THE CONSULTANT

The Newsletter of the IEEE Consultants Network of Long Island

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Chairman
Jerry Brown
(631) 271-9714
jlbrown@essexsys.com

First Vice Chairman
Peter Buitenkant
(631) 491-3414
peterbui@optonline.net

Second Vice Chairman
Sam Sadinsky
(631) 476-5780
s.sadinsky@ieee.org

Treasurer
David Rost
(516) 599-6202
ConsultDPR@ieee.org

Secretary
Dr. Richard LaRosa
(516) 486-7827
r.larosa@ieee.org

Newsletter Editor
Dr. Richard LaRosa
(516) 486-7827
r.larosa@ieee.org

Jr. Past Chairman
John Dunn
(516) 378-2149
ambertec@ieee.org

Sr. Past Chairman
Murray Kleiner
(516) 822-1381
m.kleiner@ieee.org

Alliance of IEEE Consultant Networks
Irwin Weitman, P.E.
(631) 266-2651
i.weitman@ieee.org

Voice-Message Referral Service
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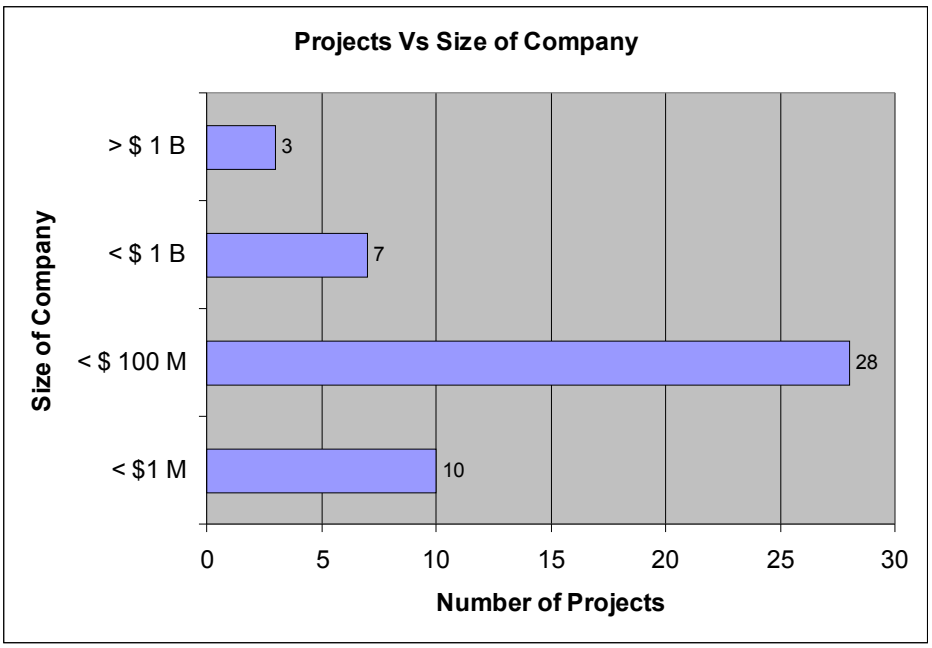
Chairman's Corner – *Jerry Brown, Essex Systems*

Where Does Our Business Come From?

The following charts summarize results of the member survey sent out several months ago. We got only twelve responses. Keep in mind they will be used for future marketing decisions.
If after reviewing them you feel that your practice has been overlooked, you can still complete a survey and send it to me for a later update.



continued p 3

Meetings

July 2, 2008
Topic: "State-of-the-Art Laser Triangulation Sensors"
Speaker: Steve Chirichella, Senior Sales Engineer, Keyence America

August 6, 2008
Topic: "The Difference that Industrial Design Can Make in Engineering Projects"
Speaker: Eric Seger, Design Resources USA Inc.

September 3, 2008
Topic: "Embedded Linux Development for Power Architecture"
Speaker: Alex Peck, FAE, Freescale Semiconductor, Inc.

October 7, 2008 7 PM
Topic: "Ways to Succeed as an Engineering Consultant"
Panel Discussion: Several of our more experienced members will will briefly describe how they:

1. **Find clients**
2. **Apportion their time among clients**
3. **Price their services**
4. **Use contracts**
5. **Keep clients happy**
6. **Bill for services**

After these presentations, the floor will be opened for questions.

