

# Competition History

## 1981 – 2004

### 2005 **FORMULA SAE**

**Conceived initially as a road-racing counterpart to the established SAE Mini Baja®, the Formula SAE® event has grown by a factor of about 20 in terms of both cars and participants.**

**M**ost engineers over the age of say, forty, cannot recall anything like Formula SAE while they were in school. Early engineering design competitions were more or less simple on-campus events such as egg drops, for which the intent was to design the most damage-resistant box. Challenging? Sure. Interesting? Maybe, but not exactly enticing to a motorhead.

In the mid 1970s, several universities began hosting local student design competitions with off-road vehicles. At one of them, Fred Stratton, from the Briggs & Stratton Corporation (B&S), was a design judge. It was through him and his colleagues that the SAE/B&S connection was established. Bob Catterson, now retired from that firm, recalls that many B&S engineers were active within the SAE Milwaukee Section, particularly with student activities. With support from both the Milwaukee Section and B&S the first SAE Mini Baja® arose. Its success convinced SAE International to support this event at other locations throughout North America.

The SAE Mini Baja took its name from the famous Baja 1000 off-road race in Mexico. The first SAE Mini Baja competitions took place in 1976 and quickly became three annual regional competitions. These events established a standard format: a day of static events—design, cost, and presentation—followed by a day of individual performance events, and capped by an endurance event on the third and final day. The emphasis at Mini Baja is on chassis design, as each of the teams uses an identical 8-hp B&S engine that cannot be modified. At every competition, engineers from Briggs & Stratton have participated to ensure conformance to the rules.

Over the past twenty years, the SAE Mini Baja has been successful beyond anyone's expectations. Credit for the success can be shared by many people, but special thanks must be given to Briggs & Stratton—to date it has donated well over 1000 engines to the cause, plus countless hours of technical support at all of the events.



# Mini-Indy



▲ 1981 - University of Tulsa

## SAE Mini-Indy

In 1978, Kurt Marshek, then at the University of Houston (Texas), contacted the SAE Educational Relations Department to discuss a variant of Mini Baja. How about a similar competition for on-road racing vehicles? Both SAE and Briggs & Stratton were receptive to the idea, and planning for the 1979 SAE Mini-Indy began. Marshek recalls that one of the potential sites investigated was the Texas World Speedway. Ultimately the competition was held on the campus of the University of Houston. With the speed potential an unknown, the decision was made to use 5-hp B&S engines for all competitors. Thirteen schools entered, and eleven competed that first year—with the overall winner from the University of Texas at El Paso.

As many organizers have found, the work in building a car can be exceeded only by that to organize the event—and there were no takers after 1980. Having seen the potential of the event, Mike Best, Robert Edwards, and John Tellkamp, students at The University of Texas at Austin, approached Dr. Ron Matthews with an idea—how about another Mini-Indy, but with some changes? Make the rules more open; let it be as unlimited as possible. It was desired that this new competition would take the cars to the next level of engineering. The Baja competition was great for chassis design, but many students wanted to work on engines as well. The new rules would keep engine restrictions to a bare minimum. Any four-stroke engine was allowed for the first four years, with power limited by a 25.4 mm intake restriction.

With grass roots support from his students, Ron Matthews contacted the SAE Educational Relations Department and set the wheels in motion. To differentiate this new event from the Mini-Indy, a new name was sought. To reflect better the road-racing nature of the event and its increased engineering content, the Formula SAE name was adopted.

## 1981

Ron Matthews remarked, “That first Formula SAE was small, but truly national in participation. Six schools said they would attend, but only four showed up: Stevens Institute (NJ), University of Tulsa (OK), University of Cincinnati (OH), and The University of Texas at Austin. The judges also reflected a national event, coming from General Motors, Ford, Southwest Research Institute, a variety of oil companies,—and, perhaps most notably, famous race car driver/engineer/owner Jim Hall, who flew in from the Indy 500 specifically to serve as a judge.”

The first day’s static judging was for “Best Appearance” and “Excellence in Engineering and Design Creativity.” The following two days were spent with performance events. For scoring purposes, equal weight was given to acceleration, maneuverability, and fuel economy with a double score for the endurance event. The overall winner of the inaugural Formula SAE was the team from Stevens Institute.



▲ 1981 - Jim Hall with the University of Texas at Austin entry



▲ 1981 - Stevens Institute of New Jersey

## 1982

To entice more schools to compete, a second category was created for cars powered by Briggs & Stratton engines. It was hoped that schools would consider entering a modified Baja car to gain experience with the competition.

A significant rules change was added for 1982. The first Formula SAE rules, patterned after Mini-Indy, did not require suspension, and thus several of the cars were simply large karts. From then on, Formula SAE would require four-wheel suspension. Even with this change the entire rules package for 1982 was only four pages.

