Marketing the 2002 WPI Formula SAE Racecar

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Abstract:

The goal of the Marketing the 2002 WPI Formula SAE Car IQP team is to design a marketing strategy for the 2002 Car, and present this campaign as the presentation event for the annual FSAE competition in Pontiac, Michigan. This presentation involves attempting to sell our ideas and our car to the judges at the competition, as though they were potential customers, clients, or investors. In order to best serve the needs of, and in turn get the business of, the prospective target customers, a survey is essential. This survey provides the information necessary to compose the ad-campaign, and the final presentation of the project. Further, the data from the cost report, in addition to the survey, will be used to layout a business plan including factory design and proposed production costs.

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1. Introduction and Overview:

1.1: Introduction

The Society of Automotive Engineers holds an annual competition for colleges and universities to build and race Formula SAE cars. These FSAE cars must be built within strict guidelines outlined in the FSAE rules put out every year to go with the competition. Schools choosing to enter field teams of students, who spend the entire school year designing, building, testing, and tuning these cars in preparation for the final competition held in May in Pontiac, Michigan. Each year approximately one hundred and twenty schools from across the globe enter their designs [1.1].

The competition consists of several static and dynamic events, where the teams will be given the opportunity to earn points. The team with the highest total score from the combined events wins. The events in 2002 will include technical inspection, cost, presentation, engineering design, solo performance trials, and high performance track endurance. Please see the 2002 Formula SAE Rules for details on each event and guidelines for car construction [A-1].

While most of the events are based on the car and its performance, there is one predominant event which is not. The presentation event is an event which judges the ability of the team to make a successful presentation to high level executives with marketing of the car in mind.

1.2: Presentation Event

The focus of this IQP is the marketing and presentation aspect of the FSAE competition. This includes the presentation event itself, and the subset of events and outside research that go into making the presentation possible.

The presentation event as we have known it from previous years involved the marketing and prospective sales of one thousand cars per year. This event has changed in the last year, however, and now focuses on the actual ability to make a presentation, along with manufacturing and marketing the car and its design. The number, now for manufacturing goals, is four cars per day.

Held on the first day of competition, this event, judged by people SAE has chosen to represent car company executives, will be judged on organization, content, and delivery of the presentation. The presentation should cover the "Concept of the Competition," and attempt to sell the car and its design to the judges. This will be done through a marketing strategy and clever presentation of the car's unique advantages.

One or more team members must make this presentation with a maximum time of ten minutes not including questions. After the first ten minutes have elapsed, a further five minutes are allotted for the judges to ask questions which the team is encouraged to answer. The team will be judged only on these criteria and for this event, not on the actual car. The grading sheet for this event can be seen as Appendix A-6 to the 2002 Formula SAE Rules [A-1]. The maximum number of points a team can earn for the presentation event is seventy-five.

1.3: Objectives of this IQP

The foremost goal of this IQP is to win the presentation event at the 2002 FSAE competition. In order to accomplish this, a number of other goals must first be achieved. In order to accomplish our cardinal objective, these lesser tasks must be determined and carried out to the greatest benefit to the team.

The manufacturing portion of the presentation is largely based upon the cost event and parts list. Consequently, this IQP team will be assisting with the cost event along with researching manufacturing techniques. The cost analysis in itself is an event, worth a possible one hundred points to the team. The goal in this case is to have a prototype car costing under twenty-five thousand dollars, and a production car which would cost substantially less. In past years, it was specified that the production car cost under nine thousand dollars. Though this has not been specified this year, nine thousand dollars will remain a goal for us. In the presentation, we will address what it will take for a company to begin manufacturing our car with the stated goal of four per day. Our goal will be to minimize production costs so we can maximize profit while keeping the final production car price down for the customer.

The marketing portion of the event must be based on solid market research as well as contrived marketing materials, thus the team will also be conducting a survey and generating advertisements. Closely related to these undertakings is the work of publicity for the car, attracting sponsors, and helping to put out their names on the publicity and marketing materials for the team. This is to include a team website, team logo, brochure to send to prospective sponsors, and business cards and shirts for the team that have the team logo and sponsors.

Assuming the target audience given in the rules of nonprofessional, weekend autocrossers, the group will conduct a survey to further narrow down our target, and allow us to realize their preferences, that our advertising will most appeal to them. This survey will also help to determine the common interests of out audience, so that we will best know where to place our advertisements.

Apart from the two main focuses, marketing and manufacturing, a number of other notes must be made for the presentation itself. Having researched old presentation events, including old IQPs and their respective future recommendations sections [1.2,1.3], we have been able to gain a lot of advance knowledge and tips. One of the difficulties is to make a presentation that maintains the interest of the judges who have been watching presentations all day. We must remember to introduce all the team members before the event in order to be polite and remain professional. We should not to speak too swiftly, use the entire allotted time, and use it wisely. We must also remember to bring backup versions of everything we need for the presentation, including the slides of the presentation itself, the brochures, the advertisements, and backup slides, made to answer probable questions the judges will have after the first ten minutes. In past years, teams have lost substantial amounts of points due to lack of backups. Through research, we were also made aware of the fact that we will have several minutes prior to beginning, where we may begin to circulate any additional materials we have brought to the judges. This will be advantageous, because the judges will have a little bit of knowledge about us and the car going into the presentation.

In this document, any reference to 'we' or 'us' will refer to the Marketing the WPI 2002 Formula SAE Racecar IQP team.

2. Market Research:

2.1: Target Audience

As per the 2002 Formula SAE Rules section 1.2, the target audience for the proposed production sales of the 2002 WPI FSAE car is the nonprofessional weekend autocross racer [A-1]. In order to make our marketing of the car to this audience successful, we must find out how to get our advertisements to the appropriate people. Conducting a survey of the largest sample of autocrossers we could find was the way determined best for accomplishing this. The SCCA, or Sports Car Club of America, is the primary group that runs the races our target audience participates in. It is not the only group, but it is the largest, and all other groups accept the rules set up by the SCCA. That being said, a lot of our research will involve them and their club [2.2].

2.2: Survey Development

Now that a survey has been decided on, the next step is to compose a clear, non-biased survey that answers the questions we need answered. The best way to accomplish this is to follow the five principles of experimental design [2.1]. They are; make sure the process is stationary, block what you can, randomize what you cannot block, replicate as time and budget permit, and confirm results. Surveys, as a whole, are usually stationary, and this can be seen in the results section [A-2], by noting that the numerical answers do not tend to rise or fall with the time that they were entered. Blocking, which is to group results in order to extract more useful data, will be covered in the Survey Results Analysis section. Since we cannot block the information coming in to us, we hope it will remain close to random in those who chose to fill out the survey. The larger and more

randomly chosen the sampled population, the closer a representation of the total population will it give. In researching surveys, it has come to our attention that a preliminary, or "pilot" study is recommended to see if the later study is worth doing. We will accomplish this through a small test of the survey. If the test goes well, the survey will continue as planned. If the test shows some failure on the part of our survey, it will be revised before continuing. This is one version of the fourth principle of experimental design, replicate as time and budget permit. The last is to confirm the results. This will be done through the hopeful success of our presentation and marketing scheme.

Causes of problems and biasing in surveys include selection bias, nonresponse bias, and response bias [2.1]. A selection bias is one in which the study only gets results from a selected group of population, rather than a random one. Nonresponse is a bias from the fact that certain people will not respond due to various reasons. Response bias comes from certain wordings of questions that may confuse the audience or cause them to lie on purpose. Specific wording of questions and shorter length of the survey will help to keep these down. Identified biases in our survey include a selection bias, a nonresponse bias, and response bias. That is to say that since we only put the survey out to a small group of people, once in text and once via email, not all of our target population, or even necessarily a representative group of our target population was sampled. We feel in this case that the sampled population is an acceptable representation of the whole. The nonresponse bias cannot be corrected, but it can be helped with measures like making the survey relatively short in order to not take up too much time. We feel that any response bias was eliminated due to our having read and revised the survey several times, though only time will tell.

The last step in designing the survey was to choose what questions we needed answered to help us best come up with a quality marketing campaign. Section 1.2 of the 2002 Formula SAE Rules [A-1] states that the car must have very high performance in terms of its acceleration, braking, and handling qualities, and that the car must be relatively low in cost, easy to maintain, and reliable. In addition, the car's marketability is enhanced by other factors including aesthetics, comfort, and use of common parts.

After hours of brainstorming, it was decided to split the survey up into three sections. The first section deals with the survey taker himself. The second section deals with the survey taker's racing and willingness to spend money. The third and final section consists of possible factors in the car (acceleration, braking, etc.) that must be rated one through five. The complete survey may be seen in the appendices [A-2].

We feel that the survey as it is, will allow us to understand where to market our car, and what the target audience is looking for, thus how to market the car.

2.3: Survey Distribution

In order to get the largest possible sample of autocrossers to best represent the entire audience, several methods were used. The survey was put out in two versions, one in printed form, and one on the internet, though they were verbatim copies of each other.

Our first attempt was with the printed version, before the online version had been finalized, as a sort of preliminary test. This version was distributed on March 30th, 2002, at an SCCA club dinner, yielding over thirty responses, and proving to us that the survey was good and the online version could be continued with.

Through the aid of a local computer science student, and after some testing, we were able to put up the online version so that whenever it was filled out, the results would be saved, and could be accessed later by the team. Word was sent via email to a well known and very large mailing list for autocrossers, autox@autox.team.net, and a link was put up to the survey from the team website. This online survey was up from April 1st, 2002 to April 14th, 2002, and generated another sixty responses. For simplification, the hand-written surveys were entered into the online version as well. Thus we had ninety-four responses; all stored in the same format.

2.4: Survey Results Analysis

Through considerable effort, all the results were entered into a single database. At the same time, all results were checked for consistency. This was to make sure if one subject wrote "grassroots" as an answer, this was counted as the same thing as when another subject wrote "Grassroots Motorsports" in the favorite magazine section. For numerical data, averages were taken of all results, and for short answer questions, the mode, or most commonly given answer, was taken. These are listed in the averages column at the end of all the other data. Please see the survey results in the Appendix [A-2]. While our results are not a perfect representation of all possible clients, we feel these to be a good representation. According to our research and the five principles of experimental design, blocking is the last step we can do to help get a better representation of what we are looking for [2.1]. While this lowers the total number of used surveys, it will get them closer to our target audience. The question chosen to block by is question number three of section II. This is the question asking whether or not the taker of the

survey is interested in owning a separate car for SCCA race events. Those who answer yes, we feel, have more of an impact on our possibilities of selling cars. Thus, using only those surveys who answered yes (numbering now seventy-five), we have a new set of results under the heading: "interested ppl avgs," or averages representing interested people. Again, please see the Appendices for these results [A-2].

While most of the results were inconclusive (*Table 2.1, below*), showing no clear winner in the favorite TV show category for instance, there were a few clear leaders that allowed us to affect the rest of our decisions. The total distance in miles people were willing to travel and their starting locations were ruled out, due to the fact that we now plan on delivering the final product. There was also no clear winner on the class of racing preferred by the autocrossers, and the low preferred maintenance times could only serve to remind us to build a quality product.

Using our useful results, we were able to determine that a magazine ad, destined for Grassroots Motorsports, and an internet based banner ad that leads to our website were our best advertisement options. This was determined due to Grassroots Motorsports being the most agreed upon material read or viewed by our audience, and the World Wide Web being the most agreed upon place to gather information about racing. Close runner-ups included the Speedchannel/Speedvision, and Road & Track magazine. If our campaign is successful, perhaps we would expand into advertising in those.

The average age of the survey taker (39) and preferences about car features help to determine the content of the advertisements, as well as the team logo. Since handling was the clear winner in the subjective car attributes section, it will be focused upon in our advertisements later. The amounts of money specified as willing to spend will help to

determine goals about the price at which we can sell the car. The condensed results of the survey can be seen in *Table 2.1*, which displays only the averages and the blocked averages tables. *Figure 2.2* displays the differences between the average subjective vehicle requirements (blue), and the same averages with the blocking in place (red). It is evident that with the blocking in place, the results only changed slightly. This is a good sign showing that our results are fairly consistent. This consistency shows that most autocrossers are looking for similar things in cars, and that our survey is most likely a close representation of the population, and thus useful to us.

	averages	Interested ppl avgs
Distance (Miles)	444.84	539.73
Location	New England	same
Gender	89.3% male	89.3% male
Age	39.58	39.01
Racecar $/year	3701.08	3828.38
Occupation	no clear winner	same
TV Show	Speedchannel	same
Website	no clear winner	same
Magazine	Grassroots	same
Radio Station	no clear winner	same
Info Retrieval	Web	same
Comments*	-	
II		
Car Class	no clear winner	same
Preferred Class	no clear winner	same
Seperate Car?	yes	yes
Maintenance/event	2.40	2.50
Maint Willing	3.92	4.46
$/Race(only)Car	9071.18	9059.19
$/car upkeep	3331.94	2949.05
III		
Acceleration	4.06	4.11
Handling	4.86	4.82
Braking	4.35	4.30
Reliablity	4.18	4.14
Safety	3.67	3.69
Traction	4.15	4.14
Aerodynamics	2.60	2.65
Top Speed	2.37	2.45
Fuel Consumption	2.19	2.09
Aesthetics	2.96	2.89
Upgradability	3.68	3.91
Maintenance	3.92	3.97
M/S Consistency	3.06	2.99
Parts Purchase	2.46	2.58
Comfort	2.74	2.68
Adjustability	3.99	4.00

Table2.1 survey results

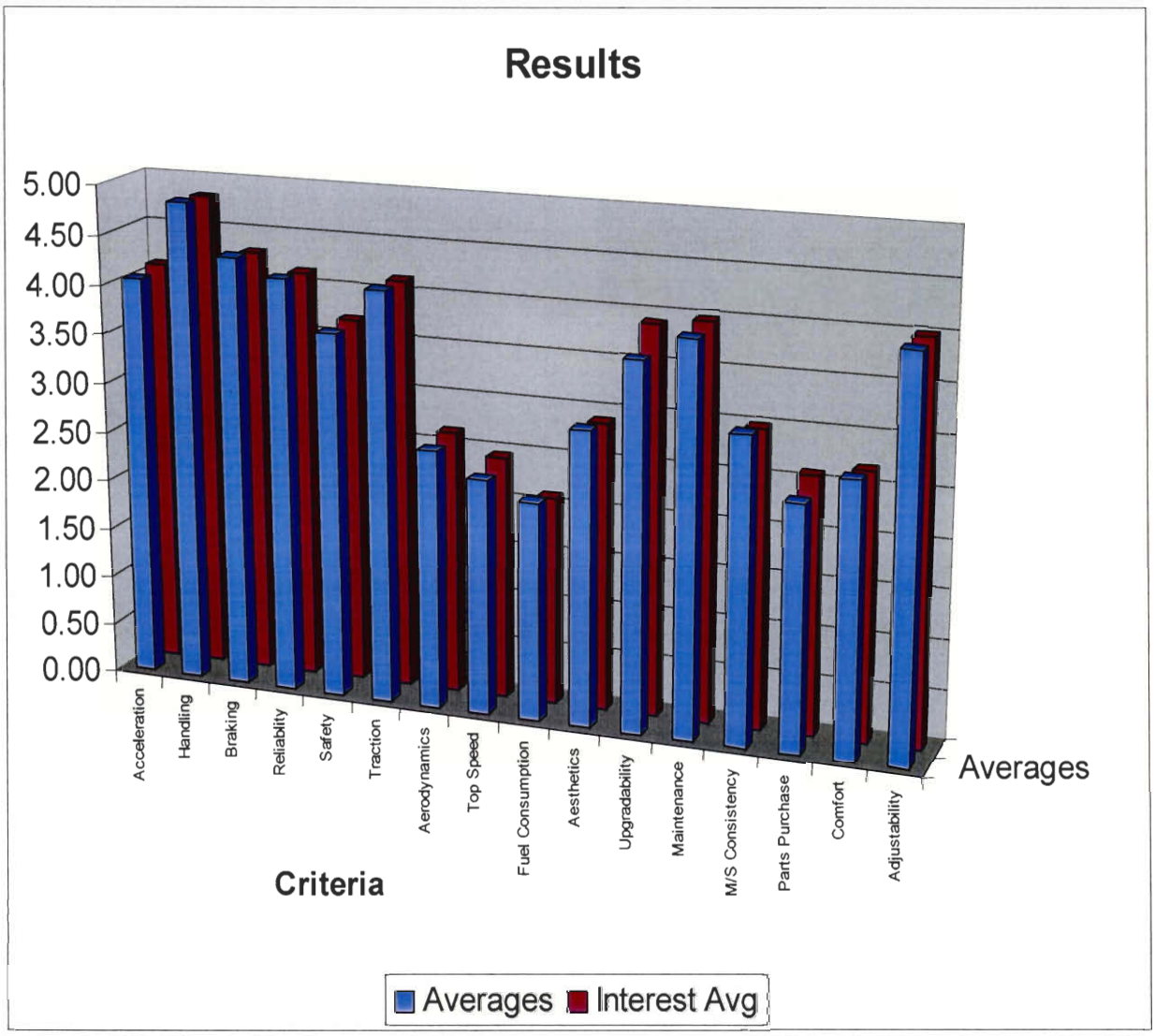


Figure2.2 Compared results

3. Cost Report:

3.1: Purpose

The Cost Report is the summary and projected cost of building the prototype of the Formula SAE racecar. The event is called the "Cost & Manufacturing Analysis Event;" the Cost Report is half of the event and must be submitted by a date prior to the competition. The team with the least expensive car is awarded the most points and the most expensive the least. The Cost Report teaches each team some of the varying aspects of manufacturing, alternative manufacturing methods, budgeting resources, and the limit nature of budgets.

3.2: Procedure

The cost analysis must be all-inclusive, taking into consideration: the cost of all parts bought, the cost of raw materials, the cost of labor and the cost of machine time. It should be an accurate representation of what it would cost a private party to build the team's car, taking into consideration that the car is a one-off prototype and not in any way related to a production model. For this year's team the final cost was $17,056.80.

This year's IQP team helped the FSAE team finish the Cost Report on time. The team was behind schedule due to a number of setbacks, and had many deadlines fast approaching. As a Result we helped make progress by gathering the necessary information to compile the report. We helped by measuring welds, measuring pipes, and counting bends in pipes, as well as researching current part and material prices. These totals were inputted into the final Cost Report calculations. By taking on these responsibilities we saved the FSAE team countless hours of counting, measuring and

searching. We also helped the FSAE team compute some of the final calculations. In doing this, we allowed the FSAE steam to focus on the fabrication of the car, rather then having to spend time doing small menial tasks.

4. Factory Research/Manufacturing Design:

4.1: Methods and Processes

Throughout the entire manufacturing process, and the design of the floor plan layout, every effort was be made to use Lean Manufacturing methods. Some of the efforts consist of the use of: Batch production, Just in Time production methods and the use of computers to track the flow of materials once they are on site. Attention was also be paid to things such as the exterior layout and positioning of the building. All aspects of the layout of the building in addition to all the production methods must be taken into consideration in order to optimize the efficiency of all the processes that must come together to form a good, reliable car that is also economically feasible.

When parts and raw materials arrive at shipping and receiving, they will be prepped before they are sent to the appropriate destination. By prepping everything in shipping and receiving, the amount of trash will in the individual work stations will be kept down, making for less that has to be transported within the manufacturing facilities. Once the parts and materials are prepped, they will be moved either using a wheeled cart, container or by use of a small forklift. All containers that are used will de designed to be easily stackable, that way, with little effort, they can be arranged in a manner that will take up as little space as possible [4.1].

The design and manufacturing facilities will have a computer network. This network will serve several purposes. The network will allow for a direct link between the computers of the engineers that are doing the designing and the CNC machines that are actually making the parts. This will allow any design revisions and iterations to go into effect immediately. The network will also be used to keep track of the quantity and

location of parts; in-plant stock will automatically be tracked using bar code readers and laser scanners [4.2]. In addition, the network will be used to tell the workers at each work station the specifications, such as which options are to be included, of each car.

The Just-in-Time production concept will be used in determining the quantity and frequency of parts ordering and manufacturing. Efforts will be made to keep the number of parts in stock as low as reasonably possible. Parts and materials will be ordered so that they are received just as they are needed. Parts will be machined just in time, subassemblies will be built just in time, cars will be completed just in time to be shipped and cars will be shipped just as there is a demand for them. This will help keep costs down in several ways. Less floor space will be needed to store parts that are not yet needed. The small quantities of in-house parts can be stored in the cells and stations where they will be needed. This will also help keep down costs since fewer people and less machinery will be needed to move materials [4.3]. Without Just-in-Time techniques, all received and manufactured parts will have to be transported by a worker, possible using a machine, to a storage area. It will take more effort to keep track of what is already in stock. After that, someone, again, possibly using a machine, will have to go get the part and then transport it to the area where it is needed.

As many already manufactured and assembled parts will be bought as possible. Efforts will be made to keep down the number of parts that must be manufactured in house since it is generally more cost effective to buy parts that someone else mass-produces, such as engines or brake calipers, rather then having to make every single individual part on sight.

Batch Production will be used to manufacture the parts that must be made on site. Batch production is often used for production runs of between 100 and 5000 units. Unlike mass production, with dedicated machines, or piece-part production, with it's slow production rates. Batch production will provide a reasonable amount of flexibility wile allowing for an adequate output, all at an acceptable cost. Batch production will warrant the use of special tools and jigs that are dedicated to a particular job or task. It will also use flexible CNC machines [4.3]. Changes within the car design and variations between each car caused by different options will be easily accommodated for. Batch production will also allow each machine to make more then one kind of part, so that machines do not sit idle, while minimizing the amount of deviation within each kind of part.

4.2: Exterior Layout

Much consideration must be paid to the layout of the building, roads, driveways and parking lots that encompass the site. Proper planning will allow for a safe environment that will; easily allow materials to flow on and off sight, accommodate expansion and reduce energy needs. Site layout is also one of the first steps towards factory plan layout.

The front of the building will be set to face west. The loading docks will be located on the back, eastward facing side, of the building where costumers will not have to see them. More importantly, this will also be done to shield any large open doors, i.e. loading docks, from the prevailing winds, which blow from a northwesterly direction in

New England. This is a common practice in industry because it helps reduce heating and cooling costs [4.1].

On the back side of the building there will be a 120ft by 120ft pad so that trucks that are making deliveries can access the loading bocks, park and turn around, see Figure 4.1. All trucks will park in this area while making deliveries. The industry standard minimum of 120ft of paved surface will be put in front of the loading docks [4.1]. The standard minimum will be used because it is expected that there will be a relatively small number of deliveries going on at one time so space should not be at a premium.

The driveway that leads to the pad will run along the south side of the building, as seen in Figure 4.1. This will allow trucks to enter the delivery area from right to left, in a counterclockwise forward flow path. That will also allow the trucks to back up to the loading docks in a clockwise reverse flow path. It is accepted that this is the safest setup since drivers will have a direct line of sight to where they are backing up to, unlike backing up in a counterclockwise direction where they would have to rely on their passenger side mirror [4.1]. The access road will be 26ft wide, the accepted minimum for two lane roads that are used by trucks [4.1].

There will be a parking lot for costumers and employees in front of the building. That location will provide for easy access to most of the building. It will be approximately 17,400 sq ft. There will be a maximum of 61 people on sight at one time [A-8], and there should be 285 sq ft of parking per person. If it is estimated that the number of employees will grow by about 8 percent per year then the parking lot should be 385 sq ft per employee. 385 sq ft per person would accommodate the first five years of expansion [4.1]. The driveway to the parking lot will be separate from the driveway to

the truck pad at the back of the building. It is desirable to keep trucks and cars separated from each other.

If the site is large enough to support a future expansion, the building will be pushed to the southern side of the lot. Expansion will be restricted on the southern, eastern and western sides of the building, as seen in Figure 4.1, so it will not be practical to expand in these directions. There will be a road along the southern side of the building. There will be a large pad for trucks and loading docks on the eastern side. It is not desirable to expand where loading docks are [4.1]. In addition, there will be a parking lot and offices along the west side of the building. The north side will be free, so by leaving the extra room on that side, future expansions are made more feasible.

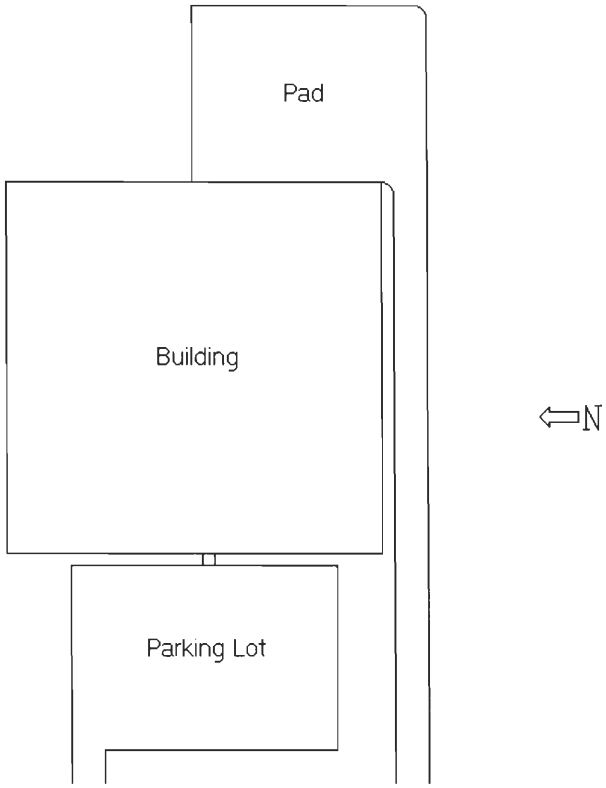


Figure 4.1. This picture shows the relative locations of the different facilities that will be built on the site.