Place: Briarcliffe College, Great Room
1055 Stewart Avenue, Bethpage, NY.
.
Guests are welcome. No charge. No preregistration.
Light refreshments will be served.

Directions: See our website www.consult-li.com.

Other Meetings
Consult the Events Calendars on the Section website: www.ieee.li and the LICN site: www.consult-li.com

Remember to inform the members about seminars and other items that might be of interest. E-mail them at members@consult-li.com.

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Address All Correspondence to:

IEEE Consultants Network
Of Long Island
P.O. Box 411
Malverne, NY 11565-0411

Tel: (516) 379-1678
Web: http://www.consult-li.com

Newsletter Staff
Editor: *Dr.Richard LaRosa*
Tel: (516) 486-7827
e-mail: r.larosa@ieee.org

Associate Editors:
John Dunn, Ambertec, Inc.
Tel: (516) 378-2149,
e-mail: ambertec@ieee.org

Peter Buitenkant
Tel: (631) 491-3414
e-mail: peterbui@optonline.net

Printing and Distribution:
Dr. Richard LaRosa
Tel: (516) 486-7827
e-mail: r.larosa@ieee.org

Deadlines: Flexible
Articles for publication in ***THE CONSULTANT:*** Send them in. We need them.

The IEEE Consultants' Network of Long Island maintains a referral service of engineering, computer, managerial, and technical professionals. Call or write for more information. There is no charge to the client for this service.

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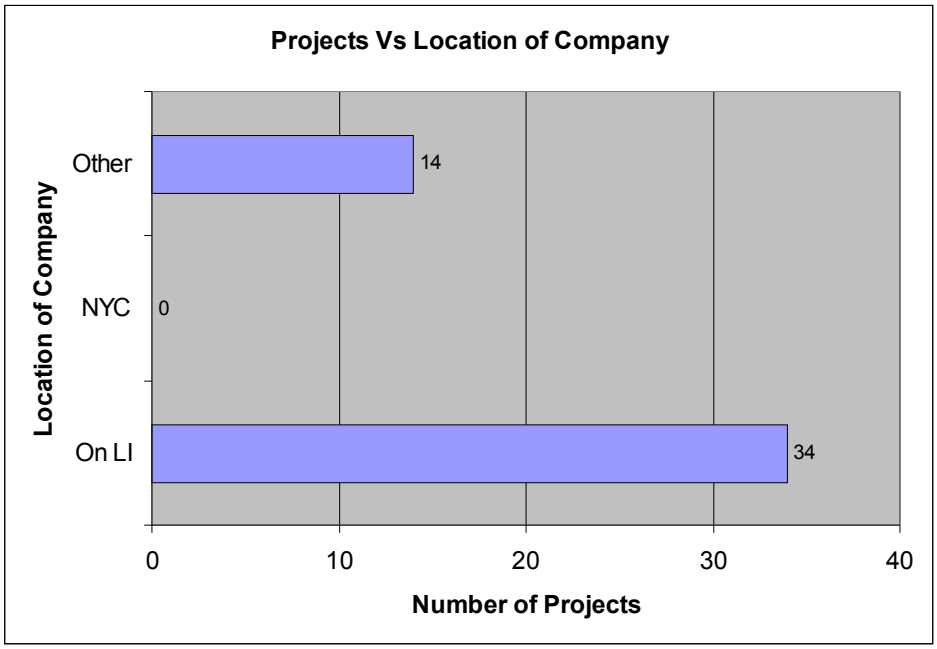
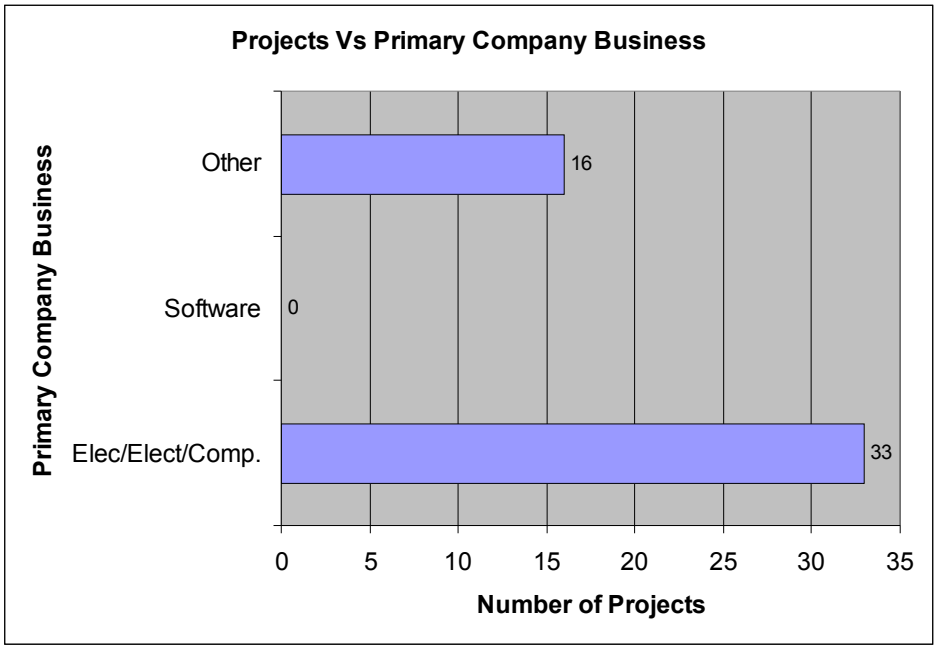
Chairman's Corner continued



