CorrDefense DoD News about Preserving Military Assets

Volume 2, Number 1
Spring 2006
Other News

Featured Profile: Lew Sloter, Ph.D.

CorrDefense Interviews Dr. Sloter about the DoD Corrosion Initiative

Since the Department of Defense (DoD) Corrosion Policy and Oversight Initiative got underway in 2003, the DoD Corrosion Office began relying on a team of experts from the Army, Navy, Air Force, Marine Corps, Coast Guard, and NASA, in conjunction with industry and academia. A vital member of this team is Lew Sloter, Associate Director for Materials and Structures in the Office of the Deputy Under Secretary of Defense for Science and Technology.

Dr. Sloter spoke with *CorrDefense* about the expertise and experience that he brings to the DoD Corrosion Initiative.

CorrDefense: **What aspects of your education and experience do you think helped prepare you for working with the DoD Corrosion Initiative?**

I have been working on corrosion-related projects since my undergraduate days. My senior thesis was on the corrosion fatigue and fretting fatigue of marine aluminum alloys. Later on I returned to corrosion fatigue as the subject for my doctoral thesis. Specifically I studied the corrosion fatigue performance of orthopedic fixation devices, commonly referred to as "hip pins," and the stainless steel and titanium alloys used in orthopedic surgery.

After going to work for LTV (Vought) in 1979, my first assignment was a corrosion survey of two RF-8 Crusader aircraft that we were overhauling for the Navy. As a materials engineer working on military projects (especially A-7 Corsair II aircraft and B-1) and commercial programs like the Boeing 747, 757, and 767, corrosion was always a consideration in materials and process selection. As a section head and, later, a research manager at Naval Air Systems Command and the Office of Naval Research from the mid-80s to mid-90s, corrosion was always a significant component of all my activities. We certainly took the corrosion performance of materials and systems into careful consideration when writing specifications for the V-22, VH-60, and P-7 aircraft and in upgrades to aircraft like the P-3 and A-6.

We certainly took the corrosion performance of materials and systems into careful consideration when writing specifications for the V-22, VH-60, and P-7 aircraft and in upgrades to aircraft like the P-3 and A-6.

Finally, corrosion consultation and corrosion project oversight have been and will remain an important part of materials and structures within Defense Research and Engineering, where I have been gratified to work for the last nine years.

CorrDefense: **Mr. Wynne, former Under Secretary of Defense for Acquisition, Technology, and Logistics, suggested that your job in this initiative is to act as its "technical conscience." What do you think he meant by that?**

Mr. Wynne was always very gracious and supportive to the Corrosion Initiative and to all of us working with it. It was a very great personal honor to have had the opportunity to work so closely with him. As you know, Mr. Wynne is an

outstanding engineer and executive. He feels it is the function and obligation of engineers to carefully examine technical facts and theories in order to explore and develop practical options.
When we do so, the program managers and decision-makers who balance cost, schedule, performance, safety, and other attributes can do so with all the relevant facts on the table.

I think that by "technical conscience" he meant that I should continuously encourage the technical experts involved in corrosion to play this role and to have the courage to bring forth the facts of corrosion as well as their best engineering judgment. And he meant for me to participate in appropriate debates and the priority balancing necessary to achieve a valuable defense product.

I think that by "technical conscience" Mr. Wynne meant that I should continuously encourage the technical experts involved in corrosion to play this role and to have the courage to bring forth the facts of corrosion as well as their best engineering judgment.

CorrDefense: **How do you keep up with the state-of-the-art in corrosion engineering and research and other technology areas associated with the broad purview of your Pentagon position?**

Obviously, no one can remain deeply expert and current in every aspect of materials and structures. Fortunately, because of all the outstanding experts and researchers associated with DoD programs, it is not vital for me to do so. I try to participate in focused meetings, conferences, and workshops such as the Tri-Service Corrosion Conference and materials societies' meetings. Visiting and talking with university and industrial researchers and managers is very valuable.

