ConsortiumConnection

FEATURE ARTICLES

PARTICIPANTS IN THIS ISSUE

- NAWCWD
- Flight of the Century
- University of Colorado at Boulder
- COMPSIM
- RMV Technology Group
- Allied Minds
- NASA

TECHNOLOGY IN THIS ISSUE

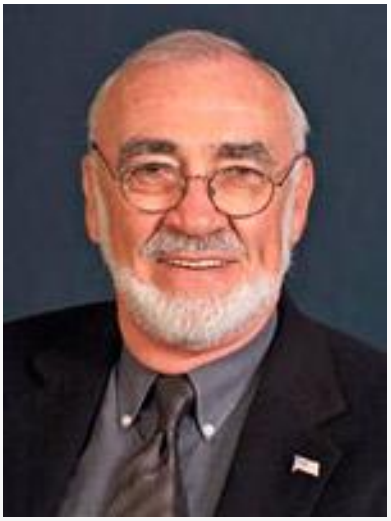
- R&D in the USA
- Electric Airplane Speed Record
- Knowledge Enhanced Electronic Logic
- Autonomy
- Computational Materials
- Packaging Engineering
- Technology Sharing
- Space Shuttle

Mr. Gilbert Decker, Former Assistant Secretary of the Army, Speaks at NAWCWD

Mr. Gilbert Decker, advisor to the China Lake High Tech Consortium and former Assistant Secretary of the Army for RD&A, was a Distinguished Speaker for the Colloquia Series. The topic of his presentation was "Basic and Applied Research: The Fuel of American Greatness".

Mr. Decker co-chaired an expert panel that was assembled to consider how current trends in research and development (R&D) might unfold over time and how those trends could affect the US DoD laboratories and R&D centers. He presented case studies of Basic and Applied Research that led to product and system applications that created enormous value to both US industry and Government economies, and several that led to US Defense and Military supremacy. He presented some of the studies that make the case for continuing Basic and Applied Research as a high priority, even with the current economic malaise.

Continued on Page 2



ABOVE: Mr. Gilbert Decker, Former Assistant Secretary of the Army (RD&A)

Continued from Page 1

Mr. Decker spoke on some of the findings of the panel which looked at national trends in basic research and R&D, including trends in Department of Defense research funding; that conducted an in-depth examination of the research enterprise; and profiled several non-Army laboratories known for their high-quality basic research, to gain insight into how the Army might

The panel identified several trends, such as an increasing focus on near-term results and tendency toward risk aversion, that are hampering the research effort. Mr. Decker concluded with a list of recommendations for addressing these issues to help get the best long-term value from investments in basic research.

Here are some excerpts from the presentation:

"I'll lead off with a comment on the title of my discussion today. You folks here at China Lake are first class hi-tech men and women. China Lake's track record of superb accomplishments is testimonial to that effect. So, my title is sort of preaching to the choir. I don't have to deliver a sermon to you talented folks because I know you are already believers.

If I were delivering this talk to a lot of our elected representatives and/or to the bean counters and sociologists in government, I would think like an old time preacher and say "convert and be saved to help save the health and wealth of the nation and your fellow citizens".

Download Mr. Decker's entire report "Army Strong: Equipped, Trained and Ready" at: http://www.ntis.gov/

ATTRIBUTES OF HIGH QUALITY RESEARCH ORGANIZATIONS

- Clear and substantive mission.
- Critical mass of assigned work.
- Highly competent and dedicated research workforce Inspired, empowered, highly qualified leadership .
- Management authority and flexibility, including a pool of funding at the discretion of the research leader.
- Promotion tracks for top quality researchers that do not require becoming managers.
- State-of-the-art facilities and equipment.
- Effective, two relationship with clients (research sponsors.
- Strong linkage to other top quality research organizations.

"We stressed that managing risk, which included TRL's that were accurate, was essential. The huge empire of staff layers that exist in program reviews are all geared to CYA avoidance of risk vice risk management. A well-educated and talented work force is the single most important factor in developing realistic requirements and executing approved programs. There are huge layers of staff that exist to review the reviewers who review the programs. It is not only expensive overhead but also it leads to real inefficiencies.

With that, I would like to close with an "attaboy" to the entire China Lake Community. Notwithstanding all the bureaucracy that exists, you folks have an exemplary track record in technology development that has truly benefitted all the services, not just the Navy. Keep up the good work!"

Learn more about NAWCWD by clicking below

NEXT ISSUE

Have an article, announcement, or press release you'd like to see in the next issue of Consortium Connection?

Contact us at:
bill.hogan@clhtc.com

FACTOID

Did you know that:

Chip Yates now holds the world record for being the first person to fly an electric airplane over 200 mph at the Inyokern Airport in California's Mojave Desert, beating the previous record of 175 mph?

See article in this newsletter on Page 7.