4.3: Floor Plan

The one building will house all of the parts of the company: design, sales, marketing, distribution, manufacturing and all the other parts that are essential for a successful business. In small businesses, where it is feasible, this is done for several reasons. When design changes are made, they can go into effect much more rapidly. In addition, by consolidating everything into one building, overhead is cut.

The sales department will be in the southwest corner of the building. By having it there, it will be next to the show room so there will be an easy flow from the show room to the sales department, see Figure 4.2. Costumers will easily be able to get from the show room to the sales department where they will be able to finalize any purchases.

At the front, the west side of the building, there will be a showroom. By having it there, it will be easily accessible to customers in addition to being visible from the exterior and thus self-promoting. There will be several different cars in the show room that will show some of the different options and features that will be offered. The showroom will be to the left of the parts department and the sales department. By having the sales and parts department on one side of the showroom, and the other parts of the business that do not involve manufacturing on the other side of the showroom, workers will be able to get to the different parts of the building without cutting through a crowded parts department or a sales department that should be friendly and inviting and not cluttered with workers and sales people.

The parts department will be in between the assembly area, showroom and the sales department. Workers from the parts department will be able to get to the assembly area where they may need to go to get parts that they do not have in their own stock. In addition, it will be immediately adjacent to the other areas that are open to the public.

At the front of the building, there will also be a dining area. It will be able to make use of windows and natural light. On the backside the dining area, the east side, there will be bathrooms and locker rooms for the employees. By having these things where they are, they will be as centrally located without putting them in a location where they will get in the way of the flow within the assembly area. The bathrooms are the

innermost part since they will likely be what are used the most by employees from all over the building and in all of the different areas and departments.

Offices will be put in the northwest corner of the building. In that location, the offices will make use of the natural light from exterior windows. More importantly, by putting the offices in this location, it will help keep the assembly area square, as seen in Figure 4.2. Having a square work area is more desirable then a rectangular work area, which is much more desirable then having an oddly shaped work area [4.1].

Along the south side of the back of the building is where shipping and receiving will be. Consequently, that is where the loading docks will be. There will be three loading docks so that there will be enough docks so that trucks do not have to wait to make deliveries. On the other hand, there will not be an excessive number of loading docks. The north side of the back of the building is where the newly completed cars will be tested. By having the cars tested there, it will allow completed cars to be stored between where they are tested and shipping and receiving, minimizing the amount that the completed cars have to be moved. Keeping down the amount that parts and product have to be moved is desirable [4.3]. In addition, having these three departments along the back of the building will help keep a regular shape for the assembly area.

The large area left in the center of the building is where the manufacturing and assembly of all the parts will take place. The assembly line, where all the individual parts and subassemblies will come together to form a car will start by shipping and receiving and end by the car testing area, see Figure 4.2. By having shipping and receiving and all of the assembly areas on one side of the assembly line, the total amount of material transportation within the manufacturing facilities will be reduced since many of the more

materials intensive parts of the manufacturing process, such as chassis construction, are the first things to be done. Along the assembly line, there will be specialized stations where all of the parts of the car will be assembled. Within each station there will be U-shaped cells, U-shapes are preferable for cells [4.3]. These cells will manufacture any necessary parts and assemble any necessary subassemblies for that particular station. This will make the assembly of the cars go faster since, when it is time to attach many parts, they will already be mostly assembled. All of the stations will be on the same side of the assembly line. By doing this, parts will not have to be transported across or around the line. This will decrease the distance that parts will have to be transported, which, as previously discussed, is always strived for.

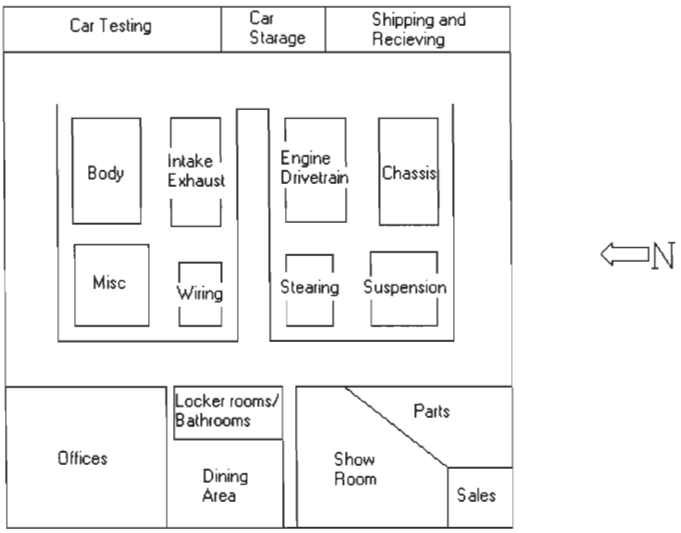


Figure 4.2. This picture shows the layout of the different parts of the building within the building.

4.4: Cost

Each car will be sold for $13,079.00. This price was established by analyzing the values of the costs associated with manufacturing a product and running a business in general. While some costs were easily found or estimated, other costs were found by consulting with the owner of a manufacturing business.

Expense	Calculations	Yearly Costs
Payroll	57 employees x $70,000	$3,990,000
Leas	$8 x 60,000 sq ft	$48,000
Machines	$290,280 / 5 years	$58,056
Parts per Car	($10,000-20%)x1008 cars	$8,064,000
Utilities	$1 x 60,000 sq ft	$60,000
Phone	$20,000	$20,000
Product Liability Insurance	$13500 (estimated cost of car) x 1008 car/year x 2%	$272,000
Building Insurance	$20,000	$20,000
Tax	$1 x 60,000 sq ft	$60,000
Total Yearly Cost		$12,592,056
Cost per Car	$12,556,000 / 1008 cars	$12,492
With 5% Profit Margin	$12,456 + 5%	$13,116
MSRP		$13,119.00
Estimated Profit	1008 (13,119 – 12,492)	$632,016

Table 4.1. This table displays the costs and profit associated with manufacturing one years worth of racecar.

The 60,000 sq ft facility will be leased for a cost of $8.00 per sq ft [4.4]. It was estimated that yearly payroll for the 57 employees [A-8] of varying skill, background and education would be $3.99 million. It is estimated is that, since most of the employees will be unskilled, the employees will average $35,000 a year which will, after including worker benefits and all other costs, cost the business $70,000 per year per employee. The Cost Report [A-11] was used to determine the parts that would need to be made in order to manufacture each racecar and then these findings were used to make a list of necessary CNC machines, see Table 4.2. Haas's website [4.5] was used to estimate a cost of about $290,280 for the necessary machines. This will be the final cost after taking a 5-year lone at 6% interest. According to the Cost Report [A-11], it cost about $10,000 to buy all the parts, which will not be manufactured in house, necessary to build each car. In

determining the sales price of each car, it was assumed that there would be a 20% savings on parts, over what was actually paid. It was assumed that there would be a fair amount of savings over what was paid once parts are bought in bulk, but actual savings numbers were unavailable. Utilities and taxes will each cost about $1 per sq ft [4.4] for a total cost of $60,000 each. Phone bills will cost about $20,000 per year; product liability will cost about $30,500 per year and building insurance will cost about $20,000 per year [4.4]. In addition, an extra 5% will be built into the cost to allow for profit and make up any unforeseen expenses.

Machine	Price	Quantity	Total Price
CNC Plasma Cutter	$40,000	1	$40,000
CNC Vertical Milling Machine	$43,250	3	$130,000
CNC Lath	$38,000	2	$76,000
		Subtotal	$246,000
		6% for 5 Years	$44,280
		Total Cost	$290,280
		Cost per Year	$58,056

Table 4.2. This is a breakdown of the necessary machines and associated costs.

The current price of the car, $13,119.00 may change over time for little is knows about the market. However, by charging $13,119.00, all overhead will be covered and there will still be money left over to allow for profit or future expansion. See Table 4.1. With the current numbers, car sales will generate over $632,000 per year; this will be a 5 percent return in investment.

5. Logo Development:

This year, our group decided to take the team logo a step further than with prior years. We wanted the logo to stand for more than just the name of the car and to represent the qualities of our car we wanted people to know about before even seeing the car. The new logo will be a key feature on our car and in our promotional materials, so a professional and eye-catching appearance is essential [5.1].

Our first step in developing our logo was to research what a logo should do and the guidelines for generating an effective identity for our business though the logo. *How to Create a Corporate ID*, by Neil Cohen [5.2], presents 5 tips for generating a logo that will effectively promote a business. The following list shows the key phrases he presents in the article.

1. Your corporate identity says it all.
2. Choose your design firm carefully.
3. Avoid design clichés.
4. Don't date your design.
5. Create a multidimensional logo.

Based on these recommendations, we set out to brainstorm what we wanted the logo to represent, and then we tried to generate ideas as to what symbols and words would sum up these qualities. The ideas and themes we wanted to convey were:

1. Show that the car is a product of WPI, specifically FSAE Engineering
2. Convey that the car is fast, will be competitive and win
3. Reflect school colors if possible
4. Target the our specific audience

5. Reflect the high quality of engineering inherent in the car's design
6. Be suitable for single and multi-color applications
7. Designs or graphics should be visible and recognizable without the text to aid in visual recognition
8. Be appropriate for use by future teams without modification

From this list, we generated some basic ideas for what we thought would meet these criteria and help guide the rest of the design process.

1. Use WPI block letter logo from school letterhead
2. Use FSAE motorsports logo from past years
3. Use arm and hammer symbol as seen on the school crest
4. Consider two different logos, one complex and one simple for different applications

Use of the WPI block letterhead will establish the car's WPI background. The block letter logo is one of the most recognizable symbols of WPI to those outside of the school and its use will allow people to instantly relate our race and marketing team with WPI the university and its great engineering reputation. It will be included on most of our promotional material to promote this association.

The FSAE Motorsports logo was adopted by the 2000 WPI FSAE team and has become associated with quality racecars and used on many promotional items. Use of this logo will provide continuity with prior WPI teams and further establish this car as the result of WPI Motorsports' extensive engineering and racing history.

The arm and hammer symbol serves many purposes. On the WPI Campus, it has been the weathervane on Washburn Labs to symbolize WPI's heritage of putting theory into practice [5.3]. It is also used in the WPI seal to exemplify skilled art or practice, which is an integral part of learning and theory [5.4]. It is also the traditional symbol for Vulcan, the Roman god of fire and metalworking and namesake for the 2002 WPI FSAE Racecar.

The goat's head is used as a further connection with the WPI tradition. The goat's head stems from the mascot of the class of 1893. The class selected the goat as its mascot because it was felt to best represent the temperament of the class and has since become a lasting symbol at WPI of our rich history.

Once we had generated some basic plans for what the logo was to include, we enlisted the artistic assistance of Susanne Gendron, a professional graphic designer who works primarily in logo development. We discussed the ideas and the themes previously generated, comparing those with ideas Ms. Gendron presented. Her recommendations led to the inclusion of a checkered flag scheme as part of the logo. Ms. Gendron presented this idea to help convey the winning design of our car. The checkered flag has wide recognition as a symbol of winning and victory. Although the autocross events this car is designed for do not use a checkered flag to signal victory, we believe the symbol is recognizable by our target audience as a positive sign. We based this assumption on the survey results that indicated much of our target audience watches racing on television and reads racing related magazines, both of which would reinforce the checkered flag

symbolism. Figure 5.1 shows the design Ms. Gendron generated as a result of our discussions.

Figure 5.1: First evolution design as presented by Sue Gendron

Through discussion amongst team members, we decided that a modified version of choice 3 would be best suited to our needs. We wanted to make the WPI name more prominent, to include the arm and hammer symbol to bring the Vulcan and WPI history symbolism back into the logo and to change the look of the goat's head to be more aggressive. We also decided that it would be more effective if we added in text in the fonts and styles used in our other promotional materials as opposed to having Ms. Gendron hand draw text into the logo sketch. Figure 5.2 shows the results of these changes.

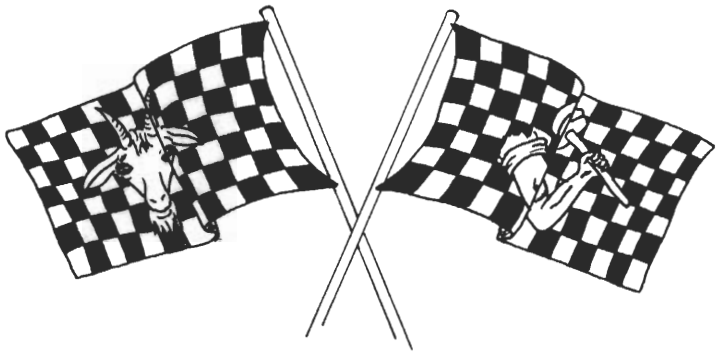


Figure 5.2: Redesigned logo sketch as presented by Sue Gendron

Figure 5.3: A modified negative image of Figure 5.2

Figure 5.2 was modified into Figure 5.3 because the negative image makes the goat's head and arm and hammer symbol much more visible against the checkered background.

Figure 5.4: Sketch from Figure 5.3 with WPI and Motorsports text additions

The final logo design presented by Figure 5.4 incorporates a modified version of the sketch provided by Sue Gendron in combination with the distinctive WPI block lettering and Motorsports logo. This design provides a clear representation of our team's school pride, rich WPI traditions, quality engineering, and proven performance. This logo will be viable for future teams to use because all of its symbols are representative of WPI or the racing target audience. This is an improvement over previous logo designs that were too specific for the car and did not work as well when representing the team. The logo is a simple design that succeeds in representing the team's strengths while following the guidelines set forth at the initiation of the logo development process.

6: Business Card and Team Uniform Development

6.1: Business Card Development

Business cards are a universal method of easily exchanging basic contact information between individuals. They are often the only written information that remains after a conversation and can provide a useful means of generating and preserving interest in a company or organization once the card is distributed. The business card design process began with an evaluation of what information was crucial to an effective card and what ideas the card was to represent. Brainstorming among group members generated the following list of criteria.

1. Display the group member's name and design specialty (chassis, aero, etc.)
2. Display the Team's name
3. Display a phone and/or fax number for contacting the team
4. Display a mailing address for the group
5. Display an email address for either the group member or the group as a whole
6. Display the team logo
7. Display the school logo
8. Display the team's web address

The member's name and specialty are important because they assist in name recognition and allow that person to be recalled along with their area of expertise. The team name, logo, and school information are included to promote association of the team member with the WPI FSAE team and WPI's strong engineering reputation. Various forms of contact information are included because this information is vital in allowing the recipient of the card to later contact the team with questions, possible sales and comments.

The information is arranged to highlight important aspects of the card. The team logo is the most prominent feature of the card and is placed to the left of center so it is the first item encountered visually as the reader scans from the top down and reads from left to right. The next information encountered is the team name and slogan that are at the top left. These two pieces of information set the background and attitude for the card and then the personal information is presented along the left side underneath the team name and logo. Website and email contact information, the two most important and often used forms of contact expected are at the bottom for ease of visual location and recognition. Great consideration was given to maintaining a minimum of visual distractions so the reader would not be distracted from the vital information and attitudes the card is designed to communicate.

The business card design started out as a simple concept format, as shown in Figure 6.1, with the appropriate information presented in a clear format. Different logos were tried, including the WPI Seal shown in Figure 6.2 and a first evolution logo sketch shown in Figure 6.3, however, the final logo design was selected as the best representation of our team as shown in the final card design Figure 6.5. The team then considered these changes; a consensus was taken about the changes, and input for further developments were discussed. As the card design progressed further, the fonts, colors, and relative text sizes were varied, as shown in Figures 6.3 and 6.4 to place emphasis on the website, email address, and slogan.

Figure 6.1: Business Card Template

Figure 6.2: Business card concept 1 includes logo choice 3, the team slogan, the website address, and contact information.

Figure 6.3: Business card concept 2 includes the WPI Seal with the same information and format as choice 1.

The consensus among team members was that the logos developed for the team should be used, as opposed to the school seal, to make the text more appealing and to improve the visibility of the web page and email address.

Figure 6.4: Business card concept 3 includes changes to the font style and sizing

The recommendations of the team were followed to produce Figure 6.4. It was agreed that this font style and size layout better emphasized the website and email information. It also gave the card a more aggressive look and highlighted the slogan.

Figure 6.5: The final card design incorporating the team's logo, vital information, and team slogan.

The final card design in Figure 6.5 features the team logo prominently displayed on the left hand side of the card and the team and member's information written along the right hand side. The second most prominent text is the FSAE Motorsports title so an association with FSAE racing is established followed closely by the "Wide Open Engineering" slogan in italics to represent the hard charging nature of our designs and products. The logo is displayed separately from the text to avoid visual clutter and the curves around the logo are matched by the profile of the personal information text. Care was taken to maintain a visual break between the logo and the information to preserve the easy to take in format of the card.

The card design satisfies all of the criteria set forth by the team at the beginning of this process. The WPI block letter logo is prominently displayed in red; the team name and slogan are clearly presented alongside the team logo; the team members name and pertinent contact information are all presented in a simple, easy to understand format. Success was declared when a poll of the IQP team members resulted in unanimous approval of the card design for publication.

6.2: Shirts

The IQP team designed two shirts, each of which has a particular purpose. There is a button-down shirt which will be used for the formal events, the Design Review and the Presentation Event. The other shirt will be more casual, a T-shirt, used for when the team is working on the car or participating in a dynamic event. This combination will allow team members' attire to be well suited, regardless of the of the activity being participated in.

6.3: Shirt Design

The dress shirt, the button-down, will be dark gray in color. Dark gray was decided upon through a vote by the IQP team. It was felt that the dark gray will look nice, go well and it is similar to WPI's school colors. On the left breast, there will be the logo, embroidered on, as to look nice and professional. The car name and slogging will not be put on the shirt in order to keep them timeless; it is desired for the shirts to be identified with WPI and all it stands for, not a particular car or year. It is hoped that, by having the logo, some brand recognition will be formed. The right breast of each shirt will be

personalized with each individual team member's name. This shirt, and design, will help complete the uniform that each team member will ware, which in turn will help the team members will look even more respectable and professional.

The casual shirt, the T-shirt, will also be dark gray. Dark gray was chosen for the T-shirt for the same reasons as with the button-down, in addition, it is resistant to stains. Also, like with the button-down shirt, the T-shirt will have the logo on the left breast. On the back of the shirt will be the logos of all of the 2002 car sponsors. The logos will be arranged in such a manner as to draw the eye to all the different company logos. Another design consideration for the T-shirt is that, if the number of colors within the logos can be kept to 3 or 4, there stands to be a reasonable amount of money saved when having the shirts made.

7. Dealership Brochure:

We decided that a brochure would be a good way to spread information about the FSAE car. Many of today's leading car companies rely on brochures for this exact reason. The goal of the brochure is to entice the potential buyer into buying a car. Since the target buyers are weekend autocross racers, we created a brochure that would make them understand that our car is better than the competition.

We wanted to follow some guidelines while creating the brochure so some research was done. Our research led us to believe that there is either none or very scarce published information on the creation of dealership brochures. In the library not one book, article, or online information was found regarding the design of dealership brochures. We figured the next best resource we could use would be real brochures from real car companies. Many brochures were taken form local dealerships including Toyota, Honda, Mazda, Subaru, Mercedes, and BMW. The brochure that best summarized the current design of dealership brochures was the 2002 Mazda Miata [A-3]. We now have the materials needed to make the most realistic brochure.

A comparison of the acquired brochures allowed us to make a few conclusions to aid in our brochure design. The three musts in designing a brochure are large colorful pictures, very few words, and a data table highlighting the car's strong points. With these in mind we went about creating a brochure.

Figure 7.1. The brochure cover.

The cover of the brochure [Figure 7.1] needs to grab the reader's attention and make him/her want to keep reading. The picture on the first page is an action shot so the reader knows the WPI Vulcan is fast, powerful, and a real racecar. The text on the cover is simple and plain which also should intrigue the reader so they desire to learn more. The cover simply gets the reader's attention, tells them the name of the car, and lets them know what division of racing the car is for.

First came the desire.

Figure 7.2. The first page of the brochure.

The first page of the brochure [Figure 7.2] is the start of the story of an autocross racer's increasing interest in the sport. The picture of the tools represents the yearning to be involved with cars. The black text stands out against the white background to really draw the reader's attention to it.

Figure 7.3. The second page of the brochure.

The second page of the brochure [Figure 7.3] is simply a side shot of the car. This is the reader's first chance to actually see what the car looks like. Hopefully at this point the reader is interested and now wants to keep reading.

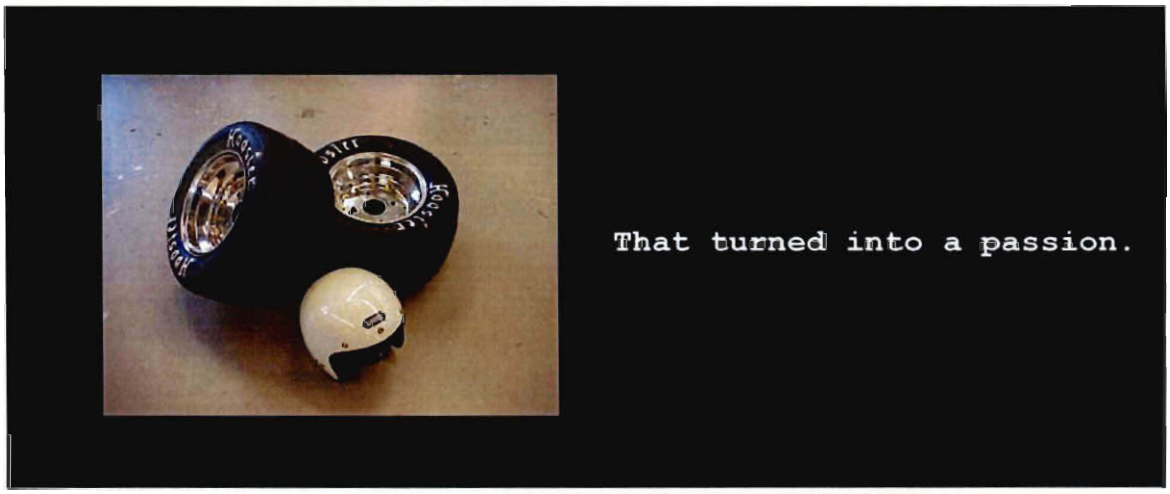
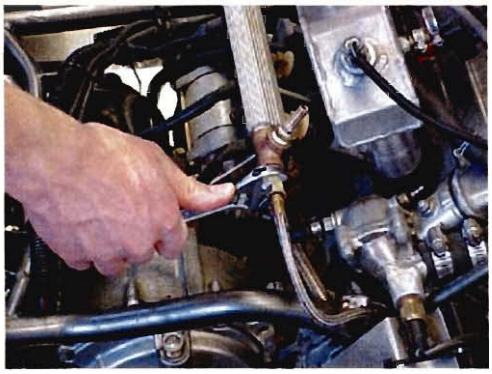


Figure 7.4. The third page of the brochure.

The third page [Figure 7.4] continues the story of the autocross racer. The background is now black with white text, another pair of high contrast colors to help draw the reader's eye. The picture on this page is of materials found in a stereotypical autocross racer's garage. In the picture there are extra tires for racing and a helmet, which is a must for all racers. The text also tells how the autocross racer in the brochure story is being more interested in the sport yet.

Figure 7.5. The forth page of the brochure.

The forth page [Figure 7.5] is a shot of the car parked with the autocross racer's helmet resting on the wheel. The picture shows that car at a good angle to grasp what it really looks like. The helmet also helps the reader understand the size of the car. The helmet is on the rear tire so show the improvement in the helmet from the previous page. The helmet is also traditionally a symbol of racing so it reminds the reader exactly what is car is for, beating the competition. The background is black so the picture really stands out keeps the reader focused on the car.



Developed into a lifestyle.

Figure 7.6. The fifth page of the brochure.

The fifth page [Figure 7.6] continues the autocross racer's story further. This page is white with black text again for the high contrast attention getting affect. The picture is of a racer working on their car, showing the close connection many racers' have with their vehicles. The text explains how even deeper into the sport the racer is becoming.

Figure 7.7. The sixth page of the brochure.

The sixth page [Figure 7.7] is an action shot of the autocross racer actually driving the FSAE car. The picture lets the reader know exactly what the car is made for,

driving. The picture also allows the reader to imagine what they would look like behind the steering wheel.

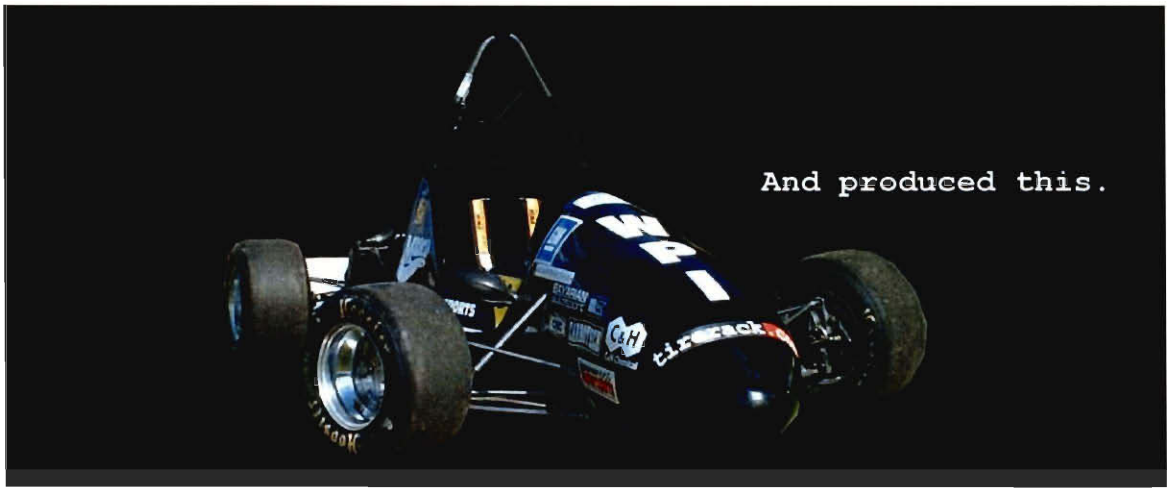


Figure 7.8. The seventh page of the brochure.