UT Austin won the Formula class while UT Arlington made an impressive debut with 1st and 2nd in the Briggs & Stratton class. The first international entry, the Universidad LaSalle (Mexico), was another highlight of 1982, entering a car in the B&S class.



▲ 1982 - University of Houston

## 1983

Although the separate Briggs & Stratton class was eliminated, two UT Arlington cars finished 1st and 3rd with modified 8-hp B&S engines, in large part due to fuel economy. The powertrain variety was as follows: a 65-cm<sup>3</sup> Kawasaki, a 250-cm<sup>3</sup> Honda, a 250-cm<sup>3</sup> Kawasaki, a 450-cm<sup>3</sup> Suzuki, a 600-cm<sup>3</sup> Honda, two 11-hp Briggs & Strattons, and two 300-cm<sup>3</sup> Sachs Wankels.

## 1984

The last competition hosted by UT Austin drew eight entries. Among the notable advances in Formula SAE technology was the first-ever, all-composite vehicle, entered by UT Austin.

The variety of powertrains during this era was vast: Triumph 750-cm<sup>3</sup> twin, 300-cm<sup>3</sup> Sachs Wankel, 500-cm<sup>3</sup> Yamaha, 400-cm<sup>3</sup> Honda, 250-cm<sup>3</sup> Honda, and a 600-cm<sup>3</sup> Honda in the winning car from the University of Houston.

It is interesting to note that the first four years saw consecutive improvements in acceleration times but increasingly poor fuel economy—it was obvious that the students were willing to sacrifice efficiency for performance!

The rules for 1984 noted that, “Because this is an engineering design competition and not a test of driver skill, a 2-second-penalty will be assessed every time a tire is lifted off the ground during a turn.” Although all teams used pump gasoline, diesel, methanol, and ethanol were all legal fuels.

## 1985

After nurturing the event for four years, The University of Texas at Austin turned it over to their colleagues/rivals across the state in Arlington. Bob Woods initiated a major rules rewrite, and the competition scoring was revised to include the static events as a portion of the overall awards using a 1000 point scale. The scoring system mimicked the schedule refined for Mini Baja over the years. UT Arlington entered two cars in 1985 and took first and third places overall, with the West Virginia University in second.

Perhaps the biggest change was the introduction of the cost report. In 1984 the rules simply stated that “The total project cost, excluding student labor, must not exceed \$2000.” Now, for the first time, students were faced with submitting a report for the manufacturing costs of 1000 units. The maximum accepted value was \$4500 per unit.

New rules for 1985 included the addition of the engine displacement cap at 610 cm<sup>3</sup> and a reduction in the intake restriction to 23 mm.

1985 saw the first entries with forced induction: West Virginia running a supercharged 300-cm<sup>3</sup> Sachs Wankel and Marquette running a turbocharged 550-cm<sup>3</sup> Kawasaki. This was also the first year of organized SCCA participation with 20+ SCCA workers from the Texas Region handling flagging and scoring.



▲ 1984 - University of Texas - Austin



▲ 1985 - University of Texas at Arlington



▲ 1986 - Lawrence Tech

## 1986

For the first time, Formula SAE moved out of Texas. Lawrence Institute of Technology (now known as Lawrence Technological University) hosted the event on its Southfield, MI campus. This Texas-Michigan alternation would last through 1990. Moving to Michigan brought the event into the backyards of the Big Three and increased visibility to the auto industry immeasurably. Each of the Big Three auto-makers and many suppliers donated money to offset the expenses of running the 1986 competition.

Event organizer Wayne Brehob noted in his event write-up that the split between air- and water-cooled engines was roughly 50:50. Four of the 15 cars used forced induction: two superchargers, two turbochargers.

The University of Texas at Arlington won its third championship in a close battle with the rookie entry from the University of Maryland. It was a very rewarding win, as 1986 marked the start of prize money being awarded. Volkswagen of America sponsored a \$1000 award to the overall first place team.



▲ 1987 - University of Maryland

## 1987

Skidpad performance reached a milestone with the first cars to pull in excess of 1.0 g: The University of Texas at Arlington (1.09), and Cornell (1.04). Another milestone was the first appearance of fuel injection with the University of Maryland and UT Arlington entries. It was obvious that both of these teams had worked out any bugs prior to the competition as they finished first and second overall. The choice of powertrains was evenly split between the 600-cm<sup>3</sup> Kawasaki Ninja and the 500-cm<sup>3</sup> Honda Hurricane with each having about 40% of the field.

## 1988

There was no sophomore slump from Cornell. The team did its homework over the year and won its first Formula SAE championship. The big news for 1988 was the introduction of an official methanol fuel (M85) class. The U.S. Department of Energy, through the Argonne Laboratory, sponsored additional awards for best methanol fuel conversion, best methanol fuel economy, as well as best overall methanol placement. Now, with a strong financial incentive, teams began pursuing the methanol fuel option for their race engines. The University of Maryland won \$2500 in prize money for its M85 efforts in 1988.



