Airfield Damage Repair Overview

Welcome to the Air Force Civil Engineer Airfield Damage Repair (ADR) overview course.

In this lesson we will identify past methods used to repair a damaged airfield, describe the methods currently being used by today's war fighters, and describe future developments for ADR. History has shown us that air bases are no longer safe havens. They can be a most immediate and lucrative target for an offensive air operation. It's easier to destroy aircraft sitting on the ground rather than confronting them in the air.

Airfield damage repair (ADR) was formally known as rapid runway repair (RRR) and is the same process just under a new name. The job is dirty, hard work, and by no means glamorous, but at that moment in time there isn't any other tasking more mission essential.

What is airfield damage repair? Airfield damage repair is the process for using construction equipment, tools, portable equipment and temporary surfacing material to provide a minimum operating surface using expedient repair methods. ADR encompasses more than just pavement repair. Other areas such as explosive ordnance reconnaissance, repair quality criteria (RQC), aircraft arresting system installation, airfield lighting systems and utility repairs must be considered.

Much of the information in this lesson can be in found the rapid runway repair pamphlet (AFPAM 10-219, volume 4) and unified facilities criteria (UFC 3-270-07).

Airfields were almost nonexistent during WWI. A runway consisted of any level surface, dirt strip, open road or grass field. Planes were designed to take off and land on these unimproved surfaces. All it took to make airfield repairs was a tractor and plow. How did the ADR repair process evolve?

Civil engineer heavy maintenance forces developed expedient repair techniques during WWII and the Korean conflict.

In WWII, aircraft launched and landed on wood plank runways. The problem with the wood planks was that they would eventually deteriorate. As aircraft transitioned from propellers to jets, a better expeditionary airfield concept was needed as well as a way to make expedient runway repairs.

During the Korean War, aircraft landed on pierced steel planking (PSP), known as "Marston Matting". This planking was used to build airfields over sand and helped to stabilize the ground. Initially the planks had a non-skid surface coating which provided good traction.

As they wore, however, the PSP became smooth and when combined with a little rain and mud, they were as slippery as ice. Repairs were made by replacing the damaged planks or welding a new piece over the top of the old one.

Involvement in Vietnam by Civil Engineers highlighted the need for some type of expedient airfield surface material. In 1964, the first crater repair test was conducted using AM-2 aluminum matting. This successful test lead to the initial air force purchase of AM-2 matting, which was quickly shipped to Southeast Asia.

AM-2 aluminum matting, replaced PSP, and was adopted by the air force in 1965 for use in nearly all bases in South Vietnam. A non-skid ferrous coating was factory-applied to the wearing surface. AM-2 was used in expediting airfield construction by eliminating the time required for placing concrete or asphalt pavements. AM-2 matting is still in use.

As the Southeast Asia conflict diminished, the cold war in Europe became more of a reality. Existing concrete airfields were considered prime targets and the immediate restoration of these damaged airfields was priority one. ADR was identified as a vital process in keeping an airfield in operational condition.

The concrete slab repair technique was adopted by the United States air force Europe (USAFE) as their preferred method for airfield damage repair. The concrete slab method was a more permanent repair technique, but because of the extreme weight of the slabs, it was not easily transported.

With the AM-2 repair kit already in the air force inventory, the need to fine tune this repair process was reviewed by the air force civil engineering and services center, Tyndall AFB, Florida in the early 1970's. Various configurations of people and equipment were tested to determine the proper mix for the most efficient installation of the AM-2 repair kit to meet European requirements.

At the same time a major effort was started to find new equipment and better repair methods and materials for restoring damage airfield surfaces. From these tests, new equipment such as the hydraulic excavator, 4 cubic yard front-end loader and 8 cubic yard dump truck emerged.

New spall repair materials and a new crater repair cover was developed in the 1980's. The fiberglass mat was introduced to supplement Civil Engineers inventory of ADR crater covers. This new fiberglass mat eliminated many of the problems inherent with the AM-2.

Throughout the 1980's numerous multi crater tests were conducted. These tests were meant to integrate the fiberglass mat into the repair process plus help determine the exact number of personnel and mix of equipment required to accomplish ADR repairs. In 1985, one of the largest tests every conducted was "salty demo" at Spangdahlem air base in Germany.