The seventh page [Figure 7.8] of the brochure is one of the most important. It is the end of the autocross racer's story and provides a really clear picture of what just the car looks like. The picture has the background taken away so car itself stands out that much more. Again the high contrast colors where used to direct the attention of the reader to the car.

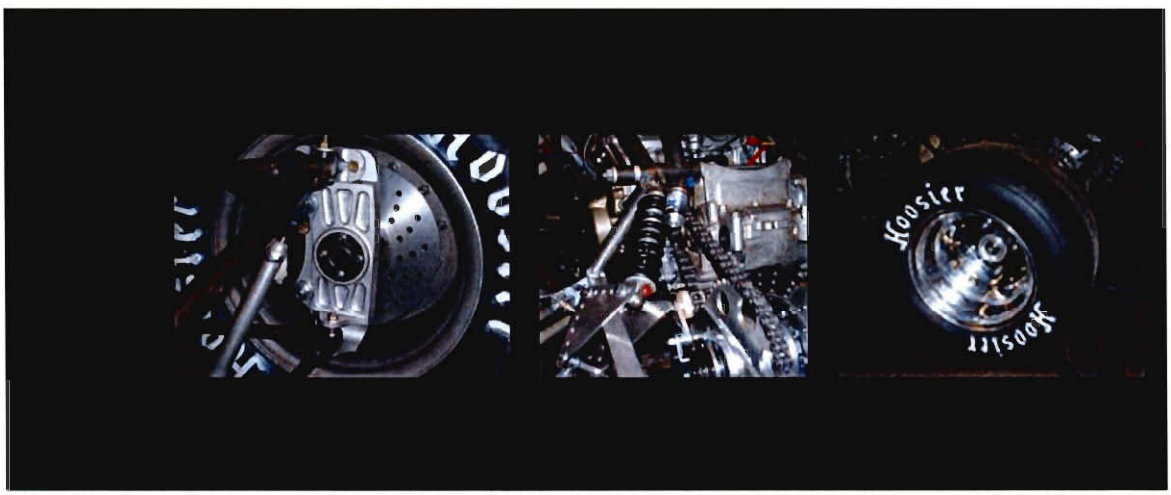


Figure 7.9. The eighth page of the brochure.

The eighth page [Figure 7.9] allows the reader for the first time to see close up some of the vital systems of the car. The pictures allow an experienced racer to look at the set up of the brakes, suspension, and the tires. While at the same time allowing a novice racer to see the quality of craftsmanship and some of the most important aspects of an autocross racer's car.

The time for change is now,

step into a whole new class.

Figure 7.10. The ninth page of the brochure.

The ninth page [Figure 7.10] shows a autocross racetrack, the car in action, and text that suggests that the FSAE racing division is the correct choice. The picture of the autocross track illustrates exactly what the car was designed for. The picture of the car racing shows the reader what they could look like and do with a FSAE car.

Incredible speed, handling like no other, combined with quality and reliability make the WPI Vulcan a must have for serious racers.

Figure 7.11. The tenth page of the brochure.

The tenth page [Figure 7.11] is another set of close up pictures as well as justification for buying a new FSAE car. The close up pictures allow the reader to see what powers the car, the chain that drives the wheels, and more of the suspension. The text mentions the aspects of a car important to an autocross racer that we obtained through our survey.

The numbers speak for themselves.

Vehicle Type: Mid-Engine, Rear-Wheel-Drive, Chain-Driven

Engine Type: Honda CBR F4 600cc	**Performance:**
Power: 74 rwhp	**Zero to 60 mph: 3.9 sec**
Torque: 42 lb-ft	**Street Start, 5-60 mph: 4 sec**
Transmission: Sequential 6 Speed	**Standing ¼ mile: 12 sec**
Wheelbase: 70 in	**Braking, 70-0 mph: 98 ft**
Length: 106 in	**Skid Pad: 1.38 g**
Curb Weight: 550 lbs	**Fuel Economy: 25 mpg**

Figure 7.12. The eleventh page of the brochure.

The eleventh page [Figure 7.12] is the most important page in any car brochure. This is the page that lets the reader see and understand the real power our car has. As the

text on the top of the page states, the data provided really speaks for itself. What does anyone what to know when he or she is buying a car? Exactly what is found in our data table, all of the numbers that make our car far superior to the competition. All of the imperative statistics on our car can be found on this page, that is what makes it the most essential page in the whole brochure. Once the reader reads what our car can actually do on the track, he or she will become even more interested.

Figure 7.13. The twelfth page of the brochure.

The twelfth page [Figure 7.13] recaps the whole brochure in just one picture. The picture does say a thousand words. It reminds the reader that the car is for racing, driving, performance, and fun. Experienced racers would also notice the pylons in the picture marking on which side of them the driver must go. The text simply, shortly, and sweetly makes the reader realize what they could do if he or she owned an FSAE car.

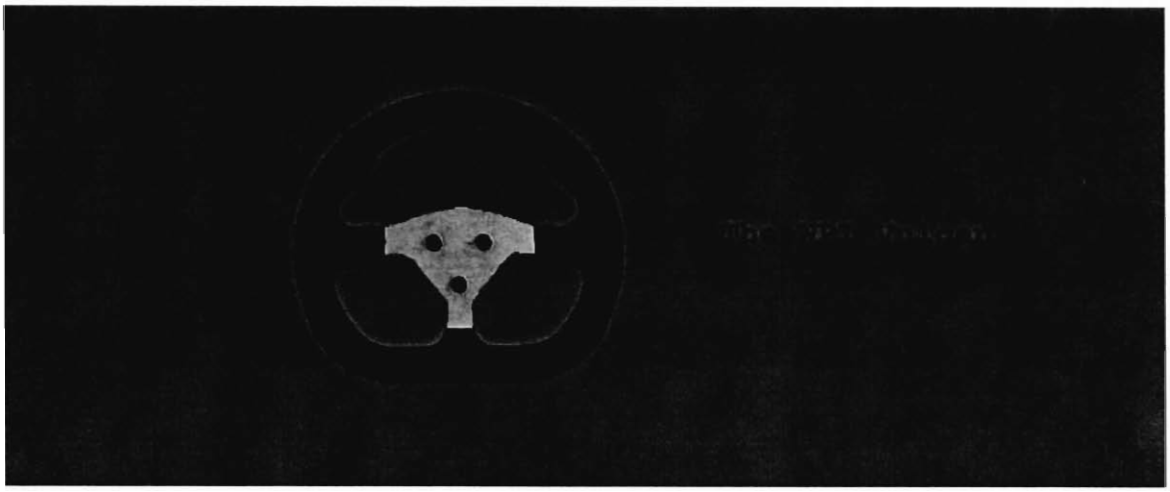


Figure 7.14. The brochures back cover.

Back cover [Figure 7.14] had the same relaxed look and style as the front cover. The text remind the reader of the name of the car he or she was just reading about, as well as help imbed the name into hers or his memory. The picture is of a steering wheel is another common image when talking about racing. By the time the reader makes it to the back cover, most of hers or his questions should be answered and they should desire to learn more.

The brochure does not mention the cost of our car anywhere on purpose. The reasoning behind this was not to deter any potential buyers before they investigated more. Anyone who reads the brochure, should be left yearning to learn more and the only way to do so is to call, visit online, or stop by a dealership. This increases the chance of a possible sale. This was the trend in almost every brochure we picked up from different dealerships. It seems to be the industry standard, so it applies to our car also.

The finished brochure will be available in numerous places for potential consumers and others interested in this division of racing. The brochures will be available at all of the factories and dealerships. Since our target consumers get much of their

information from the Internet, this would be one of the best places to get the brochures. On our website as well as other leading car sites, there will be an order form to have a brochure mailed to them or to download the brochure directly. The brochure will be available in two different downloadable forms, both in .pdf format and .gif. The different formats allow people with slower connections download the lesser quality .pdf format, and the faster connected people to download the high quality .gif. The Internet allows us to reach people nationwide easily and allow them to instantly view the brochure on their computers. This cuts down on printing cost and allows those interested to get information quickly in the comfort of their homes. Also encompassed with our magazine ads will be a mail in card for ordering a brochure. This way we reach our target buyers through the Internet, magazines, and at each factory and dealership.

The brochure will be printed up on stiff high quality photo paper and the cover will be printed on slightly thicker cardboard. We looked into getting a brochure professionally printed for the competition in Michigan at a few local printing places. The store that had the best prices was Kinkos, at about $15.00 a piece. This included all printing, cutting, and binding. While for us to have a few made up this price is reasonable but for mass production the cost would be far less. The brochure provides a compact packet of critical information for anyone interested in our FSAE car.

8. Presentation:

The main focus of this IQP is the presentation that we will present to the Society of Automotive Engineers judges in Pontiac, Michigan. This is the presentation that is covered in the first section of this IQP and is the culmination of all of our work and research to be used in the Formula SAE competition [A-1]. Covered in this section is how the goals laid out in chapter one will be accomplished in our presentation.

The team felt that the best method of presenting our information was an electronic slideshow, displayed during our speech. To create this slideshow we found Microsoft PowerPoint as the most convenient way to do so. The slides are of generalized versions of the work that we have completed over the past ten weeks [A-10]. These general versions cover a less technical part of the Formula SAE competition, and focus more on selling the car than hard numbers. The team does, however, have all the hard numbers to back up the presentation, and these can be brought forth if the judges have any questions during the question period after the first ten minutes.

Apart from including all the research and the contents of the presentation required by the rules, we must also make our presentation entertaining; that it will stand out from the rest (or at least hold the judges' attention) during the competition. In order to make the slides visually appealing, the photos that were taken of the race car, as well as the generated advertisements and flashy looking charts were used.

Having been given recommendations on the event from previous years, we were able to make our presentation, not only within the rules, but with a few years' passed down experience, as well as the tremendous information we have collected for this project. These recommendations have had some bearing on the foci and sub-tasks

throughout the rest of the research, but here is where they came into play the most. Some of the more important information we received includes a reminder to introduce all the teammates before we begin, not to speak too swiftly, to use all the time allotted us, and to have plenty of backups for everything. Another technique offered us is to leave generalities in specific areas, guiding the judges' questions so that we can be prepared for them. Thus, several backup slides will be made covering the few areas not covered by the slides to follow as well as some of the hard numbers we will need to back them up.

For the title slide, [A-10] we wanted to show an action shot of the Vulcan to catch the viewer's attention. Using a still shot of the race car, we pulled the picture into Adobe Photoshop to blur the picture and make the viewer believe the car was moving. We also wanted to make sure that the new logo appeared on the slide, it was felt that a good location would be the lower right hand corner.

After the first slide and the introduction, we felt it was important to introduce the people who worked on the IQP and slideshow. In slide 3 [A-10], we outlined what we would be discussing during the presentation to give the viewers an idea of what to expect. We felt it was important to highlight the facts that we would be discussing our marketing plans, the car itself, what materials we would use to market the car, and how much it would cost to make the Vulcan.

In the forth through sixth slides we discuss our marketing strategies. Using the results from our survey, we displayed the results highlighting the facts that our target market was ninety percent male and had an average age of 39. After mentioning the results of our survey, in the following two slides we showed how our car was better than the competition, as well as the car's specifications.

In the ninth and tenth slides, the marketing plan was talked about. The results from the marketing survey were used to devise a marketing strategy. There will be magazine ads in Grassroots Mororsports and ads on the internet.

The eleventh and twelfth slides are the last slides that cover new material. It was decided to put the driest part of the presentation, manufacturing processes and cost breakdown, last so that people's attention would not be lost near the beginning of the presentation, thus reducing the effectiveness of the entire presentation.

The thirteenth slide recaps all of the previously discussed information. It will reemphasize all of the covered material, allowing it to be fresh in the minds of the people that see the presentation.

9. Advertisements:

9.1: Web Ad

The Internet will be heavily used for marketing. One of the conclusions that was drawn from the analysis of the survey was that, much of the target audience gets a majority of its information from the Internet. In order to take advantage of this, multiple website banners will be made. More then one banners will be made since the banners are relatively simple to make, and by having multiple banners, the likelihood that a banner will catch the eye of a possible customer is increased. These banners will be run on some of the car related web pages that were more commonly put as favorite sites on the marketing survey.

9.2: Design Methodology

The design is intended on drawing possible customer's attention to the product. As a result, the design should be interesting and fun to look at. In addition, the banner does not need to sell the car, it just has to interest people enough so that they click on the link and go to the web page so they can learn more about the car.

Before starting the design process, a number of banners relating to cars and automotive products were looked at [A-7]. This helped show what the qualities are that make for a good banner. After examining a number of banners, the conclusions were drown that there should be a picture, the name of the product and some interesting or entertaining text.

According to the survey that was held [A-2], handling is very important to people interested in buying an autocross car. As a result, the handling was stressed as much as

possible in the banner. Because of this, many of the pictures involve cars cornering and going around cones. For the text, there should be, either something worth knowing about the car, or some interesting or entertaining text. It was decided that there would not be enough room to put a meaningful amount of information, as a result, a catchy slogan was used. Here too, it was decided to stress the handling of the car.

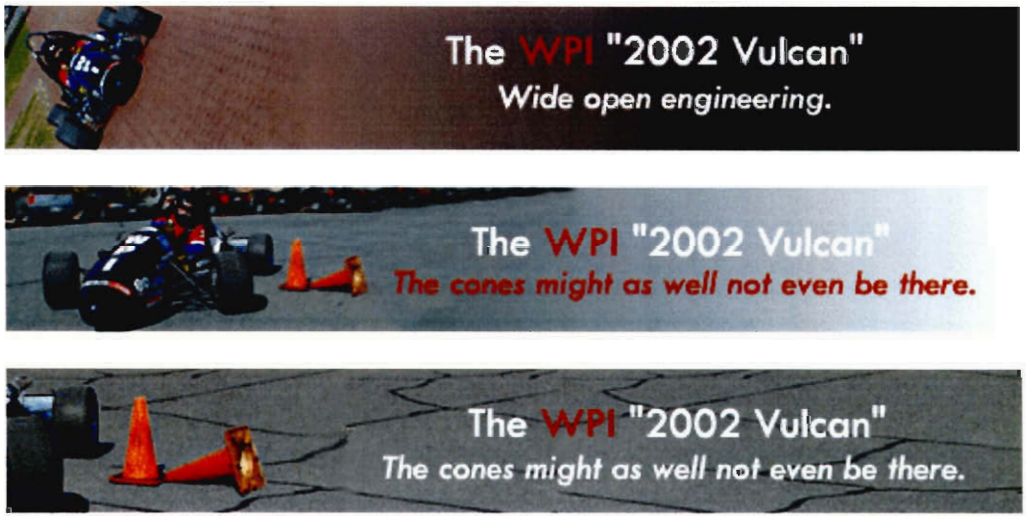


Figure 9.1: Shows the three web ads that were made.

9.3: Magazine Ad

In addition to finding information on the Internet many of our target buyers relied on magazines as a good resource. Through the analysis of the survey results it was found that Grassroots Motorsports was the most popular magazine among those who participated in the survey. By looking at a number of car ads found in Grassroots Motorsports as well as some of today's other leading car magazines. We also looked for books or information pertaining to this subject but we did not find any. So we used the real ads as a basis for the design of our own.

Figure 9.2. The first magazine ad design.

The study of the ads allowed us to make a few conclusions as to what we needed for our own. The requirements were, good pictures of the car, some specifications of what the car can do, the name of the car, and a catchy slogan. One ad that represents what we found in most is an ad for a Subaru WRX [Appendix A-6]. We developed a few different layout styles and tried to isolate the positive attributes in our efforts to improve the early design. he first layout we came up with [Figure 9.2] had all of the characteristics we looking for but just did not seem to be the most appealing layout. The slogan sounded too vague and passive, it was not the aggressive racing sound we were looking for. We also noticed that there is not a point to having a slogan if no one can see or read it. Nothing on the ad was really that attention grabbing but rather it all blended together. The stats on the car were also not on this layout and the name and other various statements

about the car were hard to see. We realized the need for improvement but also that we had created a good starting block.

Figure 9.3. The final version of the magazine ad.

By noticing all of the flaws in our first magazine ad we were able to greatly improve our second attempt. This time the statistics on the car were placed where they were easily viewable by the reader. The two smaller pictures of the car were increased in size to allow the reader to see the car more clearly. The name of the car and other information along the bottom were made more noticeable by darkening the background area behind them. The slogan was shortened, increased in font size, edited to sound better, and relocated so it is more easily seen. The second and final version of the magazine ad was significantly enhanced in order to increase the professionalism of the ad.

Eye grabbing and full of information makes our magazine ad an excellent way to advertise the car. By placing the ad first in magazines that the people who completed

surveys listed we can reach are target market quickly and effectively. Then in the future we can branch the ad out into other magazines in order to attract more people to the sport. This way we first reach those interested and can establish FSAE as a larger division of racing. Later by broadening the market we can keep the sale of cars constant and increase the possibility of opening more factories and dealerships.

10. Website

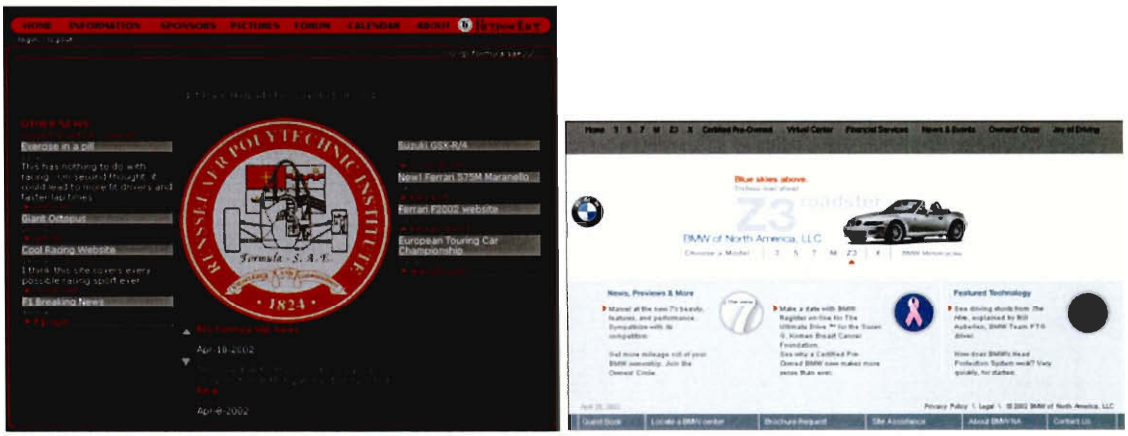
With the internet frequently being used as a place of advertisement and research, we felt it was necessary to develop a site for the Formula SAE race car. While we had a current site for the Motorsports club and the Formula SAE group on campus, we wanted a site that looked more professional and was primarily focused on the new car being built. This new site would be used to inform and educate the general public and potential customers on the people building the car, the current status of the new race car, view pictures of the car, see the companies that sponsor the car, as well as the history of the club.

The current website we had was a general area for information on the Motorsports club and the FSAE program on campus. While the site had valuable information, it was not as visually appealing as other school's and business' sites. In addition, the site was not being updated as frequently as it should and therefore not many club members would view it on a regular basis. As a result, there was no reason to post current updates on the car or any issues that needed to be immediately resolved.

Figure 10.1 – The old website

As can be seen in Figure 10.1, the old website had a nice menu bar at the top that made for easy navigation around the site. This menu remained at the top of the page for all the pages that were viewed. For the new website we wanted a similar styled menu, whether it was horizontal or vertical.

When developing the new website, our goal was to create a site that was simple in design yet attractive to the audience. We attempted to look for references about designing websites, but the only references we found were based on coding the pages and not the layout. Since we did not have any books as references, we decided to view current websites of both schools and car businesses for ideas for our website. Several colleges' websites were visited for examples, including RPI's site [10.1]. As can be seen below in Figure 10.2a, RPI's website is very simple yet effective in their design. Using the classy colors of black and red, they designed a website that used simple lines, effective menus, and detailed information.



Figures 10.2a and 10.2b – RPI's SAE website and BMW's North American website.

Another site that was appealing was the website of BMW [10.2]. Using the similar simple lines and text (see Figure 10.2b), BMW was able to create a site that was very visually appealing. However, one drawback of the BMW site was it seemed to take too long to find information on the site. We wanted to create a site that was easy to navigate around and easy for the user to view.

One of the first versions of our new website included a drop-down menu from the top of the page. However, after attempting to code the website as well as viewing the page, it was determined that drop-down menus were too complex and not as eye pleasing as we would like.

Figure 10.3a – The original menu idea

Figure 10.3b – The new website's menu. The image on the left is the regular menu. When the viewer moves the cursor over a menu choice (Members in this example), that choice will change colors and a brief summery of that page is displayed below the menu.

After reviewing other websites, it was decided that a side menu would be used with a menu that when rolled over would highlight the option and display a little information on that page. This design was first seen on the new WPI website [10.3]. By being able to roll over a menu choice and have the menu change color and display a general overview of what was on that page greatly improved the navigation and dynamics of the page.

When creating the menu, multiple software applications were used in an attempt to find the most efficient way to create the site. Macromedia Fireworks, Macromedia Dreamweaver, Microsoft Frontpage, Adobe Photoshop and Adobe ImageReady were all used and compared in determining what would be best to use for the website. The determining factors in deciding on what software would work best was the skill level of the web designer as well as the time restraint to have a finished and running site. Dreamweaver and Fireworks were first believed to be the best programs to use in creating

the menu. However, after a few days of struggling with the software it was decided that those programs could not perform all of the tasks that needed to be completed, and/or the web designer could not determine how to use all of the functions of the software. In the end Adobe Photoshop and ImageReady were used to draw and code the actual menu. After creating a functioning menu, the file was imported into Microsoft Frontpage to code the rest of the page.

What we determined to be the best way to update the content of the webpage was to draw the content up in Adobe Photoshop and insert the pictures in Microsoft Frontpage. This enabled us to include any text styles we wanted, as well as any graphics we wished to add. While there are many ways to add content to websites, we found this to be the easiest for us to do.

It was necessary for the site to contain valuable and interesting information, yet not be cluttered with useless facts. When considering options it was decided that the page would be oriented towards the SAE Race car, instead of the Motorsports club as a whole. On the main page when a viewer first visits the website is a welcome message with a general overview of who the Formula SAE group is. Using the RPI site as an example we decided to use black, maroon, and grey (WPI's school colors) for our entire site, as can be seen in Figure 10.4.

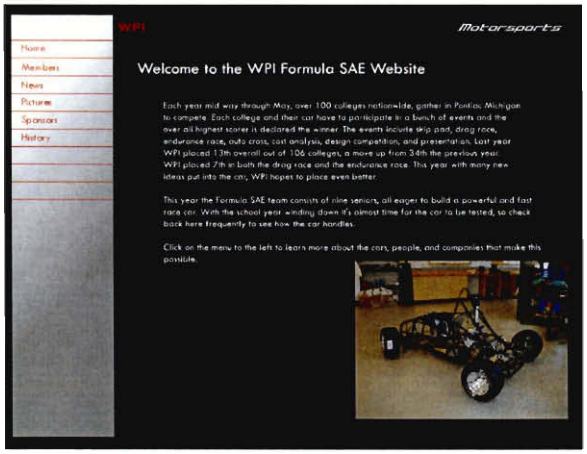


Figure 10.4 – Home page of the new website

The members page (Figure 10.5) contains the biographies of the members of the MQP team who are helping build the car. One possibility that was considered is including a picture of each member with their biography. While this option was not done, it is being considered for the future.

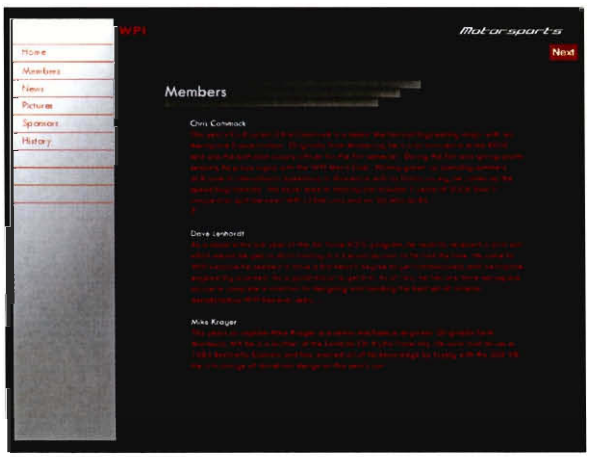


Figure 10.5 – Members' biographies

Wanting to keep team members and the general public informed on the project's status, it was necessary to include a page with current updates. On the news page, the viewer can see where each MQP team stands with their work, how much more needs to be complete, and how long until the car will be drivable. Once the car is completed the page will contain information on how the testing of the car is going.