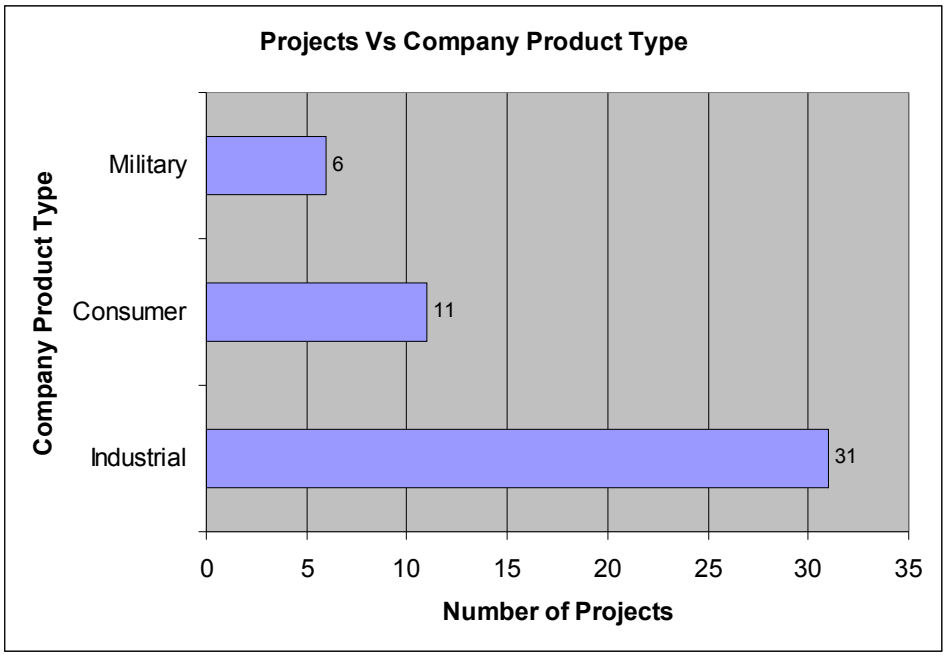
Note: Queens and Brooklyn were included in the Long Island numbers