PARTICIPANTS

In the News:
Cobalt Technologies
Flight of the Century
Allied Minds
NASA

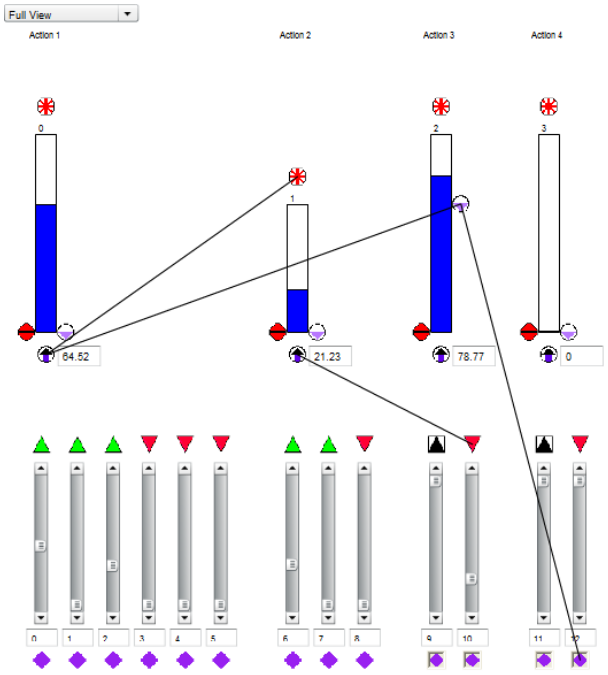
Click on NEWS to read more

In Pursuit of Autonomy

Helena G. Keeley
CEO - Compsim LLC
Brookfield, Wisconsin

The increasing interest in autonomy is highlighted by the July 2012 task force report: "The Role of Autonomy in DoD Systems". A new technology is available that may change the playing field: Knowledge Enhanced Electronic Logic (KEEL®) Technology from Compsim. KEEL Technology provides a new way to process information, much like the right hemisphere of the human brain supports judgment and reasoning. KEEL is supported with a "Dynamic Graphical Language" that makes it much easier to define and test the complex cognitive processes needed for autonomy. Unlike brittle IF THEN ELSE rules, KEEL engines capture "how to think" in one very small "function" that can address many needed cognitive problems. With KEEL, the problem space is maintained and manipulated in data tables with the single KEEL function. Using this paradigm, the SMEs spends their time defining and enhancing the cognitive policies, rather than developing and debugging complex formulas and code.

When armed forces are trained as warfighters, they are taught how to respond to different events. They are taught how to recognize situations. They are taught how and when to use weapons. They are taught how to think. If you give events, objects, and collections of objects labels, you are on your way to creating KEEL-based models that emulate *how to think*. These events, objects, and collections of objects can be considered "information objects". The process of thinking (for humans) requires establishing values for these "information objects" and integrating them in ways to create more information objects that are "decisions" and "actions". These decisions and actions will also include values that define "how much" of an action.