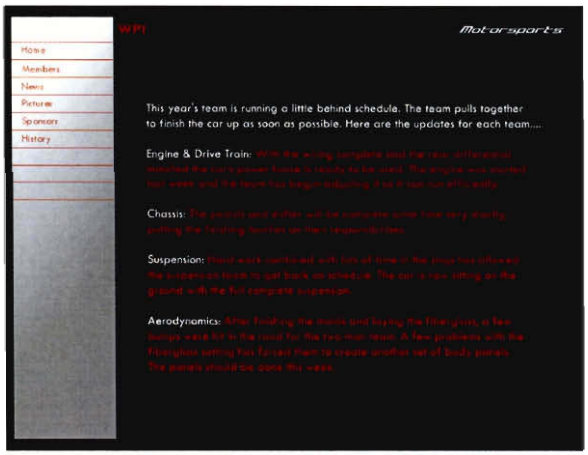


Figure 10.6 – The news page

It is often difficult to describe to the general public the style of cars that are built at WPI. Therefore it was decided that it would be best to include pictures of the projects, while they were being built and also being driven. As can be seen in Figure 10.7, we included close-up pictures of the suspension, chassis, and drive train.

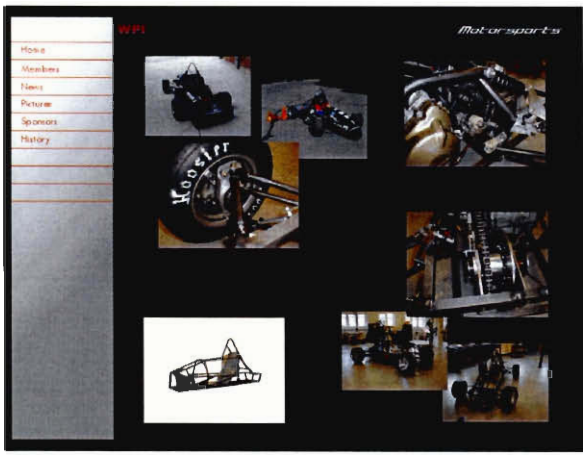


Figure 10.7 – Pictures page

A key part of the Formula SAE project is the funding. While WPI supplies the group with funding for the project, it is necessary to find outside sponsors to help fund the project. To show our appreciation for their generosity and publicize their names, the website includes a page listing the sponsors. By clicking on the logos on the sponsors' page, viewers can visit the websites of our sponsors.

Figure 10.8 – Sponsors page

Finally, in order to show the progress of the cars over the years it was determined that it would be best to have a page dedicated to the history of the SAE cars. As of now we only have the statistics of previous cars and how they did during competition Michigan. In the near future we plan on viewers being able to see the pictures of past year's cars as well as the teams that built and raced them.

Figure 10.9 – History page

11. Sponsorship:

Each year the FSAE team relies on financial help from off campus sources, we took in upon ourselves to help the team this year. We first got a list of sponsors from the past and combined it with a list of new possible sponsors to make one main list. We then began calling each business, company, or person individually, asking for donations. We did not have much luck with this approach due to the tragedies that occurred on September 11th in NYC. The decreases in the stock market affected all stockholders nationwide, including those who annually donate to the WPI FSAE team. A new approach was needed in order for the team to finish the car on time. We decided that a brochure would be the best way to have our request for assistance heard nationwide. We felt that a brochure rather than a newsletter or other publication would allow the possible sponsors to connect more with the WPI FSAE team. We felt brochure was overall more pleasing to the eye and conveyed more information, than any other form of printed material.

The brochure was designed so previous donors could be reminded of their help in the past and so possible future donors could learn about the FSAE program at WPI. The first page of the brochure [Appendix A-4] featured a two-column write up of what the FSAE program is and what the program does. The two pictures are of this year's team gathered around a mock chassis of the car and one of the previous years car. The text explains the financial problems that the team has run into this year as well as their success in the past. Also in the top left and right corner of this page two of our current sponsors are featured. As more sponsors are obtained their company names will be replace those on this page as the brochure is updated

The second page [Appendix A-4] has the biographies of half the team as well as the current summary of the car. The biographies allow the possible sponsor to learn a little more about each member of the team and their history of working on cars. The summary lets the possible sponsor know what stage of being completed the car is. As the brochure continues to go out, this will be updated also. The pictures shown are the plug used for the fiberglass body and the Honda engine being worked on.

The third page [Appendix A-4] has three sections to it; the second half of the team member's biographies, an explanation of the competition held in Michigan, and a section that highlights the same two sponsors that were featured on the first page. The second half of the biographies are located on this page, giving the possible sponsors a chance to learn about all nine team members. The competition section explains the time frame, the events, and WPI glorious history in Michigan. The meet the sponsors section spotlights two of the sponsors, what they do, how they helped, and how to contact them. Being featured in this section is just one more plus to becoming a team sponsor.

The fourth page [Appendix A-4] of the brochure is the page design to convince any person or company that the WPI FSAE team is a worth cause to sponsor. This goal of this page is to sell the car to the possible sponsors. Using our sales pitch and an explanation of all of the benefits of becoming a sponsor, this page convinces the possible sponsor that the WPI FSAE team is the way to go. At the bottom of this page all of the contact information can be found also for those who decide to become a sponsor.

The fifth page [Appendix A-4] speaks for itself, using all pictures. The pictures show the progress and design that has gone into the car as well as some of the previous

years sponsors. The WPI Motorsports logo as well as the address to this years new website are located on the bottom.

The last page [Appendix A-4] merely provides an easy and simple way to mail the brochures. This helps cut down on the costs of buying large envelopes to mail the brochures in.

The six-page brochure was sent out to over fifteen companies, without much luck. Phone calls and receiving brochures was enough to convince the sponsors that we needed their help. An updated brochure was also sent out a couple of months later as a follow up, with hopes that a reminder of the financial situation at WPI would spark more interest from sponsors. Neither the first nor second edition of the brochure was successful. The funds were just not as abundant this year as in the past. So despite our efforts being greater than in the past, our results were under par.

12. Closing Remarks:

During the course of the project, a great deal was learned about, not only Formula SAE and collegiate competitions, but also about presentations, marketing, manufacturing *and Life*. We can only hope that our efforts were of some use to the 2002 FSAE team and future teams who can reference our work for assistance.

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10.1 Rensselaer Polytechnic Institute. 27 April, 2002 <http://www.rpi.edu/>

10.2 BMW. 27 April, 2002 <http://www.bmw.com/>

10.3 Worcester Polytechnic Institute. 27 April, 2002 <http://www.wpi.edu/>

Appendices:

A-1: FSAE Rules

Competition overview

Presentation event

Presentation Grade sheet

Cost report event

A-2: Survey results

A-3: Dealership Brochure from 2002 Mazda Miata

A-4: Sponsor Brochure

A-5: Website

A-6: Referenced Magazine Advertisement

A-7: Referenced Web Advertisements

A-8: Floor Plan

A-9: Logo Generation Tips by Neil Cohen

A-10: Presentation Slides

A-11: Cost Report Spreadsheet

Appendix – 1

2002 Formula SAE rules

Appendix – 2

Survey and Results

Thank you for your participation in our survey regarding the marketing of an SCCA race car. The results from this survey will be used in an Interactive Qualifying Project (IQP), regarding the marketing of a Formula SAE car. The data entered will be reviewed and analyzed by five Worcester Polytechnic Institute students. While you do not need to answer any questions you do not feel comfortable with, the more you are able to answer will benefit our project.

I.

1. Average miles commuted to SCCA event/business: _____
2. Current state of residence or region of country (Northeast, Southwest, etc.): _____
3. Gender: _____
4. Age: ____
5. Average amount of money willing to spend annually on SCCA car: _____
6. Employment/Occupation: _____
7. Favorites....
TV Show: _____
Website: _____
Magazine: _____
Radio Station: _____
8. Where do you find most of your information/merchandise (Web, TV, Mail, etc.): _____
9. Additional Comments:

II.

1. What class car do you use in SCCA events: _____
2. Would you prefer to use a different class? If so, which one: _____
3. Would you be interested in having a separate SCCA car: _____
4. How much time for maintenance do you spend on your car per event: _____
5. How much are you reasonably willing to spend on a SCCA car: _____
6. If in the market:
Amount willing to spend on a car only for SCCA: _____
Amount allowed annually for SCCA car upkeep: _____

III.

Please rate the following in regards to importance to you (1 = not important, 5 = very important):

Acceleration	○1	○2	○3	○4	○5
Handling	○1	○2	○3	○4	○5
Braking	○1	○2	○3	○4	○5
Reliability	○1	○2	○3	○4	○5
Safety	○1	○2	○3	○4	○5
Traction/Skip Pad	○1	○2	○3	○4	○5
Aerodynamics	○1	○2	○3	○4	○5
Top Speed	○1	○2	○3	○4	○5
Fuel Consumption	○1	○2	○3	○4	○5
Aesthetics	○1	○2	○3	○4	○5
Ability to Upgrade	○1	○2	○3	○4	○5
Ease of Maintenance	○1	○2	○3	○4	○5
Metric/Standard Consistency	○1	○2	○3	○4	○5
Ability to Purchase Parts from One Source	○1	○2	○3	○4	○5
Comfort	○1	○2	○3	○4	○5
Adjustability	○1	○2	○3	○4	○5

IV

Optional:

Name: _____

E-mail: _____

Submit Form Clear Form

I (94 surveys)	1	2	3	4
Distance (Miles)	50	300	500	500
Location	MA	MA	NH	NH
Gender	m	m	f	m
Age	34	49	30	32
Racecar $/year	3000	1500	5000	5000
Occupation	Consultant	Engineer	Health Care	Computers
TV Show	-	Junkyard Wars	Speedvision	F1A World Rally
Website	-	smallfortuneracing	-	-
Magazine	-	Budo News	Sportscar	Linux Journey
Radio Station	WBCN	WZLX	WXLO	-
Info Retrieval	Newspaper	TV	Magazine/TV	Web
Comments*	-	-	-	-
II				
Car Class	ITA	ITB	ITC	DSR
Preferred Class	ITA	ITA	ITC	ITA
Seperate Car?	yes	yes	yes	yes
Maintenance/event	2.5	2.5	0	6
Maint Willing	2.5	30	5	6
$/Race(only)Car	40000	0	15000	15000
$/car upkeep	3000	0	3000	3000
III				
Acceleration	4	4	5	3
Handling	5	5	5	5
Braking	5	5	5	4
Reliablity	5	5	5	4
Safety	5	3	4	4
Traction	5	1	3	4
Aerodynamics	1	4	3	2
Top Speed	1	3	4	2
Fuel Consumption	1	1	1	1
Aesthetics	3	1	2	1
Upgradability	5	4	4	3
Maintenance	5	5	4	3
M/S Consistency	1	5	1	2
Parts Purchase	1	5	3	3
Comfort	2	4	1	1
Adjustability	4	5	3	3

5	6	7	8	9
100	50	30	50	30
MA	MA	MA	NH	MA
m	f	f	m	m
30	37	30	41	58
2500	3000	2000	3000	2000
Sales	Finance	Administrative	Administrative	Engineer
-	ER	Survivor	CSI	Junkyard Wars
-	boston.com	boston.com	-	ner.org
FHM	boston	Car&Driver	-	grassroots
WBCN	WCRB	WFNX	-	WBUR
Web	Web	Web	Web/Mail	Web
-	-	-	-	-
FM	SSB	SSC	ITC	FM/solo2
ITA	SSB	SSC	ITC	FM/solo2
yes	no	yes	yes	no
1	2	1	1	4
3.5	2	3	30	4
20000	38000	5000	0	0
7500	3000	2500	2000	0
4	5	4	3	5
5	5	5	5	5
5	5	4	3	5
4	5	4	4	4
5	5	3	5	4
5	4	3	3	4
2	3	3	2	2
2	3	3	2	2
2	1	3	1	2
1	1	3	3	3
4	2	4	3	5
3	3	5	4	4
1	3	3	3	4
1	3	4	1	2
1	3	3	1	2
5	3	4	4	5

10	11	12	13	14
0	55	100	55	100
MA	MA	CT	MA	CT
f	f	m	m	f
45	50	41	54	41
0	5000	500	5000	8500
Bank	Health Care	Engineer	Graphic Design	Purchasing
Daily Show	-	Junkyard Wars	Speedvision	Junkyard Wars
mp3.com	-	ner.org	-	ner.org
Vanity Fair	-	ant. week	Racer	Sports Car
WGBH	WXKS	WAQX	-	WNPR
-	Web	Web	Web	Web
-	-	-	-	-
GP	CP	ITC	CP	ITC
CP	CP	ITC	CP	ITC
yes	yes	yes	yes	no
3	0	1	1	0
3	0	1	1	0
5000	0	5000	5000	8500
5000	0	500	5000	8500
5	4	4	4	5
5	5	5	5	5
3	3	5	4	5
4	5	5	5	4
4	4	3	4	4
4	3	1	3	3
4	3	1	3	3
3	4	1	3	5
4	2	1	1	2
5	4	2	4	2
5	4	2	4	2
4	4	4	4	2
3	3	4	3	2
4	3	3	4	2
5	3	2	3	2
5	4	4	4	3

15	16	17	18	19
20000	75	50	70	115
MA	NH	MA	CA	FL
m	m	m	m	m
36	31	58	21	27
4000	2000	5000	0	2000
Mechanic	Machinist	Engineer	student	Health Care
West Wing	-	Speedvision	24	Everybody Loves R.
scca.org	radtrax.com	mac.com	granturismo.com	mr2.com
grassroots	automobile	discover	Road&Track	Maxim
WZKX	WEQX	WBZ	-	WZZR
Web	Web	Web	Web	Web
-	-	-	-	-

GP	EP	ITA	SSC	ITA
SSB	ITC	ITA	GT-2	ITA
yes	yes	yes	yes	yes
1.5	1	3.5	0	1
1.5	3	6	0	1
20000	10000	17500	0	5000
4000	2000	5500	0	2000

5	4	5	4	4
5	5	5	5	5
4	2	5	5	4
5	5	4	5	5
1	3	4	5	2
4	5	4	4	5
1	1	4	4	2
1	3	2	3	1
3	1	1	4	1
1	5	3	4	3
3	4	4	4	4
5	4	4	4	4
3	1	2	5	5
2	3	2	3	3
3	3	2	5	2
4	4	4	5	4

20	21	22	23	24
10	10	80	60	85
CA	NJ	WA	IL	TX
m	m	m	m	m
45	35	18	28	58
5000	1000	100	1500	30000
Designer	Administrative	student	Consultant	Computers
Twin Peaks	Dark Angel	Simpsons	-	Third Watch
dvdtalk.com	board.mr2faq.com	mr2faq.com	-	corvetteforum.com
Car&Driver	-	Road&Track	grassroots	Autoweek
-	-	KSJO	-	-
Web	Web	Web	Web	Web
-	-	-	-	-
SSC	SSC	EP	EP	T-2
ITA	SSC	EP	EP	T-2
yes	yes	yes	no	yes
1	1	3.5	0.1	1
1	1	3.5	0.1	1
10000	0	2000	10000	30000
4000	0	1200	10000	3000
4	4	4	3	5
5	5	5	5	5
3	5	4	5	5
3	5	3	4	5
2	5	1	1	4
4	5	5	5	5
2	3	4	1	3
2	3	1	1	3
1	4	2	1	3
5	2	4	1	3
2	5	4	1	4
4	5	4	3	3
5	3	4	3	3
3	1	2	1	5
2	2	1	1	3
3	3	5	3	5

25	26	27	28	29
50	150	150	20	75
TX	NY	CA	KA	TX
m	m	m	m	m
31	45	26	56	48
1000	3000	7500	400	2000
Chemist	-	Engineer	Retired	-
Junkyard Wars	Survivor	Simpsons	-	-
zooass.com	rennlist.com	oddtodd.com	miata.net	-
grassroots	automotive news	autoweek	grassroots	-
KZPS	WXRK	KMBY	-	-
Web	Newsp/Web/TV/Rad	Web	Web	Web
-	-	-	-	-

EP	HP	SSB	EP	SSB
EP	HP	SSB	EP	SSB
yes	no	no	no	no
5	0.1	1	0.25	0.5
5	0.1	1	0.25	0.5
1000	23000	32740	10000	0
1000	400	32740	10000	0

3	3	5	4	5
5	5	5	5	5
5	5	5	3	5
4	5	5	5	4
2	5	4	2	3
2	5	5	4	3
1	3	3	2	3
1	2	3	2	3
1	4	3	2	3
1	4	4	4	4
3	2	3	1	3
4	5	4	5	3
1	3	3	5	2
1	1	3	4	2
1	5	4	4	3
5	4	4	5	4

30	31	32	33	34
100	150	30	100	30
NC	AK	VA	NE	MA
m	m	m	m	m
27	46	31	35	55
1000	10000	1500	10000	1000
Engineer	Finance	Computers	Computers	Computers
Simpsons	-	-	South Park	Shadetree Mech
-	fiat page	-	cbsmarketwatch	cartct.com
autoweek	grassroots	-	Porsche Panorama	grassroots
-	-	WAMU	-	-
Web	Web	Radio	Web	Web
-	-	*see Surveys	-	-
FA	SSB/solo2	ITA	ITS	EP
FA	SSB/solo2	ITA	ITS	EP
yes	yes	yes	no	yes
1	2	0	8	3
2	2	0	4	3
0	12500	0	5000	0
0	2000	0	20000	0
5	3	4	4	5
4	5	5	5	5
5	4	4	5	4
3	4	3	4	4
3	3	2	3	5
5	3	5	5	4
3	3	3	5	4
3	2	3	1	4
2	1	3	1	2
2	3	3	2	3
3	3	4	5	3
3	5	4	5	3
3	3	2	5	3
3	3	1	1	2
3	3	3	1	4
4	4	3	5	4

35	36	37	38	39
15	17	50	60	30
FL	AZ	ME	CA	MO
m	m	m	f	m
24	46	20	38	21
8000	1000	2000	4000	300
Military	Sales	student	Marketing	student
JAG	EverybodyLovesR.	Conan O'Brian	Sopranos	Seinfeld
240sx.com	SCCA.org	sr20deforum.com	-	cameltoe.org
SportCompactCar	autoweek	grassroots	-	European Car
-	-	-	-	KHITS
Web	Web	Web	-	Web
-	-	-	-	-
ITS	SSB	ITS	EP	ITS
SSB	ITA	ITC	EP	ITS
yes	yes	yes	yes	yes
3	2	3	3	1
6	2	3	3	1
10000	5000	5000	20000	10000
2000	1000	5000	5000	500
4	4	3	5	4
5	5	5	5	5
3	4	4	5	5
3	4	5	4	5
4	3	5	5	5
5	4	4	4	5
4	2	3	1	1
3	2	2	1	1
2	2	4	1	2
3	4	3	3	2
5	4	5	4	2
4	3	5	3	2
1	1	3	3	1
1	2	4	4	2
3	3	4	3	4
4	3	5	4	4

40	41	42	43	44
30	100	50	60	500
CA	NY	GA	MO	MI
m	m	m	m	m
47	42	34	33	51
3000	700	2000	3000	700
Engineer	Mech	Consultant	Health Care	Consultant
The Prisoner	Junkyard Wars	West Wing	the Osbournes	Seinfeld
-	neons.org	civic.indybbs.net	scca.org	ebay.com
-	SportsCar	grassroots	grassroots	Sports Car
KPFA	WCMF	NPR	KQRC	WCSX
all	Web	Web	Web	Web
-	-	-	-	-

SSB	ITS	FA	ITS	F125ShifterKart
SSB	EP, et al.	FA	SSB	F125ShifterKart
yes	yes	no	yes	yes
1.5	0.75	1	1	1.5
1.5	0.75	1	1	1.5
10000	5000	15000	15000	6000
3000	700	2000	15000	700

4	5	2	4	5
5	5	5	5	5
4	5	4	5	5
3	5	5	5	5
3	5	3	5	5
4	5	5	5	5
3	1	2	4	1
3	1	1	4	4
2	5	2	1	1
4	1	3	4	4
4	5	4	5	3
3	5	4	5	4
2	5	1	3	5
2	5	2	5	3
2	5	3	4	2
3	5	3	5	5

45	46	47	48	49
25	50	100	45	180
CA	CA	NM	CA	MT
m	m	m	m	m
44	32	39	56	45
4000	10000	5000	3000	3000
-	automotive	Computers	Computers	Education
Speedchannel	Six Feet Under	WinBenStein's$	JAG	West Wing
-	cnn.com	scca.org	quixtar.com	i-Club
-	Road&Track	R/C Report	Road&Track	grassroots
-	NPR	KZZR ABQ	KBIG	-
Web	Web	Web	Web	Web
-	-	-	-	-

DSR	FP	EP	ITB/DSR	ITS
DSR	ITB	EP	ITB/DSR	ITS
yes	yes	yes	yes	yes
0.5	5	2	1	1
0.5	5	2	1	1
0	15000	20000	5000	30000
0	2000	5000	5000	2000

5	4	3	4	4
5	5	5	5	5
5	4	4	5	4
5	5	5	5	5
3	5	3	5	5
5	5	4	5	5
3	3	2	4	4
4	3	1	3	3
3	2	2	4	4
3	5	4	4	5
5	5	3	4	5
5	3	4	5	5
3	5	2	2	3
4	2	2	2	3
3	3	3	4	2
5	5	4	4	4

50	51	53	54	55
30	20	80	20	125
FL	PA	GA	IN	MA
m	m	m	m	m
30	30	52	38	32
50000	500	1000	1000	6000
IT Business Anal.	Lawyer	Architect	Marketing	Computers
Speedchannel	Law&Order	History Channel	ER	Simpsons
dailysportscar.com	vwvortex.com	-	theonion.com	i-Club
grassroots	European Car	Fortune	-	autoweek
-	WRRK	WFOX	WVPE	WHJY
Web	Web	Web/Magazine	-	Web
-	-	*see Survey	-	-
FP	ITS	CSR	HP	SSB
FP	ITS	CSR	HP	ITS
yes	yes	yes	yes	yes
24	15	4	0	1
48	30	4	0	0
0	0	10000	0	0
0	0	1000	0	0
5	2	5	4	4
5	1	5	5	5
5	2	5	4	5
4	2	2	5	3
4	2	3	5	4
4	1	5	4	5
3	2	1	2	2
3	2	1	2	3
3	3	1	3	1
4	2	1	3	1
4	2	3	3	4
4	3	1	4	5
3	4	1	5	1
3	3	1	2	1
3	3	1	3	1
4	3	5	3	4

56	57	58	59	60
65	400	30	50	1000
VA	CO	NJ	VA	MD
m	m	m	m	m
27	29	39	43	61
2000	2500	500	3000	3000
Computers	Administrative	Engineer	Contractor	Administrative
Enterprise	Friends/ER	West Wing	RPM 2 nite	Screen Savers
-	roadfly.com	npmb.com	ebay.com	ebay.com
grassroots	grassroots	GRM	Sportscar	grassroots
-	-	-	WNOR	WGMS
Web	Web	Web	Web	Web
-	-	-	-	*see Survey
ITS	SSB	solo2	ITC	FSP/BS
ITS	SSB	solo2	ITC	FSP/BS
no	yes	no	no	yes
1	4	0.5	8	1
1	4	0.5	8	1
0	7500	0	1000	10000
2000	2500	0	3000	2000
5	5	3	3	4
5	5	5	5	5
3	5	4	5	4
4	5	3	5	2
5	4	4	4	5
5	5	4	3	5
3	4	2	1	2
3	3	2	2	2
3	3	3	3	1
4	3	3	4	4
3	5	2	5	4
4	4	4	5	4
5	2	5	3	4
3	3	2	1	1
4	4	4	1	1
5	4	3	5	4

61	62	63	64	65
35	25	50	170	40
TX	FL	TX	CO	AL
m	m	m	m	m
56	55	30	48	36
3000	1500	1000	6000	1500
IT	education	Engineer	Engineer	Computers
O'Reilly Factor	Nova	Speedchannel	Frasier	Law&Order
houscca.com	-	penny-arcade.com	scca.org	Yahoo.com
grassroots/SciAm	grassroots	automobile	Road&Track	grassroots
KPFT/KPRC	-	-	KBCO	WTAK
Word of Mouth	Web/WordofMouth	Web/TV	Web/Magazines	Web
*see Survey	-	-	-	-
FP	solo1/2	solo2	F125	FP
EP	GP	solo2	F125	EP
yes	yes	yes	no	yes
3	1	3	4	1.5
3	1	3	4	2
20000	10000	3000	0	15000
3000	10000	1500	0	5000
5	4	4	4	5
5	5	5	5	5
5	5	4	5	5
5	4	5	4	4
1	5	5	4	4
5	4	5	4	5
3	3	4	3	2
3	3	3	3	1
1	2	4	3	1
1	1	4	4	4
3	3	5	2	5
5	3	5	4	5
1	3	3	4	5
1	3	4	3	3
1	3	4	3	3
5	3	4	4	4

66	67	68	69	70
50	50	60	50	50
CA	NE	MA	GA	IL
m	m	m	m	m
55	67	44	54	31
2000	1000	5000	2000	1500
Engineer	Retired	Computers	Engineer	Sales
West Wing	West Wing	-	Speedchannel	Speedchannel
solo2.com	-	bbc.co.uk	-	centralillinoisimports
Car Craft	PC Mag	Performance Bike	Car&Driver	grassroots
KFI	WJJZ	WBUR	-	-
Magazines	Web	Web	-	Web/Magazines
-	-	*see Survey	-	-
EP	EP	EP	EP	GP
EP	EP	EP	EP	GP
no	no	yes	yes	yes
1	1	2	2	1
1	1	2	2	1
0	0	10000	8000	2880
0	0	10000	1000	2880
5	5	3	5	3
5	5	5	5	5
5	5	5	5	3
5	5	4	4	4
5	5	4	4	5
5	3	5	4	5
2	1	4	1	2
1	1	3	2	1
2	5	3	2	1
4	4	3	2	3
4	1	5	4	3
4	1	4	4	5
3	1	5	4	3
1	1	3	4	2
4	4	3	4	3
5	1	5	4	5