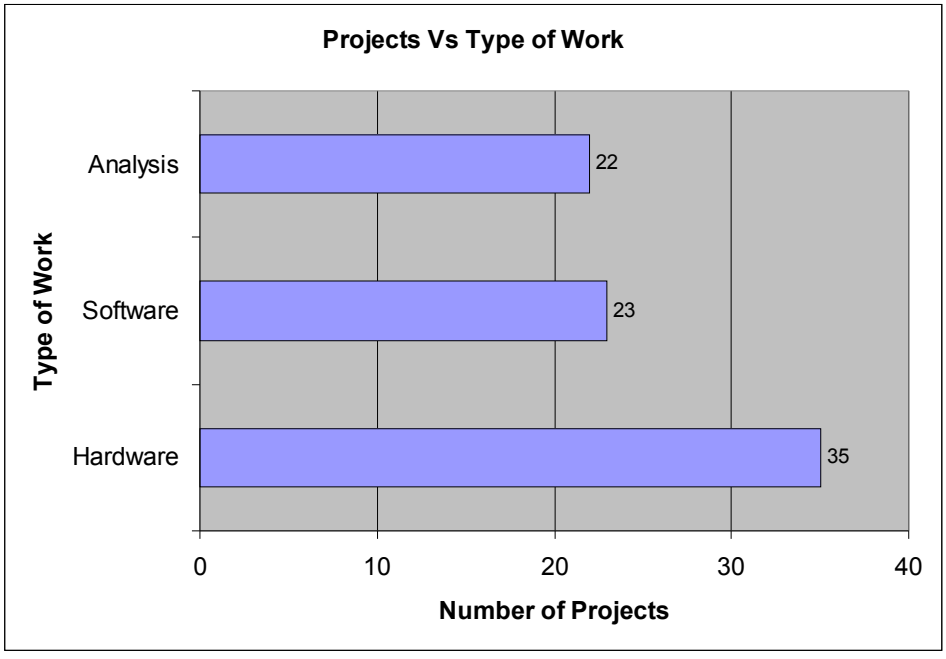


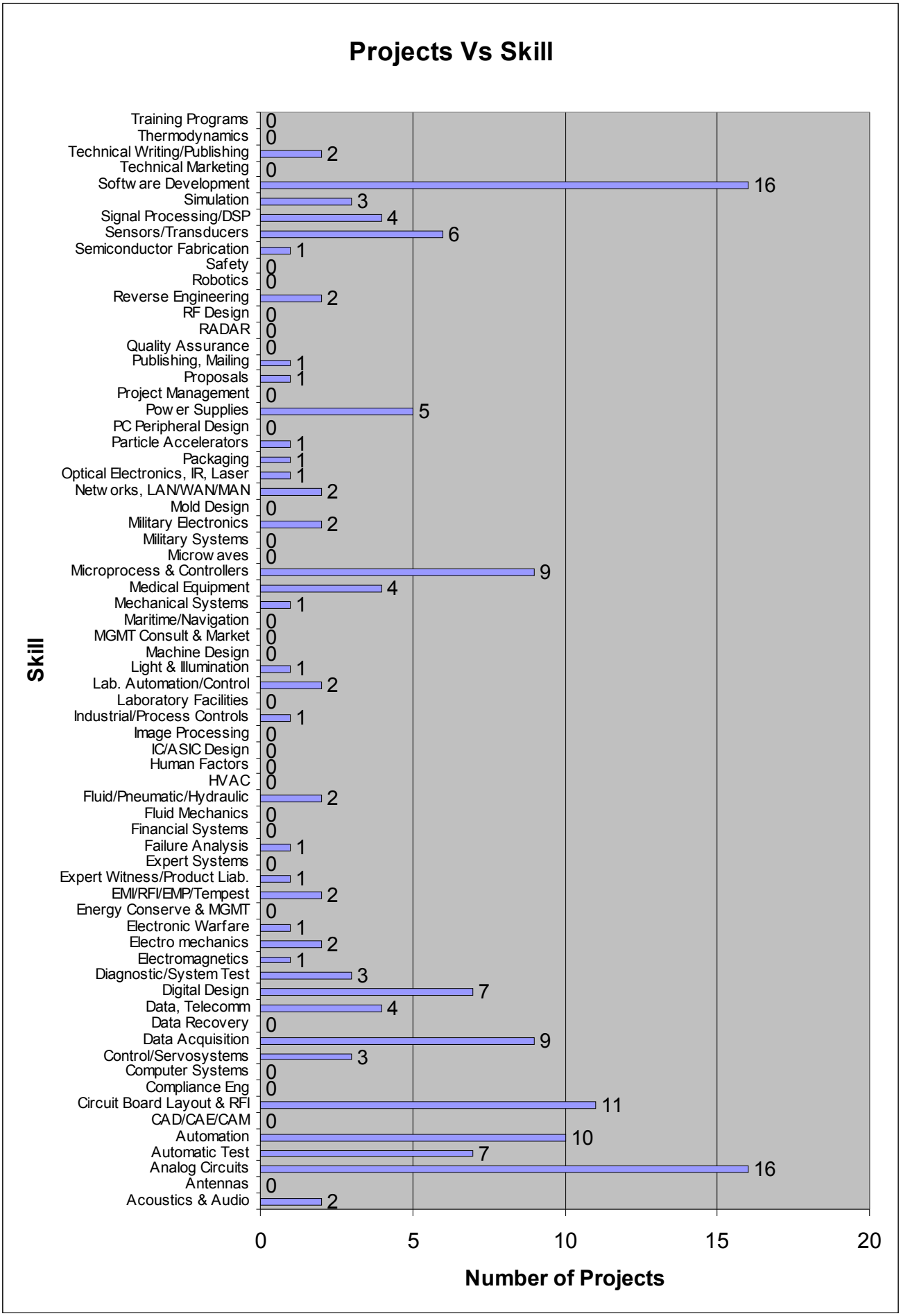
Other primary company businesses listed by members in the survey.

