

# EEVC NEWSLETTER

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Peter Cleaveland, Editor

Club Address: P.O. Box 134, Valley Forge, PA 19481-0134

email: easternev@aol.com. Web site: www.eevc.info

President: Oliver Perry, 5 Old Stagecoach Turn

Shamong, NJ 08088, (609) 268-0944

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## EEVC "RON GROENING" BEST ENGINEERED CAR AWARD PHYSICS OLYMPICS 2009 By Oliver Perry

Ken Barbour, Alan Arrison, and I met at a New Jersey diner 6:00 AM Saturday morning, February 21st, had a quick breakfast and then drove over the bridge to Media, Pennsylvania to attend the annual Physics Olympics "Showdown" of the Southeastern Pennsylvania Physics Olympics League. Eight high schools competed in this year's Olympics League and came to Penncrest High School for the final meet of the season.

As we have done for more than a decade,



*Mindy Coleman, Winner of the EEVC Award*

the EEVC selects what we feel is the best engineered vehicle in the electric car event, which is just one of many events in the over-all Physics Olympics League competition. We present a plaque to the winning entry.

This year's plaque was given in memory of former EEVC member Ron Groening, an engineer for Lockheed Martin (formerly GE) who died about a year ago. Ron regularly attended past Physics Olympics meets

and assisted in the selection of our award.

Fran Poodry, a physics teacher at West



*Fran Podyry, Alan and Ken register cars*

Chester East High School, was responsible for running the electric car event.

### **This Year's Winner**

The scoring rules of this year's competition favored teams with more than one car. Each team was allotted 5 runs down the track with the same car or different cars. For each additional different car, points were added to the team score. As a result teams had an incentive to bring more cars to the competition. And since prop cars are somewhat easier to build than the wheel driven cars, we found an increased number of good cars this year.

**Mindy Coleman**, a senior physics student from Penncrest High School, designed and built what we determined was the over-all best vehicle entered in the competition. This should have come as no surprise because Mindy won the gold medal\* last year as a junior in this event. Each year the electric vehicle event is modified to change the type of vehicle built and to change the competitive goals. This year the students were required to propel their cars with a propeller. The prop had limits in terms of size and number of blades. The goal was to achieve the shortest



*Fran Podyry at the starting line*



*Go!*

time possible in traveling the distance between the foul lines on the basketball court in the Penncrest High School main gym. The track was narrow and the real trick turned out to be getting the cars to travel straight enough to stay inside the confining boundaries. Only about four cars actually crossed the finish line. The 36 other trials went out of bounds. Many cars could not even travel half the distance before going off track. In those cases distance traveled counted for the scoring instead of time.

\* The Physics Olympics Competition awards gold, silver, and bronze medals to the top three cars based upon their performance results only. The EEVC award is chosen on the basis of engineering design, strength and durability, craftsmanship, and uniqueness as well as performance. It is a subjective award and may or may not also be a medal winner.

### **Design to Win**

Since this year's event goal was to design the fastest car between a start and finish line, while staying within track boundaries, a winning design had to display both quickness and straight line velocity. Many of the cars traveled straight until they reached a certain



*Across the finish line*



Top cars



Mindy's winning car

speed, then they lost control. As one student pointed out, a slower car that stayed straight frequently was superior to a car that moved quickly but went out of control.

The rules required that all cars have wheels no smaller than CDs and that they carry an index card flag to make and break the laser beam start and finish timers. In addition the cars had to have a minimum mass of 200 grams. All had to be powered by the same electric motor, which in turn had to be limited to a standard 9 volt fire alarm battery.

One of the critical concerns for a prop car designer is mounting the wheels so that they

roll straight with little resistance. (No expensive wheel ball bearings or magnetic bearings were allowed.) A second important consideration regards the position of the flag. It can act like a rudder. (The rules required that the flag be the foremost part of the car and set to break a beam 20 centimeters above the floor.) Finding the optimum size of the propeller and maintaining a fresh battery were also important factors. As for keeping the car in a straight line, it seemed as if the distance between front and back wheels played an important part.