71	72	73	74	75
50	10	30	50	58
IL	OH	OH	MI	PA
m	m	m	m	m
24	37	27	31	35
5000	1000	2000	2000	1500
Computers	Administrative	Computers	Engineer	Scientist
Simpsons	NYPD Blue	Speedchannel	Speedchannel	Speedchannel
mr2ownersclub	-	mr2.com	mr2faq.com	-
Road&Track	Car&Driver/MotorT	-	SportCompactCar	autoweek
-	WNCX	-	-	WXPN
Web/WordofMouth	Web	Web	Web	Web/Magazines
-	-	-	-	
SSC	GP	EP	solo1/2	GP
SSC	GP	EP	solo1/2	ITS
yes	yes	no	yes	yes
3	0.5	0	3.5	2
10	0.5	0	4	2
25000	0	0	3500	7000
10000	0	0	3500	1000
3	5	1	3	5
5	5	5	5	5
5	4	5	5	5
3	4	4	5	5
4	3	1	4	5
3	4	5	5	5
2	3	3	1	4
1	4	1	3	4
2	3	2	1	4
4	5	3	3	5
5	2	2	4	5
5	3	3	4	5
3	1	5	4	5
2	2	3	2	3
3	3	1	2	3
5	2	5	4	5

76	77	78	79	80
5000	100	20	150	50
OK	KA	AL	MA	AZ
f	m	m	m	m
44	61	42	56	47
4000	5000	2000	1500	3000
Business	Journalist	Engineer	Retired	Sales
Six Feet Under	West Wing	Jeopardy	West Wing	-
s2ki.com	scca.org	MacFixit.com	autox4u.com	-
autoweek	SportsCar	Car&Driver	-	grassroots
KMOD	KHCC	-	-	-
Web	Web	Web	Web	Web
-	*see Survey	-	*see Survey	-

SSB	GP	SSB	FP	solo2
SSB	GP	SSB	FP	solo2
yes	yes	yes	yes	yes
1	2	0	2.5	1
1	3	0	3	1
0	0	15000	10000	0
0	0	2000	1500	0

5	1	1	5	5
5	1	1	5	5
5	1	1	4	5
5	1	2	4	4
5	1	3	3	3
5	2	1	5	2
5	5	5	3	2
5	4	5	2	2
2	5	5	1	2
2	4	3	1	3
5	5	3	4	4
5	1	3	4	4
2	3	5	1	2
2	4	5	2	2
3	2	3	2	4
3	3	2	2	4

81	82	83	84	85
40	35	50	20	15
CO	WA	CA	CO	ID
m	m	m	m	m
45	26	29	28	20
1000	10000	1000	1000	5000
Warehouseman	machinist	Engineer	-	student/Army Res.
RPM Tonight	family guy	Junkyard Wars	-	Star Trek
-	mr2.com	miataforum.com	-	geekculture.com
N.AmericanPylon	SportCompactCar	grassroots	-	grassroots
WCBE	-	KFJC	-	-
Web/WordofMouth	Web	Web	Web	Web/WordofMouth
*see Survey	-	*see Survey	-	*see Survey
EP	solo1	SSB	HP	EP
ITC	solo1	SSB	any	ITA
yes	yes	no	yes	yes
1	2	0.5	1	1.5
1	2	0.5	1	2
2000	5000	30000	3000	5000
1000	5000	0	1000	5000
3	5	3	4	5
5	5	5	5	5
5	5	4	4	4
4	3	5	5	3
5	2	3	5	2
4	5	4	3	5
2	2	2	3	1
1	2	1	1	1
1	2	4	1	1
2	3	4	3	1
3	4	4	3	5
4	2	5	5	2
3	5	5	3	5
2	2	2	4	1
2	2	5	3	1
5	3	4	3	5

86	87	88	89	90
150	75	15	50	80
IN	VA	TX	IN	NH
m	m	m	f	f
51	51	31	47	40
3500	3000	1500	2500	2500
Computers	Computers	Engineer	Finance	Marketing
Speedchannel	Law&Order	Speedchannel	ER	West Wing
Yahoo.com	-	miataforum.com	-	-
grassroots/R&T	Car&Driver	autoweek	Southern Living	Archaeology
-	-	KLOL	WVPE	WKLB
-	Web/TV/newspaper	Web	newspaper	Web
*see Survey	-	-	-	-
EP	EP	EP	EP	EP
ITS	EP	EP	EP	ITB
no	yes	yes	yes	yes
5	1	0.1	5	1
6	1	0.1	5	5
0	10000	30000	15000	17500
0	10000	750	15000	2500
4	3	5	4	5
5	5	5	5	5
4	5	4	5	5
3	5	5	4	4
3	5	3	4	3
4	5	5	5	4
2	4	1	2	3
2	3	2	2	3
3	2	2	1	2
3	3	2	3	1
2	4	4	4	5
3	4	5	4	4
2	3	1	1	5
1	3	2	1	4
3	4	3	1	3
4	4	3	5	4

91	92	93	94	averages
150	8000	80	50	444.84
MA	MA	NH	MA	New England
m	m	m	m	m
45	32	52	22	39.58
3000	2000	2500	1000	3701.08
Computers	Computers	Engineer	student	no clear winner
Babylon5	CSI/Ed	Speedchannel	Speedvision	Speedchannel
starbulletin.com	f1-live.com	slp.com	-	no clear winner
SportsCar	velonews	Road&Track	Road&Track	Grassroots
WBUR	WFNX	WKLB	WMF	no clear winner
Web	Web	Web	Web	Web
-	-	-	-	-

GP	HP	EP	ITA	
ITA	ITA	ITB	ITA	
yes	yes	yes	yes	yes
4	3	3	15	2.40
20	3	5	15	3.92
20000	8500	17500	6000	9071.18
12500	2000	2500	1000	3331.94

4	5	5	4	4.06
5	5	5	5	4.86
5	3	5	4	4.35
3	5	4	3	4.18
4	1	3	3	3.67
3	5	4	4	4.15
2	2	3	4	2.60
2	2	3	2	2.37
2	1	2	2	2.19
2	4	1	3	2.96
4	4	5	3	3.68
4	5	4	4	3.92
2	5	4	3	3.06
1	1	3	2	2.46
2	2	2	3	2.74
4	5	4	2	3.99

Interested ppl avgs
539.73
same
same
39.01
3828.38
same
same
same
same
same
same

yes
2.50
4.46
9059.19
2949.05

4.11
4.82
4.30
4.14
3.69
4.14
2.65
2.45
2.09
2.89
3.91
3.97
2.99
2.58
2.68
4.00

Appendix – 3

2002 Mazda Miata Dealership Brochure

Appendix – 4

Sponsor Brochure

WPI Motorsports

A New Year, a New Car...

This year's 2002 WPI Formula Society of Automotive Engineers race car is now in production! Consisting of four specialized areas of production, this year's team is trying to improve all aspects of the car compared to previous years. Sporting for the first time two aerodynamic wings, WPI will gain the leading edge with the competition. Supplying the power to this year's car is a redesigned power train and a modified Honda F4 motorcycle engine. With 600 cubic centimeters yearning for fuel, it's just waiting to tear up the competition. To help keep this beast in control and on the ground, the suspension team has improved the speed and accuracy for camber adjustment by using a sophisticated system of pre-made camber adjustments. Possibly the most important part of the car, holding everything together, is the redesigned chassis. Looking to greatly improve the stiffness and resistance to twist, the chassis consists primarily of square tubing. By combining this teams innovations, engineering,

Members of this year's team work on the mock chassis for the car

The 2000/2001 FSAE car ready to race at an event

and need for improvement, this year's car will be far superior to previous year's cars.

Team members rotate using WPI's fine construction facilities in the Project Lab, located in the basement of Higgins Laboratories. On campus, team members can use CNC machines, metal working machines, wind tunnels, and a variety of other useful tools. Headed by Chris Cammack, senior and captain for the team, these nine seniors finished and running by the middle of February. However, due to financial constraints, production this year has been slower than usual. While production thus far has been to schedule, as the deadline approaches the funds are rapidly depleting. Despite the financial troubles, the team keeps a positive attitude and enthusiastically continues work on this years race car.

Contents:

Meet the MQP Members

Chris Cammack
This year's Co-Captain Chris Cammack is a senior Mechanical Engineering major with an Aerospace Concentration. Originally from Minnesota, he is also involved in Army ROTC and was the battalion supply officer for the fall semester. During the fall and spring sports seasons, he plays rugby with the WPI Men's Club. Having grown up spending summers at Brainerd International Speedway in Minnesota with his family racing, he comes by the speed bug honestly. His experience in motorsports includes 3 years of SCCA Solo II competition split between WPI's FSAE cars and an '85 Mazda Rx-7.

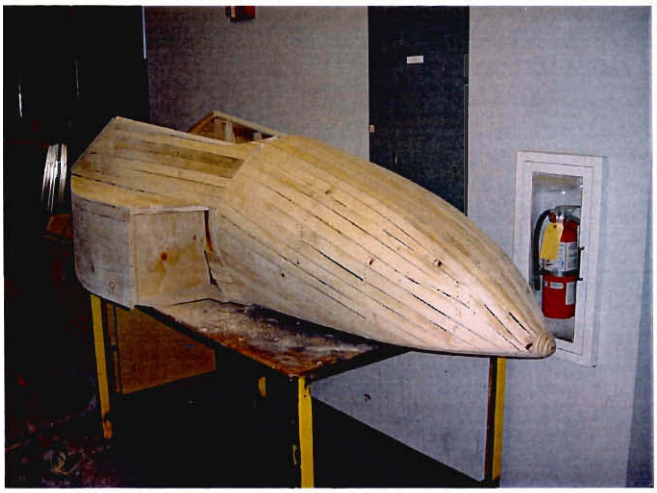
Mike Krager
This years co-captain Mike Krager is a senior mechanical engineer. Originally form Marlboro, MA, he is a brother of the Lambda Chi Alpha fraternity. He owns and drives a 1984 Berlinetta Camaro and has learned all of his knowledge by toying with the 305 V8. He is in charge of drivetrain design on this years car.

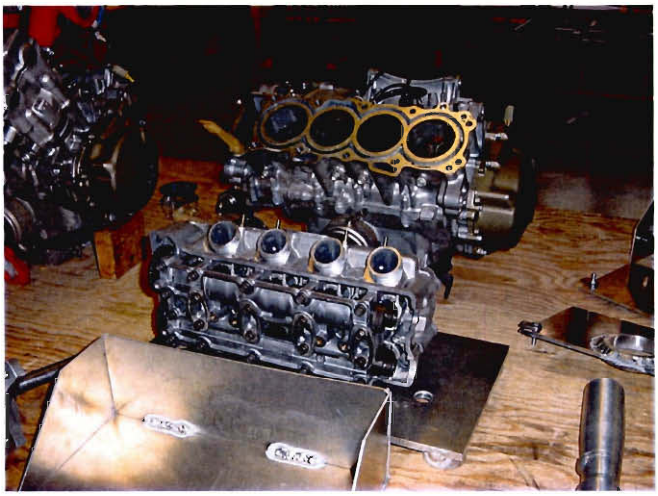
Matt Covati
Middletown Maryland
Senior
Mechanical Engineer design concentration
2002 Suspension team member

Dave Lenhardt
As a cadet in his last year of the Air Force ROTC program, he recently received a pilot slot which means he gets to start training in a Cessna as soon as he find the time. He came to WPI because he needed to have a bachelors degree to get commissioned, and aerospace engineering sounded like a good major to get it in. As of now, he has one more aerospace course to complete in addition to designing and building the best set of racecar aerodynamics WPI has ever seen...

Current Summary

With deadlines fast approaching, the car is being worked on constantly. At the time of publication, the mock shell for the body has been completed. By the weekend it should be covered in Bondo and ready to fiberglass. With aerodynamics, the rear wing mold is almost complete and ready to form the final wing. With the chassis complete, the two members focus their attention on getting the pedals finalized. The suspension team has been working on testing and forming a-arms, as well as double checking their final designs. The steering wheel and column holder are also ready to be attached to the chassis. Already bent and cut, the sheet metal for the seat and floor are now in place. With the engine and drive train group, a mock-up gas tank has been created to measure dimensions for the actual tank. The engine's heads have been machined and are now back in the lab ready to be reassembled. The team is in the process of designing and machining hubs for the car. For future plans, the team will continue to work diligently on the car to have it completed by the middle of February.





Pontiac, Michigan

Midway through the month of May, the National FSAE competition is held in Pontiac, Michigan. Each year over a hundred colleges from across the country come to compete in four racing events, as well as an overall evaluation of the car, that will determine where their car stands nationally. Last year WPI finished 13th place overall out of 106 colleges that participated. The four racing events each car must take part in included a drag race, skid pad, autocross, and endurance event. There is also a design, cost report, and presentation aspect of the competition.

Meet the companies that make this possible

LOCTITE

Loctite Corporation is a leader in the engineering adhesives and sealants market, and has been kind enough to donate $200 worth of products to our cause. From thread lockers to epoxies, gasket makers to hand cleaners, Loctite offers a wide range of high-quality products. Using their products it is assured that this years FSAE Race Car will be built strong and the team members will keep clean.

C&H

C&H Chemical manufactures and packages quality specialty chemical products and cleaning compounds that are performance oriented and environmentally safe. They produce a wide variety of products under the name C&H, and under the name SprayDet. Whether you need an all-purpose industrial degreaser, a lotionized hand soap or a specialized product to clean the wheels of a Boeing 757, they have a product to meet your specific needs.

Meet the Members (cont.)

John Escolas
Originally from Oxford, MA, he is attending WPI to obtain a degree in mechanical engineering. He is responsible for the drivetrain on the 2002 WPI FSAE car. He has been involved with cars for as long as he can remember. He has worked on cars for many years at the auto body shop in addition to his personal cars. His plans for the future are to work in the automotive field.

Adam Strelczuk (Strelspeed)
A member of the drivetrain group, Adam was born in Gdansk, Poland. He's studied Nuclear Engineering at Three Rivers, and transferred to WPI to study Mechanical Engineering. He has a love of foreign sports cars and all cars alike, and he's had a chance to drive the new 911 Turbo, Dodge Viper, a Strosek Modified 911, and various Lotus's. In addition to working on cars, Adam does a lot of off road motorcycling, mountain biking, and hiking. He currently drive a 1974 Datsun, with multiple modifications, including big brakes, triple webers, a cage, custom a arms, 280 block with a 240 head, coilovers, etc. He also owns a custom built Convertible 280Z (that needs finishing) as well as a 2001 XR650R

.Michael Carlin
Senior
Suspension Team
Mechanical Engineer—Design
Hometown: Milford, MA

Josh Beauvais
Josh Beauvais is a Junior on WPI's chassis design team. From Hubbardsten, MA, previously enlisted in navy as machinist mate, general ME major CS minor.

Alexander Clifford
From Gilford, New Hampshire
Senior
Mechanical Engineer
Also involved with the campus radio station

WPI WORCESTER POLYTECHNIC INSTITUTE

Motorsports

The Formula SAE Program needs your help!

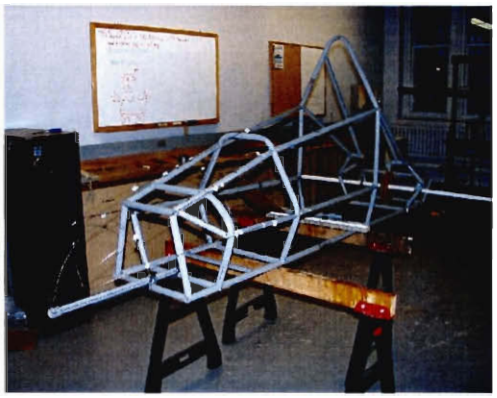
The services engineers provide to society are irreplaceable.
Here's your chance to help them flourish!

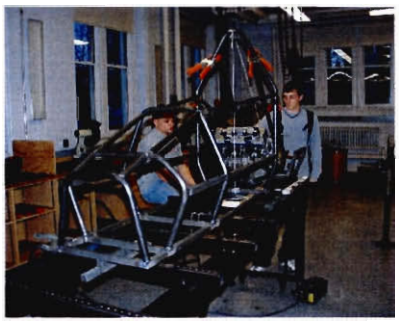
The Formula SAE program is a unique experience where a group of students are given the opportunity to design, build, test, and race their very own Formula style racecar. Each year the students compete with their car in Pontiac, Michigan against as many as 110 other colleges and universities. The competition consists of static design and cost judging followed by a drag race, skid pad, autocross, and endurance events. Last year the team placed an amazing 13th in a field of 108 overall, but they need your help!

The team is partially funded by WPI, however any further spending above this grant must be covered by sponsorship money from people like you! All donations are greatly appreciated and tax deductible. Would you like to support the team and further the education of the up and coming generation of engineers? **Then think of becoming a WPI Formula SAE sponsor!**

To help out the FSAE Program, please contact:

WPI M.E. Department
Phone: (508) 831-5236
Fax: (508) 831-5680
Email: fsae@wpi.edu





Visit the new and improved website.
www.wpi.edu/~fsae

WPI
Motorsports

Department of Mechanical Engineering
WPI Higgins Labs
100 Institute Rd.
Worcester, MA 01609

Place Stamp Here

To:

WPI Motorsports

2002 FORMULA SAE

DaimlerChrysler Ford Motor Company General Motors

Appendix – 5

Website

WPI Motorsports

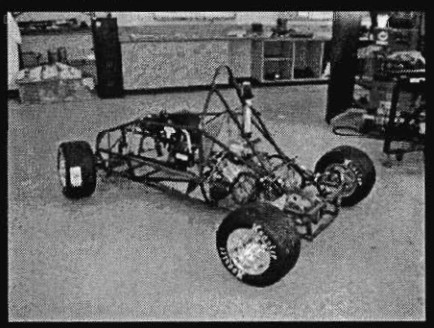
- Home
- Members
- News
- Pictures
- Sponsors
- History

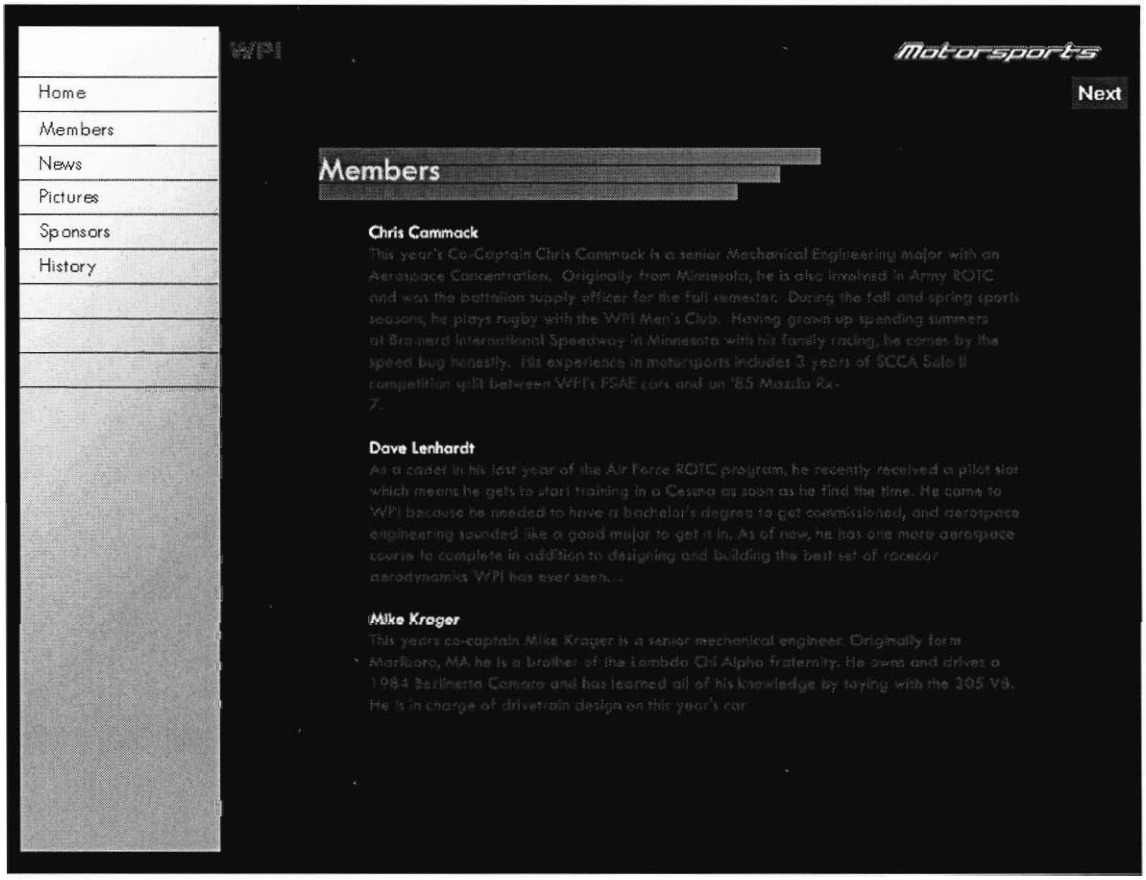
Welcome to the WPI Formula SAE Website

Each year mid way through May, over 100 colleges nationwide, gather in Pontiac Michigan to compete. Each college and their car have to participate in a bunch of events and the over all highest scorer is declared the winner. The events include skip pad, drag race, endurance race, auto cross, cost analysis, design competition, and presentation. Last year WPI placed 13th overall out of 106 colleges, a move up from 34th the previous year. WPI placed 7th in both the drag race and the endurance race. This year with many new ideas put into the car, WPI hopes to place even better.

This year the Formula SAE team consists of nine seniors, all eager to build a powerful and fast race car. With the school year winding down it's almost time for the car to be tested, so check back here frequently to see how the car handles.

Click on the menu to the left to learn more about the cars, people, and companies that make this possible.