These tests proved valuable for documenting the repair process and establishing the requirement for new and better equipment, hence the largest air force purchase of ADR equipment and materials occurred throughout the mid 1980's.

The equipment mix and the repair procedures available to Civil Engineers today came about from all the hard work of Civil Engineers who participated in the events just covered.

Now that you have an idea of what Civil Engineer's had to work with in the past, let's see what today's forces are using.

Today's Civil Engineers use the techniques learned from years of research and practical field experience to make airfield damage repairs. Selection of the repair method depends on many variables such as aircraft type and load, available material, available equipment, repair quality criteria (RQC), existing pavement structure, time constraints, repair crew capabilities, equipment, and manpower.

Engineers have more critical requirements to be concerned with than their predecessors. Civil Engineers must deal with factors such as heavier aircraft, wider wing spans, greater tire pressures and load capacities when deciding the type of repair to accomplish. While some of the materials used by previous engineers has changed, the mission requirement hasn't changed. Return the runway to operational status as soon possible so the aircraft can fly and fight.

Before any type of cover can be put over the craters, we must fill them in. At this time we use two methods: crushed stone and sand grid.

There are three types of crushed stone repair methods. Each involves the use of a combination of crushed stone, ballast rock, or debris.

The debris backfill method is used when subsurface debris is plentiful and suitable for filling the crater. The crater is filled with debris to within 18 inches from the adjacent pavement surface. No material over 12 inches in diameter will be placed in the crater. This material is either broken into smaller pieces or removed from the area. The last 18 inches of the crater is filled with a well graded, crushed stone. The crater is overfilled by 3 inches, compacted, leveled with the surrounding pavement, and covered with either folded fiberglass or AM-2 matting.

The choke ballast over debris method is used when subsurface debris is suitable for fill, but limited. Fill the crater with as much acceptable debris as possible. Remember, material over 12 inches in diameter will not be placed in the crater. Place ballast rock over the debris leaving a minimum of 18 inches for crushed stone. Next, a layer of well graded crushed stone, overfilling the crater by 3 inches is added. Finally, the surface is compacted, graded, leveled with the surrounding pavement, and covered with either folded fiberglass or AM-2 matting.

The choke ballast repair method is used when water is standing in the crater or if the subsurface material is unsuitable for filling the crater. This is also known as the wet crater repair method. The crater is filled with ballast rock to within 18 inches of the pavement surface. If the base course is soft or wet, a layer of geotextile 2000   material is placed at the bottom of the crater. This will help stabilize the ballast rock. The rear tires, of the   dump truck, are used to hold the geotextile in position. The ballast rock is dumped over the geotextile and leveled. Next, a layer of well-graded crushed stone, overfilling the crater by 3 inches is added. Finally, the surface is compacted, graded, leveled with the surrounding pavement, and covered with either folded fiberglass or AM-2 matting.

The sand grid method, also known as Geocell, consists of a plastic material designed to confine sand or other cohesion less materials to produce a load-distributing base layer. The crater is backfilled with a minimum of 6 inches of fill material to within the last 17 inches below the original pavement surface. The material is leveled and a layer of geotextile is placed to separate dissimilar materials. A layer of sand grid material is placed in the crater, filled with cohesion less material and compacted. You may need to repeat the process of geotextile, sand grid and compaction. Once the craters is level with the surface, place a FOD cover over the top.

Once the craters are filled a cover material must be placed over the top to prevent damage to aircraft engines. There are several different foreign object damage (FOD) covers used by our forces. The army, navy/marine corps and the air force each have their version of a plastic type of FOD cover.

The army FOD cover is referred to as a fiberglass reinforced panel (FRP). The army ADR kit contains FRP panels in three sizes. When assembled, this cover will cap one crater 25 feet in diameter.

The navy/marine corps ADR kit consists of an FRP air-shippable container and is designed to enable rapid repair of foreign object damage (FOD). FRP comes in different size panels. The kit will cover one area 69 1/3 feet wide by 62 feet long.

The air force uses a folded fiberglass mat (FFM). It's air-transportable, can be moved easily by vehicles, can be pre-positioned at greater distances from airfield pavement surfaces, and can be stored indoors out of the elements. A standard FFM weighs about 3,000 pounds and consists of nine fiberglass panels and will cover a crater 30 feet x 54 feet.