### Winning Car

The pictures shown give you an idea of what the better cars looked like. These cars

were not thrown together at the last minute with duct tape, glue, and cardboard. (Once in a while a clever and lucky individual will succeed in throwing together a last minute winner, but not frequently.) It turned out that most of the better cars were from Penncrest

High School. As a team they correctly figured out what worked best and passed the information along. Mindy's car had a screw connection between the front and rear sections of her car that allowed the front end to be pivoted. Behind the pivot screw there was an adjustable screw that allowed one to precisely set the direction of the front

wheels. If you look at the picture of her car you can see an adjustment screw (near Mindy's thumb) that can change the angle of the front wheels in a very precise manner. This feature was one that distinguished Mindy's car from her competitors. However, in spite of this outstanding steering feature, Mindy's car did not quite make the finish line before swerving out of bounds.

Mindy knew from



EEVC members Ken Barbour and Al Arrison present the EEVC award to Mindy Coleman



Teacher Robert Malcovsky and EEVC winner Mindy Coleman



*Mindy Coleman and mom Jane*

last year's experience what to do and where to go for advice in building her prop car. Her father, William Coleman, is a master plumber for Herman Goldner, with a garage filled, as Mindy said, "with all sorts of useful things." She also understood the practical principles of momentum, friction, acceleration, and electric power sufficiently to get started in a right direction. In addition to her father she has an older brother, a former Science Olympiad participant whom she was able to consult.

Her teacher, Mr. Robert Malkovsky, gave his classes the right sized flat plastic washers to fit perfectly into the large centers of the CD wheels. (If students cannot attach the axles precisely in the exact center of their wheels, they will have all sorts of trouble.) The holes in the washer centers were a perfect for the small diameter brass tubing which Mindy's father found in his garage. This tubing was used for both front and back axles. The brass axles fit nicely inside hollow aluminum tubes that were attached to the front and rear chassis. Another important feature were the bushing collars with set screws in them that could be mounted to the brass axles next to the inside surface of the CD wheels to keep them from shifting to or away from the car body. It is not healthy for the wheels to rub tightly against the body and create unnecessary drag. But neither does one want the wheels to slide back and forth in a lateral direction and cause drag on one side or the other. The collars kept the axle from moving in or out. In Mindy's car the wheels were rigidly attached to a straight axle which in turn spun inside a tube attached precisely to the frame of the car.

From the picture of Mindy's car you can see a masterpiece in terms of simplicity and

strong construction. Although some suggested that a shroud around the propeller would increase speed of the car and help to control direction we noticed that none of the vehicles with shrouds approached the finish line. Mindy used the same propeller (without a shroud) that came with the provided motor propeller kit. Evidently that size of a prop is most efficient for that particular sized motor. We heard that some students previously tried different sized props and did not achieve better results.

### **A little bit of clever thermodynamics**

One of the problems that Mindy (and others) cleverly solved was how to fit the slightly over-sized flat washers into the center of the CDs. They became a perfect fit, once they were in. But they didn't fit until they were first placed in a freezer and frozen. Then they fit perfectly and made a tight non-slipping fit when warmed. (Reminds me of the old iron wagon wheel rims that were heated to slip over the wooden wheel.)

Noted in the picture of Mindy's car is a plastic semicircular piece of white plastic. In the event that the car might turn out to be under the weight specification, Mindy had a coin holder added to hold extra grams of mass if needed. She rightly realized that cars with minimum mass accelerate best. Her index car flag was doubled for stiffness to keep from flapping in the breeze, another nice touch of engineering design.

### **The life and Times of Mindy Coleman**

Mindy told me that she feels as if she has been involved in physics ever since she was ten years old through her older brother and sister, who took the same program in previous years. Presently she is in AP Physics with her teacher Robert Malkovsky, having had first year physics with Mr. Ciccarelli last year. She feels that both teachers run a really strong physics program and teach so that everyone can learn. In her opinion they are by far the two best teachers she has had at Penncrest. Both are always there to help. Mindy wrote me the following statement, "The tests and homework are incredibly challenging but after looking back at the previous year the challenge and hard work have taught me so much and have paid off."

Mindy likes attending Penncrest High School and feels that through Mr. Gregg (I assume the high school principal) they have gained a lot of school spirit and support for the academic and sports teams. She has been in National Honor Society for two years, Future Business Leaders of America for two years, Lions Paw, Renaissance Club and

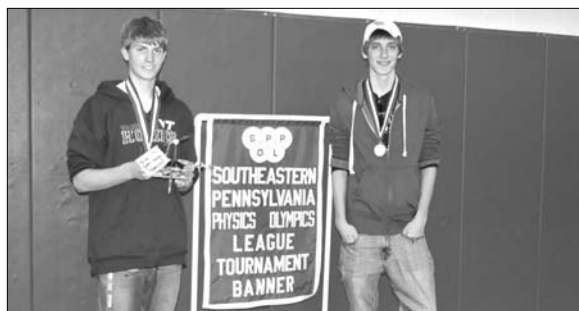


*Tim Bannan and Mindy Coleman with PSE&G Team Cup*

Physics Olympics for two years. She has been a band member for four years where she plays the bassoon and is a color guard captain. In addition to participating in these extra curricular activities she finds time to work at a CVS drug store a few times a week.