Test lab - Military/Aerospace
Auto parts aftermarket
Ice Cream distributor
Medical Imaging
Aerospace
Hydraulics
Consumer products
Electronics packaging
Violin bows
Circuit board manufacturing

Note: I included Radar and Medical Imaging in the Electrical/Electronic/Computer category.


Projects Vs Company Product Type
Company Product Type
Military
Consumer
Industrial
6
11
31
0
5
10
15
20
25
30
35
Number of Projects


Projects Vs Type of Work
Type of Work
Analysis
Software
Hardware
22
23
35
0
10
20
30
40
Number of Projects


Projects Vs Skill
Skill
Training Programs 0
Thermodynamics 0
Technical Writing/Publishing 2
Technical Marketing 0
Softw are Development 16
Simulation 3
Signal Processing/DSP 4
Sensors/Transducers 6
Semiconductor Fabrication 1
Safety 0
Robotics 0
Reverse Engineering 2
RF Design 0
RADAR 0
Quality Assurance 0
Publishing, Mailing 1
Proposals 1
Project Management 0
Pow er Supplies 5
PC Peripheral Design 0
Particle Accelerators 1
Packaging 1
Optical Electronics, IR, Laser 1
Netw orks, LAN/WAN/MAN 2
Mold Design 0
Military Electronics 2
Military Systems 0
Microw aves 0
Microprocess & Controllers 9
Medical Equipment 4
Mechanical Systems 1
Maritime/Navigation 0
MGMT Consult & Market 0
Machine Design 0
Light & Illumination 1
Lab. Automation/Control 2
Laboratory Facilities 0
Industrial/Process Controls 1
Image Processing 0
IC/ASIC Design 0
Human Factors 0
HVAC 0
Fluid/Pneumatic/Hydraulic 2
Fluid Mechanics 0
Financial Systems 0
Failure Analysis 1
Expert Systems 0
Expert Witness/Product Liab. 1
EMI/RFI/EMP/Tempest 2
Energy Conserve & MGMT 0
Electronic Warfare 1
Electro mechanics 2
Electromagnetics 1
Diagnostic/System Test 3
Digital Design 7
Data, Telecomm 4
Data Recovery 0
Data Acquisition 9
Control/Servosystems 3
Computer Systems 0
Compliance Eng 0
Circuit Board Layout & RFI 11
CAD/CAE/CAM 0
Automation 10
Automatic Test 7
Analog Circuits 16
Antennas 0
Acoustics & Audio 2
0
5
10
15
20
Number of Projects

Where are the Hybrids? —— Carl E. Schwab

After years of telling us how great the hybrid cars will be – where are the hybrids?

The Prius by Toyota was introduced about 1995 and has been sold internationally and in the US and is now on its third iteration. Somewhere between 50,000 and 500,000 have been sold in the US and internationally. There are about 1000 here on Long Island and you do see them frequently. They are easily recognized because of their distinctive shape.

But where are the rest?