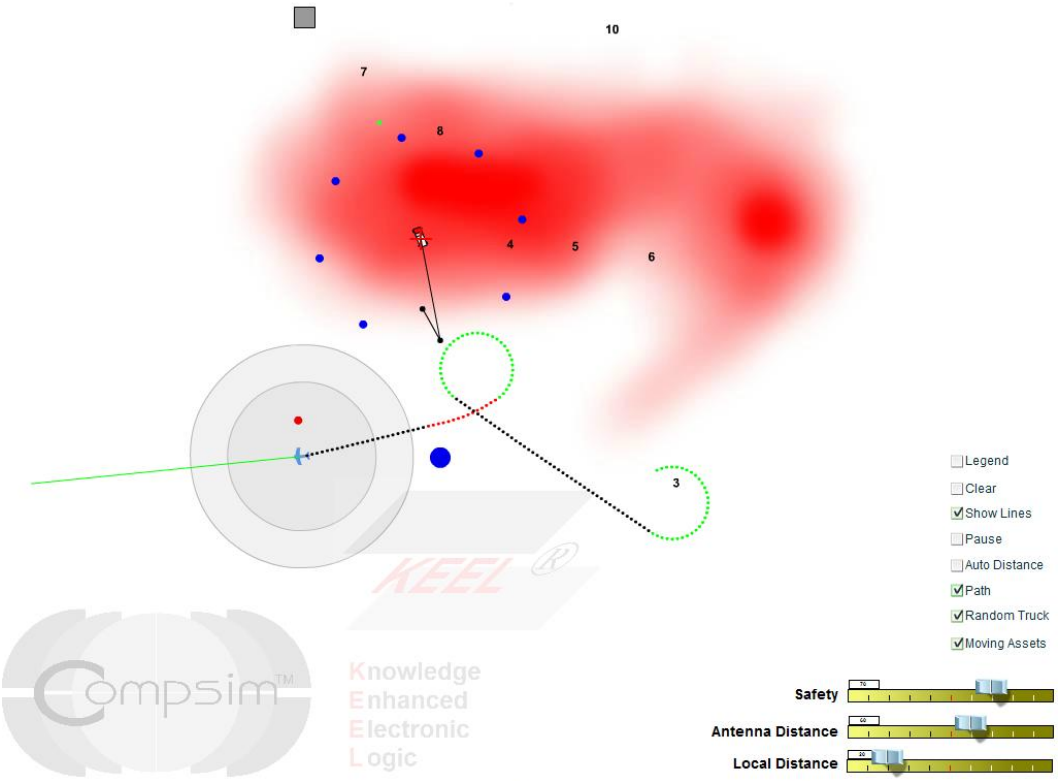


KEEL Dynamic Graphical Language

Learn more about COMPSIM by clicking below

Continued on page 4

AUTONOMY continued from page 3



Cognitive Policy for Vehicle Tracking

KEEL Technology is an "expert system" technology, in that a human defines the policies. A human SME defines how information objects are inter-related. The human thinks in terms of how some information objects control the importance of other information objects, or how they influence (or contribute to) the interpretation of other information objects.

KEEL was developed to address "wicked" problems that have, in the past, proven difficult to cost effectively address. Many of these problems require in-depth investigation and testing as part of the development process, because they are so difficult to articulate. The KEEL Dynamic Graphical Language was developed to address this issue. It provides a truly interactive / visual experience that allows the SME to interact with the policy on a computer screen and get immediate feedback as he/she stimulates information objects with the mouse.

This allows them to observe information propagation throughout the model. Behind the graphical interface a KEEL "cognitive" engine is created as if a human was wiring the neurons of the brain. The KEEL Engine operates as if it was an explicit mathematical formula.

This allows domain experts to develop and test the models without support from mathematicians or software engineers. When the model has been completed, it can be immediately translated to conventional code in numerous languages for deployment in any platform and any system architecture.

>>

Task force report: "The Role of Autonomy in DoD Systems"; July 2012; Department of Defense, Defense Science Board.

To learn more about KEEL Technology:
http://www.compsim.com/AboutKEEL.htm

Computational Robotic Materials

Nikolaus Correll
University of Colorado at Boulder

Exponential increases in computational power, miniaturization, and advances in manufacturing techniques allow for an ever tighter integration of sensing, computation, and actuation. This provides an opportunity for making materials not only smart, but change their shape, appearance, and properties in response to the environment. We dub such materials, which will be amorphous and scalable, "Computational Robotic Materials" (CRM). CRMs combine sensing, computation, and actuation into a single cell, which can then be networked to create systems of arbitrary shape and size. Such cells could be integrated into garments, furniture, vehicles, tools and even building materials to make them interactive and change their physical appearance and behavior. For example, CRM shoes could warn their wearer when she sets foot on a slippery surface, CRM garments could alert workers of dangerous environmental radiation and indicate its direction, and CRM gloves could help its users to feel things humans are not normally sensitive to such as small temperature differentials, pH-value or presence of certain organic molecules. Other CRMs might allow a mattress to seamlessly transition from soft to hard, airplane wings to change their shape, bandages to heat or cool bruises, clothes to adapt their size to their wearer or becoming body armor, military vehicles to adapt their camouflage to the environment, and walls to change their opacity and air permeability in response to local sensing and gestures.

While materials integrating these properties seamlessly are still futuristic, we have begun to construct macroscopic instances of CRMs, which allows us to study their key algorithmic and software engineering challenges. Examples of these are shown in Figure 1. These include an artistic wall that creates a life-like impression by having 70 actuators wiggle in coordinated, yet random – very much like an animal swarm – fashion and responding to the presence of people by the equivalents of anger, curiosity or surprise; a modular cubicle system in which each block can change its opacity, color and air permeability in response to local sensors and user gestures; a shirt that is equipped with an array of microphones and micro-controllers, that perform a frequency analysis of the incoming sounds, compare values with their neighbors and then indicate their direction to their wearer; and a soft, robotic muscle that can move autonomously using local sensing and distributed control.

Albeit spanning multiple orders of magnitude in length scale and numbers of computing elements (from 70 to 6 networked microcontrollers and from 40 feet to 6 inch), all of these prototypes share the same hardware and software infrastructure, with future miniaturization of CRMs in mind.

Continued on page 6

Figure 1: From left to right. "Swarm Wall" a 40x12 feet installation at the CU art museum consisting of 70 actuators driven by distributed control; the "Amorphous Façade", a modular building block that can change its color and opacity; "Flutter" a dress embedding microphones, vibration motors and distributed computation to triangulate and indicate the direction of sounds; and a 8-cell soft robot that can move autonomously by selectively inflate parts of its body solely based on local sensing and distributed control.