In her free time Mindy likes going to the beach and attempting to surf. She drives a rear wheel Thunderbird SC and claims that she has learned what not to do to keep her wheels on the road in wet conditions. She and her car have performed live physics coefficient of friction experiments; complete with angular velocity, torque, and inertia concepts added in. (Hopefully she has not directly experimented with elastic and inelastic collisions.)

The most important people in her life are her family and friends who are there to support her. Obviously her parents William and Jane Coleman have to take pride in raising such a successful young girl. Behind most successful kids are equally great parents who have obviously done something right. As mentioned previously, her father is a master plumber who has succeeded in his trade. Her mom works in the administration office of Marple Newtown School District in New-



*CJ Gamber and Richard Forbes won the Silver Medal*

town Square, Pennsylvania.

So what does the future hold for this talented young lady? Mindy hopes to attend West Chester University where she can participate in the Color Guard and major in accounting. She would like to squeeze in a few physics courses along the way. And, she hopes to pick up some scholarship money at graduation to help achieve her goal.

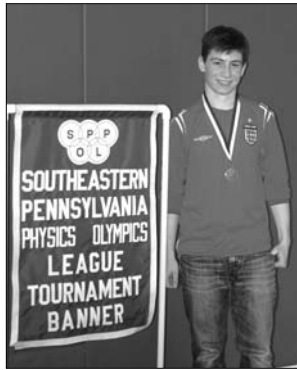
### **EEVC Registration Questions**

This year in order for a student to be eligible for the EEVC award they had to go to our web site and find the answers to several questions as well as give us their opinion of the future of electric cars. Mindy found it very interesting, from examining our web site, that we have sponsored competition with real full sized cars. And as for the future, she feels that our new U.S. president will help electric cars become more main stream in an effort to resolve both the economic and environmental threats.

### **More Unedited Student Responses**

I thought it would be interesting for you to read several other student responses. Ariel Kirkwood and Zack Hanni (school unlisted) said the future was dim for electric cars because battery technology is too expensive. Steven Fischer from West Chester East High School felt the future was bright because the battery powered cars are the most advanced energy source vehicles.

Andrew Tulk and Reese Leopard from West Chester East stated that unfortunately it depends largely on the cost of development and the price of fuel. Another factor is that of pollution. While electric cars produce little, common hybrids using fuel cells create waste from battery construction and disposal. The fuel cells are expensive to create and with falling gas prices people will use conventional cars more. Because of that they did not feel that electric cars will be that well received. But we can all watch for the Chevy



Josh Kassner from Harriton High School won the bronze medal.

Volt, though.

Megan Fantoni and Tyler Block from West Chester East High School said the future of electric cars depends on whether or not the economy

improves. If the economy improves and there is funding for the advancement of electric cars technology, it will advance.

### Once again Penncrest High School wins the PSE&G Team Electric Power Cup

The PSE&G Team Electric Power Cup, provided by the New Jersey Electric and Gas utility to our league over 10 years ago, is an award that annually is passed on to the electric car team that posts the highest team score, not the highest individual score. Penncrest High School once again won that award. Pictured next to the award is one of the senior captains of the team, Tim Brannan.

### Olympic Gold Medal Winners

Nicholas Frigiola and Joey Verica, both seniors from Penncrest High School, teamed up to produce the winning car and the gold medal. (Picture not available)

Richard Forbes and CJ Gamber, juniors from Penncrest High School, teamed up to produce the second place, silver medal car.

Josh Kassner from Harriton High School won the bronze medal.

### PRESIDENT'S MESSAGE by Oliver H. Perry



The following article reminds us as to how soon we can expect more electric and hybrid vehicles in the main stream. Let every person draw his or her own conclusions.

“What Price, Green?” page R4 The Journal Report, *Wall Street Journal*, Monday, March 9th.

