



THE CONSULTANT

The Newsletter of the IEEE Consultants Network of Long Island

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Chairman's Corner — Jerry Brown, Essex Systems

Where does your business come from?

One of the questions that came up as we planned the postcard campaign was how to define the target audience. It's necessary to do this in a way that facilitates building a mailing list. The consensus of the committee members was that typical prospects are:

1. Companies located on Long Island and the greater New York City boroughs.
2. Companies under \$100 million in sales
3. Companies classified under Standard Industrial Classification prepared by the U.S. Dept of Labor as producing electrical, electronic and software products. This included measuring, analyzing and controlling instruments. [If you're interested, you can find a description of the codes at http://www.osha.gov/pls/imis/sic_manual.html .]

Is this correct? We'd like you to tell us where the majority of your business comes from. The following survey could help us in the future. This is a draft copy. I'll be emailing something like this to you soon.to get your response

For each question below tell us about your last five projects.

Company size in sales (Total company; not just the division you worked for):

1. < \$1M ; < \$100M ; < \$1B
2. < \$1M ; < \$100M ; < \$1B
3. < \$1M ; < \$100M ; < \$1B
4. < \$1M ; < \$100M ; < \$1B
5. < \$1M ; < \$100M ; < \$1B

Company location:

1. _____ on Long Island ; _____ NYC boroughs ; _____ Other
2. _____ on Long Island ; _____ NYC boroughs ; _____ Other
3. _____ on Long Island ; _____ NYC boroughs ; _____ Other
4. _____ on Long Island ; _____ NYC boroughs ; _____ Other
5. _____ on Long Island ; _____ NYC boroughs ; _____ Other

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Meetings

June 4, 2008

Topic: "How I Design Switching Power Supplies"

A Pragmatic Approach for Wide Ranging Applications

Speaker: Martin Kanner, Kanner Electro-Medical Co. (KEMCO)

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.

Time: 7 PM

**Place: Briarcliffe College, Great Room
1055 Stewart Avenue, Bethpage, NY.**

Guests are welcome.

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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Deadlines: Flexible

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

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Chairman's Corner continued

Primary Company business:

1. Electrical/Electronics/Computers/Software ; Other
2. Electrical/Electronics/Computers/Software ; Other
3. Electrical/Electronics/Computers/Software ; Other
4. Electrical/Electronics/Computers/Software ; Other
5. Electrical/Electronics/Computers/Software ; Other

Product type

1. Industrial ; Services ; Consumer ; Military
2. Industrial ; Services ; Consumer ; Military
3. Industrial ; Services ; Consumer ; Military
4. Industrial ; Services ; Consumer ; Military
5. Industrial ; Services ; Consumer ; Military

Hardware/Software/Analysis

1. Hardware ; Software ; Analysis
 2. Hardware ; Software ; Analysis
 3. Hardware ; Software ; Analysis
 4. Hardware ; Software ; Analysis
 5. Hardware ; Software ; Analysis
-

Hybrid Checker Cab? — Carl E. Schwab

This article is written slightly in jest – but not really. Recently Mayor Bloomberg, of New York City announced that starting in 2009 a set of guidelines for hybrid taxicabs in New York City would be in place.

Specifically he set forth the general requirement that that they deliver an average of 25 mpg, or better, in general livery service. Some researching suggests that current mileage is between 15-20mpg, probably closer to 15mpg.

Bloomberg indicates that GM, Nissan and Ford will supply such vehicles.

Nissan offer will be based upon the Altima whose technology is based upon Toyota under license. Ford is to offer an Explorer presumably based upon the technology also licensed from Toyota and used in the Ford Escape. The GM offer is less clear and may be a “mild hybrid”.

I think Mayor Bloomberg is to be congratulated in pushing clean hybrid technology for this city-wide taxi service. The key to most efficient livery service, I feel, is BER, (Brake Energy Recovery). Reason being speeds are mostly in the 0-35mph range and frequent stops.

Harking back to the several articles I wrote about converting a standard sedan into a series hybrid, the thought occurs, what about resurrecting the “Checker Cab”, but building it as series hybrid? The “Checker Cab” and a few others were “purpose built” for the rigors of city livery service. They had to be rugged, flexible in loading and passenger seating, and driven prodigious mileage throughout their service life.

