The New Limits to Hardening

By Marc V. Schanz, Senior Editor

Threats to air bases have evolved. The solutions must, too.

Crew chiefs prepare to launch a B-2 at Andersen AFB, Guam. China’s development of air-launched cruise missiles poses a growing threat to the PACAF base.
Targeting enemy airfields is a strategy as old as military aviation itself, but several trends are pushing Air Force leaders to consider new approaches and investments to increase the survivability and resiliency of American airpower. New analyses and growing anti-access, area-denial (A2/AD) concerns from more capable missile technologies are prompting a more diversified and creative approach to ensuring future air operations are successful.

USAF and Department of Defense officials are examining how they can ensure the survivability of forward based airpower worldwide. In Europe, for example, planners are concerned about a threat that’s been given little attention since the end of the Cold War: airborne and missile attacks on main operating bases (MOBs).

In addition to closing a qualitative military gap with new equipment and better training, Russia has invested in improving its strategic aircraft and standoff weapons. In 2014 the US State Department formally charged Moscow with violating the 1987 Intermediate-Range Nuclear Forces (INF) Treaty by testing a new ground-based cruise missile, known as the R-500, with a range between 300 and 3,400 miles.

Since the 2014 Crimea crisis especially, USAF has deployed assets around the continent—many times from facilities that do not feature the robust infrastructure and recovery capabilities at the command’s MOBs. The US and other NATO nations are examining how to better enhance these locations.

In June 2015, US Air Forces in Europe-Air Forces Africa officials declared they are going to push for funds in the upcoming five-year budget plan to make targeted investments at both USAFE-AFAFRICA bases, as well as locations owned by US allies. (The European Reassurance Initiative, a post-Crimea fund for expanded Europe operations, is critical to these investments.)

“The one thing I have come to realize ... is the importance of airfields,” USAFE-AFAFRICA’s boss Gen. Frank Gorenc told reporters at AFA’s Air & Space Conference in September. “Airfields are our platforms. And they have to have certain things on those airfields that would allow for high-volume combat operations.” One of the unintended consequences of Russia’s actions in Ukraine, he added, is a renewed focus on the importance of airfields in contingency planning. Many of the countries where USAF had deployed air assets as part of Operation Atlantic Resolve have the same concerns, and want to build up both infrastructure at fields as well as capability to recover their functionality in the event of attack.

Since the end of World War II, hardening has emerged as a key attribute of airfield survivability. Over time, concepts such as revetments and reinforced aircraft shelters developed, as the vulnerability of air assets in the open became more clear and acute.

By the end of the Vietnam War, US and allied militaries were investing in aircraft hangars with reinforced concrete and blast doors in Europe, and stood up the first prototypes in West Germany at facilities such as Bitburg and Ramstein air bases, according to a June 2015 RAND study on air...
Airmen mix water and concrete to patch a hole during an airfield damage repair training exercise at Andersen.

Airmen and marines use front end loaders to fill and level a crater on a mock runway at Kadena AB, Japan.

Chinese land-attack cruise missiles rolled through the streets of Beijing during a parade in September celebrating the 70th anniversary of the end of World War II. China’s missile activity is putting the spotlight on the need for hardening of US assets in the Pacific.
By the time the Cold War ended, the US had built approximately 1,000 hardened aircraft shelters at bases in both Europe and across the Pacific—many of which are still in service today at facilities such as Spangdahlem AB, Germany, Misawa AB, Japan, and other forward bases. Base enhancement was a project undertaken by the Soviet Union and its allies too, and today some 700 airfields around the world in 70 countries feature some version of a hardened shelter, according to the RAND study.

USAF’s overseas presence in Europe and Asia is today far smaller than during the later years of the Cold War. Because of this, the service is shifting its global posture to get more out of its reduced force as demand for airpower continues to go up. USAF and DOD leaders now routinely express concern about America’s ability to project combat and mobility airpower, wherever and whenever it sees fit, from rear echelon bases. Many of these locations are now under an increased threat from medium- and long-range ballistic and cruise missiles—and nowhere in the world is this threat more acute than in East Asia, according to DOD leaders and analyses.

**CHINA’S MISSILE COLLECTION**

China spent the past two decades, following the Taiwan Strait crisis of 1996, amassing a large inventory of conventional missiles. This missile arsenal was on full display for the world to see during the much-hyped Sept. 3 military parade in Beijing, which commemorated China’s 70th anniversary of the end of World War II. In addition to tanks, armored vehicles, and aircraft, the People’s Liberation Army used the occasion to roll out many missile variants China had previously kept relatively under guard. These included the DF-21D “carrier killer” anti-ship ballistic missile, the DF-10A land attack cruise missile, and the DF-26 intermediate-range ballistic missile, among others. China today has “the most active ballistic missile program in the world,” according to a RAND Project Air Force analysis on the relative military capabilities of the US and China published in September, and has amassed more than 1,200 short-range ballistic missiles, along with medium-range and cruise missiles that are capable of targeting US air bases in Korea and Japan. The development of air-launched cruise missiles also poses a growing threat to Andersen AFB, Guam, some 1,800 miles from the Chinese coast, the report noted. When China fields conventionally armed IRBMs, Guam’s vulnerability to attack will “greatly increase,” the RAND assessment continued. “As important as numbers, … missile accuracy has also improved dramatically, enabling the force to target critical US facilities,” RAND noted.