AM-2 aluminum matting is still being used to make repairs. Its primary purpose is for taxiway repairs and parking aprons. AM-2 can be used on the airfield when spacing between the patches is large. However, it is considered to be inadequate for use with wide body aircraft. These aircraft need to be cautious of making tight turns on areas repaired with AM-2. Damage to the aircraft and matting can occur.

You have seen what ADR techniques early Civil Engineers have used and we've looked at what current methods are being used. What does the advancements in technology hold for new materials and developments?

Advancements in technology have brought about a new age of materials having greater strengths and lighter weights that may replace AM-2 and FFM. These new materials are being studied but are not currently in the air force inventory.

TYCOR FRF is a lightweight fiber-reinforced foam core matting material. Each panel is two inches thick with a maximum weight of approximately 4 pounds per square foot. It can withstand a repeated rolling wheel load of 30,000 pounds from a simulated f-15 aircraft when placed over a 6 California Bearing Ratio (CBR) soil condition. The TYCOR matting system has passed simulated aircraft traffic testing at Tyndall AFB, fl validating it as a viable solution for this harsh application.

The Air Force is working hard to find a lighter weight FOD cover that will reduce the number of aircraft needed for transportation. The desired material must be as strong or stronger than AM-2 and FFM and most important, a material that is lighter and easier for the war fighter to install.

Nothing has a more negative impact on a unit's capability to accomplish its mission than weak command and control. It can "rip the heart out" of an organization's motivation and esprit de corp. Simply put, without effective command and control, nothing will work. The best-trained and equipped airfield damage repair (ADR) team will never reach its true potential if saddled with ineffective leadership.

Command and control of an engineer team is a tough job, and it will be especially tough immediately following an attack. Good leadership can contribute greatly towards overcoming training and resource shortfalls; unfortunately, the opposite is not true. For a unit to have strong command and control, individuals within the command structure must be completely knowledgeable and competent in their position—to accept anything else is unconscionable.

The Emergency Operations Center (EOC) is the hub of ADR activities. From the EOC, the Mission Support Group (MSG) Commander, Base Civil Engineer (BCE) (or designated representative), and other key support commanders or functional chiefs provide overall direction and guidance to the field forces accomplishing base recovery. In particular, the BCE passes EOC information and decisions to the civil engineer (CE) Unit Control Center (UCC). The minimum operating strip (MOS) selection team is located in the EOC and the ADR damage assessment and explosive ordnance disposal (EOD) teams report to the EOC.

All main operating base (MOB) assigned forces, in-place and deployed, are under the operational control of the local wing commander or equivalent. The wing commander controls assigned forces and all air base operability (ABO) operations through the Installation Control Center (ICC) using the battle staff and existing radio and telephone communications. The ICC monitors status and location of personnel, resources, communications, damage, and other factors impacting mission-capability.

The EOC is established, in accordance with AFI 10-2501, Air Force Emergency Management (EM) Program Planning and Operations, and AFMAN 10-2602, Nuclear, Biological, Chemical, and Conventional (NBCC) Defense Operations and Standards, specifically to direct ABO survivability and recovery operations. As addressed earlier, the EOC is the focal point for all base recovery operations. It also provides command and control of most ABO forces to ensure continuity of operations during preattack, transattack, and postattack operations.

The MSG commander, or equivalent, directs activities in the EOC and coordinates the efforts of the supporting staff to collect, analyze, prioritize, display, and report information on the status of the base. The EOC, which is subordinate to the ICC, is the focal point for determining and tracking the extent of base damage. As damage inputs are received, the EOC staff then develops a recovery strategy for ICC approval, implements and directs the recovery activity, and monitors recovery progress.

As an integral part of the ICC, the EOC actively coordinates with other ICC cells such as logistics and operations, and reports directly to the Commander's Senior Staff. The EOC usually is collocated with, or adjacent to, the ICC battle staff work area (Battle Cab) to allow the battle staff easy viewing of EOC displays. Without a close proximity arrangement with the ICC battle staff, the EOC will find it difficult to perform its base recovery mission effectively.

An alternate EOC is established at another facility, preferably, the alternate ICC, which affords at least the same degree of protection as the primary EOC. The alternate EOC personnel track and record information plotted at the primary EOC, so it will be capable of assuming the primary EOC functions with little or no notice.