WPI
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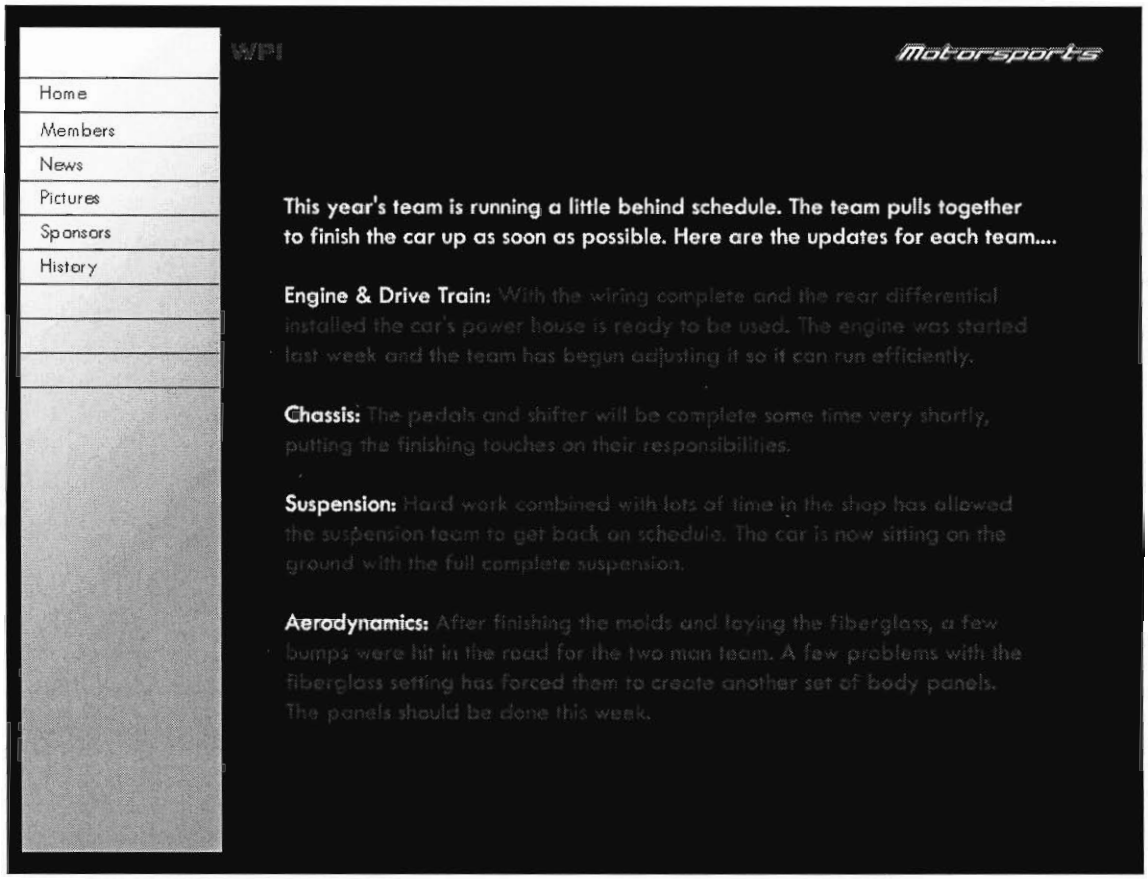
Members
Chris Cammack
This year's Co-Captain Chris Cammack is a senior Mechanical Engineering major with an Aerospace Concentration. Originally from Minnesota, he is also involved in Army ROTC and was the battalion supply officer for the fall semester. During the fall and spring sports seasons, he plays rugby with the WPI Men's Club. Having grown up spending summers at Brainerd International Speedway in Minnesota with his family racing, he comes by the speed bug honestly. His experience in motorsports includes 3 years of SCCA Sale II competition split between WPI's FSAE cars and an '85 Mazda Rx-
7.
Dave Lenhardt
As a cadet in his last year of the Air Force ROTC program, he recently received a pilot slot which means he gets to start training in a Cessna as soon as he find the time. He came to WPI because he needed to have a bachelor's degree to get commissioned, and aerospace engineering sounded like a good major to get it in. As of now, he has one more aerospace course to complete in addition to designing and building the best set of racecar aerodynamics WPI has ever seen...
Mike Kroger
This years co-captain Mike Kroger is a senior mechanical engineer. Originally form Marlboro, MA he is a brother of the Lambda Chi Alpha fraternity. He owns and drives a 1984 Berlinetta Camaro and has learned all of his knowledge by toying with the 305 V8. He is in charge of drivetrain design on this year's car


WPI
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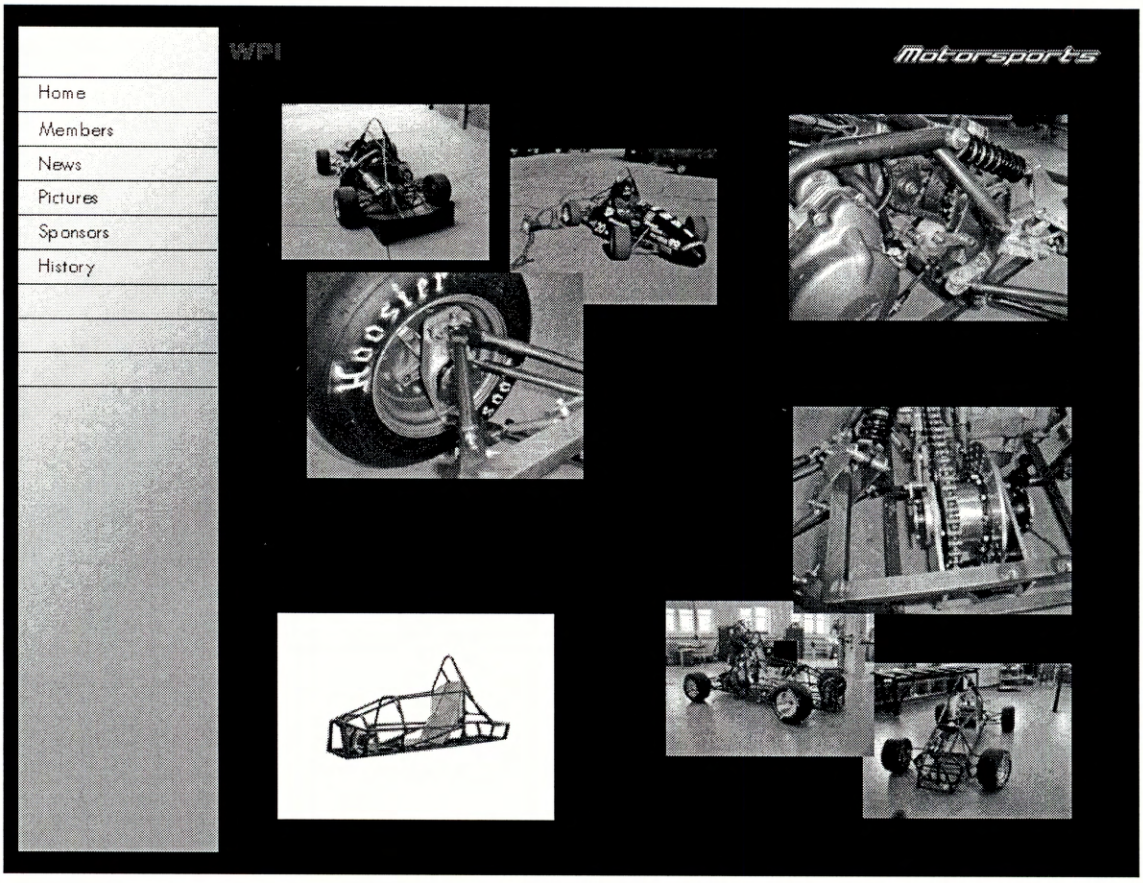
History
This year's team is running a little behind schedule. The team pulls together to finish the car up as soon as possible. Here are the updates for each team....
Engine & Drive Train: With the wiring complete and the rear differential installed the car's power house is ready to be used. The engine was started last week and the team has begun adjusting it so it can run efficiently.
Chassis: The pedals and shifter will be complete some time very shortly, putting the finishing touches on their responsibilities.
Suspension: Hard work combined with lots of time in the shop has allowed the suspension team to get back on schedule. The car is now sitting on the ground with the full complete suspension.
Aerodynamics: After finishing the molds and laying the fiberglass, a few bumps were hit in the road for the two man team. A few problems with the fiberglass setting has forced them to create another set of body panels. The panels should be done this week.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creative materials incorporated
Motor Sports International
C&H
EDCO DRILLING
LOCTITE
Mitchell's Drivetrain - 384 Hartford Turnpike Shrewsbury, MA 01545 - 508.839.2820
Jeff's Garage - Custom Exhaust - Charlten, MA
Mills Radiator - Worcester, MA
We are always looking for new sponsors. If you or your company are interested then send an e-mail to fsae@wpi.edu. Also below is a link to our brochure. Please read even if you just want to learn more out about the team.
Download the Official Brochure Here (in .pdf format)
If you would like to contact the WPI Mechanical Engineering department or are interested in sponsorship, here's how...
WPI Mechanical Engineering Department
100 Institute Road
Worcester, MA 01609
Phone: 508-831-5236 / Fax: 508-831-5680


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History
99-00
Summary of WPI at 2000 FSAECar #600
Categories Event Placement Points Possible Points
Static Events(Thursday) Presentation 1* 75.00 75
Engineering Design 52 70.00 150
Cost 5 78.36 100
Solo Tests(Friday) Acceleration 25 56.65 75
Skid Pad - ** 50
Autocross Performance 35 46.36 150
Track Performance(Saturday) Endurance-Economy DNF 0 400
Total Score 34/104 326.38 1000
Awards
The Pi Research Best Presentation Award
2nd Place in The Lear Corporation Best Interior Award
(includes ergonomics and safety)
2000 WPI MQP Departmental Award

Appendix – 6

Reference Magazine Advertisement

Appendix – 7

Reference Web Advertisements

Appendix – 8

Floor Plan

Persons Position	Number of People First Shift	Number of People Second Shift	Total People with Position
Machinist	3	3	6
Car Assembler	12	12	24
Welder	4	4	8
Sales People	2	0	2
Parts Department Workers	2	0	2
Shipping/Receiving	2	0	2
Final Inspector/ Tester	1	1	2
Engineers	2	0	2
Secretary	2	0	2
Marketing	1	0	1
Part Transporters	2	2	4
Janitor	1	1	2
Total Workers	34	23	57
Total Visitors	4	0	4
Total People on Site	38	23	61

This table shows the number of people in each position within the building.

Appendix – 9

Logo Generation Tips by Neil Cohen

A-12: Logo Generation Tips by Neil Cohen [7.2]

1. Your corporate identity says it all. The first step before you embark on your identity development is to develop your company's brand strategy and target audience profiling. The next step is to translate all that information into your logo design. Ask yourself whether you want your company to be perceived as big and traditional or modern and eclectic, technology- or service-driven, or serious or fun. Whatever your answers, they need to be conveyed in your logo design.

However, there are limits. Some company attributes may be so esoteric that they are hard to convey in a single logo design. Bottom line: Don't ask your logo to do too much, and you'll be fine.

2. Choose your design firm carefully. Every design firm has a different approach, personality, and style, all of which are reflected in the body of its work. Make sure you thoroughly review prospective designers' portfolios to see if they have the necessary experience as well as the look you're striving for.

3. Avoid design clichis. Swooshes, ellipses, and little running men are just some of the many design clichis that people rely on to convey a company's brand. And while these tools are familiar, cute, and comfortable, they are mainstream and do not stand out in today's competitive landscape. Often when assessing the competitive landscape of logos, you will see a mind-numbing similarity that makes you wonder if companies just decided to copy one another intentionally. It's hard to be original, but there are definitely more creative ways to demonstrate motion and speed than a swoosh-type logo.

4. Don't date your design. Just as you should choose for your company a name that won't embarrass you down the road, design your logo with an eye on the future. If you make your logo timeless, people will always relate to it. And while it may be tempting to go with the trendy colors and typefaces of a particular time, keep in

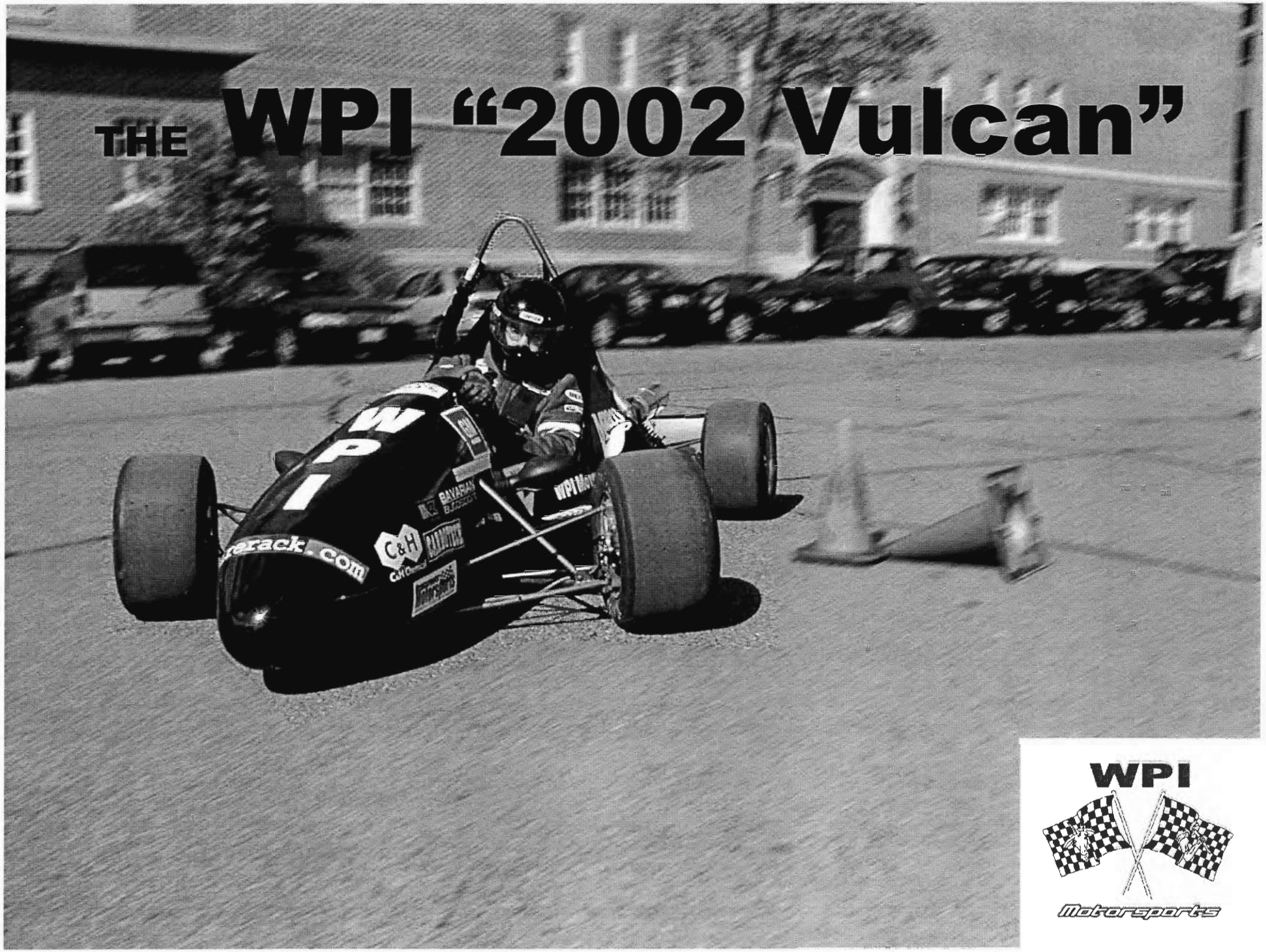
mind that they will quickly look dated, along with your company.

5. Create a multidimensional logo. One of the biggest mistakes companies make in logo development is that the logos can be used only one-dimensionally. In other words, the logo looks good on a business card, but that's about it. Either the colors are too thin, the types too light, or the logo just doesn't transfer well when you shrink it or place it on a home page. Remember: Your logo is going to be used and seen in multiple environments, from T-shirts and magazines to letterhead and Web sites. The best logos work everywhere and anywhere.

Appendix – 10

Presentation Slides

THE WPI "2002 Vulcan"

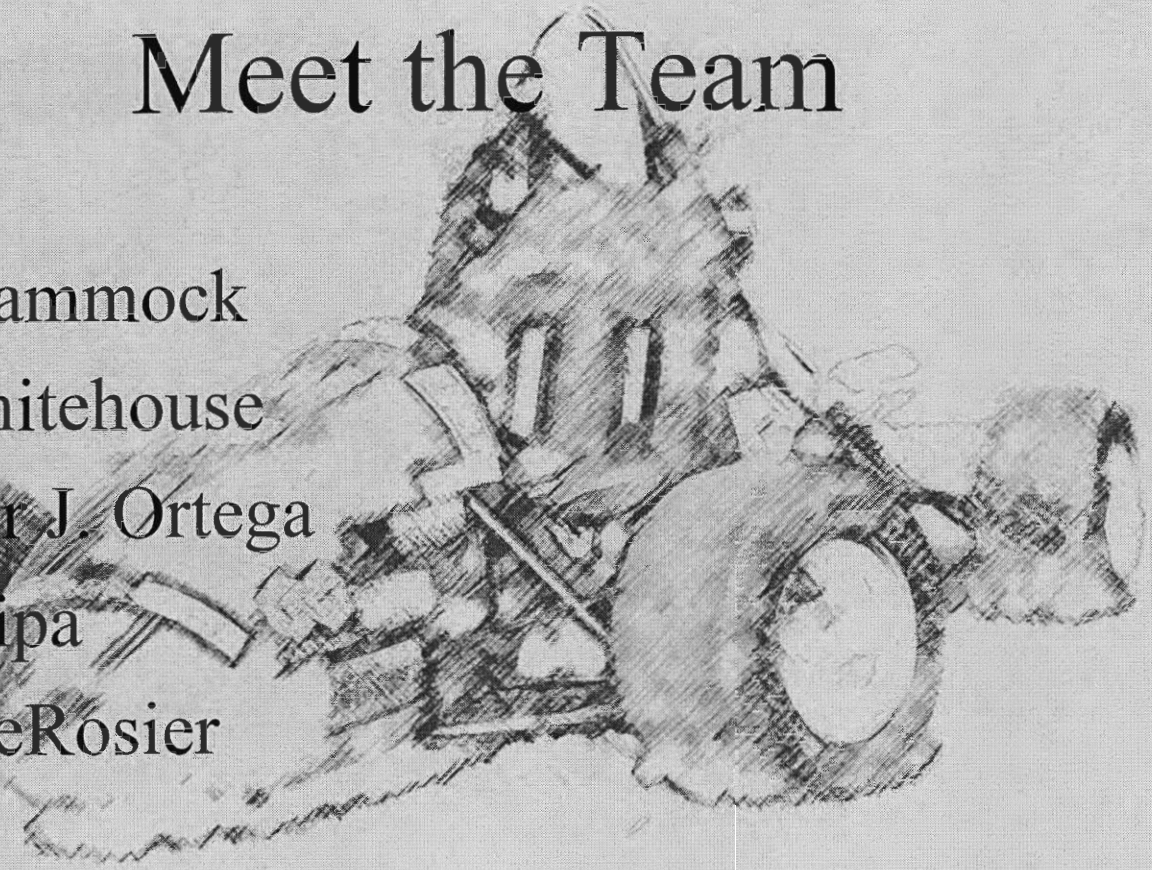


WPI

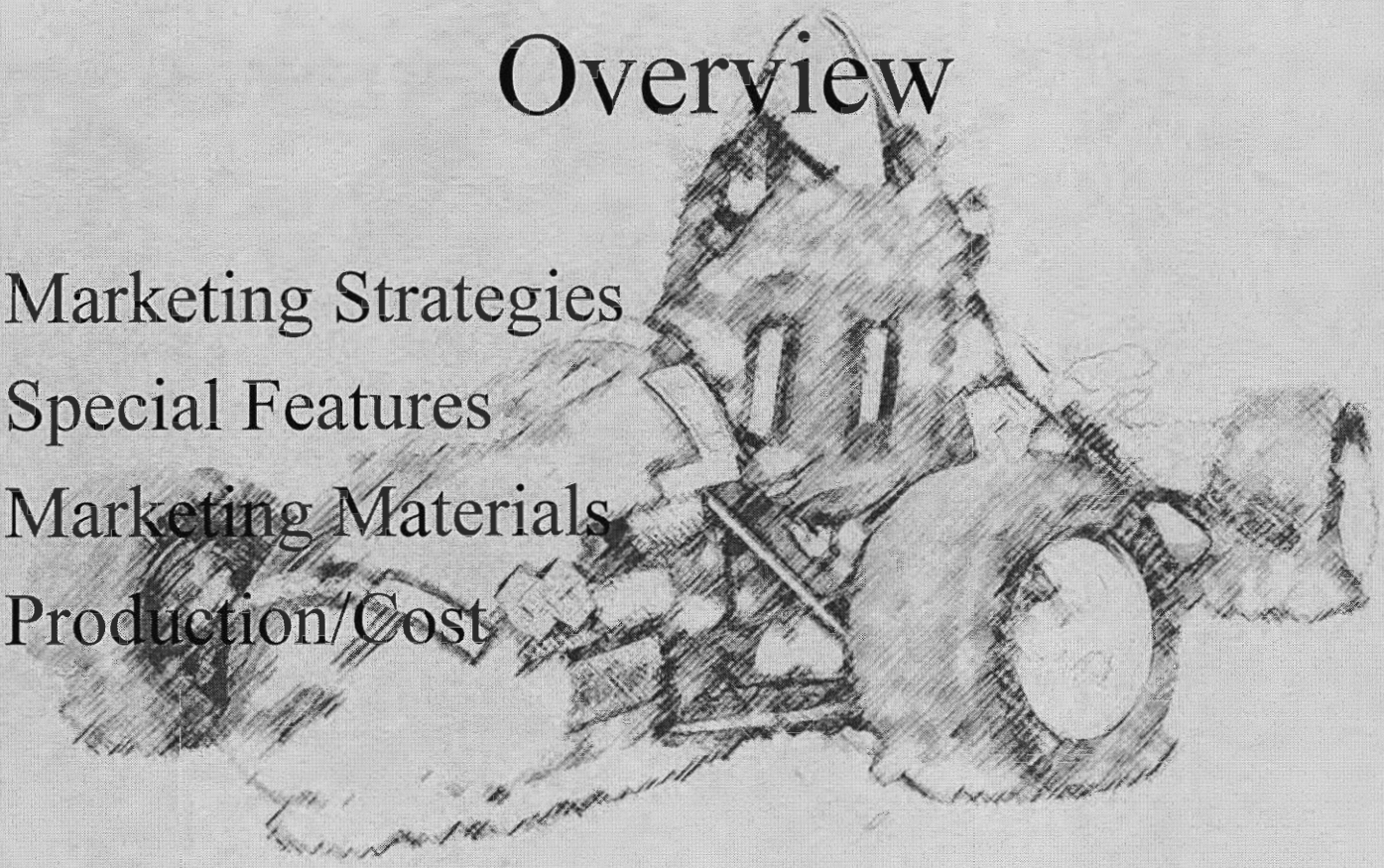
Motorsports

Meet the Team

- Chris Cammock
- Neil Whitehouse
- Schuyler J. Ortega
- Steve Tipa
- Chad DeRosier



Overview



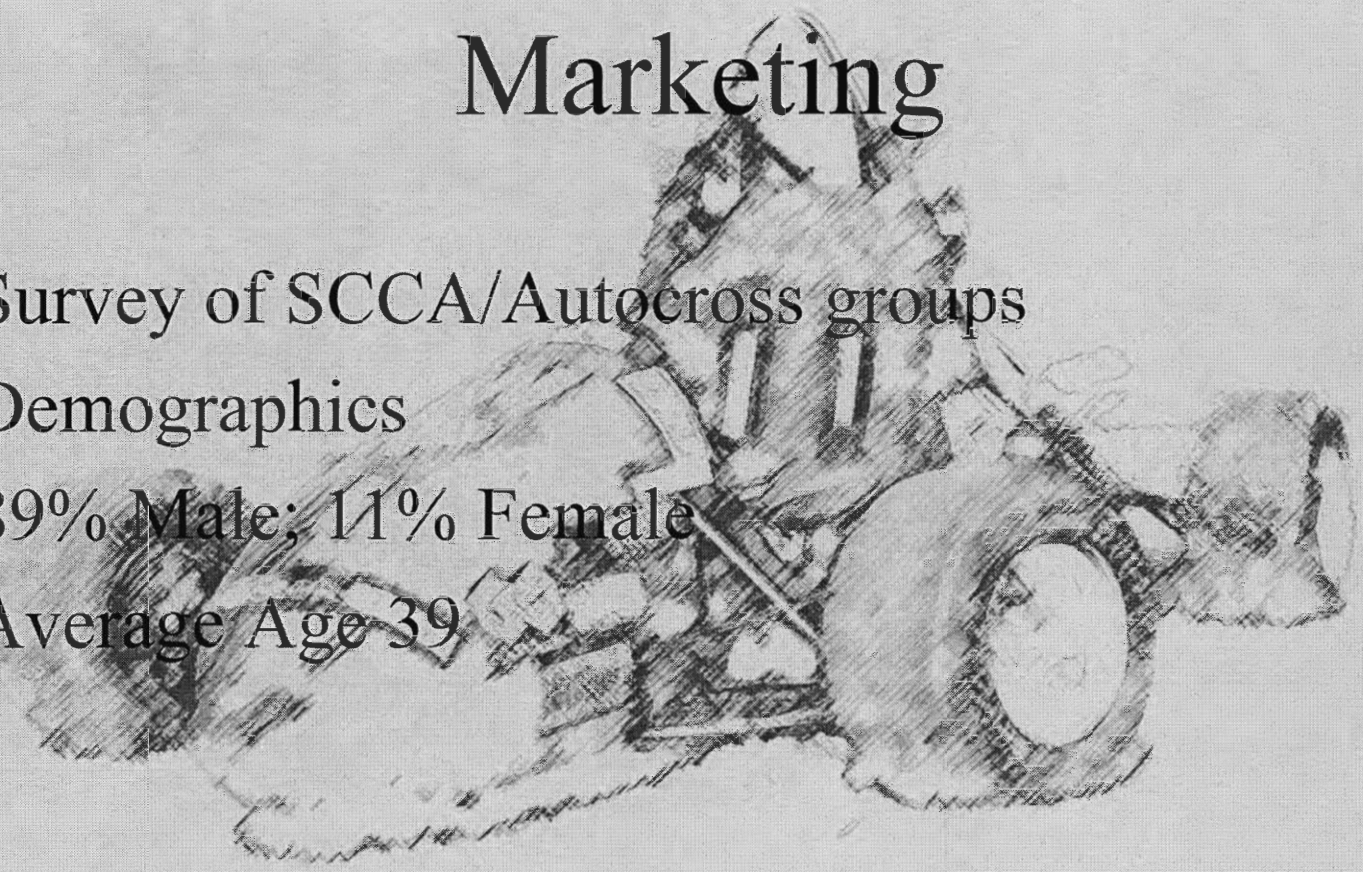
- Marketing Strategies
- Special Features
- Marketing Materials
- Production/Cost