COMPUTATIONAL continued from page 5

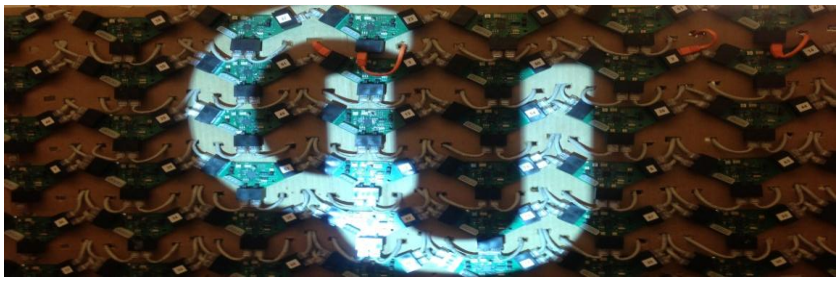


Figure 2:
48-cell CRM test-bed to study scale-free computational and communication challenge, such as distributed pattern and gesture recognition.

For example, computational challenges that are common to all of these systems are: (1) How to generate the local instructions to achieve a desired behavior on collective level; (2) how to program a large distributed system; and (3), how to process information within the network to minimize the information that needs to be communicated across the material and requires subsequent processing. Figure 2 shows an example of a high-density CRM prototype, which we use to study gesture and shape recognition. We used this prototype to develop algorithms that can quickly disseminate code in the system in a viral fashion by having nodes reprogramming each other. We have also studied algorithms that allow to route information in a large-scale network in a scalable way. To this end, we are currently investigating using Bloom filters, which are a memory and computational efficient method to test membership in a set, for multi-cast routing. This multi-cast group then allows all involved nodes to exchange information and find a consensus on the detected pattern without perturbing the rest of the network. Mathematical challenges we are investigating are how to model the dynamics of soft and flexible materials that are actuated from within, such as the soft robot shown in Figure 1, right. As these system consist of both stiff and flexible elements that constrain the expansion of the system and could be actuated to generate local deformation, we are currently studying tensegrity structures and their models as possible abstraction.

While CRMs can lead to interesting applications at the macro-scale using off-the-shelf technologies and existing manufacturing techniques – possible examples that go beyond the existing prototypes at our lab shown in Figure 1 include deformable airplane wings, exoskeletons with adaptive compliance to support when lifting weights, or bridges changing their resonance properties – the final goal of CRMs are polymers that seamlessly integrate sensors, actuators, computation and power distribution. One possible approach to achieve this is to build up on the growing field of polymer electronics, which has demonstrated polymer transistors and simple logic gates. Although these circuits are very slow and bulky when compared with their silicon counter-parts, smart distributed algorithms could process information in parallel and implement simple pre-processing and information forwarding. Being able to print a NAND gate – a basic logic element – and combine it with organic LEDs, would allow to implement basic cellular automata and possibly to print the game of Tetris on the back of a magazine at the same cost to print an advertisement now. Unfortunately, processing and manufacturing of all-polymer circuits is still in its infancy and creating even simple state machines by inkjet printing alone remains a major challenge.

CRMs are an emerging paradigm that might transform how we think about functional materials and requires a new level of interdisciplinary collaboration among computer science and the engineering disciplines. While truly multi-functional materials are still futuristic, identifying useful applications at the macroscopic scale and building prototypes will allow us to address the algorithmic foundations of future CRMs. These results can then serve as a driver to accelerate bottom-up research into the materials and computer architecture challenges, which will literally dissolve the boundary between material and computer science.

Click here to learn more about CU Boulder

World's Fastest Electric Airplane Breaks 200 MPH Record!

by Marc Carter

Chip Yates, who's known for setting speed records with electric motorcycles, has just set a new world record in his Long-ESA electric airplane. Yates now holds the world record for being the first person to fly an electric airplane over 200 mph. Yates' record-setting flight grabbed the world record at 202.6 mph at the Inyokern Airport in California's Mojave Desert, beating the previous record of 175 mph set by the electric Cri-Cri. See Figure 1.

Figure 1

For the record-setting flight, Yates and the **Flight of the Century** team converted a Long-EZ airplane into the all-electric Long-ESA airplane. The Long-EZ is already known for setting speed and endurance records thanks to its efficient design and it easily cruises at speeds over 200 mph with its gasoline-powered engine. The electric Long-ESA is powered by a 258 horsepower electric motor and the team is currently working on a new Infinite Range Electric Flight mid-air "refueling" technique that provides the ability to swap out the plane's batteries while it is in flight, giving it an unlimited electric flying range.

Yates' flight this week lasted 16 minutes and was his first time flying the electric airplane. See Figure 2. Unfortunately, the plane's trip was cut short when "a dead cell killed propulsion following the record run." Next, the team is going to replace the batteries and go for another run, since Yates feels that it's possible to reach even faster speeds.

.

