



THE CONSULTANT

The Newsletter of the IEEE Consultants Network of Long Island

Volume 23, Number 5

May 2006

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Chairman's Corner — *John Dunn, President, Ambertec, Inc.*

"Hot" button time, at least for me. The first subject is the general public's perception of teachers.

I have of late been overhearing enormously derogatory comments made in various public places about how easy teachers have it, how much they're overpaid for working only six hours a day and how unfair it is that they get all kinds of time off, especially with holidays and the summer.

Let me say this at the outset: I come from a family of teachers. This includes my mother, my wife, my in-laws, my wife's cousin and my wife's aunt, so I may be just a teeny little bit prejudiced. However, I have also seen how my children's teachers, taken as a group, included both the good and the bad, so maybe I'm not that prejudiced after all.

What is overlooked is that teachers have to do class time, have to do preparation time to get ready for class time, have to do examination preparation time, have to do examination marking time, have to put in administrative time and have to take time fairly often for making home contacts.

Six hours a day?? Try ten to fifteen hours a day and you'll be closer to it.

So how do these misperceptions arise? Does everyone think they know what it is to be a teacher just because they once went to school?

By the same token, what about the general public's perception of consultants?

Mention that word in some places and listen to the derisive snickering.

Wanna see something nasty? Look at "Working In Dilbert's World", in the first paragraph, part (C), at the following web site:

http://www.dilbert.com/comics/dilbert/news_and_history/html/working_in_dilberts_world.html

Something is very much not right. Teachers aren't the only victims of misperception.

Meetings

June 2006

**7:00 PM, Wednesday, June 7, the first Wednesday of the month.
Briarcliffe College, 1055 Stewart Avenue, Bethpage, NY**

Topic: "Liability Protection for Engineering Consultants"

Speaker: Mr. Norman Bluth, Esq. of Jericho, NY

Admission is free (no charge). No pre-registration is required. For further information, contact the Chairman, John Dunn, by e-mail: ambertec@ieee.org, or by telephone: (516)378-2149.

Another Organization

The New York Society of Professional Inventors held its regular monthly meeting on May 24. The topic was "Engineering from Invention Concept to Production" by Mr. Paul R. Herbert, whose company, Herbert Engineering & Design Company, offers a range of engineering, design, machining, and brochure services to innovators who want to get their products on the market. Mr. Herbert's specialty is creative light metals and plastics product design and development.

Mr. Herbert and many speakers at previous meetings simply assume that products will be made in China or other Far Eastern countries. Even the tooling and sometimes the AutoCad drafting is done there. There are many steps in the process. At the manufacturing stage, you pay up front, the stuff goes into a container, there are shipping costs, delays in ports, duties, etc. Finally you get to see what's in the container. A happy outcome depends on relationships that have been built and nurtured over the years, and understandings that transcend language barriers. Some previous speakers have offered to use their relationships for the benefit of their clients.

Mr. Herbert remarked that Mexican quality was good in the first production runs, but then it seemed to go downhill.

THE CONSULTANT is published monthly by the IEEE Long Island Consultants Network and is available free of charge to its members.

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Hurricanes — *Dr. Richard LaRosa, sealevelcontrol.com*

The Coriolis effect has afforded me many happy hours of contemplation in trying to understand whether a real physical force results from a change of reference from inertial coordinates to a coordinate system locked to the Earth's surface. Last month, I gave the wrong explanation for the rotations in a hurricane.

Satellite photos show cloud features that might be spiraling clockwise and outward, or counterclockwise and inward. Actually, we are seeing both. The wispy cirrus clouds at the highest altitude are spiraling clockwise and outward. The heavier cumulus clouds are at lower altitude and are spiraling inward in a cyclonic, counterclockwise direction. The hurricane's highly efficient heat engine brings a lot of air and moisture up to the top of the troposphere and it has to spread out radially. The Coriolis effect makes it turn to the right (Northern Hemisphere) in the Earth coordinate system. Kerry Emanuel says the eyewall and the cyclone at lower altitude turn in the opposite direction so that the total angular momentum is zero.

The friction forces between the low-altitude air and the Earth's surface seem to be speeding up the Earth's rotation. Can the hurricane's heat engine be adding to the kinetic energy stored in the Earth's rotation? More happy contemplation in store.

Hurricane Suppression—Warm-Core Ring Dissipator

I have been working on OTEC-powered pumping stations to be stationed inside the Loop Current in the Gulf of Mexico. Warm water carried by the Loop Current is swept to the interior of the loop by the Coriolis force. The pocket of warm water can be 150 meters deep at the center and can add a lot of energy to a hurricane that runs across it. The loop sometimes extends quite far into the Gulf in the direction of New Orleans. Katrina ran down the center of this hairpin loop and intensified. The interior of the loop is a good location for the pumping stations that bring up cold water and mix it into the warm surface water. We are not trying to cool the Loop Current itself — only the warm water that is swept toward the center and held there.