Finding our target audience

- Who is our market
- 65,000 Current SCCA Members

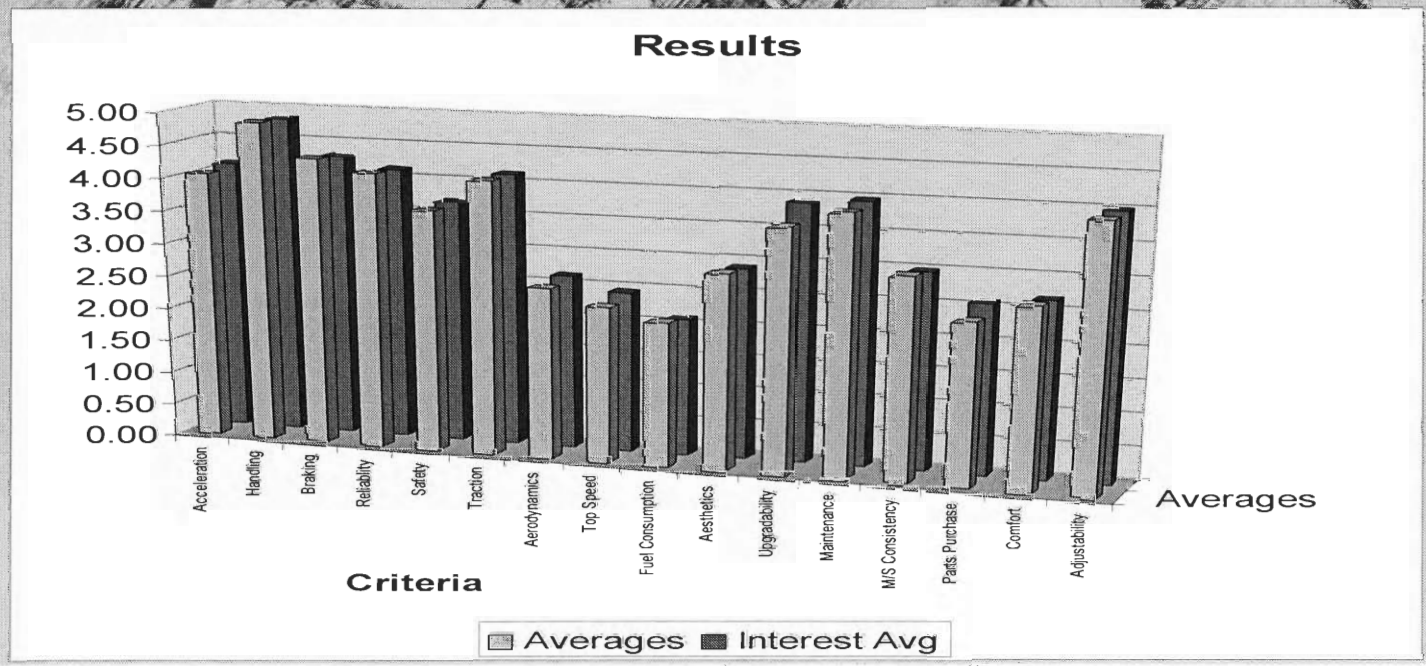
Marketing

- Survey of SCCA/Autocross groups
- Demographics
- 89% Male; 11% Female
- Average Age 39



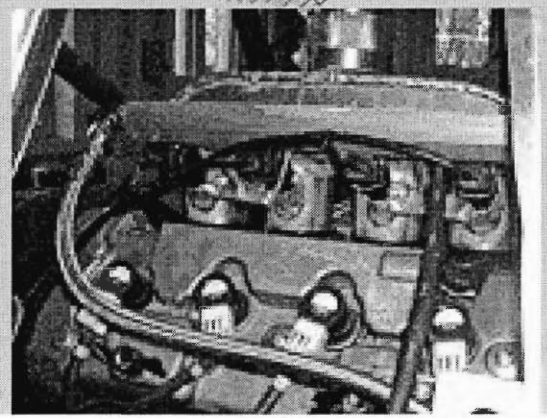
Marketing

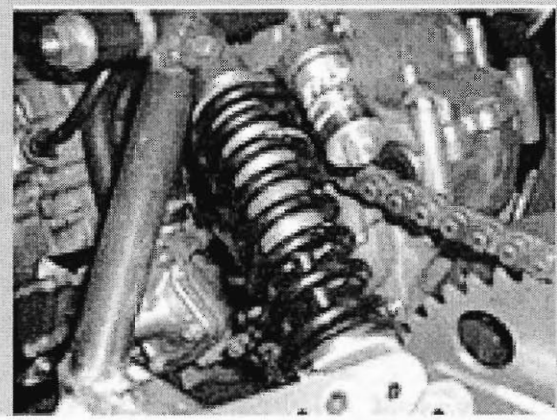
- Respondents rated important car attributes
- Preferences directed our marketing campaign



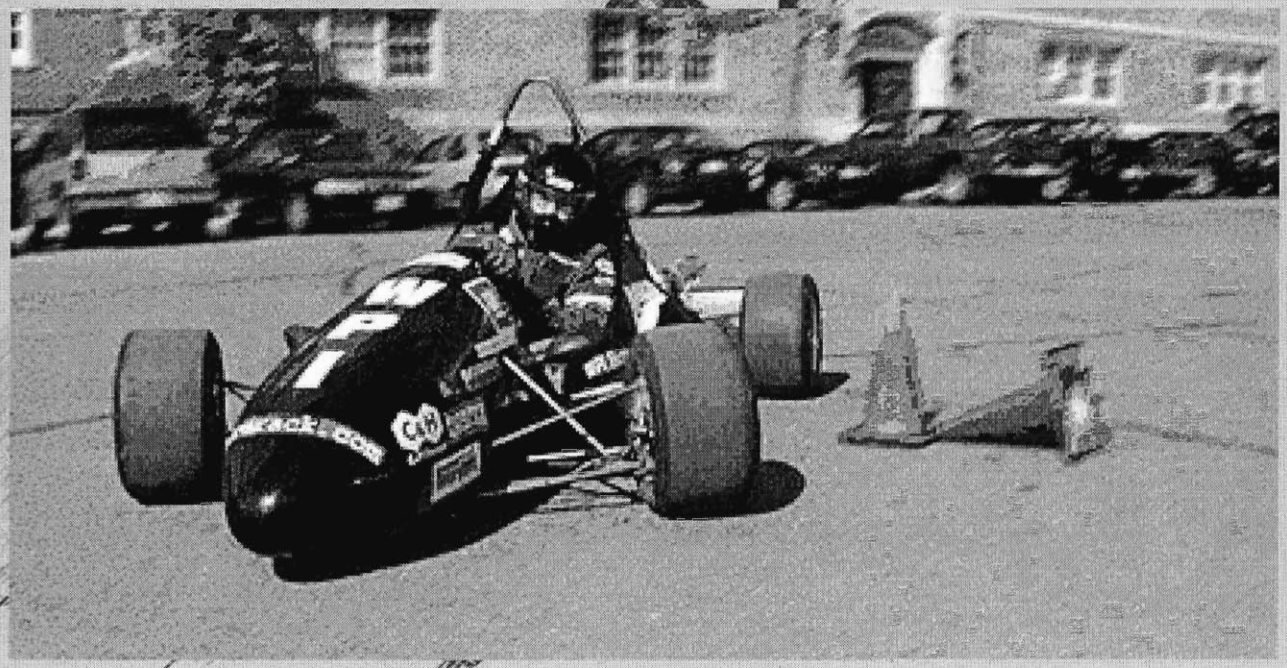
Vulcan Advancements

- Suspension
  - Adjustable Camber
- Engine
  - Ported, Polished, Three Angle Valve Job, Custom Fuel Injection System
- Aerodynamics
  - Diffuser, Front & Rear Wing
- Drivetrain
  - Differential





Car Specifications



Engine Type: Honda CBR F4 600cc

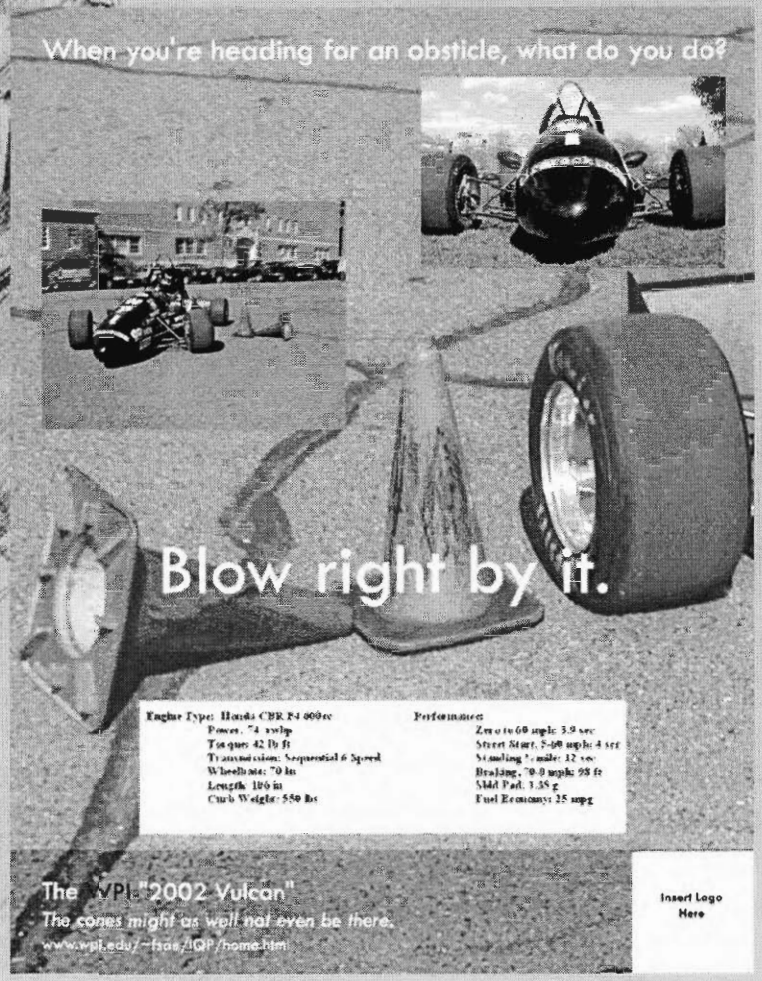
- Power: 74 rwhp
- Torque: 42 lb-ft
- Transmission: Sequential 6 Speed
- Wheelbase: 70 in
- Length: 106 in
- Curb Weight: 550 lbs

Performance:

- Zero to 60 mph: 3.9 sec
- Street Start, 5-60 mph: 4 sec
- Standing ¼ mile: 12 sec
- Braking, 70-0 mph: 98 ft
- Skid Pad: 1.38 g
- Fuel Economy: 25 mpg

Marketing

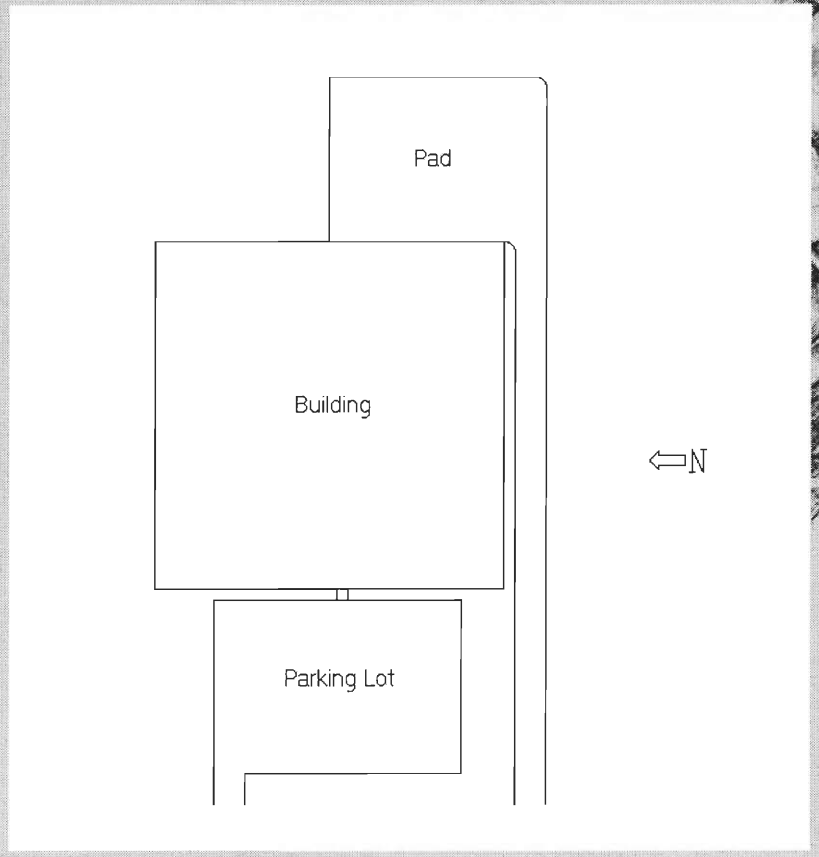
- Grassroots Motorsports
- Internet
- Magazine and Banner Ads

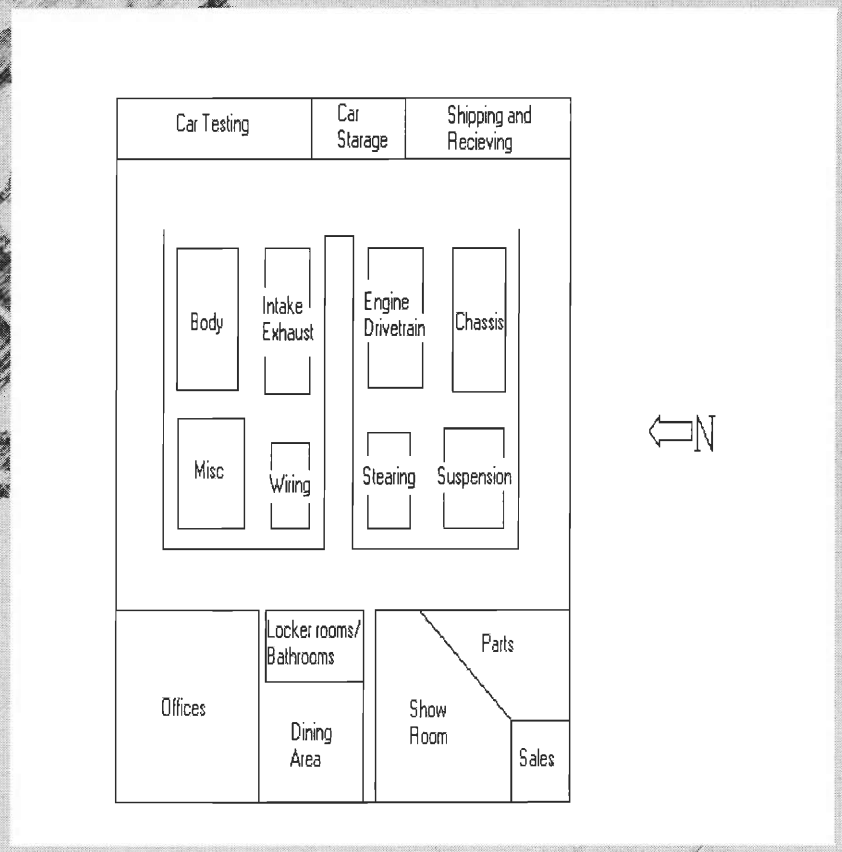


Marketing

- Magazine Ads
- Banner Ads
- Dealership Brochure

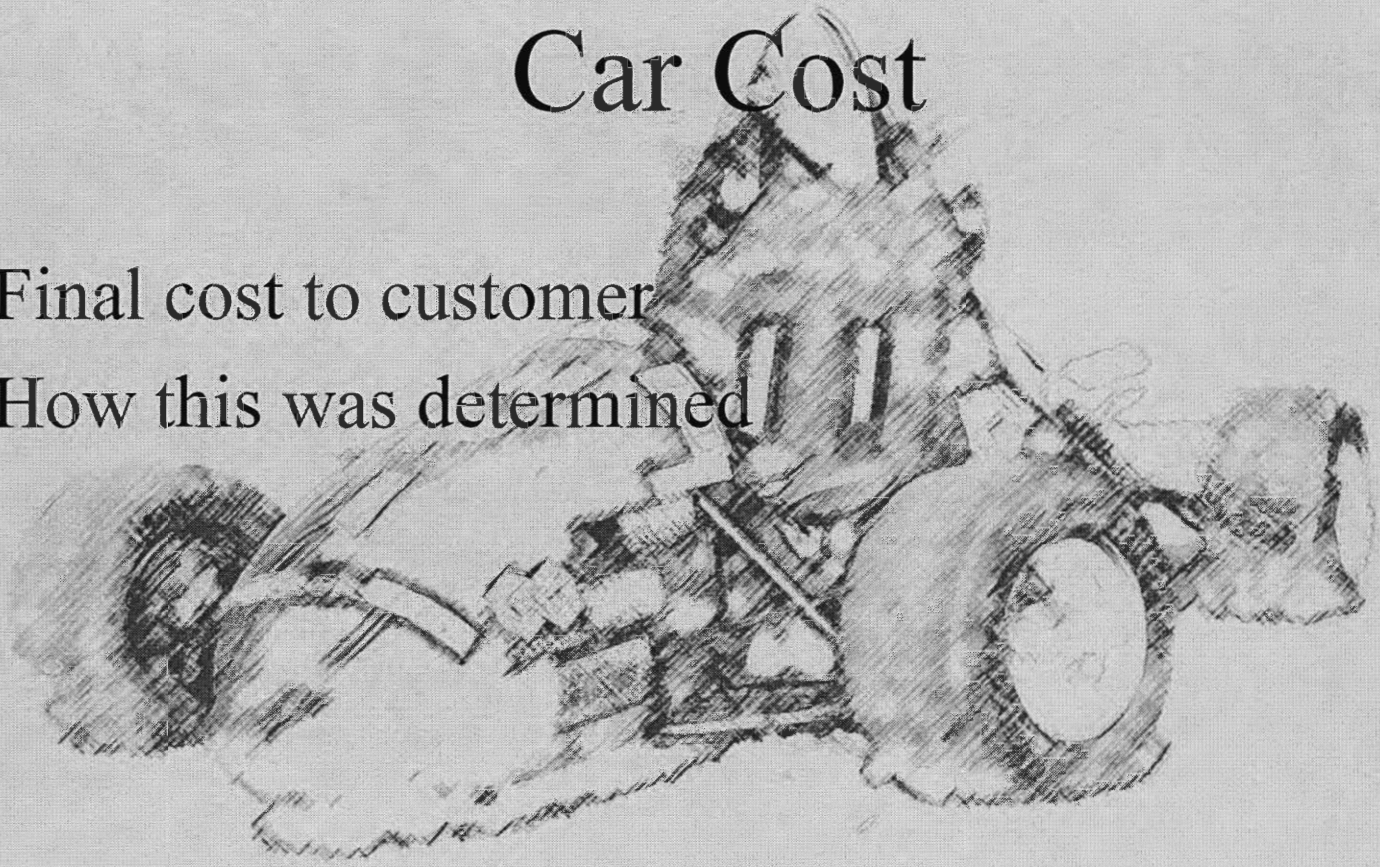
Production Cost Analysis





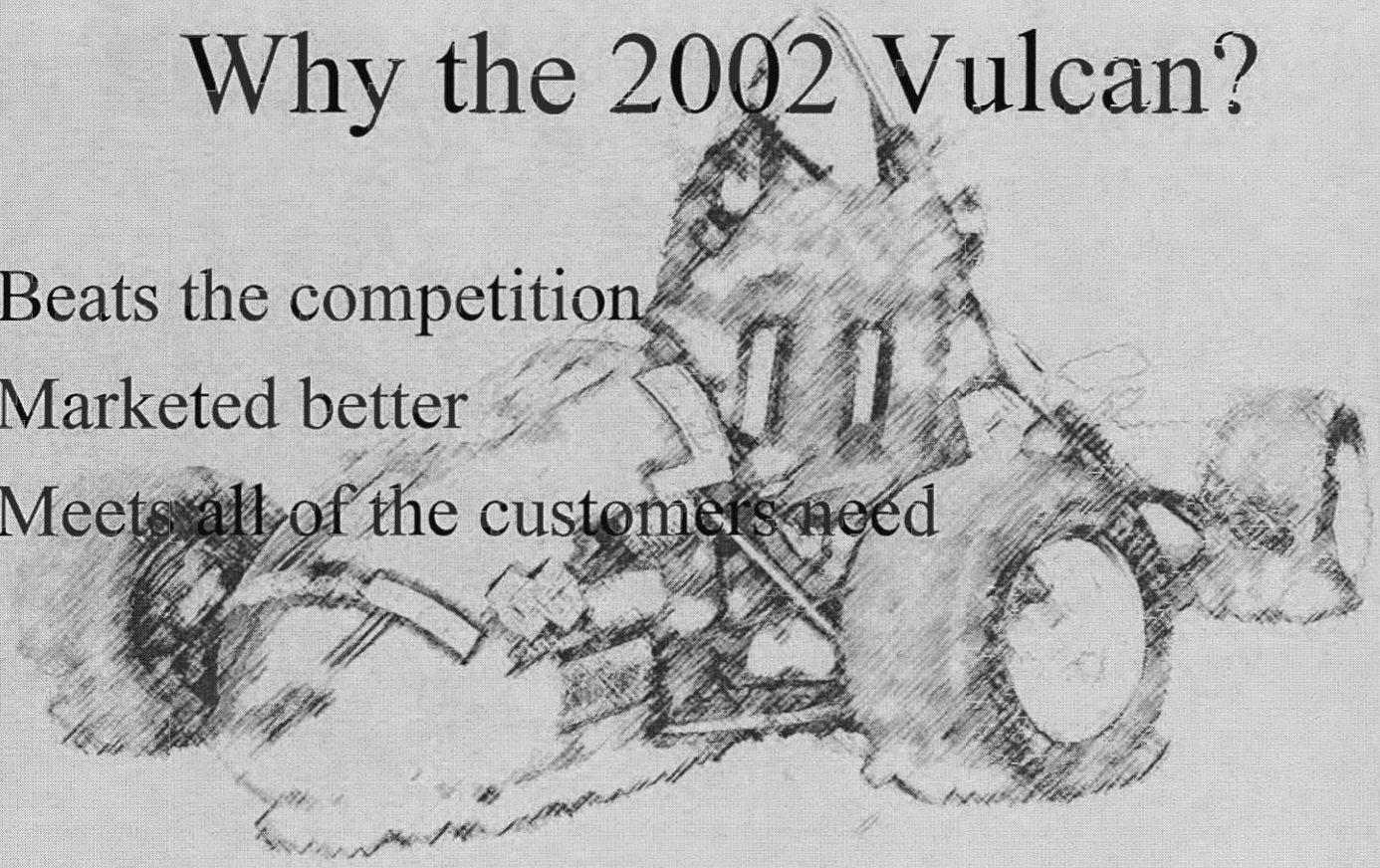
Car Cost

- Final cost to customer
- How this was determined



Why the 2002 Vulcan?

- Beats the competition
- Marketed better
- Meets all of the customers need



Any questions?

Appendix – 11

Cost Report Spread Sheet

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Brake System	Brake Discs	41	.250 4130 "N" Steel Sheet 12 x 17 (Rear Brake Rotor)	P	1.42	$32.00	$32.00	Each	The Dillsburg Aeroplane Works 717-432-4589	$45.44
Brake System	Calipers		Billet Dynalite Single	P	3	$81.85	$81.85	Each	PrecisionBrakesCompany.com 541-488-2604	$245.55
Brake System	Brake Lines		Braided Lines	P	3	$20.00	$20.00	Each	Mechanics BLISS Supply Company 508-753-8137	$60.00
Brake System	Brake Lines		Hard Lines	P	1	$10.00	$10.00	Each	Mechanics BLISS Supply Company 508-753-8137	$10.00
Brake System	Brake Fluid			P	1	$3.69	$4.49	Each	Honda Valkyrie Online Store 740-676-4722	$4.49
Brake System	Cylinder Assembly			M	1	$14.88	$14.88	Each	WPI	$14.88
Brake Sub Total										**$380.36**

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Engine & Drivetrain	Fuel Injection	2	Fuel Injection system 4F, 15K, 1 Bar MAP, fpr, rpm, cw, BL, L	P	1	$1,161.95	$1,161.95	Each	Racetech Inc. 403-274-0154	$1,161.95
Engine & Drivetrain	Fuel Injection	2	Fuel Injection mixture meter	P	1	$120.70	$120.70	Each	Racetech Inc. 403-274-0154	$120.70
Engine & Drivetrain	Gasket	4	12251-MBW-013 Gasket, Cyl Head	P	1	$48.99	$48.99	Each	Motorsports International 508-832-9494	$48.99
Engine & Drivetrain	Exhaust	8	Exhaust Collector	P	1	$21.35	$21.35	Each	Headers by "Ed", Inc. 612-729-2802	$21.35
Engine & Drivetrain	Sprocket	11	592X	P	1	$34.99	$34.99	Each	Sprocket Specialists 530-533-0802	$34.99
Engine & Drivetrain	Sprocket	11	X520	P	1	$37.99	$37.99	Each	Sprocket Specialists 530-533-0802	$37.99
Engine & Drivetrain	CV Joints	26	INV-02002081 Housing	P	4	$135.00	$135.00	Each	Taylor Race Engineering, Inc. 972-422-0567	$540.00
Engine & Drivetrain	CV Joints	26	INV-02002011 Tripod	P	4	$40.00	$40.00	Each	Taylor Race Engineering, Inc. 972-422-0567	$160.00
Engine & Drivetrain	CV Joints	26	INV-02002071 Boot	P	2	$22.50	$22.50	Each	Taylor Race Engineering, Inc. 972-422-0567	$45.00
Engine & Drivetrain	Intake	30	Alum Extruded Round Tube 2.5 0.75 96.0 (Intake Runners)	P	1	$123.00	$123.00	Each	Yarde Metals Inc 860-589-2386	$123.00

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Engine & Drivetrain	Differential	31	6061-T6511-TB Alum Extruded Round Tube 5.0 0.75 12.0 (Diff. Cover)	P	1	$98.00	$98.00	Each	Yarde Metals Inc 860-589-2386	$98.00
Engine & Drivetrain	Axles	32	Carbon 4340 Rough Turned Round 1.125" x 72.0" (Rear Axle)	P	1	$47.19	$47.19	Each	OnlineMetals.com 800-704-2157	$47.19
Engine & Drivetrain	Differential Bearings	33	R24-2RS	P	3	$18.85	$18.85	Each	Bradford Industries 508-799-2551	$56.55
Engine & Drivetrain	Exhaust	34	Exhaust Wrap 1x50	P	1	$24.95	$24.95	Each	Summit Racing Equipment	$24.95
Engine & Drivetrain	Fuel Tank	36	Fuel tank cap	P	1	$24.95	$24.95	Each	Chassis Shop 231-873-3640	$24.95
Engine & Drivetrain	Muffler	39	311-20019 2"IDS2 Supertrapp Muffler	P	1	$140.00	$140.00	Each	Seacoast Sport Cycle, Inc. 603-870-9133	$140.00
Engine & Drivetrain	Gasket	42	12251-MBW-013 Gasket, Cyl Head	P	1	$48.99	$48.99	Each	Motorsports International 508-832-9494	$48.99
Engine & Drivetrain	Gasket	42	12391-MBW-000 Gasket, Head Cover	P	1	$29.99	$29.99	Each	Motorsports International 508-832-9494	$29.99
Engine & Drivetrain	Gasket	42	11392-MBW-000 Gasket	P	2	$6.99	$6.99	Each	Motorsports International 508-832-9494	$13.98
Engine & Drivetrain	Gasket	42	14523-MAL-A00 Gasket	P	1	$1.99	$1.99	Each	Motorsports International 508-832-9494	$1.99