Figure 2

Read more: [World's Fastest Electric Airplane Breaks 200 MPH Record! | Inhabitat - Sustainable Design Innovation, Eco Architecture, Green Building]

Packaging Engineering: A First Line of Defense For Suspect Component Detection

Bob Vermillion, CPP/Fellow
RMV Technology Group, LLC
NASA-Ames Research Center
Moffett Field, CA 94035

The days of purchasing U.S. based products from one's local distributor can be compromised by outsourcing efforts lacking traceability in the supply chain. In contrast to aerospace & defense, the pharmaceutical sector is actively engaged in utilizing a sound packaging engineering approach enabling non-conforming or suspect counterfeit products to be differentiated, tracked, identified, inspected and placed into quarantine.

Scope of the Problem: Supplier Non-conformance and Suspect counterfeit packaging represents a hazard to electrostatic discharge (ESD) sensitive devices or components through cross contamination (Figure 1) during transport and storage while generating high voltage discharges in the parts inspection and manufacturing process. Several aerospace related issues involve long-term storage supplier non-conformance with antistatic foams, antistatic bubble wrap, vacuum formed antistatic polymers and Type 1 moisture barrier bags. The late John Kolyer, Ph.D. (Boeing, Ret.) and Ray Gompf, P.E., Ph.D. (NASA-KSC, Ret.) were advocates in the utilization of a formalized physical testing material qualification process. Today, however, prime contractors and CMs rely heavily upon a visual inspection process for ESD packaging materials. Over the past 10 years, however, suspect counterfeit ESD packaging materials have compromised the supply chain.

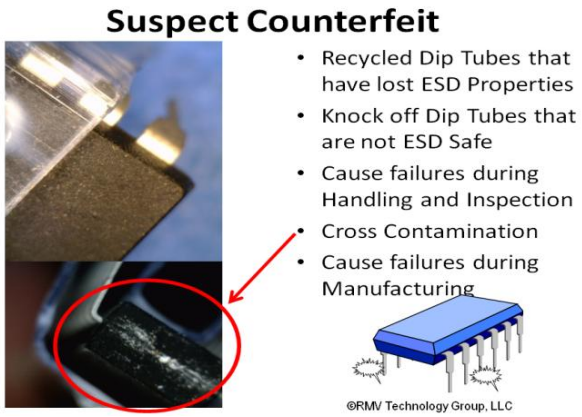


Figure 1

Most recently, despite visual inspection of an outer package label and bar code scanning by an electronic components distributor, suspect counterfeit re-topped electrostatic discharge (ESD) sensitive components were still purchased in error. To compound the matter, a new and very inexpensive method of removing a component's lettering is now being utilized by the counterfeiters that does not show evidence of tampering as illustrated in Figure 2.

Original: Left **Tampered**: Right

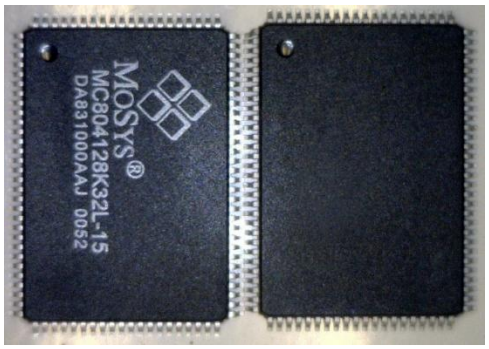


Figure 2

One countermeasure for detection is the use of RFID in packaging for incoming inspection and inventory tracking. Another measure constitutes "hands on" training for Incoming Shipping & Receiving personnel in the use of advanced inspection techniques of packaging materials. For example, ESD sensitive components are typically protected by packaging that industry identifies by " color": i.e., Pink for antistatic bubble, Black for carbon loaded polymer JEDEC trays and Tape & Reel. Color is not an indicator of static control packaging performance, however, this identification marker is widely accepted by the aerospace & defense and space sectors. A simple and cost effective electrical resistance test can very easily determine if the packaging is compliant beyond misidentification by color. If the package fails this initial test, then it should be flagged for components that could be compromised. A simple rule to remember is "*A counterfeiter will not be motivated to package fraudulent ESD sensitive components in compliant static control packaging that could add up to 40% or more in material costs alone.*"

PACKAGING ENGINEERING continued from Page 8

The author's groundbreaking presentation at the NASA-Quality Leadership Forum (March 2010) first identified that suspect counterfeit packaging materials are being used extensively in the supply chain. As a result of this white paper, two articles were published titled Dip Tube and JEDEC Trays and Tape & Reel that provide greater detail as a result of the conference. Both articles can be found at:http://www.esdrmv.com/content/suspect-counterfeit-training. The RMV presentation and referenced articles describe issues related to antistatic packaging as a long-term storage hazard. Even though NASA may not use dip tubes in manufacturing, many prime contractors, CMs and electronic distributors continue to source legacy products housed in antistatic IC carriers.