After the loop elongates, it pinches together and a closed ring is formed. The current in the ring continues to circulate around a clockwise path due to its inertia. This ring detaches from the loop and drifts westward at 2 - 5 km per day. If a ring is 200 km in diameter and its center passes through a particular point in the Gulf, the trailing edge will pass the point 100 days later than the leading edge for the slowest drift, and 40 days later for the fastest drift. I don't have velocity profiles for the Loop Current, but I have them for the Florida current near Miami, and they should be similar. Assume that we form the ring by bending a piece of the Florida Current around in the form of a circle 200 km in diameter. The volume transport around the ring is 25 million cubic meters per second. The volume transport involves integrating the velocity over the cross section of the current. Integrating the square of the velocity over the cross section gives the kinetic energy, which is 11.68 GJ per meter of current path. A 200 km diameter ring has a length of 628 km, and the total kinetic energy of the ring is 7.34 million GJ. Integrating the cube of the velocity over the cross section gives a power transport of 12.6 GW.

If we dissipated the kinetic energy of the ring at a uniform rate of 2.83 GW, the ring would disappear in a month. Dissipating more power would get rid of the ring sooner. This would be of great benefit to the offshore petroleum industry, because disturbances caused by the drifting rings sometimes force them to suspend operations. Hurricane suppression would be helped because the deep pocket of warm water could no longer be contained, and it would spread out in a thin layer which can not supply much energy to a hurricane. Best of all, we can forget about having to install tension-leg platforms and cold-water pipes all over the Gulf and transporting monstrous pumping stations around to keep up with the drifting warm-core ring. The OTEC-powered pumping stations require large heat exchangers in order to accommodate the poor efficiency of the OTEC heat engine.

Instead, we can have a fleet a highly-mobile floating units, which we will call "Ring Dissipators." Each ring dissipator will have a turbine that is driven by the circulating current of the ring. The turbine is attached to a rigid cold-water pipe that extends down possibly 100 meters to cooler water. A small high-speed electric-motor-driven pump would be mounted at the bottom of the pipe to weigh it down and provide a counter-torque to the stator of the alternator driven by the turbine. With the pump at the pipe inlet pushing the water up, we avoid the problem of cavitation at the inlet of a

small high-speed suction pump. A perforated fabric discharge hose is still needed, but it would not need to be as long as those in an OTEC-powered pumping station, and there would be only one hose instead of the three required for the OTEC station.

Pumping up cool water would be the primary means of dissipating the kinetic energy of the ring current. The turbine would also supply power to orthogonal thrusters which would keep the turbine in the ring. Its position relative to the ring would be monitored by a satellite and instructions would be transmitted to the thruster controller. The azimuth orientation of the ring dissipator can be provided by an on-board compass. The required North-South and East-West displacement corrections can be translated into x- and y-component thruster signals by an on-board computer. The ring dissipator must also be aligned with the direction of the ring current for maximum power input to the turbine. This will require a means of sensing the current direction relative to the craft. Remote-operated vehicles (ROVs) generally have four thrusters, one at each corner of the ROV. The thrusters are aimed in a circumferential direction around the ROV. Combinations of forward and backward drives can translate the ROV in two orthogonal directions, as well as rotate it in azimuth. Very heavy-duty work-class ROVs use hydraulic-powered thrusters, but most others use electric motor drives. Our ring dissipator would be considered light duty and can make use of much existing technology.

The Loop Current feeds the Florida Current, which is only about 800 meters deep. The Florida Current is stratified according to temperature, with the warmest water on top. The stratification in the Loop Current is essentially the same, so there is no Loop Current flow below 800 meters. Therefore, a drag chute attached to the top of the cold-water pipe by a cable at least 1000 m long should keep the ring dissipator from moving too fast downstream. There is some motion at depth due to tidal flow, but the on-board navigation and thruster system should be able to compensate for it.

This sealevelcontrol.com project has evolved through many stages, all of them described in various issues of this newsletter. The concern at the start was with the melting of polar ice sheets and the resulting increase in sea level. We have learned that the Florida Current-Gulf Stream system might be slowed 10 % if enough turbine power were extracted to supply the peak demand of the Con Edison-LIPA service area. This would reduce the heat transported to the Arctic, but then came the realization that this would leave more heat in the Gulf of Mexico to help the hurricanes to intensify. Therefore, slowing down ocean currents was ruled out and OTEC-powered pumping stations in the deep Atlantic Ocean outside the Windward Islands were considered. Bad location. Too much cold water required to reduce the temperature of this enormous current. Also, the Sun would heat the surface water during its passage to the Gulf of Mexico, and there would be no benefit to this critical region. Study of the bathymetry of the Caribbean area showed that there was an adequate supply of cold water in the Gulf of Mexico, so the pumping stations could be stationed inside the Loop Current. This reduced the number of stations required to provide a tangible protection to the Gulf Coast region, especially New Orleans. Instead of trying to mix cold water into the main current and have it disappear through the Florida Straits, we cool the pocket of warm water that is swept inside the loop. The depth of this warm-water mass supplies energy to hurricanes such as Katrina that pass through the loop. This looked like real progress, except for the need to chase after the warm water that is enclosed by rings that pinch off from the main Loop Current and drift westward.

Ring Dissipator to the rescue. We cannot employ these on the Loop Current itself unless we find a way to use them briefly to induce a pinching-off and separation of a portion of the Loop Current. The mechanism of separation is being studied, and we may find ways to keep ring dissipators employed full time. But once there is a detached ring, the ring dissipators can attack it without interfering with the removal of warm water through the Florida Straits.