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Engine & Drivetrain	Gasket	42	19312-MBW-000 Gasket	P	1	$2.99	$2.99	Each	Motorsports International 508-832-9494	$2.99
Engine & Drivetrain	Gasket	42	18291-MV9-000 Gasket, Ex. Pip	P	8	$3.50	$3.50	Each	Motorsports International 508-832-9494	$28.00
Engine & Drivetrain	Chain	44	RK-520SMO-B4	P	1	$55.12	$68.90	Each	Performance Cycles 508-842-1068	$68.90
Engine & Drivetrain	Fuel Injector	51	Injector bosses, weld or epoxy, set of 8	P	1	$54.00	$60.00	Each	Force Fuel Injection, Inc. 305-235-6160	$60.00
Engine & Drivetrain	Sprocket	52	X520	P	1	$37.99	$37.99	Each	Sprocket Specialists 530-533-0802	$37.99
Engine & Drivetrain	Hose Clamps	55	#268441	P	1	$1.69	$1.69	Each	AutoZone 508-799-7222	$1.69
Engine & Drivetrain	Radiator	58	Special Make Radiator	P	1	$225.00	$225.00	Each	Mills Radiator Service, Inc. 508-798-9038	$225.00
Engine & Drivetrain	Fuel Rail	60	Fuel Rail	P	1	$29.50	$29.50	Each	Force Fuel Injection, Inc. 305-235-6160	$29.50
Engine & Drivetrain	Fuel System	62	3/8"MJ x 3/8" MP Straight	P	1	$1.41	$1.41	Each	Mechanics BLISS Supply Company 508-753-8137	$1.41
Engine & Drivetrain	Fuel System	62	3/8"MJ x 1/4" MP Elbow 90	P	1	$2.64	$2.64	Each	Mechanics BLISS Supply Company 508-753-8137	$2.64

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Engine & Drivetrain	Fuel System	62	3/8" Teflon S.S. Braided Hose	P	2	$3.75	$3.75	Feet	Mechanics BLISS Supply Company 508-753-8137	$7.50
Engine & Drivetrain	Fuel System	62	-06 Teflon Hose x 3/8" FJS	P	2	$5.84	$5.84	Each	Mechanics BLISS Supply Company 508-753-8137	$11.68
Engine & Drivetrain	Fuel System	62	Labor to assemble hose	P	1	$10.00	$10.00	Total	Mechanics BLISS Supply Company 508-753-8137	$10.00
Engine & Drivetrain	Fuel System	62	Thread Sealant w/ Teflon brush bottle 1pt	P	1	$9.36	$9.36	Pint	Mechanics BLISS Supply Company 508-753-8137	$9.36
Engine & Drivetrain	Fuel System	62	10" show handle wire brush model WB-416	P	1	$1.50	$1.50	Each	Mechanics BLISS Supply Company 508-753-8137	$1.50
Engine & Drivetrain	Fuel System	62	3/8" Acid Brush	P	10	$0.27	$0.27	Each	Mechanics BLISS Supply Company 508-753-8137	$2.70
Engine & Drivetrain	Fuel System	62	SG-100 Safe-T-Grit 6" x 24"	P	2	$3.28	$3.28	Each	Mechanics BLISS Supply Company 508-753-8137	$6.56
Engine & Drivetrain	Fuel Pump	67	Fuel Pump	P	1	$97.99	$97.99	Each	AutoZone 508-799-7222	$97.99
Engine & Drivetrain	Fuel Injector	67	Fuel Injector	P	1	$39.99	$39.99	Each	AutoZone 508-799-7222	$39.99
Engine & Drivetrain	Fuel Filter	67	Fuel Filter	P	1	$3.79	$3.79	Each	AutoZone 508-799-7222	$3.79

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Engine & Drivetrain	Fuel Line	74	ST-6 x 1/4 Adapter	P	2	$3.00	$3.00	Each	Baker Precision Bearings 562-427-2375	$6.00
Engine & Drivetrain	Fuel Line	74	ST -6 to 1/8 N	P	4	$3.05	$3.05	Each	Baker Precision Bearings 562-427-2375	$12.20
Engine & Drivetrain	Fuel Line	74	-6 90 Degree -	P	2	$6.56	$6.56	Each	Baker Precision Bearings 562-427-2375	$13.12
Engine & Drivetrain	Fuel Line	74	90 Degree-4 to	P	2	$14.63	$14.63	Each	Baker Precision Bearings 562-427-2375	$29.26
Engine & Drivetrain	Fuel Line	74	90 Degree 3/8	P	1	$14.63	$14.63	Each	Baker Precision Bearings 562-427-2375	$14.63
Engine & Drivetrain	Fuel Line	74	1/4 x 1/8 NPT	P	1	$2.90	$2.90	Each	Baker Precision Bearings 562-427-2375	$2.90
Engine & Drivetrain	Fuel Line	74	-6 An Cap (FBM	P	6	$1.45	$1.45	Each	Baker Precision Bearings 562-427-2375	$8.70
Engine & Drivetrain	ECM/Engine Electronics		Electronic Engine Management System	P	1	$1,000.00	$1,000.00	Each	Racetech Inc. 403-274-0154	$1,000.00
Engine & Drivetrain	Engine		1999 Honda F4 Engine	P	600	$1.00	$1.00	CC	Argo Cycles, Inc 603-645-0010	$600.00
Engine & Drivetrain	Chain		ATV Chain Tensioner	P	1	$54.95	$54.95	Each	High Performance Designs, Inc. 763-389-3336	$54.95
Engine & Drivetrain	Radiator Fan			P	1	$68.00	$68.00	Each	Carparts.com 877-927-7427	$68.00
Engine & Drivetrain	Engine/Diff Oil			P	4			Quart		$0.00

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Engine & Drivetrain	Fasteners		1/4 20 x2" Hex Head	P	1			Box		$0.00
Engine & Drivetrain	Fasteners		1/4 20 x2" Button Head	P	1			Box		$0.00
Engine & Drivetrain	Fasteners		1/4 28 x1" Button Head	P	1			Box		$0.00
Engine & Drivetrain	Spark Plugs			P	1	$29.50	$29.50	Each	Motoworld 800-403-5953	$29.50
Engine & Drivetrain	Overflow Bottles		Nalgene Bottle	P	1	$7.00	$7.00	Each	EMS.com 888-463-6367	$7.00
Engine & Drivetrain	Fasteners		3/8 x 24 x 1 Button Head	P	6			Each	Briely Lombard 508-791-8111	$0.00
Engine & Drivetrain	Fasteners		5/16 x 24 x 1 Button Head	P	6			Each	Briely Lombard 508-791-8111	$0.00
Engine & Drivetrain	Fasteners		3/8 x 24 x 1.25 Button Head	P	2			Each	Briely Lombard 508-791-8111	$0.00
Engine & Drivetrain	Fasteners		5/16 x 18 x 2 Button Head	P	6			Each	Briely Lombard 508-791-8111	$0.00
Engine & Drivetrain	Fasteners		5/16 x 18 Locknuts	P	24			Each	Briely Lombard 508-791-8111	$0.00
Engine & Drivetrain	Fasteners		5/16 x 18 x 1.75 Button Head	P	6			Each	Briely Lombard 508-791-8111	$0.00
Engine & Drivetrain	Fasteners		1/4 x 28 x .75 Button Head	P	24			Each	Briely Lombard 508-791-8111	$0.00
Engine & Drivetrain	Fasteners		1/4 x 28 Locknuts	P	24			Each	Briely Lombard 508-791-8111	$0.00
Engine & Drivetrain	Gas Tank			M	1	$56.23	$56.23	Each	WPI	$56.23
Engine & Drivetrain	Drivetrain Manufac.			M	1	$157.56	$157.56	Each	WPI	$157.56
Engine & Drivetrain	Exhaust			M	1	$12.78	$12.78	Each	WPI	$12.78
Engine & Drivetrain	Intake			M	1	$43.75	$43.75	Each	WPI	$43.75

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Engine & Drivetrain Sub-Total										$5,546.33

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Frame & Body	Body Processing	7	7/16" 8' T	P	50	$1.25	$1.25	Each	Home Depot 508-721-2247	$62.50
Frame & Body	Body Processing	7	Wire Nails	P	3	$0.97	$0.97	Each	Home Depot 508-721-2247	$2.91
Frame & Body	Body Processing	7	2"SXSBALVA	P	1	$14.98	$14.98	Each	Home Depot 508-721-2247	$14.98
Frame & Body	Body Processing	7	ELCRWDGLUG	P	1	$12.97	$12.97	Each	Home Depot 508-721-2247	$12.97
Frame & Body	Body Processing	9	Laminating Resin	P	40	$2.65	$2.65	Pound	Hydroski International 401-490-5738	$106.00
Frame & Body	Body Processing	9	Spiral Wrap	P	1	$15.00	$15.00	Wrap	Hydroski International 401-490-5738	$15.00
Frame & Body	Body Processing	9	Aerosil 200	P	1	$6.50	$6.50	Each	Hydroski International 401-490-5738	$6.50
Frame & Body	Body Processing	9	Box of Brushes	P	1	$4.00	$4.00	Each	Hydroski International 401-490-5738	$4.00
Frame & Body	Body Processing	9	Wax	P	1	$7.00	$7.00	Can	Hydroski International 401-490-5738	$7.00
Frame & Body	Body Processing	9	Polybeam	P	12	$19.31	$19.31	Yard	Hydroski International 401-490-5738	$231.72
Frame & Body	Body Processing	9	Bag Tape	P	5	$3.00	$3.00	Roll	Hydroski International 401-490-5738	$15.00
Frame & Body	Aerodynamic Wing	15	2x2x8 TG R	P	4	$10.97	$10.97	Each	Home Depot 508-721-2247	$43.88
Frame & Body	Aerodynamic Wing	15	Poly Sheet	P	1	$8.97	$8.97	Each	Home Depot 508-721-2247	$8.97

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Frame & Body	Aerodynamic Wing	15	Sprv Adh	P	2	$8.67	$8.67	Each	Home Depot 508-721-2247	$17.34
Frame & Body	Aerodynamic Wing	15	RP1/2-200	P	1	$18.00	$18.00	Each	Home Depot 508-721-2247	$18.00
Frame & Body	Chrome-a-lite	27	FIB838	P	4	$12.85	$12.85	Gallon	FinishMaster, Inc. 508-752-5626	$51.40
Frame & Body	Body Processing	27	Chrome-a-Lite	P	4	$10.28	$12.85	Gallon	FinishMaster, Inc. 508-752-5626	$51.40
Frame & Body	Body Processing	27	2XL Paint Suit	P	1	$6.84	$8.55	Each	FinishMaster, Inc. 508-752-5626	$8.55
Frame & Body	Brake Pedal	34	WIL-340-1285	P	1	$95.95	$95.95	Each	Summit Racing Equipment	$95.95
Frame & Body	Body Processing	45	Hardener Fiber 912	P	4	$1.39	$1.39	Each	Advance Auto Parts 508-754-6844	$5.56
Frame & Body	Body Processing	45	3x21 50 gr	P	2	$4.97	$4.97	Each	Home Depot 508-721-2247	$9.94
Frame & Body	Body Processing	45	Liquid Hardener	P	1	$1.39	$1.39	Each	AutoZone 508-799-7222	$1.39
Frame & Body	Body Processing	45	Spreader	P	1	$1.79	$1.79	Each	AutoZone 508-799-7222	$1.79
Frame & Body	Body Processing	46	Liquid Hardener	P	1	$1.97	$2.46	Each	FinishMaster, Inc. 508-752-5626	$2.46
Frame & Body	Body Processing	46	Icing Finish Putty	P	1	$17.18	$21.48	Tube	FinishMaster, Inc. 508-752-5626	$21.48
Frame & Body	Body Processing	46	Crystal Bay, 80D Stikit 6"	P	1	$23.41	$29.26	Roll	FinishMaster, Inc. 508-752-5626	$29.26

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Frame & Body	Body Processing	46	Crystal Bay, 180 Stikit 6"	P	1	$20.10	$25.12	Roll	FinishMaster, Inc. 508-752-5626	$25.12
Frame & Body	Body Processing	47	Lacquer Thinner	P	1	$7.75	$9.69	Gallon	FinishMaster, Inc. 508-752-5626	$9.69
Frame & Body	Body Processing	72	Chrome-a-Lite	P	4	$9.95	$12.44	Gallon	FinishMaster, Inc. 508-752-5626	$49.76
Frame & Body	Body Processing	72	Panel Adhesive	P	1	$14.14	$17.68	Each	FinishMaster, Inc. 508-752-5626	$17.68
Frame & Body	Body Processing	72	Cartridge Gun	P	1	$39.95	$49.94	Each	FinishMaster, Inc. 508-752-5626	$49.94
Frame & Body	Body Processing	75	Chrome-a-Lite	P	2	$12.85	$16.06	Gallon	FinishMaster, Inc. 508-752-5626	$32.12
Frame & Body	Body Processing	75	Liquid Hardener	P	4	$2.46	$3.08	Each	FinishMaster, Inc. 508-752-5626	$12.32
Frame & Body	Body Processing	75	Poly Pail 2 1/2 Quart	P	4	$0.69	$0.86	Each	FinishMaster, Inc. 508-752-5626	$3.44
Frame & Body	Body Processing	76	Resin	P	3	$106.00	$106.00	Each	Verdant Technologies	$318.00
Frame & Body	Throttle Controls		Bicycle Brake Cable	P					Fritz's Bike Shop	$0.00
Frame & Body	Shifter Cable		B&M Cable	P	1	$31.95	$31.95	Each	Summit Racing Equipment	$31.95
Frame & Body	Pedal Assem.			M	1	$73.81	$73.81	Each	WPI	$73.81
Frame & Body	Side Panels			M	1	$60.07	$60.07	Each	WPI	$60.07

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Frame & Body	Chassis			M	1	$241.56	$241.56	Each	WPI	$241.56
Frame & Body	Body Manufac.			M	1	$3,500.00	$3,500.00	Each	WPI	$3,500.00
Frame & Body Sub-Total										**$5,271.41**

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Instruments, Wiring and Accessories	Switches	54	Switches, etc.	P	1	$34.65	$34.65	Total	Rayco Car Electronics 508-757-8388	$34.65
Instruments, Wiring and Accessories	Fuses	55	#015392	P	1	$2.49	$2.49	Each	AutoZone 508-799-7222	$2.49
Instruments, Wiring and Accessories	Fuses	55	#015395	P	1	$2.49	$2.49	Each	AutoZone 508-799-7222	$2.49
Instruments, Wiring and Accessories	Wire	55	#163451	P	1	$2.49	$2.49	Each	AutoZone 508-799-7222	$2.49
Instruments, Wiring and Accessories	Connectors	55	#296731	P	1	$1.99	$1.99	Each	AutoZone 508-799-7222	$1.99
Instruments, Wiring and Accessories	Connectors	55	#296863	P	1	$1.99	$1.99	Each	AutoZone 508-799-7222	$1.99
Instruments, Wiring and Accessories	Switches	55	#047123	P	1	$2.99	$2.99	Each	AutoZone 508-799-7222	$2.99
Instruments, Wiring and Accessories	Connectors	55	#296863	P	1	$1.99	$1.99	Each	AutoZone 508-799-7222	$1.99
Instruments, Wiring and Accessories	Switches	55	#325943	P	1	$3.99	$3.99	Each	AutoZone 508-799-7222	$3.99
Instruments, Wiring and Accessories	Connectors	55	#296863	P	1	$1.99	$1.99	Each	AutoZone 508-799-7222	$1.99
Instruments, Wiring and Accessories	Connectors	55	#296772	P	1	$1.99	$1.99	Each	AutoZone 508-799-7222	$1.99

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Instruments, Wiring and Accessories	Wire	55	#163444	P	1	$2.49	$2.49	Each	AutoZone 508-799-7222	$2.49
Instruments, Wiring and Accessories	Connectors	55	#095939	P	1	$4.79	$4.79	Each	AutoZone 508-799-7222	$4.79
Instruments, Wiring and Accessories	Heat Shrink Tube	56		P	6	$2.00	$2.00	Feet	WPI EE Dept	$12.00
Instruments, Wiring and Accessories	Switches	59	Glow Rocker Blue	P	1	$3.89	$3.89	Each	Advance Auto Parts 508-754-6844	$3.89
Instruments, Wiring and Accessories	Indicator Lights	59	Panel Light Red	P	1	$2.79	$2.79	Each	Advance Auto Parts 508-754-6844	$2.79
Instruments, Wiring and Accessories	Switches	59	Glow Rocker Amber	P	1	$3.99	$3.99	Each	Advance Auto Parts 508-754-6844	$3.99
Instruments, Wiring and Accessories	Switches	59	Switch On-Off	P	1	$4.49	$4.49	Each	Advance Auto Parts 508-754-6844	$4.49
Instruments, Wiring and Accessories	Battery	65		P	1	$61.90	$61.90	Each	MK Battery Inc.	$61.90
Instruments, Wiring and Accessories	Electrical connector	67	MTM 8598 SWITCH	P	1	$3.74	$3.74	Each	C.A.P. 508-798-1831	$3.74
Instruments, Wiring and Accessories	Electrical connector	67	MTM 85941 SWITCH	P	1	$3.74	$3.74	Each	C.A.P. 508-798-1831	$3.74
Instruments, Wiring and Accessories	Brake Light Bulb			P	1			Each	AutoZone 508-799-7222	$0.00

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Instruments, Wiring and Accessories Sub-Total										$162.87

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Miscellaneous, Safety, Finish and Assembly	Seats		Carpet	P	1	$8.99	$8.99	Each	AutoZone 508-799-7222	$8.99
Miscellaneous, Safety, Finish and Assembly	Paint - Frame		Krylon	P	4			Can	AutoZone 508-799-7222	$0.00
Miscellaneous, Safety, Finish and Assembly	Brake Light - Housing			P	1			Each	AutoZone 508-799-7222	$0.00
Miscellaneous, Safety, Finish and Assembly	Mirrors			P	2	$12.00	$12.00	Each	Fritz's Bike Shop	$24.00
Miscellaneous, Safety, Finish and Assembly	Safety Harness		5 point harness item #trwc5500	P	1	$109.95	$109.95	Each	Racer Wholesale	$109.95
Miscellaneous, Safety, Finish and Assembly Sub-Total										**$142.94**

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Steering System	Steering Rack	16	1410 Rack & Pinion, STD Vert	P	1	$83.48	$83.48	Each	Amundsen Research Corp 229-435-2647	$83.48
Steering System	Steering Wheel		Item 3406	P	1	$124.00	$124.00	Each	Pegasus	$124.00
Steering System	Steering Wheel Quick Release		mst-12434	P	1	$36.90	$36.90	Each	Race Central	$36.90
Steering System	Steering Rack Mount			M	1	$36.70	$36.70	Each	WPI	$36.70
Steering System	Steering Bearing Holder			M	1	$44.02	$44.02	Each	WPI	$44.02
Steering System Sub-Total										**$325.10**

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Suspension and Shocks	Uprights	22	7075-T7351-PL Alum Heat Treatable Plate 2.0 8.15 48.9	P	1	$246.00	$246.00	Each	Yarde Metals Inc 860-589-2386	$246.00
Suspension and Shocks	Uprights	22	7075-T651-FL Alum Cold Finish Rect Bar 3.0 4.0 24.75	P	1	$95.00	$95.00	Each	Yarde Metals Inc 860-589-2386	$95.00
Suspension and Shocks	Uprights	22	7075-T6511-Rd Aluminum Extruded Round 4.25 5.0	P	1	$35.00	$35.00	Each	Yarde Metals Inc 860-589-2386	$35.00
Suspension and Shocks	A/Arms	36	C73-812 Tube Adpt 1/4-28 RH 1/2x058 (rod ends)	P	8	$4.50	$4.50	Each	Chassis Shop 231-873-3640	$36.00
Suspension and Shocks	A/Arms	40	1/2 x .035 4130 "N" Tubing	P	12	$1.57	$1.57	Feet	The Dillsburg Aeroplane Works 717-432-4589	$18.84
Suspension and Shocks	Uprights	48	Bearings	P	1	$4.99	$4.99	Each	Applied Ind Tech 508-831-5000	$4.99
Suspension and Shocks	Uprights	49	Packaged retaining rings	P	1	$4.99	$4.99	Each	Applied Ind Tech 508-831-5000	$4.99
Suspension and Shocks	A/Arms	50	Rod Ends	P	1	$121.41	$121.41	Total	Alinabal, Inc. 203-877-3241	$121.41
Suspension and Shocks	Material	70	3/4 x .065 4130 "N" Tubing	P	24	$1.84	$1.84	Feet	The Dillsburg Aeroplane Works 717-432-4589	$44.16
Suspension and Shocks	Material	70	1/2 x .065 4130 "N" Tubing	P	18	$1.76	$1.76	Feet	The Dillsburg Aeroplane Works 717-432-4589	$31.68
Suspension and Shocks	A/Arms	70	3/4 x .065 4130 "N" Tubing	P	24	$1.84	$1.84	Feet	The Dillsburg Aeroplane Works 717-432-4589	$44.16

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Suspension and Shocks	A/Arms	70	1/2 x .065 4130 "N" Tubing	P	18	$1.76	$1.76	Feet	The Dillsburg Aeroplane Works 717-432-4589	$31.68
Suspension and Shocks	Fasteners		1/4 20 x1.75" Hex Head	P	1			Box		$0.00
Suspension and Shocks	Shocks		Fox Vanilla RC	P	4	$324.99	$324.99	Each	UniversalCycles.com 800-936-5156	$1,299.96
Suspension and Shocks	Uprights			M	1	$594.43	$594.43	Each	WPI	$594.43
Suspension and Shocks	Pullrods			M	1	$46.79	$46.79	Each	WPI	$46.79
Suspension and Shocks	Pushrods			M	1	$46.75	$46.75	Each	WPI	$46.75
Suspension and Shocks	Front Bellcranks			M	1	$80.13	$80.13	Each	WPI	$80.13
Suspension and Shocks	Rear Bellcranks			M	1	$86.36	$86.36	Each	WPI	$86.36
Suspension and Shocks	A/Arms and Pickups			M	1	$217.01	$217.01	Each	WPI	$217.01
Suspension and Shocks Sub-Total										**$3,085.34**

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Wheels, Wheel Bearings and Tires	Hub	13	20-1340	P	1	$109.95	$109.95	Each	Ronnie's Mail Order 800-253-7667	$109.95
Wheels, Wheel Bearings and Tires	Hubs	18	81050	P	1	$30.00	$32.99	Each		$32.99
Wheels, Wheel Bearings and Tires	Hubs	18	3166HG	P	1	$25.00	$25.00	Each		$25.00
Wheels, Wheel Bearings and Tires	Hubs	23	7075-T651-RD Aluminum C.F. Round Bar 6.0 13.0	P	1	$168.00	$168.00	Each	Yarde Metals Inc 860-589-2386	$168.00
Wheels, Wheel Bearings and Tires	Hubs	25	7075-T651-PL Alum Heat Treatable Plate 0.25 7.0 14.0	P	4	$30.00	$30.00	Each	Yarde Metals Inc 860-589-2386	$120.00
Wheels, Wheel Bearings and Tires	Hubs	25	7075-T651-RD Aluminum C.F. Round Bar 4.0 12.0	P	1	$96.00	$96.00	Each	Yarde Metals Inc 860-589-2386	$96.00
Wheels, Wheel Bearings and Tires	Hubs	28	7075-T651-RD 6.0 12.0	P	1	$160.00	$160.00	Each	Yarde Metals Inc 860-589-2386	$160.00
Wheels, Wheel Bearings and Tires	Tires	53	43-105R25A 18.0x 7.5-10 R25A	P	4	$103.20	$103.20	Each	Hoosier Racing Tire Corp. 574-784 3152	$412.80
Wheels, Wheel Bearings and Tires	Wheels	78	10" x 8" Lightning Wheels	P	4	$76.00	$76.00	Each	Mid-Atlantic Motorsport 219-243-5553	$304.00
Wheels, Wheel Bearings and Tires	Wheel Nuts	83	Nut Wheel Clip	P	9	$3.99	$3.99	Each	Motorsports International 508-832-9494	$35.91

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Wheels, Wheel Bearings and Tires	Valve Stems			P	4	$11.95	$11.95	Each	Summit Racing Equipment	$47.80
Wheels, Wheel Bearings and Tires Sub-Total										**$1,512.45**

Area or Commodity	Part Name	Reciept #	Description / Model # or Part #	Purchased or Manufactured (P or M)	Quantity	What you paid	Retail Cost Each	Unit of Measure	Supplier's Name and Phone Number	Total Retail Cost
Assembly Cost				M	18		$35.00	Hours	WPI	$630.00
Grand Total of Vehicle										$17,056.80