A little checking reveals the following. Production of the Checker Cab was suspended in 1982, however, the company still exists and has the Rights to the name and technology. BTW before it stopped production Checker offered a CNG powered version to lower fuel costs and produce cleaner emissions. These were popular in Mid-west cities where natural gas was plentiful and inexpensive. The main negative things were cost relative to standard sedans and safety issues with items like the handy fold down “jump seats”. Also Checker had offered front wheel drive versions for several years.

From “Maximizing Brake Energy Recovery”, LICN Newsletter, June 2008, there are several points made that can be applied to the Hybrid Checker Cab. The main pack voltage will be about 250 Vdc (actually 251.6Vdc) and the boost voltage will be 500Vdc which combines to produce 750 Vdc to the VVVF (Variable-Voltage, Variable-Frequency) converter. As discussed in the referenced article, a VFSM type motor will maximize the overall BER (Brake Energy Recovery) which is key to an efficient Livery type vehicle. The VVVF unit will power three (3) drive motor/gens. The three VFSM will be used such that one drives the front wheels, while the remaining two will drive each of the rear wheels. This is very similar to the scheme on the GM VOLT3.

An alternate scheme would use two mot/gens, one for the front wheel drive and the other for the rear wheel drive. In this mode anti-slip differentials are used in both the front wheel drive and also in the rear wheel . In this case the VVVF will provide two outputs, one for front wheels and the other for the rear wheels. The design for the front and rear differentials already exists as Checker Cab property.

Rounding out this “Hybrid Checker Cab” will be a small ICE plus a VFSM driven as a generator. It will operate in a clean on/off cycle controlled by the charge state of the main battery pack (i.e. the 251.6 VDC). A PHEV feature could let you start the day with the main battery at 100% charge and after service has dropped to a settable charge level, the ICE starts and recharges the battery + load to 80% then turns off.

So as the cab is in service throughout the day the ICE will be on or off and cycle as requirements vary. While the ICE is ON, the emissions are very low because the ICE is “tuned” for a constant mechanical load from the VFSM generator, making it a significant contributor to lowering exhaust pollution in the city.

WHY NOT?

Lake Victoria — *Dr. Richard LaRosa, sealevelcontrol.com*

LESSONS FROM AUSTRALIA

AUSTRALIAN DROUGHT - QUICK FIX

The mountains of the Great Divider Range run along the east coast of the continent. They are about 2000 meters high at the south end, near the border between Victoria and New South Wales. Going north, the ridge loses altitude. Canberra Airport is on the ridge about 130 km north of the tallest mountain, and its altitude is about 600 m. Sydney is a big city on the coast about 160 km north of Canberra Airport.

The basin to the west of the Divider Range has been a fertile place with a network of rivers and other irrigation means for supplying crops with water. It is named the Murray-Darling basin because the Murray and Darling Rivers flow through it. Rice was grown as a staple food for export to many countries. Now rice growing has decreased to the point where an important rice mill was shut down and the farmers are trying to eke out a living by growing crops like grapes, which are better suited to an arid climate. This year, the water storage has decreased so severely that it is becoming too alkaline in some places and too acid in other places due to the minerals in the ground. Water must be imported from outside these regions to dilute these reservoirs. There are shortages everywhere and people face severe restrictions on their water usage.

Much of the interior of the continent has been desert for many years, and it looks like the desert is being extended. Not to worry. Engineer to the rescue! Wind roses in various places show the velocity ranges and the percent of the time that the wind in each speed range blows from each principal direction. At many places along the coast, the wind comes from the ocean at 3 PM during Spring, Summer, and Autumn. The Australian Bureau of Meteorology also supplies data for 9 AM, which seemed to show wind coming from random directions.

Aha! The central deserts heat up during the day and the air rises. Air is drawn in from the coast to replace it. Air coming from the east must rise up to pass over the Great Divider Range. At the higher altitude the pressure is lower, so the air expands. If no heat is added, this is an adiabatic process and the temperature is lowered. If the temperature drops below the dew point, the water vapor condenses, and if droplet or ice crystal size grows, we get precipitation.

Not enough precipitation? This could be caused by mountain tops heating up due to global warming. This would heat the air rising over them and cause a little less precipitation. This would allow the soil to dry a bit, so it would have less evaporative cooling and raise the soil temperature a bit more, and so on. Positive feedback makes a small perturbation grow into a noticeable effect.