The EOC is responsible for determining the scope of damage; determining its impact on the base mission; and maintaining the status of personnel, casualties, and material resources. It develops a recovery strategy, directs recovery actions, and tracks progress.

The BCE, or equivalent, normally operates from the EOC. The CE UCC, which is subordinate to the EOC, is established in accordance with AFMAN 32-4004 Emergency Response Operations. The UCC normally controls all CE recovery activities and is usually headed by the squadron's chief of operations. In other words, the recovery priorities and strategies are established in the EOC, then implemented, executed and controlled by the UCC.

Once activated, the EOC constitutes the upper echelon of the organization for base recovery operations. The EOC staff composition may be established to fit local base requirements, but, generally, it is organized into standardized emergency support functions (ESF) from the agencies identified on your screen.

At deployed locations, the base recovery concept of operations requires the BCE, or a senior designated representative, and members of the MOS selection team to be located in the EOC.

Normally the MSG commander is responsible for all EOC operations. Other senior MSG officers serve on the staff and as director of the alternate EOC.

The BCE or designated representative is the senior advisor to the EOC commander on engineering matters. From the EOC, the BCE provides direction to the ADR crews and Damage Assessment Teams (DATs), directs facility and utility repair, and provides fire protection and crash rescue capability. As mentioned earlier, much of the BCE's direction is executed through the UCC staff.

As a member of the EOC, the BCE is the command and control link between the EOC and the UCC. From the EOC, the BCE receives, reviews, and evaluates damage assessment reports, and assists the commander in developing and implementing the base recovery strategy. There are a variety of members as part of the CE staff.

The Readiness Flight Officer is responsible for oversight and administration of the EOC, coordinates activities of the remaining staff, and recommends priorities for emergency response forces. They advise the commander and battle staff on chemical, biological, radiological, nuclear, and high yield explosives (CBRNE) defense matters and exercises operational control of CBRNE survey teams. This person is also responsible for monitoring activities of the shelter management and contamination control teams through their respective functional control centers.

Explosive Ordnance Disposal Representatives control the unexploded explosive ordnance (UXOs), safing teams' activities, and advises the commander and battle staff on all matters concerning UXOs.

To support EOC operations, controller/plotter positions are filled as needed according to Air Force Manual (AFMAN) 32-4004 and base Emergency Management Plane (EMP) 10-2. These individuals will record, plot, and track attack damage inputs received from individuals and organizational control centers. They will also conduct MOS selection based upon inputs from DAT teams, weather, and aircraft loading factors, and other mission data from the ICC.

The security forces representative coordinates airbase ground defense activities and manages base security issues through the base defense operations center.

The medical representative advises the commander and battle staff on all medical matters and casualty status.

The personnel representative maintains the status of personnel strengths, on station and forecasted augmentation forces, and casualties.

If available, tracking and plotting tools can be electronic, but should have a hard copy/paper back-up system at the EOC and UCC (primary and alternate). Resources that should be available include the items displayed on the screen.

Normally, the wing commander directs operations from the ICC. After the EOC is activated, the preattack and recovery operations are managed from this command cell. In the event of isolation, attrition, or loss of equipment, CE and ADR command and control would pass in the order displayed on the screen.

If the ADR OIC loses contact with the UCC and alternate UCC, it must be assumed that they either have been damaged beyond operational capability or have inoperative communications equipment. In either case, the OIC will attempt to verify the situation by dispatching a runner to check their status. Once verified, or until directed otherwise by competent authority, the ADR OIC will continue working toward providing a repaired MOS in the required time. Similarly, DATs and EOD teams must be trained in the command sequence to automatically report to the UCC if they lose contact with both the EOC and its alternate.

The UCC is the focal point for engineer activities during base recovery. The ADR team receives its direction from the UCC. The team functions under an area repair group concept wherein an essentially equal effort is applied to both MOS and access taxiway repair requirements.

Typically, three crater repair crews are designated for MOS support and another three crews are assigned to taxiway requirements. For parallel runway bases, the installation may have more crews, or assign two crews to each runway and two for taxiways. In either case, the installation should exercise according to their installation's specific plan. In addition, the installation's In-Garrison Expeditionary Support Plan (IGESP or ESP) should reflect their approach to allow incoming forces to train accordingly.

