, I found out that one of the require bolt holes was not drilled in this block. The result is I am using one bolt into the block and the tension rod. I will see how it works, and if necessary make a bracket to brace the mount on the outside face.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0006.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0007.jpg>

The other big thing I got done is the diagonal bracing in the cockpit. Because the engine sits under the main cross bar, I was not able to run a single diagonal from opposite corners of the main roll hoop. My solution is to run two diagonals angled forward to a common point. Another bar then runs from there to the base of the "windshield". A final tube runs to the front end bracing to tie it all together. (in the picture below, I still need to fit and weld the last of the 3 diagonals)

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/PICT0008.jpg>

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Re:Update August 12, 2008

Posted by scooter70 - 2008/08/13 23:45

Head Ball wrote:

I found out that one of the require bolt holes was not drilled in this block.

Looks like it's coming along well Ken.

The iron blocks don't have that hole drilled. I could have told you that. ;) You could drill and tap it yourself if you wanted or just work around it. As long as the bracket doesn't flex and throw the belt at high RPM, you should be ok. I made my

own bracket but it isn't perfectly straight so it threw the belt a few times until I upgraded to the Katech tensioner.

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It's on its own feet!

Posted by Head Ball - 2008/08/19 01:26

Brandon came over on Sunday, and we got the car off the build table and onto the ground. It sure was nice to see it sitting on the wheels. The car seems a lot lower than when it was on the table.

We also got the engine and tranny bolted together completely. Before, the flexplate was not bolted to the torque converter. The bolt pattern was slightly off because this combo was never envisioned by GM. We had to grind the bolt holes a little, and then add a small spacer between the converter and the plate. Before putting the combo in the frame, we installed the starter. Now it's time to install the half shafts, and the drivetrain will be complete. Enough of the typing, here are the pictures:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/1011.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/101.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/1012.jpg>

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Re:It's on its own feet!

Posted by eficalibrator - 2008/09/10 03:19

Time for another update, Ken. I believe you hit what many would consider a milestone recently.

I'll have a new file for you this weekend as well. ;)

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Re:It's on its own feet!

Posted by Small Ball - 2008/09/10 13:21

That is so flippin cool Ken! hey, do you have enough camber in those front wheels?

Now plumb up the coolant lines and take her for a dirt track excursion around your gravel roads!

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Re:It's on its own feet!

Posted by JScottGT - 2008/09/23 14:23

Wow! It's actually starting to look like a car now. How close are you from firing it up and taking it for it's maiden voyage? I cant wait to see it run around the track next season.

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Re:It's on its own feet!

Posted by Head Ball - 2008/09/23 20:23

I am so behind in updates. Thanks to the efforts of Greg and Gramps, the car runs. I don't have an exhaust on it yet (I will be visiting Kenny at Muffers and More very soon) and it is also missing the alternator and cooling system. I bent up the pipes for the cooling system last weekend, and I expect to have that all buttoned up shortly. I finally figured out how I am going to wire up the alternator this morning, so that should come together shortly as well. This afternoon I made another stop at my favorite bolt store, so I now have all the hardware to mount the front suspension and the brakes.

The main things keeping it from being drivable right now are the lack of a throttle cable/pedal, shifter cable, and working brakes. I have all the pieces needed to complete these items, I just need to find the time.

I would love to have it running by Calabogie, but let's be honest with ourselves: that's a stretch. I do think it's possible you will see it at Grattan this October.

I will take some pictures tonight to show the progress.

Ken

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Re:It's on its own feet!

Posted by Head Ball - 2008/09/24 00:25

Here are some pictures of the latest progress.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/pic22222.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/pic22223.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/pic22224.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/pic22225.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/pic22226.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/pic22227.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/pic2222.jpg>

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Re:It's on its own feet!

Posted by duffyc - 2008/10/12 16:25

Sweet! What a fun looking project. Nice work!

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Re:It's on its own feet!

Posted by Head Ball - 2008/10/17 02:43

Duffy, how's it going? Thanks for the compliments. For the most part, it has been very fun. There have been some tense moments, but anyone who knows me knows that I handle that kind of thing in stride. :pinch:

Anyways, big news!!! The car is on the trailer headed for Kenny's shop to get an exhaust tomorrow. And, it drove on the trailer under its own power. Of course, this was at 10PM so it wasn't possible to get any pictures. I was pretty excited. I don't know about the neighbors though. Nothing like an open exhaust at 10 to make friends in the neighborhood.

I'll get some pictures tomorrow in the daylight and after Kenny and his gang at Muffers and More put some pipes on this thing.

It's looking like a real possibility for Grattan next Saturday. :woohoo:

Ken

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Re:It's on its own feet!

Posted by JScottGT - 2008/10/17 16:35

With no body work or a windshield, it will probably be a cold ride around the track... but cant wait to see it out there. I am still on the fence on whether or not I will trek out there for the last track day of the year, but I am leaning toward yes. Plus I still have the cooler the guy in the saabaru donated to the club for water & gatorade.

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Re:It's on its own feet!