▲ 1988 - Cornell University

## 1989

The 103°F Texas sun was rough on cars, drivers, and spectators at the hottest event to date. A record 36 cars from 31 schools competed. Event chairman Ed Bass noted, "The 1989 competition was the first to be jointly hosted by an SAE Section (South Texas) and a university (The University of Texas at San Antonio)." It was also the first time the host school did not compete—was that Southern hospitality, or evidence that the only thing more time consuming than building a car is organizing the event? The San Antonio community embraced the event, with the Mayor signing a proclamation of "Formula SAE Weekend." The local paper failed to do its homework, though, labeling the front page photograph as "Formula Sigma Alpha Epsilon!"

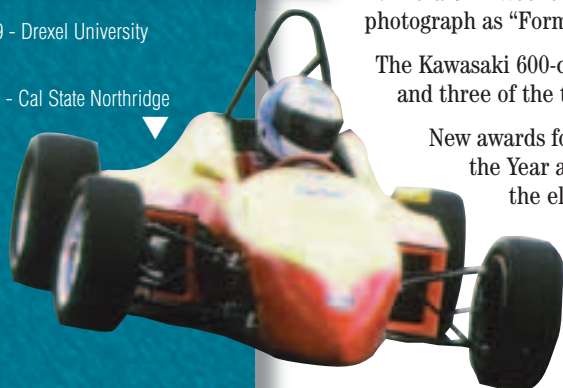
The Kawasaki 600-cm<sup>3</sup> Ninja engine was the powertrain of choice, with almost 50% of the field and three of the top four overall finishers—including the winners from UT Arlington—using it.

New awards for 1989 included Safety Design, won by Cal State Northridge, and the Rookie of the Year award, won by Western Washington University. Rules changes for 1989 included the elimination of rotary engines. In the event summary report, concern was expressed about the "large number of entries" which resulted in a "shortage of time in most events."



▲ 1989 - Drexel University

▲ 1989 - Cal State Northridge



## 1990

Although it missed out on the big prize, the Cornell “sucker” car was the star of 1990. The Cornell students took a page from history and reinvented Jim Hall’s 1970 Chaparral 2J CanAm car. It featured powered ground effects and the resultant downforce was sufficient to pull a record 1.32 g on the skidpad. Similar to many sanctioning bodies, the SAE rules committee subsequently banned powered ground effects.

UT Arlington’s fifth Formula SAE championship was the first to be won by a turbocharged car.

## 1991

General Motors, inspired by the great success of its GM SAE Sunrayce competition, deserves credit for moving Formula SAE from a relatively small university event to a major automotive industry happening. Students competing in the 1991 Formula SAE competition were exposed to top-level GM corporate support of the event. The kickoff included opening remarks from then-GM President Lloyd Ruesch. Bob Stempel, then GM Chairman, was seen throughout the event as well. The static events were held in the GM Design dome, while the dynamic events took place at the Milford Proving Grounds. Every student competing no doubt remembers the endurance event on “Black Lake” as being the ultimate parking lot.

1991 saw the first significant use of wings on Formula SAE cars. The University of Michigan and the University of Missouri-Rolla both ran very large wings mounted midship above the driver. Although both cars were extremely fast in the dynamic events, not everyone in attendance felt the benefits outweighed the penalties. And, as with most advances in racing, concern for speed and safety led to restrictions on wing size and placement in subsequent years.

The overall winner was Virginia Tech. Todd Bowland, the VT captain, has since carved a special place in Formula SAE history by going directly from Formula SAE to the CART IndyCar series. Chip Ganassi Racing had offered a special award of a weekend with the team to the captain of the winning team. Todd impressed the professional team enough to secure full-time employment. Todd now works as an engineer for Newman-Haas Racing along with three other Formula SAE grads!

## 1992

After the success of the 1991 event, GM was left in a bit of a quandary. They had raised the level of the event to the point at which a return to a university parking lot was no longer desirable. Luckily, Ford had been having great success hiring students with SAE design competition experience, and agreed to host the 1992 event. A team of recent grads working at Ford acted as the staging committee with the events being held at various Ford facilities in Dearborn. Ford brought in Grand Prix greats Jackie Stewart and Bob Bondurant to help with driver education.