Crews should be flexible in order to focus on specific areas driven by the actual damage and the air tasking order (ATO) requirements. Each crew will repair craters according to the priority established by the EOC. The hauling crew supports the six repair crews with fill and foreign object damage (FOD) cover deliveries. The support team accomplishes all the ancillary, but equally important, tasks of FOD removal, spall repair, airfield marking, airfield lighting, and aircraft arresting system installation. The ADR OIC and noncommissioned officer in charge (NCOIC) lead this entire operation.

Many difficult decisions must be made quickly and accurately during an actual airfield recovery situation. Recognizing the need for decisive response to a wide variety of situations, base recovery calls for a standard organizational structure and assigns responsibility accordingly. To get a better understanding of these responsibilities, please take time to review Air Force Pamphlet 10-219, Volume 4, chapter 3.

The support team OIC's primary responsibility is to ensure that the several crews assigned under him/her accomplish their taskings on time and correctly. While the crews themselves are not large, they are diverse in nature and somewhat specialized. Any individual has the potential to delay launch and recovery operations if the performance of their portion of the ADR effort is lacking. This is particularly true of the FOD removal and spall repair teams. The support team OIC will act in a roving controller capacity during the entire ADR operation to ensure all teams are providing the required support. Also having to serve as a roving controller is the ADR NCOIC.

The NCOIC must maintain close oversight of both the MOS and taxiway ADR operations and the associated hauling team support. The ADR NCOIC's primary function is to act as an on-site problem solver and to provide technical and control assistance to the ADR OIC. The ADR NCOIC must facilitate the coordination of requirements between all ADR crews to ensure delays in repair progress are avoided.

Crew chiefs carry out their task of managing the crater crew's operations and reporting progress to the ADR OIC.

The host BCE's communications equipment will provide sufficient assets to accomplish the ADR mission. However, mobility forces should deploy with two-way radios to enhance the ADR capability further. When possible, the deployment team's radios should be adjusted to correspond to the frequency of the host. When possible, the deployment team chief should coordinate with the host frequency manager so that the radios can be configured to the same frequencies.

The ADR OIC and NCOIC must maintain communications not only with the various ADR team chiefs, but also with the CE UCC. Each unit should formulate their ADR communications requirements predicated upon the anticipated situation. Factors to consider when doing so include team experience, threat assessments, leadership expertise, and available equipment resources. Radio authorization levels are outlined in allowance standard (AS) 660, Non-Weapons Systems Communications Requirements.

Radio communication is the ideal method; however, due to any number of variables, radios may be partially or totally unusable. Therefore, establish some alternate form of communication, such as field phones, base phones, and runners to pass information, such as simple status reports, requests for essential services or supplies, and passing directions and guidance.

Communications with the following essential primary and alternate agencies should be available to relay damage reconnaissance and to manage ADR activities from the engineering UCC.

Both ADR OIC/NCOIC should have a portable (hand held) and vehicle-mounted, multi-channel, jam-resistant, frequency modulation (FM) radio for communications with engineering UCC and ADR teams.

The MOS crater teams, taxiway crater teams, and haul teams should each have a portable, hand held, two-channel, jam-resistant FM radio for intercommunications.

The airfield management and ramp net should have a single-channel that is jam-resistant for contact with the ADR OIC and NCOIC.

The MAAS team, Airfield Lighting team, FOD clearance team, MOS Marking team, EOD ADR support team, shelter managers, and equipment operators of sweepers, excavators, graders, paint machine, ordnance clearance equipment, dump trucks, stockpile loaders, etc., should be provided a single-channel, jam-resistant radio for contact with their respective team chief.

As you can see, without effective command and control, ADR operations are not likely to meet mission requirements. The wing commander controls assigned forces and all ABO operations through the ICC using the battle staff and existing radio and telephone communications. The ICC monitors status and location of personnel, resources, communications, damage, and other factors impacting mission-capability.

The next level of ADR command and control is the EOC, which is controlled by the MSG Commander and is the hub of ADR activities. From the EOC, functional chiefs provide overall direction and guidance to the field forces accomplishing base recovery. In particular, the BCE passes EOC information and decisions to the CE UCC. The UCC is the focal point for engineer activities during base recovery. The ADR team receives its direction from the UCC. It is important that each control center have an alternate location to assume responsibility if the primary becomes disabled.

Finally, the ADR OIC and NCOIC direct numerous ADR teams. Effective and secure communication is critical between the various teams and control centers. Alternate communication procedures must be established in case the primary methods become disabled to ensure effective control and reporting continues.

