



Queen's University
BAJA SAE®



**Queen's University Baja SAE Design Team
2009 Season Year End Report**



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The following report summarizes the team structure and performance for this past 2009 season. Included are team members, positions and duties as well as a summary of competitions and past seasons.

2009 Team Members: The following is a list of team members and contributions/duties within the team. All of the members are in Mechanical and Materials Engineering unless otherwise stated.

Name (graduating year)	2009 Position/Duties
Matthew Van Gorp (2009)	Team Manager, Steering, Chassis
Rob Andrews (2009)	Assistant Manager, Drivetrain, Chassis
Paul Yang (2009)	Logistics, Machinist, Suspension
David Adams (2010)	Lead Machinist, Steering
Bryn Elliott (2009)	Suspension, Fabrication
Brett Goemans (2011)	Pedal System, Throttle, Fabrication
Andrew King (2009)	Fabrication
Tim Boushel (2009)	Suspension, Machinist
Parthiv Amin (2011, Chemical Engineering)	Manual Lathe, Fabrication
Eric Chan (2011)	Guards, Weld Testing
Colin Griffiths (2011)	Seat
Alex S. (2011)	Fabrication
Alex Pearson (2011)	Fabrication
Sam Roesch (2012)	Fabrication
Rob Lancefield (2012)	Fabrication, Guards
Daryoush Moezzi (2011, Economics)	Sponsorship

2010 Team Members: The following list comprises the senior members that will be leading the 2010 team. We are currently engaged in recruitment campaigns targeted at first years and second years, as well as setting up logistics for the 2010 season.

Name	2010 Position/Tentative Duties
David Adams (2010)	Team Manager, Lead Machinist, Gearbox
Rob Andrews (Graduate Studies)	Assistant Manager, Machinist
Bryn Elliot (Graduate Studies)	Assistant Manager, Fabrication, Frame
Brett Goemans (2011)	Machinist, Fabrication
Parthiv Amin (2011, ChemEng)	Machinist, Fabrication, Sponsorship
Daryoush Moezzi (2011, Econ)	Sponsorship



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2009 Season Overview:

Baja SAE Alabama 2009 (1st Competition)

As Alabama was the first competition of the season, the senior members had a dominant role (half of the team graduated in 2008). There were some unexpected minor issues, however, despite these setbacks/adjustments, the team had a strong finish placing 11th out of 88 teams.

Day One consisted of technical inspection of the vehicle and design review. The team passed the technical inspection with ease, having to make only three minor adjustments. Next was a 40 minute presentation of the car's design including topics ranging from suspension/steering/braking to innovation/craftsmanship/originality. The team placed 11th overall in design.

Day Two consisted of four short dynamic events, the first of which being acceleration where the team placed 19th. The second event was to test the vehicle's traction under load. The traction event consisted of towing a small truck while the Baja vehicle travelled over various sizes of stones, from boulders to gravel and sand. The team did not perform as expected, placing 67th. The team agrees that specifically tuning the transmission and suspension before the traction event could help improve results in the future; however, specifically designing the car for a traction event would limit its performance in all other areas of the competition, where the majority of the points are awarded. The team then progressed to the maneuverability event, in which the driver must navigate the car through a winding forested track. This was a strong event, as the team placed 7th. The first true test of the car's durability came in the suspension event, where the Baja needed to negotiate large obstacles such as drops, logs, rock beds, and stairs. Many other cars were damaged in this event, but the Queen's vehicle came through without a scratch, placing 21st. The team could have placed 7th if a time penalty was not assessed for hitting a track boundary marker.

The climax of the competition was the four hour endurance race on Day Three, which is a wheel-to-wheel race in which the teams need to complete as many laps of the track as possible. This is the greatest test of the car's durability and design performance. The endurance race is also the highest scored event, constituting 40% of the points. We are proud to say that the car was extremely fast while on the track. However, the team placed 25th because nearly half the race time was spent in the pits or waiting to be towed to the pits. The major issue was the durability of the drive-shafts, as one broke early in the race, requiring replacement. The change was completed promptly in less than 20 minutes, whereas in a more relaxed setting, the task would have taken well over an hour. The second problem that took away from race time was the failure of two stock components on our brand new engine. This was an easy fix; however the team had to wait 40 minutes to be towed off the course. For his first time acting as competition driver, David Adams performed admirably, and the team has great confidence in his mature and able driving



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skills. With this new competition experience, David should be able to lower his maneuverability and suspension course times, as well as handle larger obstacles on the endurance course with increasing ease and confidence.

Baja SAE Oregon 2009 (2nd Competition)

The second competition of the season was our greatest success this year. After traveling to Oregon, the team settled into the first day of events with ease. Technical inspection was passed without any issues discovered, and the team placed 8th in design and 11th in the sales presentation, out of a field of 65 teams, much to the delight of the team members.