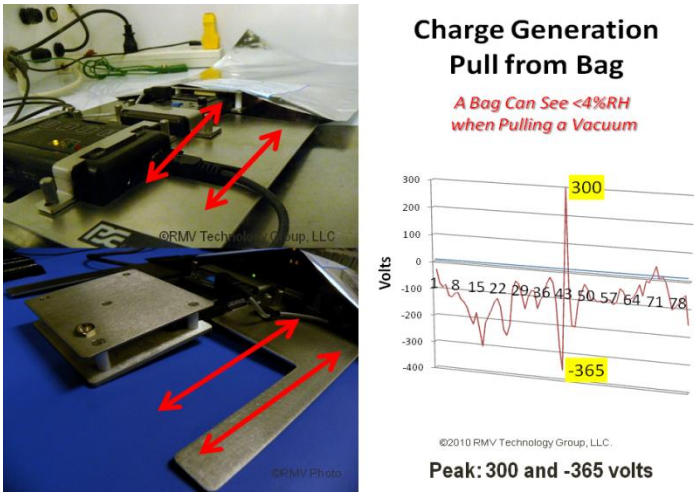


Figure 3

A first line of defense strategy to mitigation of counterfeits in the supply chain is a proactive approach in effective packaging design *know how* instead of reliance upon suppliers to do the right thing. Since 1997, RMV has tested static control products and packaging for the end user, OEMs, CMs and distributors. Despite favorable supplier in-house test reports or technical data sheets, we have found that the majority of ESD materials and packaging from the Pacific Rim fail standardized ESD testing. For example, the Type I & III bag required by the DOD is to provide a charge free shielding environment for ESD sensitive components (see Figure 3, Tape & Reel Type I bag). The utilization of ever changing pallet patterns in combination with specialized packaging (see Figure 4) is a simple change that can thwart

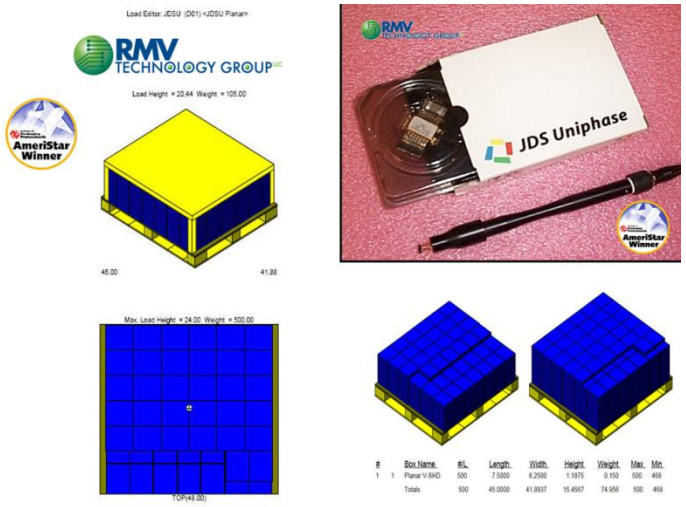


Figure 4

suspect counterfeiting and make tampering much more difficult. Thus, both supplier and customer are aware of the ever changing pallet patterns through the use of a Change Notification.

In March 2012, RMV in collaboration with the US Defense Ammunition Center (DAC) presented a white paper at NIPHLE, Washington, D.C. RMV demonstrated that despite accurate initial qualification efforts for ESD materials utilized in the DOD supply chain, four of the five packaging products (pulled from new inventory) yielded failing results:

1. Fast Packs (Failed)
2. Antistatic Bubble wrapping (Passed)
3. Antistatic Pink Poly Film (Failed)
4. Type 1 Aluminum ESD Moisture Barrier Film and Bags (Failed)
5. Type 3 Metalized ESD Shielding Film and Bags (Failed)

Once a package is qualified, these results indicate that periodic verification though physical testing is either not being required or that materials are subjected to long term storage conditions beyond a material's shelf life. Due to supplier nonconformance or suspect counterfeiting, protective packaging and materials for ESD sensitive devices must be revalidated on a periodic basis during the product life cycle. Taking a proactive approach by pulling the static control material or packaging from inventory to conduct ESD testing protects the warfighter and prevents equipment failure in theatre.

Bob Vermillion can be reached at bob@esdrmv.com

Defense Laboratories Reach Technology-Sharing Agreement

By David Lerman
Bloomberg Press

A Boston-based investment company plans to announce agreements today with Defense Department laboratories that it says can speed the transfer of military technology for commercial uses.

Allied Minds Federal Innovations, a unit of closely held **Allied Minds Inc**., has formed public-private partnerships with Army, Navy and Air Force research centers to develop products from new technologies, according to a company statement. The arrangement may create hundreds of jobs in 20 new subsidiaries in the first year of operations, Chris Silva, chief executive officer of Allied Minds, said in an interview. The company, which serves as a holding company for subsidiaries, is funded through investors that include Atlanta-based Invesco Ltd. (IVZ), according to Silva.