Most manufacturers have some "hybrid" to offer. Some of these offerings are "sorta hybrids". But a phenomenon seems to be that, except for the Prius, these hybrids are NOT being bought by the public.

The writer has written several articles about designing your own hybrid and has concentrated on the "Series" mode. The first commercial offering of "Series" mode will be the GM VOLT now scheduled for late 2010 production start.

All the rest of the current hybrid offerings are "parallel" mode, i.e. the internal combustion engine (ICE) and a mot/gen power the drive wheels at the same time. Prius is a "parallel" mode design.

It is an over-simplification to state, "If you are interested in gas mileage, buy a Prius.
Otherwise don't buy a hybrid because of the excessive length of time to recover the
price premium that the manufacturers are demanding."

I am aware of a company here on Long Island that has a pool of company-owned cars that are used by employees while performing company business. The pool consisted of twelve Toyota Camry cars. Six were hybrid and six were conventional versions. Accurate records were kept of fuel and service costs. The determination was the hybrid cars had to be driven 60,000 miles to recover the premium. The company decided that the additional outlay for the hybrids was not warranted and replaced all twelve with conventional Camrys.

This long projected premium recovery time has been harangued by car magazine writers; and they have reached some bizarre conclusions. For example one writer concluded that the GM offering with a premium recovery time of 18 months was a "best buy", but in fact, its mileage on local driving was no better than the conventional model, and the trip mileage was only slightly improved. In this scheme the mot/gen was directly linked to the ICE and provided extra torque at passing speeds and little else. Real rubbish.

Car manufacturers thought being able to claim "hybrid" alone would enhance sales – it hasn't.

So the current tack, even by Toyota, is to claim hybrid techniques improve the car's performance in terms of acceleration, braking, and general comfort so that they become a real luxury car. Towards that end they are introducing new luxury hybrid models under the Lexus name.

In the writer's opinion, the premium has to be overcome. The hybrid version should cost no more than the conventional version. Economy of scale should go a long way towards this end. One of the most promising is the GM VOLT, BUT, it looks like they are adding a huge premium to the price, much as they did with the EV1. This will kill the sales required to reach economy of scale.

Another WRONG MOVE by GM, I fear. Time will tell.

Lessons from Hurricane Ike

—— Dr. Richard LaRosa, sealevelcontrol.com

GUSTAV RECAP

Hurricane Gustav, on its way to New Orleans, went through the deep warm water collected by the Loop Current. Fortunately, the loop extended only half way to New Orleans. The second half of Gustav's path through the Gulf of Mexico was over a shallow layer of solar-heated surface water which was not able to supply the heat energy required to intensify the hurricane. Therefore it made landfall as a Category 2, down from the Category 4 that it had been while passing through the loop. This suggested that we could protect the Gulf Coast by weakening the Loop Current so that it would pile up less warm water in the Gulf of Mexico. Also, the reduced current would not be carried by its inertia as far into the Gulf.

I have not yet learned how forecasters predict a hurricane's path. I don't think it has much to do with the location of deep warm water pools. But knowing the predicted path and the locations of the warm water accumulations, we can predict whether the hurricane will intensify or weaken. I correctly predicted that Gustav would weaken after it left the loop and began to pull up cooler water.

Full of confidence, I spent a couple of days glued to the computer to see if I could predict whether Ike would strengthen or weaken at various points on its path. This proved to be a somewhat humbling experience, but it was indeed educational.

FOLLOWING IKE

Ike was a Category 4 hurricane when it went past the Turks and Caicos Islands on its way to Cuba. I wondered where it found enough deep warm water to reach this intensity. I Googled "Florida Straits outflow" and found a paper that taught me that the Old Bahama Channel follows the northern coast of Cuba. Warm water from the Gulf of Mexico passes between the Florida Keys and Cuba and runs into a fork in the road. It can go north between Florida and the Bahamas, or it can turn south into the Old Bahama Channel. This junction is complicated by the presence of Andros Island in the path of the water. Most of the outflow from the Gulf turns north, but enough can flow south into the Old Bermuda Channel and provide deep warm water along the north coast of Cuba. Perhaps there is some leakage through the channels around the Turks and Caicos and various other islands that helped to intensify Ike.