One of the most effective means of staying aware of recent developments is through reading the fine trade journals provided free to subscribers. These constitute an important part of my subway reading. Of course, NACE's Materials Performance is a great way to keep up to date on corrosion products, research, and wonderful practical advice on both typical and unusual corrosion problems. Most of all, I am comforted that I have so many expert colleagues to call upon when I need advice on any technical issue, corrosion-related or otherwise.

CorrDefense: **In light of Mr. Krieg's recent appointment as Under Secretary for Acquisition,Technology, and Logistics, as well as John Young's confirmation as head of Defense Research and Engineering, what are the biggest technical challenges that should be addressed in the realm of corrosion prevention and control?**

In light of the new executive appointments you mention, here is what I would try to convey to them technically relative to corrosion in their new jobs.

The single, greatest challenge in corrosion technology remains accurate, reliable prediction of corrosion progress and damage in realistic operating environments. The prediction of corrosion behavior is especially problematic, because it is generally both a physical and chemical process that is exquisitely sensitive to a number of variables, ranging from the perfection of the material or structure and its coatings to the corrosivity (aggressiveness) of the environment, which is often effectively a micro-climate. With modern computational tools and scientific understanding, we have made great progress in prediction, but additional advancement is needed.

The single, greatest challenge in corrosion technology remains accurate, reliable prediction of corrosion progress and damage in realistic operating environments.

A related technical challenge is the development and demonstration of reliable accelerated testing techniques that provide screening and general attribute predictors of relative corrosion performance. The development of very sensitive and miniature corrosion and corrosivity sensors is paying off handsomely in making such testing more viable and productive. We now have the ability in many cases to monitor the very onset of corrosion or coating breakdown during accelerated testing, and that means more discriminating, rapid, and efficient information to corrosion engineers and materials selectors. Of course, the continued development of affordable and environmentally benign materials and processes for corrosion prevention and mitigation will remain a challenge for research for any foreseeable future and one we will continue to address.

CorrDefense: **What other challenges must be faced?**

Another broad challenge is cultural and educational. The environment constantly attacks materials and equipment. This, like our own aging, is inevitable but also like aging can be mitigated by wise, often common sense choices. Our best choice for longevity is good genes. The corrosion equivalent is designing in corrosion resistance through, for instance, the deliberate choice of materials, coatings, and maintenance access and the deliberate avoidance of known corrosion accelerators, such as joining dissimilar metals and leaving traps for water to condense or pool.

On the cultural side, we need to constantly emphasize that, although the forces that drive corrosion are inevitable, corrosion itself is preventable or manageable. Within the DoD Corrosion Prevention and Control Initiative, we are working hard to provide educational opportunities and tools that the program managers, design and systems engineers, and others need to make a positive contribution in corrosion control. Although these are significant challenges, I truly believe that we have made careful choices in consultation with the many stakeholders in defense materiel and facilities and are acting in rational ways to make corrosion less burdensome and costly to our ultimate customers—the fine military personnel who use equipment and facilities and the American taxpayer.

On the cultural side, we need to constantly emphasize that, although the forces that drive corrosion are inevitable, corrosion itself is preventable or manageable.

CorrDefense: **Can you provide examples of acquisition programs that are effectively implementing corrosion policy?**

All the programs that have been reviewed by the Defense Acquisition Board have done a credible job in addressing the direction of the under secretary. One that I found particularly memorable was the new aircraft carrier program, CVN 21, which had a very logical and rationally developed corrosion planning process and did a very fine job in showing why and how certain materials choices had been made for longevity and controlling life-cycle costs.

The Army's Future Combat System Program has incorporated lessons learned in corrosion control. The Air Force/Navy/Marines Joint Strike Fighter has a very interactive corrosion planning activity ongoing. One important issue we must keep in mind with respect to acquisition programs is that there is no single formula or solution for corrosion prevention and control. One of the primary goals of the Pentagon Corrosion Prevention and Control Office is to develop or help develop the tools so that program managers can make the best choices for their systems and produce the most affordable and effective war fighting equipment or DoD facilities.

One important issue we must keep in mind with respect to acquisition programs is that there is no single formula or solution for corrosion prevention and control.