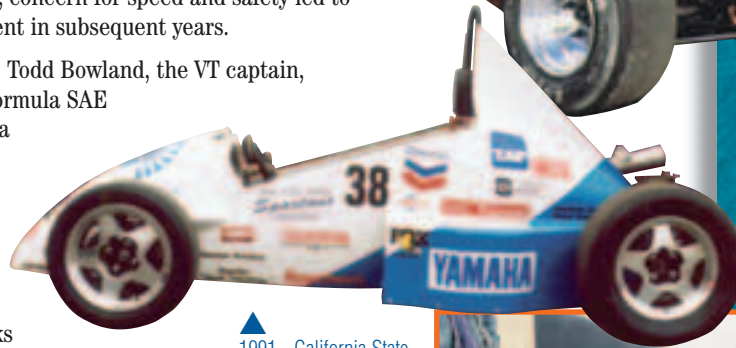
Cornell had its second win, using a turbocharged Honda CBR600 engine. This engine would account for 40-50% of the field within three years.



▲ 1990 - Cornell sucker car



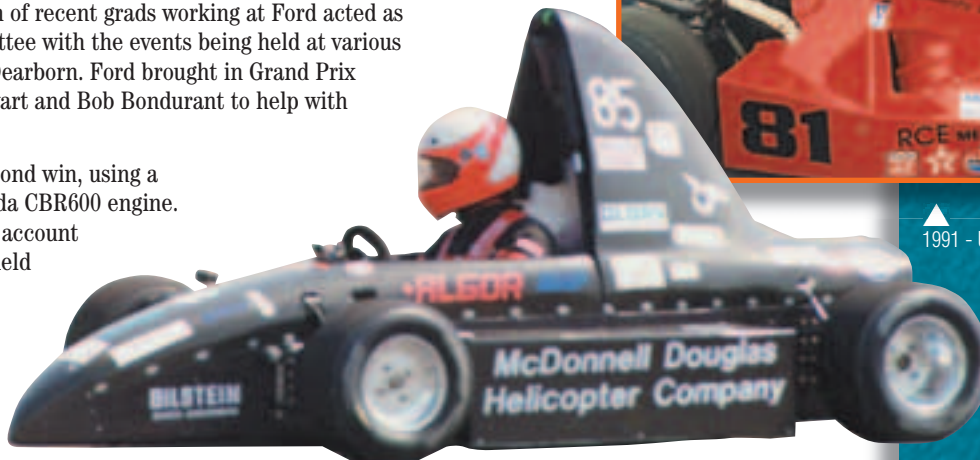
▲ 1991 - Western Washington University - The first use four wheel steering in a Formula SAE car



▲ 1991 - California State University, SanJose



▲ 1991 - University of Missouri - Rolla



▲ 1992 - Arizona State

## 1993

After GM and Ford, the natural choice for host company was Chrysler. Chrysler's magnificent new Auburn Hills Technical Center was the site, and Chrysler provided the students with numerous opportunities to interface with its technical staff. Chrysler Vice President Francois Castaing and a team of Chrysler engineers played host, while featured guests included racing legend Carroll Shelby and racer/driving instructor Terry Earwood.

The only problem for the organizers was the temperamental Michigan weather, as part of Saturday's schedule was rain delayed. The only problem for most of the teams was the car from Cornell, which won its second straight championship.



▲ 1993 - Cornell University

## 1994

After having rotated through each of the Big Three, a major decision for 1994 was needed. Would the automakers continue this rotation? What would be the best scenario for the students? In the spirit of USCAR, and the many consortium efforts of the Big Three, a Formula SAE consortium was created for 1994. The consortium would be staffed by two representatives from each of the automakers with one representative from the SAE Educational Relations Division staff. The Pontiac Silverdome was chosen as a central neutral site, and Coventry Consulting was retained for event management.

The overall win went to the University of Michigan—Ann Arbor.



▲ 1994 - University of Arizona

## 1995

With the teams returning to the same site for a second year, 1995 had a familiar feel for many people. The growth continued with 84 entries and 71 actual cars at the event. After missing out on the top spot for the past four years, UT Arlington finally added its sixth win, and did it with a significant difference—a smaller engine. The winning car used a 400-cm<sup>3</sup> Honda engine against the typical 600s. UT Arlington's logic was that, given the intake restriction, it could achieve almost the same power as a 600 while picking up significant advantages in fuel economy, weight, and cost over their rivals.



▲ 1995 - UTA

Head design judge Carroll Smith commented that it was not just a few teams making significant improvements—the entire field was increasingly competitive. The dynamic numbers back up this observation: the winning skid-pad time in 1989 would not have made the top 25 in 1995.