“AutoNation’s Mike Jackson and Edelman’s Richard Edelman on how to get consumers out of gas guzzlers.”

Question by *The Wall Street Journal’s* Jeffery Ball. “... what will people pay for technologies that are environmentally friendlier?...”

Answer Mike Jackson: “I would bifurcate (divide into two branches) the market. You have 5% of the marketplace committed to social responsibility, is willing to pay for it without a rational return, and has the economic means to to that. For the rest of the marketplace, 95%, it’s a pure economic calculation. Seventy percent of our clientele comes in and wants to talk about hybrids, and on that group we have a 2% closing rate because the payback just doesn’t come quick enough.”

“You tell me the price of gasoline and I will totally tell you what people will buy and what trade-offs they will make. They are looking for basically a two to three year payback. So in 08 starting the year at \$3.00 a gallon everybody talked about fuel efficiency but nobody acted. At \$4.00 a gallon we had the biggest shift in in consumer preference in the history of the business — a stampede to fuel efficiency. We shut down all of the truck factories and switched over to fuel efficiency. Gasoline is now at \$2.00 a gallon, and I have fuel efficient cars parked in my dealerships as far as the eye can see. I cannot give them away.”

“If you just look at the value of a used Prius one year old, at \$3.00 a gallon it is worth \$20,000. At \$4.00 a gallon it is worth \$25,000. And at \$2.00 a gallon it is worth \$15,000. All of that happened within eight months.”

Question Mr. Ball. “How high would a gasoline tax have to be to make a difference?”

Answer Mr. Jackson. “ The biggest lie in American politics is that you can be passionate about doing something about America’s

dependency on imported oil or global warming and advocate cheap gasoline or cheap energy. They are mutually exclusive concepts.”

Mr. Ball asks Mr. Edelman whether American culture can make the needed change.

Mr. Edelman’s reply, an excerpt: “If you want to sell a \$4.00 gas tax we are going to have to have a campaign to say, here’s why. We will have a real discussion about it. It is not going to work if it is just sort of coming down from Washington, because there is huge suspicion of government, too.”

## 21st CENTURY AUTOMOTIVE CHALLENGE

### April 17-19 on the campus of Penn State

Keep checking out the EEVC web site, [www.eevc.info](http://www.eevc.info) for the latest details. Plans are under way to have another great event. If you want to attend contact us.



*This bus carries Football Players to Beaver Stadium, Think Penn State!*



*Under the hood of the Penn State EV-1, hybridized with hydrogen.*

## MEETING TO SOLAR GOAL By California Pete



California has set itself an ambitious goal for renewable energy: 33% of all electricity by 2020, and some people figure it can’t be done. Yet according to a recent government report, we may be closer than expected. On February 19 the *San Francisco Chronicle*

carried a story saying that a recent report from the state Public Utility Commission had concluded that “if all the renewable power projects proposed in the state last year were built, California would easily surpass that goal.” Those projects would add up to 24 GW. “That’s on top of the renewable power already flowing in California,” says the *Chronicle*. “According to the report, solar plants and wind farms built in California during 2008 can generate 516 megawatts of electricity, roughly as much as a midsize, fossil-fuel power plant. The previous year, the state only added 113 megawatts of renewable power.”

### A falling tide lowers everything...

The current economic downturn and other changes are affecting all parts of the economy, and now, apparently, have impacted an important California industry. Yes, folks, it’s true: the porn industry is seeing a decline in sales, according to the *Chronicle*. Not only has the economy reduced the amount of money available, but free distribution on the Internet has cut deeply into the dirty-DVD business; so badly, in fact, that one Los Angeles producer has sued one of the free porn sites. And a major San Francisco producer has had to lay off 13 employees after a recent expansion didn’t turn out as well as hoped.

## NEWS UPDATE

### Electric Nissan to have 100 mile range

A February 17 AP story reported that the product planning and strategy director for Nissan North America has told the Chattanooga Engineers Club that the company’s EV, scheduled to go on sale late in 2010, will have a 100 mile range. And, the story continues, the company hopes eventually to move production

from Japan to its Smyrna, TN factory.

### **Solar plane set to fly in Europe**

*Treehugger* reported on February 25 that Eric Lentz Gauthier of Solar Flight had told them that the Sunseeker II solar airplane “will be flying over Europe this Spring.” Some details are still to worked out, but the approximate route is “from Freidrichshafen, Germany down to Sicily and then back up to Switzerland. From there the Sunseeker will be flown over the Swiss Alps to the Austrian Dolomites and through to Slovenia. From Slovenia we will fly West through Italy again, then Southern France down to Spain.”