Through the online DoD Corrosion Exchange and with the help of NACE, we are working to promulgate these tools and lessons learned to all communities—DoD, industrial, and academic—that can assist in the struggle with corrosion.

CorrDefense: **In his video address to Tri-Service Corrosion Conference attendees, Mr. Krieg has suggested that the CPC community should work "smarter," not harder. What does that mean for your office and the Corrosion Policy and Oversight Office?**

I interpret "working smarter" in this context to mean early and deliberate consideration of problems, issues, or plans; making careful choices; and setting priority. This is perfectly parallel to the approach necessary to combat corrosion—early consideration of potential problems and mitigation methods; balancing cost, risk, and benefit; and then proceeding to implement in design, maintenance, or remediation. Making the best choices early and correcting miscues quickly seems a good philosophy to apply to corrosion and to many of the other problem areas we have to confront in DoD.

CorrDefense: **In the October 2005 *CorrDefense* roundtable, David Pauling spoke about the need to "create a culture where we're not just going in and doing projects, but where we're being smart buyers." He said, "We need the necessary data and predictive cause-and-effect assessments in order to know which projects will make a difference." Do you feel that, if allowed to flourish, the Corrosion Initiative will help the CPC community obtain such data and assessments?**

Absolutely! As Mr. Pauling so perceptively notes, we need data and metrics in order to make the best choices in corrosion and in many other areas. This is why in all the corrosion projects supported by the Corrosion Initiative, we are building in means to follow progress and benefit, either in terms of return-on-investment or other objective criteria, so that we will have the facts necessary to make the case for broader application of those technologies or techniques that are shown to be effective. Making well-established best practices known to a wider community, as well as the results of our projects, is a critical part of our outreach and educational efforts.

CorrDefense: **How did you arrive at your ultimate career choice?**

I always remember having been interested in the mechanical workings and the nature of the physical world. My father was a mould maker in the glass industry and an extremely talented machinist, so I had access to a wonderfully intimate and practical side of applied technology. As a member of the U.S. "post-Sputnik" generation, there was a certainly a societal bias toward the sciences and engineering, and, in general, salaries and opportunities for engineers and scientists were promising.

At the same time, I was drawn to history and writing as satisfying endeavors. When I was an undergraduate sophomore, I could not firmly decide whether I would prefer majoring in history or engineering, so I majored in both, taking advantage of a very liberal-education option at Carnegie Mellon University. Reading history, especially Ancient Egyptian, classical, and medieval history and general historiography, is among my principal pastimes. In a very real sense modern history and historiography are quite close to science and engineering in setting up questions and hypotheses and testing them with study and data. It is an intellectually stimulating way to keep refreshing one's perspective and helps to maintain an open mind as well. One book that I would recommend to anyone is *Historians' Fallacies* by David Hackett Fischer, which was published when I was an undergraduate and remains in print. It is a valuable manual for anyone interested in preventing illogical thought and untoward conclusions.

Reading history, especially Ancient Egyptian, classical, and medieval history and general historiography, is among my principal pastimes.

In a very real sense modern history and historiography are quite close to science and engineering in setting up questions and hypotheses and testing them with study and data.

In the end, I decided that the right day-career choice was metallurgy and materials engineering, which has always provided ample opportunity for both technical and aesthetic satisfaction.

CorrDefense: **I learned from one of your colleagues recently that you play the piano.**

Although I very much enjoy music and find it very relaxing, I regret that I am not a very capable musician. I like all genres of music but my favorite is baroque and, therefore, Bach among others. Unfortunately, the *Notebook for Anna Magdalena* is about the highest level of my ability. My son Lewis is much more accomplished and fun to listen to, although he prefers Mozart. I do find listening to Bach and other baroque works, especially when performed on the harpsichord, to be particularly pleasurable. It is most enjoyable to compare the various interpretations of Bach's *Goldberg Variations* on both the harpsichord and piano. We also owe a great debt to Horowitz, who re-popularized the keyboard works of Domenico Scarlatti, which are now available also in fine harpsichord renditions. Perhaps the musical mechanics and algorithmic nature of baroque works appeals to both the engineering and aesthetic side.