During airfield damage repair operations, there is a lot of work going on all at once. As a Prime BEEF member, where you fit in will depend on what team you're on. This lesson was intended to help you see the "Big Picture" of the Airfield Damage Repair process.

There are several support teams that will be on the airfield as part of the repair process. Each of these teams has a specific job to perform while not hindering repair activities by the minimum operating strip and taxiway repair teams. The support teams include the Minimum Operating Strip (MOS) Marking Team, Foreign Object Damage (FOD) Cover Team, Spall Team, Mobile Aircraft Arresting System (MAAS) Team, and the Emergency Airfield Lighting (EALS) Team.

Once the Explosive Ordnance Disposal (EOD) team has cleared the area and the MOS has been selected, the minimum operating strip marking team will move out to runway. The MOS marking team lays out the minimum operating strip, establishes travel routes to and from the airfield, and identifies crater size and locations.

A crater is bomb damage that penetrates through the pavement surface into the underlying base and sub-grade soil, creating an upheaval in the surrounding pavement, ejecting soil, rock, and pavement debris around the impact area. Small craters are less than 15 feet in diameter. Craters that are greater than 15 feet in diameter are classified as large craters.

The MOS layout and marking team consists of 6 crew members. While the airfield is being cleared of UXO and other hazards, the 4 crew members assigned to the MOS layout team gather at the dispersed staging area to load their vehicle. When given clearance to enter the airfield they leave the staging area with an ample supply of traffic cones and edge markers for the required layout activities. The two remaining MOS marking team members remain behind to prepare the paint machine for stripping operations.

When the airfield is repaired, the MOS marking team paints a new centerline and threshold marks, and paints over the existing airfield markings. After all the painting is completed, and the EALS is installed, the cones are picked up.

The Foreign Object Damage (FOD) cover team is responsible for assembling the FOD cover. The FOD cover team chief coordinates the mat assembly location with the MOS or taxiway team chief. This area is cleared of debris and is as close to the repair area as possible without hindering crater repair operations. The mat arrives on site, is off-loaded and assembled. Remember a lot is happening in a very congested area, so think safety first.

The Spall team is responsible for repairing Spalls on the airfield. Spalls are not craters. Spalls are small holes that do not penetrate through the pavement surface to the underlying layers and are up to 5 feet in diameter. Spall repair requires just a few procedures. Square the edges up with a concrete saw. Next, jack hammer and remove debris. If needed, apply a bonding agent before placing the repair material. Finish to provide a smooth structural bearing surface for aircraft traffic.

The Mobile Aircraft Arresting System (MAAS) team installs the MAAS. The MAAS is a portable aircraft arresting system. Its purpose is to ensure our fighters can stop on the shortened runway. The kit includes two arresting units, one for each side of the runway, anchors and cable. Each unit is anchored and a cable is pulled across the runway connecting the units. When the aircraft lands, a hook on the fighter grabs the cable bringing the aircraft to a sudden stop. The aircraft is unhooked and the cable is pulled back into place ready to be used again.

One caution you need to be aware of is the "tape sweep" area. This is the area where the barrier tape is pulled out when engaged by the aircraft. If the EALS lights are set too close to the tape sweep area, damage to the lights could occur. Good communications between the MOS, MAAS and EALS teams can help prevent this problem. The MAAS is only for aircraft that have grab hooks, it's not intended for the heavy cargo type aircraft.

The Emergency Airfield Lighting Systems (EALS) team installs the emergency airfield lights on the MOS. The EALS plays a vital role in supporting the air force's flying mission. It's a completely mobile airfield lighting system intended for post attack recovery or contingency bed down operations. It is a self-contained system, designed for rapid installation on any airfield surface, and can be used on standard runways in need of temporary lighting or during daylight periods of low visibility. The EALS is not intended for permanent installation!

The EALS comes neatly packed into six transportable trailers that fit within the space of three C-130 aircraft pallet positions. Don't let size fool you, the EALS comes complete with 8 different types of runway lights, pre-formed electrical cables, and power generation equipment. Under ideal conditions, a six-person trained crew, with two general-purpose vehicles should be able to complete an installation in about 2 1/2 hours.

You now have a good understanding of the five support teams associated with the Airfield Damage Repair process.