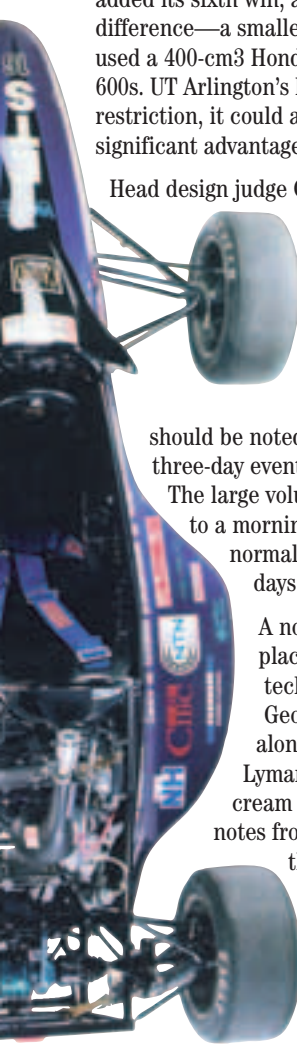
## 1996

To put the growth of the event into perspective, it should be noted that over 300 engineers acted as judges and volunteers during the three-day event, and 76 cars made it to the competition from 99 registered entries.

The large volume of cars was such that Friday's events were quite hectic due to a morning rain delay. Saturday's endurance runs also extended beyond the normal operating hours. It was noted that things were much easier in the days when more of the cars broke down early in the event!

A notable detail change was having the design judging finals take place after the endurance race. The five finalists were the Ecole de technologie superieure (ETS), Cornell University, Lehigh University, Georgia Tech, and The University of Texas at Arlington. Carroll Smith, along with Alec Purdy, Roman Slobodysnj, Ken Sperry, and Steve Lyman, spent about two hours carefully examining and comparing the cream of the crop. In addition to what they observed statically, they had notes from having watched two days of dynamic track events. In the end, the team from ETS was awarded the perfect 150 design score, with UTA one point behind.

◀ 1996 - ETS





▲ 1997 - University of Missouri - Columbia

## 1997

The more things changed, the more things stayed the same. 1997 saw the first European entry at Formula SAE. For the fifth year in a row, Cornell University, The University of Texas at Arlington, and the Rochester Institute of Technology each finished in the top ten - impressive consistency.

The rookies from across the pond, The University of Leeds, did a credible job. The fear among some teams was that with the UK being the formula car center of the

universe, Leeds would have some type of an unfair advantage. Their performance proved that engineering students everywhere have the same challenges - balancing project work with classwork, raising the funds and convincing their school administration of the project worthiness.



▲ 1997 - Penn State's winning acceleration run

Word of Carroll Smith's Sunday morning debrief grew from last year, and many more students and faculty came prepared with video recorders and took copious amounts of notes. Carroll noted that it was the close attention to detail that determined the 1997 design winner from UT Arlington. The terms knocked our socks off and that's an idea that I'd be happy to steal were mentioned more than once.

An idea from the past (1991) was revived in 1997, with the winning team selecting their most valuable team member to receive a special honor. That honor was courtesy of Ford Motorsports and was a hosted weekend with Team Rahal, and Tom Gloy Racing at a CART Indycar/SCCA Trans-Am race weekend. Geoffrey Hausheer from Cornell spent his weekend at Road America, before moving on to his post college career.



▲ 1998 - Another "learning experience" at FSAE

## 1998

While every FSAE event is the best one ever for those students involved, the longtime judges and volunteers share a similar view. Each year the competition features the "usual suspects", but the number of suspects continues to increase as more schools develop the ability to be consistently fast.

The 1998 event saw Cornell once again triumph, this time besting arch rival UT Arlington by just under 40 points. In addition to the cash award categories, Cornell won a three-day driving school for five team members in dynamic performance and two sets of tires in autocross for their best year ever.

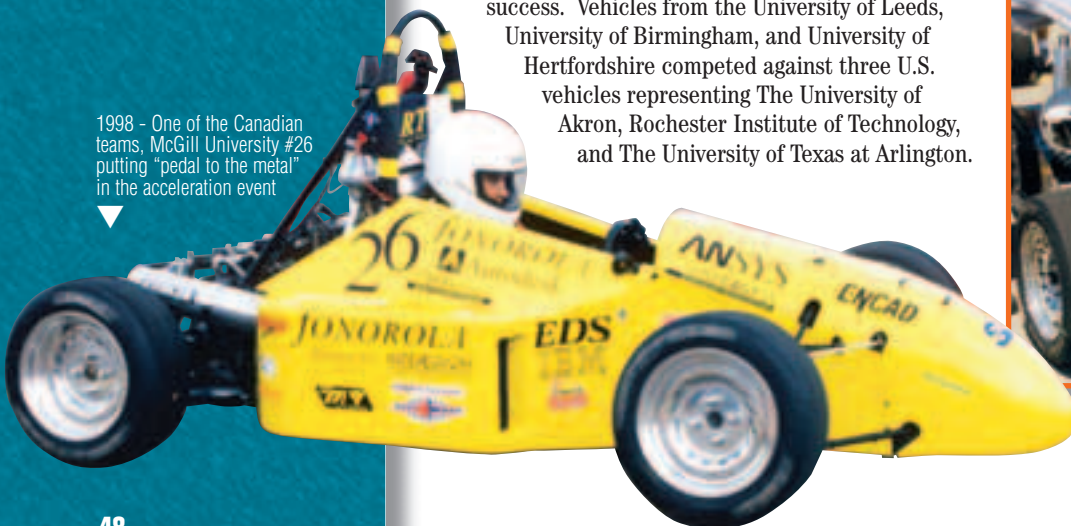
Cornell also won the first-ever SAE Foundation Cup. Through the generosity of SAE members, this prestigious trophy was established to help recognize the World Champions of FSAE for their excellence in engineering design, teamwork, creativity, and project management. SAE Foundation Trustees Donald W. Ableson and Neil A. Schilke presented the Cup to Cornell at the Awards Banquet as 800 engineering students applauded their achievement.