The fix might be to raise the dew point by adding water vapor to the air coming from the sea. Solar-heated evaporator rafts moored in coastal waters could add a small amount of water vapor to the air, which would slightly raise the dew point, allow a bit more condensation, resulting in slightly more precipitation, with wetter soil, more evaporative cooling, and so on. Positive feedback of a small change in the correcting direction might be able to cancel the perturbation that is causing the drought.

Performance calculations, preliminary solar-powered evaporative raft design, deployment method, mooring layout for service boat access indicate that the idea should be pursued. On the basis of the above assumptions about airflow over the mountains, the rafts should be located in the eastern coastal waters in order to inject water vapor into the air coming from the ocean. However, from correspondence with several authors, it has become apparent that the pattern of airflow over Sydney does not indicate that air is flowing over the mountains to the interior of the continent. It is just a land-sea breeze enhanced by the face of a mountain. The Sun heats the mountain, which heats the air, causing it to rise up the mountain during the day, and come back down during the night, when the mountain cools. This is described in the following section.

AIR FLOW AT THE MOUNTAIN RIDGE

Canberra Airport is located on the ridge, and the daily 3 PM readings of wind speed and direction indicate that the flow is more often from the northwest to the southeast, which is the direction perpendicular to the ridge. At 3 PM, the Sun is toward the west, so the western face should be warmer than the eastern face, which is now shaded. This could be one reason why more air seems to be coming up the side facing the interior of the continent. Another reason might be the greater heating of the interior deserts.

It now is apparent that the notion that air rises straight up over the deserts and is replaced by air pulled in from the coast is incorrect - a figment of my overactive imagination. Fortunately, I don't think I have made this mistake in the many other places throughout the world that are experiencing mountain drought. These other places all have prevailing wind directions or seasonal monsoons. Australia also has these large-scale wind patterns, but I do not know them well and they change from year to year, as the high- and low-pressure areas change. Atmospheric scientists have pointed out correlations between the intensity of the Australian drought and the changing locations of the high- and low-pressure areas. I am more interested in local causes of drought because I am attempting to develop a local remedy.

When air rises up on both sides of the mountain range, what happens when it reaches the top? We only have readings at instrument tower height. I'm guessing that the air (at 3 PM) leaves the ridge in a horizontal flow. Some air from the dominant side passes over the ridge and adds to the flow up the weaker side that merely turns back and flows away from the top. Most of the flow on the dominant side merely turns and flows horizontally away from the ridge. At night, the mountain cools and the flows reverse. Cool air comes down both sides.

The moisture carried by the air on the ocean side of the mountain would be enhanced by evaporator rafts moored in the coastal waters. This might increase precipitation on the ocean side of the Great Divider Range, but there would be little benefit to the interior of the continent. It appears that most of the precipitation on the interior side of the mountain merely returns moisture evaporated from the interior fresh water storage and distribution system. The net water gain in the continental interior must come from the water vapor brought by the large-scale atmospheric flow, and this is proving to be inadequate.

NEW RAFT LOCATIONS

If the Great Divider Range acts as a barrier that prevents coastal air from reaching the interior of the continent, perhaps it would be better to locate solar-heated evaporator rafts where the water vapor would be carried into the interior of the continent without having to pass over mountains. A somewhat systematic search for coastal locations that are not blocked by mountains yields three places on the south coast. One is Ceduna, a town located at an indentation that maximizes the

collection of water vapor over land, as opposed to having it blown out to sea and wasted. The Great Victorian Desert lies to the north and west of Ceduna. To the east, there is a possible path across a series of lakes that may facilitate moisture transport to the Murray-Darling basin. It will take some time to download and study the twice-daily wind speed and direction readings, and the temperature and humidity data, and relate it to the topography.

Ceduna is located on a part of the Indian Ocean coast called the Great Australian Bight. Toward the east from Ceduna, there are two large gulfs which are almost completely surrounded by land. These might be ideal sheltered locations with shallow moorings for evaporator rafts. Spencer Gulf is the first, and Gulf St. Vincent is the second. South Australia's capital city, Adelaide, is located on the east shore of Gulf St. Vincent. There are mountain ranges to the east of Adelaide, so more evaluation of topography and twice-daily wind, temperature, and humidity readings is required. Maybe there will be some conclusions for the next newsletter.

Australia was the starting point of this virtual world tour of the many drought-stricken places, all of them involving the decline of precipitation on mountains. It appears that it will take some time to learn how to apply solar thermal engineering principles to the alleviation of drought in Australia. It will be worthwhile because the people are good and able to work together to make the effort succeed.