“It is a first-of-its-kind public-private partnership between a U.S. investment group and DOD labs,” Silva said, referring to the Department of Defense.

Allied Minds will invest $100 million in technology developed by the Army Research, Development and Engineering Command, based at Aberdeen Proving Ground, Maryland; the Naval Surface Warfare Center Crane Division in Crane, Indiana; and the Aerospace Corp., which operates a federally funded research center in El Segundo, California, for the Air Force and the National Reconnaissance Office.

While the Pentagon traditionally advertises new technologies to license them to private companies for commercial use, the partnerships will let Allied Minds continuously search for promising opportunities and “shorten the commercialization cycle,” Silva said.

Revised Rules

A March 19 Pentagon notice from Frank Kendall, the undersecretary of defense for acquisition, technology and logistics, revised rules in an effort to “promote research and development within the commercial sector of the U.S. economy, and the transfer of technology from the military to the commercial sector.”

Pam Keeton, a spokeswoman for Aerospace Corp., said Allied Minds “came to Aerospace with a proposal to make it easier to transfer technologies, and was selected after a review of several companies because of its experience with labs, universities and organizations similar to ours.”

The Army and Navy labs didn’t reply to e-mailed requests for comment yesterday.

Silva said the agreements have already led to creation of two subsidiaries that have been in business for a few weeks. The first is intended to provide technology to make the wireless spectrum more efficient as mobile devices consume more data. The second provides a new way to transmit data on the internet that is more secure, Silva said. Allied Minds sees business opportunities through federal lab research in such fields as cybersecurity, wireless communications and power storage and energy, he said.

To contact the reporter on this story: David Lerman in Washington at dlerman1@bloomberg.net

To learn more about ALLIED MINDS click here

Space Shuttle Endeavour's Final Fly-by

Photo: Courtesy NASA

LOS ANGELES (AP) — September 21, 2012
The people became the paparazzi Friday, aiming their lenses not at the latest starlet, but toward the sky to catch a glimpse of an aging superstar headed for retirement.

Endeavour Arrives in Los Angeles

It was the space shuttle Endeavour, zigzagging around California where it was born and where it will spend its golden years as a museum showpiece.

From the state Capitol to the Golden Gate Bridge to the Hollywood sign, thousands of spectators pointed their cellphones and cameras skyward as the shuttle, riding piggyback atop a 747 jumbo jet, buzzed past.

"It made the hair on the back of my neck stand up. It was historic, momentous," said Daniel Pifko, who rode by motorcycle to a hilly peninsula north of San Francisco to snap a few pictures of the iconic bridge.
Across California, throngs swarmed rooftops for one last glimpse of Endeavour airborne. Parents pulled their kids out of school. Some became misty-eyed, while others chanted "USA! USA!" as the shuttle soared overhead.

Gina Oberholt screamed for joy when she spotted Endeavour from a scenic overlook in Los Angeles. She felt a bit nostalgic because her uncle had worked as a shuttle technician.

"I've always had a special place in my heart for the shuttle program," she said.

Known as the baby shuttle, Endeavour replaced Challenger, which exploded during liftoff in 1986. **Endeavour rolled off the assembly line in the Mojave Desert in 1991** and a year later, rocketed to space. It left Earth 25 times, logging 123 million miles. Friday's high-flying tour was a homecoming of sorts.

After a nearly five-hour loop that took Endeavour over some of the state's most treasured landmarks, it turned for its final approach, coasting down the runway on the south side of the Los Angeles International Airport, where elected officials and VIPS gathered for an arrival ceremony.

As the jumbo jet taxied to the hangar, an American flag popped out of the jet's hatch. Endeavour will stay at the airport for several weeks as crew prepare it for its final mission: a 12-mile trek through city streets to the **California Science Center**, its new permanent home, where it will go on display Oct. 30.

ENDEAVOR continued from page 11

NASA retired the shuttle fleet last year to focus on destinations beyond low-Earth orbit. Before Endeavour was grounded for good, Californians were treated to an aerial farewell.

Endeavour took off from the **Mojave Desert** Friday after an emotional cross-country ferry flight that made a special flyover of Tucson, Ariz., to honor its last commander, Mark Kelly, and his wife, former Arizona Rep. Gabrielle Giffords.

Photo: Courtesy NASA

ABOVE: Space Shuttle Endeavor seen over the control tower at Edwards Air Force Base, Mojave Desert, CA

It circled the high desert that gave birth to the shuttle fleet before veering to Northern California. After looping twice around the state Capitol, it swung over to the San Francisco Bay area and Silicon Valley and then headed down the coast, entering the Los Angeles air space over the Santa Monica Pier.