### **COMING EVENTS**

#### **LEV Conference**

Taipei, March 16. For info go to [www.levconference.org](http://www.levconference.org)

#### **Clean Heavy Duty Vehicle Conference**

March 16-18, Long Beach, CA. For information go to [www.calstart.org/programs/chdvc](http://www.calstart.org/programs/chdvc)

#### **World Biofuels Markets Congress & Exhibition**

March 16-19, Brussels, Belgium. Go to [www.worldbiofuelsmarkets.com/](http://www.worldbiofuelsmarkets.com/)

#### **Biomass 2009: Fueling our Future**

National Harbor, MD. Go to <http://biomass2009.com/>

#### **National Hydrogen Assn Conference**

March 30 - April 3, Columbia, SC. Go to [www.hydrogenconference.org](http://www.hydrogenconference.org)

#### **2009 SAE World Congress**

April 20-23, 2009, Detroit. For information go to [www.sae.org/congress](http://www.sae.org/congress).

#### **Roads to Renewal: A Summit on the Changing Automotive Industry — How Communities Can Thrive**

April 14-15, Chicago. Go to <http://regional-summit.cargroup.org/>

#### **Advanced Battery Mfg conference**

April 15-17, Washington, DC. Go to [www.infocastinc.com/index.php/conference/battery09](http://www.infocastinc.com/index.php/conference/battery09)

#### **21st Century Automotive Challenge**

April 17-19, State College, PA. contact Dr. Joel Anstrom, [janstrom@enr.psu.edu](mailto:janstrom@enr.psu.edu), 814-863-8904, or go to [www.eevc.info](http://www.eevc.info)

#### **2009 SAE World Congress**

April 20-23, Detroit, MI. For info go to [www.sae.org/congress/](http://www.sae.org/congress/)

#### **Challenge Bibendum**

Originally scheduled for April 26-29 in Rio De Janeiro, but postponed until 2010 due to the economic situation. For information go to [www.challengebibendum.com](http://www.challengebibendum.com).

#### **BCI 121st Convention & Power Mart**

May 3-6, Las Vegas, NV. Go to [www.battery council.org/LinkClick.aspx?fileticket=I7sMopAJNpI%3d&tabid=68&mid=497](http://www.battery council.org/LinkClick.aspx?fileticket=I7sMopAJNpI%3d&tabid=68&mid=497)

#### **34th IEEE Photovoltaic Specialists Conference (in conjunction with SEIA's PV America Conference)**

June 7-12, Philadelphia. For info go to [www.34pvsc.org/](http://www.34pvsc.org/)

#### **Plug-In 2009**

August 10-13, Long Beach, CA. For info go to [www.plugin2009.com/](http://www.plugin2009.com/)

#### **Fifth IEEE Vehicle Power and Propulsion Conference**

September 7-11, Dearborn, MI. For information go to [www.vppc09.org/](http://www.vppc09.org/)

#### **Energy Conversion Congress and Expo**

September 20-24, 2009. San Jose, CA. Go to [www.ecce2009.org/](http://www.ecce2009.org/)

#### **eCarTech 2009 1st International Fair for Electric Mobility**

October 13 - 15, Munich. For info go to [www.ecartec.eu/index.html](http://www.ecartec.eu/index.html)

#### **Battery Power 2009**

October 20-21, Denver, CO. For information go to [www.batterypoweronline.com/bppt-conf09/bp09\\_index.php](http://www.batterypoweronline.com/bppt-conf09/bp09_index.php)

### **MEETING SCHEDULE**

Meetings are held in Room 49, Plymouth-Whitemarsh High School, 201 East Germantown Pike in Plymouth Meeting, PA, and begin at 7:00 p.m. As in previous years, there will be no July or August meetings.

April 9

May 13

#### **\*\*\* FOR SALE \*\*\***

1997 Chevy S-10 Electric Conversion  
Runs well, has fairly new pack of sealed 12 V batteries in it. Range is about 18-20 miles at 45 mph. Full specs. are available at: <http://home.roadrunner.com/~pickupman2007>.

Interested parties contact Ken Olsen at [pickupman2007@nc.rr.com](mailto:pickupman2007@nc.rr.com).