The threat of Chinese missiles to airfields in Asia is one that has long concerned officials at US Pacific Command and Pacific Air Forces alike. In April 2013, PACOM Commander Adm. Samuel J. Locklear III told the Senate Armed Services Committee he is “acutely aware” of the resource commitments resilience requires. He declared there would be a number of initiatives to improve base defenses to facilities on the island that “would allow you, ... as quickly as possible, [to] recover ... if it ever were to be attacked by someone.” In addition to hardening certain hangars and storage assets, US officials are reinforcing “fuel heads,” improving runway recovery tools and capabilities, and the capability for USAF commanders to better command and control assets dispersed to other locations.

Speaking to the House Armed Services Committee in April 2013, USAF Chief of Staff Gen. Mark A. Welsh III and then-Air Force Secretary Michael B. Donley said the service would increase base resiliency activities on Guam in the coming years. “This is not a choice between dispersal or hardening, it’s a combination of factors that will help make our bases … resilient in any scenario,” Donley said.

Some of these efforts are linked to a fund known as the Pacific Airpower Resiliency Initiative, said Kathleen I. Ferguson, then USAF’s installations chief, as an effort to ensure Guam’s viability as a basing location in light of proliferating missile threats.

In October 2014, PACAF brought Exercise Silver Flag to Andersen from Kadena AB, Japan, a training event for civil engineers and support airmen to build expertise in skills such as base and airfield recovery, command and control, and rapid standup operations. Officials with the 554th RED HORSE Squadron announced in April that they would also reincorporate explosive ordnance disposal training into Silver Flag events in the future at Guam, as EOD operations are a major part of airfield damage repair operations.

In the Fiscal 2016 Air Force budget request, several construction projects on Guam are tied to hardening and enhancement, including some $22 million for work on an installation control center and $19 million for dispersed maintenance spares storage and a new storage facility.

These investments are necessary to preserve the potency of US airpower projection in the decades to come, DOD leaders and analysts concede. In Vick’s RAND study, he noted that the overwhelming victory won over Iraq in the 1991 Gulf War gave birth to a new template for power projection, which has ensured success for US forces since—namely, to rapidly deploy large joint forces to forward bases and seas, create rear-area sanctuaries through air superiority, conduct extensive intelligence, surveillance, and reconnaissance operations, and initiate a massive air campaign to seize the initiative and dictate the tempo of operations.

China noted this trend, and built a capability to potentially threaten the US approach.

**AMPING UP BASE DEFENSE STRATEGIES**

Threats to bases and airfields are a large part of the emphasis on solving A2/AD problems in the Pacific and elsewhere—as DOD has moved to repurpose the joint force after years of supporting irregular warfare in Afghanistan and Iraq. In just the past few years since the US drawdown in Afghanistan got underway, and the “rebalance” to the Asia-Pacific ramped up, several studies and analyses have concluded the trends in China (and elsewhere) have significant implications for how the US will be able to fight in the future. “There is a growing appreciation that this era of sanctuary [from air base attack] is coming to an end,” Vick wrote. As a result, there is new interest in aspects of base defense that had long been neglected, from hardening to recovery and repair, to dispersal and camouflage.

In the US Central Command region, for example, major US military operations since the Gulf War have benefited from strike, close air support, air refueling, and air evacuation capabilities that were never really threatened on the ground.

An expectation that enemy attacks would never significantly disrupt sortie generation has steadily formed, Vick noted in his
study. Mortar, rocket, and bomb attacks on US bases in Iraq and Afghanistan since 2001 all together “did minimal damage to aircraft and failed to disrupt air operations,” Vick noted. The most successful of these, the September 2012 Taliban attack on Camp Bastion, which destroyed six AV-8B Marine Corps Harri-

ers, “had no impact on sortie generation” in Operation Enduring Freedom, he observed.

The threat of indirect fire and terrorist ground attack, rather than conventional ballistic missiles, was the threat that animated change in base defense approaches in the aftermath of the Gulf War. The 1996 Khobar Towers bombing in Saudi Arabia was a “watershed event” that pointed the way to dramatic changes in protecting USAF forces in theater, and anti-terrorism and force protection standards were upgraded to give guidance on securing expeditionary and permanent locations, said Darren Rice, deputy director of US Air Forces Central Command’s force protection directorate.