Another possibility is that hurricanes may not require deep water for formation. As far as I know, there are no deep warm water pools out in the Atlantic where hurricanes often form. There is only shallow solar-heated surface water. This is pure conjecture, but it may be that deep warm water becomes necessary after the hurricane is fully developed and deep water is pulled up into the eyewall. This would be the situation for hurricanes that move into the Gulf of Mexico and threaten oil and gas operations, as well as the Gulf Coast.

Ike passed over Cuba and emerged into the Gulf as a Category 1. It grew to Category 2 in the deep warm pool formed by the Loop Current. I followed it all the way to Galveston, and plotted the successive eye positions on a printout of sea surface height contours that were supposed to tell me where the deep warm water was stored. The path was very close to, but outside and to the northeast of two rings that had detached from the loop and were slowly drifting toward the Texas coast. There was warm water piled up inside these rings, but because Ike's path stayed outside of them, I thought that it was pulling up cooler water. I expected Ike to weaken, but instead, it maintained its maximum sustained wind speed and grew larger in area. Gustav had decreased its intensity when it left the Loop Current. Why did Ike not do the same thing? Perhaps Ike found some warm water outside the rings? The next section belabors this question because it is crucial to the argument that reduction of the Loop Current transport will help to protect the Gulf Coast from hurricanes.

RING CIRCULATION

There are two components of the ring circulation. One is a continuation of the clockwise path of the Loop Current. When the end of the hairpin loop closes on itself and detaches from the loop, inertia causes the current to continue flowing clockwise around the ring. The other component is the circulation transverse to the ring current.

The Coriolis force pulls the faster, warmer surface water to the right toward the inside of the ring. This water is less dense, so it forms a mound inside the ring. The first ring that Ike went past had a mound 35 cm high. It still had its circular shape. The second ring that Ike grazed was nearing the Texas coast and was splitting into two rings, each with a peak height of 15 cm. Gravity tries to make the surface water flow down the hill and the Coriolis force is pushing it up the hill. Are these two forces in equilibrium? That would depend on whether the water in the center of the ring might tend to sink and need to be replaced by more Coriolis force water. Some rough calculations using assumed temperature differentials indicate that there could be enough cooling of the water in the center of the ring to increase its density and cause it to sink. The stirring due to both components of circulation increases the heat transport and insures that the sinking and circulation is maintained.

It would be nice to have some real calculations to quantify this transverse circulation, and perhaps they already exist somewhere. For the present, I just have a hand-waving explanation for why Ike did not lose intensity as it went tangentially past the two rings: there was warm water coming up in its path to be recirculated back into the center of the ring.

An additional argument supporting this transverse flow invokes the question of why the rotating ring does not increase its radius.due to centrifugal force. Perhaps it does, and the transverse Coriolis flow keeps pulling the current back toward the center of the ring. With all the known motion and thermal conductivity, it is hard to imagine these transverse forces in static equilibrium. Circulation into the ring at the surface and return upwellimg outside the ring seems more logical. I have just begun to tackle these questions and hope to have better answers soon.

The same ideas apply to the transverse Coriolis circulation crossing the main Loop Current that passes through the Gulf. The mound in the center of the hairpin loop was 80 cm high when Ike came through. It is about that high most of the time. My hazy quantitative knowledge indicates that the warm water at the center might extend to a depth of at least 200 meters.

EXPLAINING IKE

The AccuWeather Hurricane and Tropical Storm Center predicted that Ike would be a Category 3 for a while before landfall. I predicted it would weaken. What actually happened was in between. The maximum sustained winds never reached the 111 mph required to be classified as Category 3, but it grew to enormous size. There was moderate damage to oil and gas operations, some loss of life, widespread devastation of shore structures, and great human suffering and economic loss.

I believe that the outcome would have been much worse if Ike had passed through the interior of either of the detached rings, and a real horror if it went through both of them. When it became obvious that Ike would remain a Category 2 until landfall, I caught myself wondering what to click on to run the experiment again with a different path. And then I remembered that those were real people caught in this monstrous thing, and now they would be trying to retrieve their lives.

Would turbines in the Antilles passages help to make these people safer while increasing the profits of the shipping and oil and gas operations, and providing non-polluting electric power and desalination? Could be a Win Win Win.