Meanwhile, 1998 also saw a brand new event - Formula Student, held in the UK. The inaugural event, co-sanctioned by SAE was a fantastic success. Vehicles from the University of Leeds, University of Birmingham, and University of Hertfordshire competed against three U.S. vehicles representing The University of Akron, Rochester Institute of Technology, and The University of Texas at Arlington.



▲ 1998 - The University of Akron #5 finished in 3rd place overall and won the U.S. Department of Energy/Argonne Outstanding Teamwork Award

1998 - One of the Canadian teams, McGill University #26 putting "pedal to the metal" in the acceleration event



## 1999

For regular attendees of Formula SAE, the 1999 win by The University of Akron should not have been a surprise. Since first entering the competition, the school had become increasingly competitive and followed previous success in the Mini Baja® and Aero Design® competitions. Akron's win was achieved through excellent on-track performance (1st in endurance, 2nd in acceleration, 3rd in the skid-pad, and 5th in autocross), a strong top-ten design, and competitive cost and presentation scores. Basically, the Akron team didn't give up points anywhere.

The University of Akron also won the Value Engineering Award and was the top M-85 entry. They walked away with \$6,000 in cash, a race-weekend for Andy Renko-the team MVP, a three-day driving school, two sets of Goodyear tires, and a set of KONI shocks!

The University of Leeds, RIT, and UTA placed 1-2-3 in design, but both Leeds and UTA DNF'd the endurance race knocking them out of the overall top-ten. Reliability was especially critical in 1999 as there was but a single endurance heat due to the always unpredictable Michigan weather. The competition is so tight that a single miscue can derail even the best of teams.

RIT once again did everything almost perfect, picking up yet another overall runner-up finish. RIT made up for their disappointment by winning the Formula Student Competition two months later in Birmingham, England beating UTA, Akron, and Leeds in the process.



1999 - University of Akron

## 2000

You don't have to be a seasoned veteran to win the Formula SAE competition. Competing in only its second FSAE competition, Texas A&M University won its first title with an outstanding balance of engine power, vehicle handling and driver skill. The Aggies from College Station outpointed runners-up University of Wisconsin-Madison largely on the strength of their autocross and endurance runs. In 1999, Texas A&M won the William C. Mitchell Rookie Award and turned this achievement into something bigger and better one year later at the 2000 competition.

Rounding out the top five finishers were Cal Poly Pomona, University of Florida, and University of Leeds whose fifth place finish is the highest ever for a non-North American school. Leeds has competed every year since 1997. Two months later, Cal Poly Pomona improved their performance and won the Formula Student competition in the United Kingdom. They beat the University of Toronto, Rensselaer Polytechnic Institute, Georgia Tech, Rochester Institute of Technology, Kettering University, Leeds and University of Birmingham, and a host of other teams from the UK and Europe.

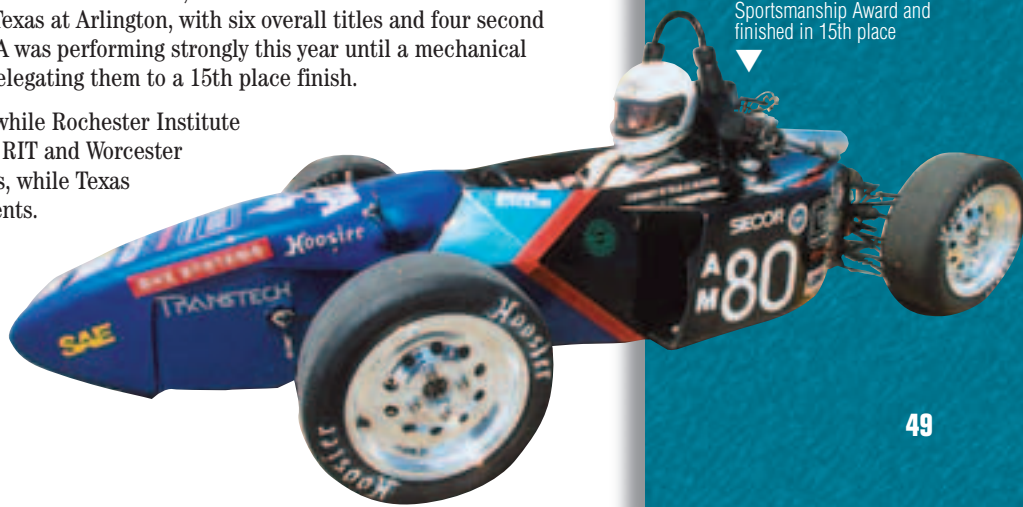
Texas A&M continues a rich tradition of FSAE success by engineering schools from the Lone Star state. The University of Texas at El Paso won the inaugural event in 1979, while the University of Texas at Austin took the top prize in 1982. Houston won in 1984, and one of the dominant schools in the history of the event is The University of Texas at Arlington, with six overall titles and four second place finishes in 22 years of competition. UTA was performing strongly this year until a mechanical glitch took them out of the endurance run, relegating them to a 15th place finish.

