

IAC Mission Success Stories

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Survivability/Vulnerability IAC

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SURVIAC

Story 1

Story 2

Saving Aircraft Fuel Tanks

During Desert Storm U.S. aircraft flew long-range missions requiring the use of external fuel tanks. As these tanks were emptied, they posed a hazard to the aircraft entering combat because of the explosive fumes still inside the tanks. For safety reasons the policy was to eject or drop these tanks before entering the target area. As the war progressed, the external tank expenditure was critically impacting available supplies. A crash program was initiated by the Air Force to adapt existing technology to protect these tanks. SURVIAC resources were crucial to this program.

Continued on Story 1

Bosnia Support

U.S. Ground forces were deployed to Bosnia as peacekeepers for a region of that country. Ethnic groups within the country had long been in conflict. During this conflict, all sides had employed land mines as a defensive countermobility measure. When the U.S. troops occupied their peacekeeping zone, many of these mines remained. These buried mines are a hidden, lethal threat to U.S. forces as they perform their daily movements within their zone. SURVIAC assisted TACOM to reduce this threat and to save U.S. troop lives.

Continued on Story 2

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Saving Aircraft Fuel Tanks (continued)

As fuel tanks become empty, the space over the fuel fills with a fuel-air mixture called ullage. This ullage is a far worse explosive threat than the fuel itself. As any tank becomes empty, it has at the same time become full of ullage. The net result is that the empty tank is very dangerous to an aircraft going into combat. This concept is understood and the design of most aircraft incorporates measures to negate the ullage danger. This is true for the internal fuel tanks in the F-16. The F-16 was also designed to be able to carry external fuel tanks to extend its range.

These tanks were drained first and then intended to be dropped prior to entering the combat zone (hence the term drop tanks). Since these "drop tanks" were not intended to be exposed to combat, no protection for the ullage was added. This saved some slight weight and cost of the external tank.



As the Desert Storm air war progressed it quickly became obvious that the expenditure of external tanks was far exceeding pre war predictions. This became an issue both for the ability to continue to prosecute the air war and for the huge financial drain of the loss of external tanks. A solution was envisioned to provide protection to these external tanks to allow them to be carried through each mission so that they could be returned and reused. SURVIAC assisted AFRL Survivability and Safety Branch to execute a crash program to design and prove a solution.

Inserting a foam into fuel tanks had long been proven to suppress fire and explosion in the tank ullage. SURVIAC data showed the results of past testing on various types of foam and fuel tank configurations. A likely foam was quickly fitted into the external tank for testing. These tests proved that the foam successfully removed the ullage fire and explosion probability. Therefore it was possible for the warfighter to carry the protected fuel tanks into combat without further endangering the aircraft. This allows the external tank to be returned and used again. Thus the stocks of external fuel tanks are extended, both saving procurement funds and providing for operational contingencies when the frequency of long range missions is paramount, as in Desert Storm.

This is a successful example of readily available data and expertise at SURVIAC assisting in a vital quick reaction Air Force development program to support the warfighter.

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Bosnia Support (continued)

Land mines fall into two categories; anti-personnel and anti-vehicle. Known minefields are cordoned off to prevent soldiers from walking into antipersonnel mines. Main roads will be swept to remove anti-vehicle mines however, changing conditions cause vehicles to travel on new trails or to go around potholes or broken down vehicles. Maneuvering along these new routes coupled with the potential of terrorists to move mines into previously swept areas, puts U.S. troops in vehicles at risk.



Soldiers inspect the HMMWV after the mine strike.

Lightweight armor protection is necessary to stop shrapnel and spallation to limit U.S. casualties. Lightweight armor materials are available such as Kevlar. This material can be shaped to protect the most exposed positions of the vehicle or the locations most likely to result in casualties from a mine detonation. SURVIAC worked with TACOM to design the most practical and protective configuration of armor for the HMMWV and 5-ton trucks. The armor basically covered the floor and lower portion of the vehicle passenger compartments. SURVIAC personnel then deployed to Europe on a quick reaction program to install the armor and to train other Army personnel. The vehicles intended for use with the Bosnia peacekeeping force were protected.

The Army used these protected HMMWV in its operations in Bosnia. During the course of the operations one protected HMMWV hit a mine. The protection worked. The lives of three soldiers were assessed as being saved by the protective armor from the lethal mine blast. This is an example of an IAC assisting the government to provide direct support to the warfighter. This points out both the dangers to the warfighter even in the peacekeeper role and how those dangers can be successfully reduced with the assistance of IACs.

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