"Even though it was a few seconds, it was a unique experience to witness history," said Andrew Lerner, who gathered at the pier with his parents. Derek Reynolds, a patent attorney from a Sacramento suburb, flew to Florida last year and camped out overnight on a bridge in the rain so he could view the last shuttle launch.

The flyover in Sacramento was a rare opportunity to share a firsthand experience of the space program with his 5-year-old son, Jack, who he pulled out of kindergarten for the day. "I want him to experience it and give him the memory since it's the last one," Reynolds said.

Peggy Burke was among the hundreds of camera-toting tourists who jammed the waterfront along the San Francisco Bay, reflecting on the end of an era.

"It's just a shame that the program has to end, but I'm so glad they came to the Bay area especially over the **Golden Gate Bridge**," she said. "Onward to Mars."

Photo: Courtesy NASA

ABOVE: Space Shuttle Endeavor seen over the Golden Gate Bridge, San Francisco, CA

Continued on page 13

EYE ON IT
Current Trends

BIOBUTANOL: The Alternate Fuel

We've seen the military embrace fuels derived from algae as well as fuels made from old cooking grease and animal fats. And now the U.S. Navy is expanding the search for petroleum alternatives with a deal to make fuels from non-food plant feedstocks.

Cobalt Technologies announced a deal between the Naval Air Warfare Center Weapons Division (NAWCWD) and the company Albemarle to produce a jet fuel from biobutanol. The project will use Cobalt Technologies' bio n-butanol to power army jets, but NAWCWD officials said they hoped commercial jets will eventually follow suit.

read more

PARTICIPANTS
In the News

Find more CLHTC participant news including a real-time news feed at www.CLHTC.com

ENDEAVOR continued from page 12

Along the flyover route, the mood was festive at times. At the Griffith Observatory, overlooking the Hollywood sign, a group of middle school children on a field trip broke out in song, giggling and belting out "The Star-Spangled Banner."

The cost for shipping and handling Endeavour was estimated at $28 million, to be paid for by the science center. NASA officials have said there was no extra charge to fly over Tucson because it was on the way.

Endeavor's carefully choreographed victory lap was by far the most elaborate of the surviving shuttle fleet. Discovery is home at the Smithsonian Institution's hangar in Virginia after flying over the White House and National Mall. Atlantis will remain in Florida, where it will be towed a short distance to the **Kennedy Space Center's** visitor center in the fall.

Photo: Courtesy NASA

ABOVE: Space Shuttle Endeavor over the Kennedy Space Center, FL

Still, public safety officials braced for congestion, worried that motorists would "gawk and drive" as Endeavour flew over.

Traffic came to a near stop along a freeway near the **NASA Jet Propulsion Laboratory** east of Los Angeles when looky-loos pulled onto the shoulders and center median. California Highway Patrol officers came through and blared over loud speakers for people to move on. See photo below.

Photo: Courtesy NASA

As Endeavour approached LAX, other airplanes were forced to circle and wait. Passengers on an American Airlines flight from Miami snapped pictures and rolled video out their windows as the shuttle arrived.

"This was a once-in-a-lifetime event," said pilot Doug Causey, who has been flying for 29 years. "That was a real treat to see something like that."

AP Writers Tom Verdin and Juliet Williams in Sacramento; Terry Chea in San Francisco; John Antczak in Pasadena; Greg Risling, Martha Mendoza and Raquel Maria Dillon in Los Angeles contributed to this report.

To learn more about NASA click here

EYE ON IT
Current Trends

BIOBUTANOL: The Alternate Fuel

We've seen the military embrace fuels derived from algae as well as fuels made from old cooking grease and animal fats. And now the U.S. Navy is expanding the search for petroleum alternatives with a deal to make fuels from non-food plant feedstocks.

Cobalt Technologies announced a deal between the Naval Air Warfare Center Weapons Division (NAWCWD) and the company Albemarle to produce a jet fuel from biobutanol. The project will use Cobalt Technologies' bio n-butanol to power army jets, but NAWCWD officials said they hoped commercial jets will eventually follow suit.

read more

PARTICIPANTS
In the News

Find more CLHTC participant news including a real-time news feed at www.CLHTC.com

China Lake High Tech Consortium

The Consortium is a unique partnership of academia, industry, government, non-profits and equity investors working collaboratively to provide creative solutions for the military and commercial marketplace.

ANNOUNCEMENTS

Now Accepting Spotlight articles for the next issue of *Consortium Connection*
Please forward submissions to **innovation@CLHTC.com** by February1, 2013, to be included in the Winter issue.

The WALL
Got ideas, innovations, suggestions or looking for collaborations? Be certain to visit "The WALL" on the CLHTC's website. Post your own, or respond to others.
The place to make Consortium Connections: **http://www.CLHTC.com**

Click on the WALL at CLHTC.com

JOIN the Consortium

For comments or questions please contact: Bill Hogan at ***bill.hogan@clhtc.com***
or visit us at ***www.CLHTC.com***