Posted by Head Ball - 2008/10/17 16:41

I'm pretty sure I will be nervous/excited enough that I will be sweating.

I do plan to get a front and rear firewall in place before Saturday. I have some friends coming over this weekend to help out. I also have the coolant pipes running right down the center of the car. I can use those as a hand warmer on the front straight. :ohmy:

You have to come out for last event Jay. No matter what, it will be a good time. The camping is worth the trip all by itself.

Ken

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Re:It's on its own feet!

Posted by Red06 - 2008/10/17 17:40

Looks good Ken! I hope you get to christen it at Grattan. I can't think of a better place. B)

I didn't realize you were putting a second seat in... For some reason I thought it was going to be a single seater. You'll have to take some video and post it when you get it back from Kenny's. I'd love to hear how it sounds. Congrats man!

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Re:It's on its own feet!

Posted by Head Ball - 2008/10/17 18:52

Red06 wrote:

Looks good Ken! I hope you get to christen it at Grattan. I can't think of a better place. B)

I didn't realize you were putting a second seat in... For some reason I thought it was going to be a single seater. You'll have to take some video and post it when you get it back from Kenny's. I'd love to hear how it sounds. Congrats man!

I tossed around the idea of a single seater for a while, but it really is fun to have a passenger in the car every once in a while. I also need more instruction (not from Alex though :P). I am really hoping that having a reliable car that will pass anyone's tech inspection will allow me to go to more events around the country.

We hit a little snag with the exhaust today. I am using Corvette manifolds, and the mating flanges aren't available. Kenny has his exhaust supplier making up some custom flanges. They will be available next week, so the exhaust will take a little longer than expected. No big deal, it just means I have to run it this weekend without the mufflers. I want to boil out the crap that's in the block before using the electric water pump. The pump cost almost what the entire engine did so I don't want to run a bunch of rust/corrosion through it.

I have to say though, Kenny and his guys were great again today. They helped me get the car off the trailer and into the shop, and in general were very easy to deal with. When the problem with the flanges came up, they called me immediately and had several options to choose from. If anyone needs works done, I really do suggest giving Kenny your business. Every time I walk in there, it seems like they know every customer by name. I see a lot of repeat customers. Thanks again Kenny.

Ken

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Re:It's on its own feet!

Posted by Head Ball - 2008/10/20 02:22

Thanks to a couple of my buddies, I was able to make a lot of progress this weekend. I really feel like the car will be ready for Grattan this weekend. I'm not saying it will be 100% complete, but it will be ready for some shakedown runs.

So what did I get done? Here is a brief list:

-made intake tubing and mounted air cleaner

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct190814.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct19087.jpg>

-finished the driver's seat mounts and added a seat back brace

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct19086.jpg>

-made the harness mounts

-finished the differential mount

-mounted master cylinders

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct190818.jpg>

-ran brake lines

-bled brakes

-mounted the brake light

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct190815.jpg>

-mounted the battery

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct1908.jpg>

-mounted the computer

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct19084.jpg>

-wired up the gauges

-made a gauge pod

-mounted gauges

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct190816.jpg>

-adjusted the trans cable

I am taking the car back to Mufflers and More this week to have the exhaust done and an alignment. I'm sure there will be some late nights this week, but I think I can make it happen for Grattan.

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct19082.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct19089.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct190810.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/oct190813.jpg>

Post edited by: Head Ball, at: 2008/10/20 02:26

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Re:It's on its own feet!

Posted by lukester - 2010/01/16 07:40

Hey I saw your build and was waiting ti see how it was finished..since Im trying to do the same thing..I was wondering why you used the 1.5 x 3 x .120 wall..could you have used 1.5 x 3 x .095? trying to decide if I should o with the .120 wall or the .095? I would save about 18.5 lbs...Sugestions would be appreciated.. thanks Luke at biggoof29@yahoo.com

Re:It's on its own feet!

Posted by Head Ball - 2010/01/27 19:25

Luke,
Sorry, I didn't see your reply until today.

I used the .120 wall tube because that's what Metal Mart had in stock. They would have to order anything thinner than that. I originally designed the car using .095 wall, and it was a bit of a surprise when I went to buy steel. Lesson learned here was to have a chat with your metal supplier before designing a complete chassis.

Ken

Re:It's on its own feet!

Posted by Head Ball - 2010/03/24 08:41

Just a couple of teaser pics for some of the changes I'm working on:

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/P1000373.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/P1000374.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/P1000375.jpg>

<http://i44.photobucket.com/albums/f25/grulich69/Build%20Pics/Wing1.jpg>

See you at Gingerman.:woohoo:

Ken

Re:It's on its own feet!

Posted by JScottGT - 2010/03/24 11:14

:woohoo: As if that car needed more power! :P Are you looking to hit 150 down the straight at Grattan?

Re:It's on its own feet!

Posted by Got2boostit2 - 2010/03/24 12:22

Ah, moar Boost! It is good!

Re:It's on its own feet!

Posted by me109a - 2010/03/26 14:58

Ah, a home made Chaparral looks to be in the works!!

:woohoo:

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