The second day once again consisted of four short dynamic events: acceleration, maneuverability, hill climb and rock crawl. The day started off well with an 11th place finish in acceleration and a 14th place finish in maneuverability. Poor performances in the hill climb and rock crawl resulted from improper suspension settings and bad luck, placing 52nd in hill climb and 35th in rock crawl.

The endurance race greatly made up for the disappointment from the last two dynamic events. The car remained on the course for nearly the entire 4 hours, except for the failure of another driveshaft. However, the team was ready for such an event, and was able to swap in a new shaft assembly in a matter of minutes. The team was rewarded at the end of the race by having the car and driver instructed to proceed to the winner's circle, where the technical inspectors review key components of the top vehicles to ensure there was no breach of regulation. Queen's Baja placed 4th in the endurance race, which resulted in an excellent overall finish of 7th!

Baja SAE Wisconsin 2009 (3rd Competition)

The third and final competition started off with the design and technical inspection on the first day. Once again, the team performed a great presentation, placing 8th in design, out of a larger field of 100 teams. The rest of the day was spent waiting patiently in line for the technical inspection, and when the car was finally inspected a few minor issues were brought up. However, the team did not have enough time to correct these issues before the inspection closed for the day, resulting in the loss of 50 points.

First thing the following morning, the team arrived on site early to ensure their spot in the technical inspection recheck line, and was quickly approved to carry on. The team had to rush, as the day involved five dynamic events, as opposed to the usual four, and four of these events needed to be completed by midday. The team performed admirably in the acceleration run, with their fastest time yet, however ended up placing 20th. The next event was the sled-pull, and it seemed the team learned from its mistakes in the Alabama traction event, performing well compared to the other teams that went through this event early in the day. However, as the day continued, weather conditions improved and so did



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the sled-pull surface, resulting in better performances from later teams, leaving Queen's in 57th. The next event of the morning was the maneuverability course, in which the team placed 24th. Finally the team had enough time to perform a single run of the mud bog course before the morning events were closed. This event involved the car driving through a pit of mud that was almost as deep as the tires. As the car was moving through the mud, the team noticed that it was moving much slower than expected, and that there was a problem with the transmission. A critical internal component of the transmission failed due to overheating, and as a result, the car lost most of its power. However, a team from Venezuela lent their spare transmission parts to Queen's such that we could finish the competition. With the borrowed parts, the team proceeded to the suspension and traction event for the afternoon, and performed well, placing 26th.

The endurance race started well, and the car performed perfectly mechanically, yet human error in driving and pit-stop strategy resulted in the team being penalized for running out of fuel on the course. Much to the delight of the team there were absolutely no mechanical issues with the car during this race. This makes the team very optimistic for next year's races. In the end, the team placed 24th in the endurance race, and 29th overall. Sadly, the team did not finish in the top three for the season, missing out on the Mike Schmidt Iron Team Award.

Past Seasons:

The following is a summary of the Queen's University Baja Design Team's achievements in the past six competition seasons. For other years, please visit our website: www.queensbaja.com.

	Competition 1	Competition 2	Competition 3
2009	11 th in design 7 th in maneuverability 25 th in endurance 11th overall	11 th in acceleration 8 th in design 14 th in maneuverability 4 th in endurance 7th overall	8 th in design 20 th in acceleration 24 th in endurance 29th overall
2008	1 st in design 3 rd in maneuverability 2 nd in suspension 3 rd in endurance 1st overall	4 th in acceleration 8 th in maneuverability 13 th in endurance 12th overall	2 nd in suspension 3 rd in maneuverability 8 th in endurance 13th overall
2007	2 nd in design 8 th in acceleration 11 th in endurance 7th overall	5 th in design 12 th in acceleration 3 rd in endurance 8th overall	6 th in design 11 th in acceleration 12 th in endurance 8th overall
2006	3 rd in design 9 th in suspension	2 nd in design 11 th in hill climb	5 th in design 14 th in endurance



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	2nd in endurance 4th overall	2nd in endurance 3rd overall	14th overall
2005	7th in design 3rd in suspension 2nd in endurance 4th overall	2nd in rock crawl 1st in endurance 3rd overall	11th in acceleration 36th overall
2004	3rd in acceleration 3rd in suspension 10th in endurance 11th overall	5th in acceleration 4th in rock crawl 12th in endurance 16th overall	3rd in hill climb 5th in endurance 10th overall

The table below is a summary of our cumulative score from all three competitions. The top three teams each year each get a commemorative award called the Mike Schmidt Iron Team Award. Generally there are approximately 10-12 teams each season that are in contention for this award.

Year	Rank
2009	N/A
2008	1 st
2007	2 nd
2006	1 st
2005	N/A
2004	3 rd

For video footage, photographs and information about the team, please email minibaja@engsoc.queensu.ca.