In cases where USAF built a more permanent footing, additional protection measures like expanded hardening or standoff space for facilities were taken into planning for long-term needs. “These plans often require multiple layers,” he added, including host nation and contract security.

As the US has steadily enhanced defense cooperation agreements with nations such as Qatar, the United Arab Emirates, and other nations in the region, it has also moved to transition from an expeditionary footing to one with more permanence. This allows for more investment in hardening facilities, defenses, and recovery operations to ensure airfield function in the event of attack.

The steady growth of ballistic missile threats in the region, such as Iran’s smaller but concerning arsenal of short-
medium-range ballistic missiles, has led to expanded cooperation between the US and the Gulf Cooperation Council states on missile defense activities as well. The UAE, Qatar, and Saudi Arabia have all invested in advanced Patriot air defense systems to protect critical infrastructure and bases.

**LONG-AND SHORT-TERM SOLUTIONS**

Last January, Welsh told Pentagon reporters USAF would move toward a “semipermanent” footing in the region over time. Once needs are identified, USAF will provide appropriate investment “whether it’s a new air operations center or it’s trying to expand family presence so we can build stronger relationships with the community and the [host] nations,” he said. But USAF’s shift to a more “enduring” posture in the Middle East is guided by factors such as resources and the need for individual facilities to support tasks and missions, said Col. Michael Saunders, AFCENT’s director of installations.

“If a facility requirement is very expensive, an expeditionary facility may be an appropriate interim solution,” he said—and if a sudden need emerges, an expeditionary solution may be the only solution. The classified US Central Command Theater Posture Plan provides guidance that helps AFCENT determine which types of facilities to invest in, and these plans guide enhancements at longstanding garrisons such as Al Udeid Air Base in Qatar.

Where the Air Force fights can change quickly—as was evidenced when Operation Inherent Resolve began last year. Several locations in the region needed immediate enhancements such as modular facilities to accommodate the influx of personnel and equipment.

“The transition from an expeditionary presence to something more enduring takes time,” Saunders said. AFCENT works in a region with a “dynamic environment where missions and requirements change more rapidly than most other [areas of responsibility].” Over the last several years, AFCENT has invested approximately $40 million a year in operations and maintenance level construction projects, much with locally sourced contracts, said Saunders. The other lever AFCENT has pulled to deal with surging need is the Air Force’s in-theater RED HORSE expeditionary civil engineers. These elements have “increasingly been focused on requirements supporting OIR,” he added.

In Europe, planners cast a wary eye toward a recently aggressive Russia. Bombs and missiles have grown more accurate since the end of the Cold War present a greater threat against fixed installations. Second, the US fights in a more expeditionary posture than during the Cold War, and is often operating away from its main bases and responding to contingencies.

“The good news is that a lot of the facilities we have, have hardened facilities on them,” Gorenc said in September. But building hardened facilities everywhere is cost-prohibitive. Going forward, US Air Force Africa and its partners have to take a dual-track approach, he added, making targeted investments in some infrastructure but also considering new approaches to deploying, which could increase survivability.

As part of funds appropriated through ERI, US and allied forces have increased “responsiveness and readiness” through improved training and staging sites with the addition of new pre-positioned stocks of ammunition, fuel, and equipment—plus better infrastructure. This “enhances NATO operations and enables Eastern allies to rapidly receive reinforcements,” said USAFE-AFARICA spokesperson Capt. Lauren Z. Ott.

Operations-wise, better survivability also includes re-looking at tactics, techniques, procedures, and training, Gorenc added.

“It’s pretty clear we are going to have to go back and start exercising some of the things we used to do in the Cold War,” he said. Some of this is already occurring, as so-called “micro deployments” of small numbers of aircraft visit facilities and locations for short durations and then redeploy back to main bases. Gorenc noted his command is working on a concept he referred to as Rapid X, modeled on PACAF’s successful Rapid Raptor F-22 deployment construct. This approach moved aircraft short term to unimproved airfields, with the aid of air mobility forces, “to generate combat power just at the right time, just at the right place,” he said. This expands the number of airfields that can generate sorties and increases targeting uncertainty on a potential adversary.

The increasing vulnerability of airfields within range of missile attack has raised the importance of long-range strike capabilities (such as standoff weapons and bombers, one of the driving requirements animating the Long-Range Strike Bomber program).

In light of the threats, the US should not expect to build up forces under sanctuary at bases and airfields “against the most capable adversaries” in the future, Vick concluded in the RAND assessment of air base vulnerability. Solutions will vary depending on geography and threats present to US forces in a given area.

Hardening, dispersal, recovery, and other techniques will all need to be used to ensure survivability in the future. Heavy-duty hardening at large bases such as Andersen makes more sense than at more expeditionary locations, which in turn can benefit from dispersal and rapid recovery capabilities.

It can be difficult and expensive to ensure the viability of air bases, and with the threats growing and evolving, mission assurance will require a level of commitment not seen in decades.