Wisconsin captured the cost analysis event, while Rochester Institute of Technology won the coveted design event. RIT and Worcester Polytechnic tied for best presentation honors, while Texas A&M swept the autocross and endurance events. FSAE champion Cornell University turned acceleration times. Like UTA, Cornell's was neutralized by a breakdown in the sixth through tenth in order were of Waterloo, University of Toronto, San Luis Obispo.



2000 - The William C. Mitchell Rookie Award went to North Carolina State University, they finished in 18th place overall by receiving points in all ten events

2000 - The University of Texas at Arlington won the EDS Outstanding Sportsmanship Award and finished in 15th place





## 2001

Yes, Cornell won again after suffering through a two year drought. In 2000, they finished in an uncharacteristic 13th place and a respectable 3rd place in 1999. Cornell along with the University of Texas at Arlington have combined to dominate the 21-year old event. UTA finished 6th this year and last won in 1996. Cornell bested runner up University of Missouri-Columbia by a whopping 105 points - 904 to 799. Rounding out the top five finishers were Ohio State University, University of Wisconsin-Madison and Texas A&M University.

Cornell won top honors for best drivetrain, optimized design, best autocross performance, and best overall track performance in addition to a 3rd place award for engine management systems. With

their win, Cornell takes the FSAE championship back to Ithaca for a sixth time. UTA has the most championships with seven, and no other schools have more than one win in the event's 21-year history.

University of Missouri-Columbia had their best finish ever by besting 3rd place Ohio State University by 23 points. ETS (Quebec) and Waterloo (Ontario) were the highest finishing Canadian schools, and the University of Leeds finished the highest in the rankings among the four off-shore teams. After experiencing electrical problems prior to the acceleration run, Leeds slipped to 14th overall.

The bar keeps rising as the number of contenders grows. The 2001 competition featured cars from Mexico, Japan, South Korea, Puerto Rico and the United Kingdom as well as Canada and the U.S.

The top four cars in design for 2001 were all outstanding, and the following comments by Carroll Smith give proof of this:

The Waterloo team listened well to criticism from previous years and produced a very clean, well integrated design. The standard of workmanship was excellent, and the car featured a stiff chassis, very good geometry and excellent ergonomics. It was a particularly attractive car and was a quantum leap forward for the team.

ETS can be counted on to produce a well designed, beautifully made vehicle. They can also be counted on to produce a very different car each year. In 2001, they had uncharacteristically done a lot of testing (testing is difficult in Quebec – something to do with the snow) and, driven with typical brio, the car did very well dynamically.

RIT can also be counted upon to produce an excellent car. The end product of several generations of students, this car was quite probably the best integrated design that we have seen. Everything that needs

to be on a racing car was there and there was nothing that didn't need to be there. This car would have scored higher if it had been less similar to RIT's previous outstanding entries.

Again it is no surprise that Ohio State produced an outstanding car. This one is particularly elegant – a simple, stiff and attractive composite chassis with effective geometry and a host of student designed, manufactured and developed electronics, including a very sophisticated gearshift system. Again, a neat and very well integrated design.

The 2002 competition has set a new record with 140 teams registered to compete and will prove to be a very exciting event. The outcome is anyone's guess.

2001 - Instituto  
Tecnologico de Chihuahua



2001 - Kanagawa Institute of  
Technology

2001 - Lawrence  
Technological University



## 2002

Cornell University made its case for being a true Formula SAE dynasty—relatively speaking, by winning its seventh championship in the collegiate design event's 22-year history. The engineering students from Ithaca, NY easily outdistanced University of Wisconsin-Madison by 110 points overall to win the annual collegiate design competition for the second straight year at a chilly Pontiac Silverdome parking lot course.

The 2002 event saw a record 118 teams from eight countries on five continents travel to Pontiac for a chance to win the coveted SAE Foundation Cup. This year the Cup was officially named in honor of 2001 SAE President Neil Schilke, an ardent supporter of SAE and its educational programs. Appropriately, Schilke is a Cornell graduate, and his pride in the performance of his alma mater in Formula SAE was evident.

Cornell took US\$8,500 in award money as well as several sets of tires home to New York in addition to the SAE Foundation Cup. Cornell won top honors for best design, endurance, fuel economy, acceleration, and skid-pad performance, while finishing second to University of Texas at Arlington (UTA) in autocross.

Georgia Tech, winners of the July Formula Student event in the United Kingdom, took home third place, followed by University of Michigan, and University of North Carolina-Charlotte. Surprisingly, Saginaw Valley State edged out Virginia Tech for sixth place. University of Western Ontario had the best Canadian finish and their best ever at eighth, while Purdue University and Brown rounded out the top ten.

The University of Wollongong from Australia was the highest finishing school from outside North America, finishing 28th. The first-ever Aussie entrant got high marks from the judges for innovative design and presentations before a mechanical gremlin left the car unable to start midway through the grueling endurance run. They also took home three awards and a total of US\$1,000!

Both Ohio State University and UTA mounted strong performances before mechanical glitches dropped them out of the endurance event to finish 24th and 29th, respectively. However UTA is assured that they will be taking first overall this year, not only at FSAE, but in Australia and England as well.

## 2003

With a second trip to the Silverdome, the University of Wollongong from Australia claimed the title of overall winner. Competing with one of the quickest and most fuel efficient in the Endurance Event and first in the Design Event, the Wollongong car was an improvement of the team's previous contender which earned them a compliment from the late Carroll Smith in 2002 when he called the car "the best first year car I have ever seen".

In essence the 2003 car was a smaller, lighter version with a lower center of gravity and various refinements. Refinements included shedding 23 lbs of weight, shortening the car by 400 mm, improving the access to front and rear coil over dampers, increased camber adjustment range, use of twin rear brakes unlike rivals who relied on a single brake, mounting their brake cylinders underneath the driver's feet rather than ahead of them allowing a key move in shortening its pullrod suspended tubular frame chassis. It is certain that with these changes and new innovations that Carroll Smith would approve on Wollongong's victory.

Also taking place at the 2003 FSAE event was the break in the 66-second barrier record in Autocross by University of Missouri-Columbia and University of Texas-Arlington Wing Car.

Kansas State University produced the 'sidewinder' which was a cross between a kart and a conventional FSAE car. A 400 cc air-cooled, four-stroke Honda ATV power plant is narrow enough to make the sidewinder approach feasible. The driver has only to be offset a modest amount. Though the Kansas State sidewinder might have been far from perfect and in need of testing and development it was a breath of fresh air.



▲ 2002 - Fanshawe College



▲ 2002 - Colorado School of Mines

2003 - University of Wollongong, Australia ▼



◀ 2003 - Ohio State University



## 2004

Reclaiming the title of 1st Place for the 8th time during the history of the event, the Cornell University team came with their game faces on and ready to race. The 2004 car looked quite different from its predecessors with a design that went beyond the boundaries of the normal multi-tubular frame for an advanced composite monocoque chassis. However, it was not the look that only impressed the design judges, but the turbo Honda engine that the students further developed based around its own in-house Engine Control Unit (ECU), which had evolved a very powerful and useful unit.

Joining the ranks of Cornell impressing the Design Judges was the team from LeHigh University. After reading the design report, the judges anticipated looking at the car that had been weighed at 301 pounds. The team built this car using a lot of Kart technology keeping the design simple and the weight low. To create such a lightweight car, the Yamaha R6 engine used by so many teams was dropped in favor of a Yamaha 426, a single cylinder torque monster. This engine was chosen for its incredible low-end torque output as well as its lightweight, partially magnesium construction. Lehigh was the first American team to run a 426. The 2004 car generated a huge amount of interest at competition; unfortunately the car suffered a crippling driveline failure in the 6th turn of the endurance race.

The 2004 Auburn car used the teams own shift system, which permitted clutchless fully automatic upshifts and downshifts. This system was pneumatically powered with a pair of electronically-controlled solenoids affecting the shifts. The pneumatic side was inspired by a paint ball gun. Who says building a FSAE car has to be all work and no play? The inspiration involved a high pressure reservoir located in a sidepod that is charged with compressed air at 1500 psi and the air pressure in the system was regulated to 90 psi. The reservoir provided the Auburn car with sufficient air pressure to last the entire endurance event.



▲ 2004 - GA Tech

2004 - University of Waterloo ▼



▲ 2004 - University of Michigan



◀ 2004 - Dartmouth College