



Air Force Civil Engineer Center



USAF Airfield Innovations

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21 SEP 17



Overview



- **Who we are**
 - R&D Team
 - Drivers
- **Program Areas**
 - Rapid Airfield Damage Repair (RADR)
 - Pavement Preservation
 - Preventive Maintenance Planning
 - Construction And Repair



Air Force Civil Engineer Center



AFCEC Mission

Provide Civil Engineering services & enterprise lifecycle leadership to Air Force installations that **enable the warfighter**

AFCEC Vision

Lead the way in delivering Civil Engineering **enterprise solutions**

AFCEC Goals

- 1) Provide Trained & Diverse AFCEC Community***
- 2) Provide Enterprise Wide Sustainable Products & Solutions***
- 3) **Continuous Improvement*****



Operations Directorate



- **Mission**

- *Provide direct technical, managerial & training **expertise** to the Air Force **civil engineer community** with emphasis on **Operations & Maintenance** of the built environment*

- **Areas of Responsibility**

- **Engineer Subject Matter Experts (24 of 34 total)**
- **Asset Visibility & Airfield Pavement Evaluation Team**
- **Operations Maintenance**
- **Force Development / Career Field Management**
- **CEMIRT – Civil Engineer Maintenance, Inspection & Repair Team including Industrial Control Systems**



Who We are



- **Subject Matter Experts**
 - Shepherd the State of the Art and Practice
 - Identify Gaps and Opportunities
 - Advocate for Research & Development
 - Mentor R&D Execution
 - Guide Technology Transfer
- **Drivers**
 - Lessons Learned
 - New Aircraft (JSF, OSPREY, RPAs) & New Threats
 - Mission Constraints: Budget, Manpower, Logistics
 - Emerging Technologies & Industry Trends
 - Congressional Mandates



R&D Team



- **AFCEC & Air Force Research Laboratory AFRL**
- **Army Corps of Engineers USACE**
 - **Engineering Research & Development Center ERDC**
 - **Transportation Systems Center TSC**
 - **Army Research Lab ARL**
- **Naval Facilities Engineering Command NAVFAC**
 - **Expeditionary Warfare Center EXWC**
- **Navy Air System Command NAVAIR**
- **Academia, USAFA, AF Institute of Technology (AFIT)**
- **International Project Agreements**
- **Trade Organizations & Industry**



Airfield Damage Repair (ADR)



- **ADR Modernization Program**
 - Rapid Airfield Damage Assessment System RADAS
 - Recovery of Airbases Denied By Ordinance RADBO
 - Airfield Operating Surfaces (Includes RADR)
- **Capabilities for Each Force Module**
 - Open the Base
 - Establish the Mission
 - Expand the Mission
 - Sustain & Maintenance the Mission
 - Recover the Mission
 - RADR is one of 4 Airfield Surface Related Mission Requirements



Rapid Airfield Damage Repair

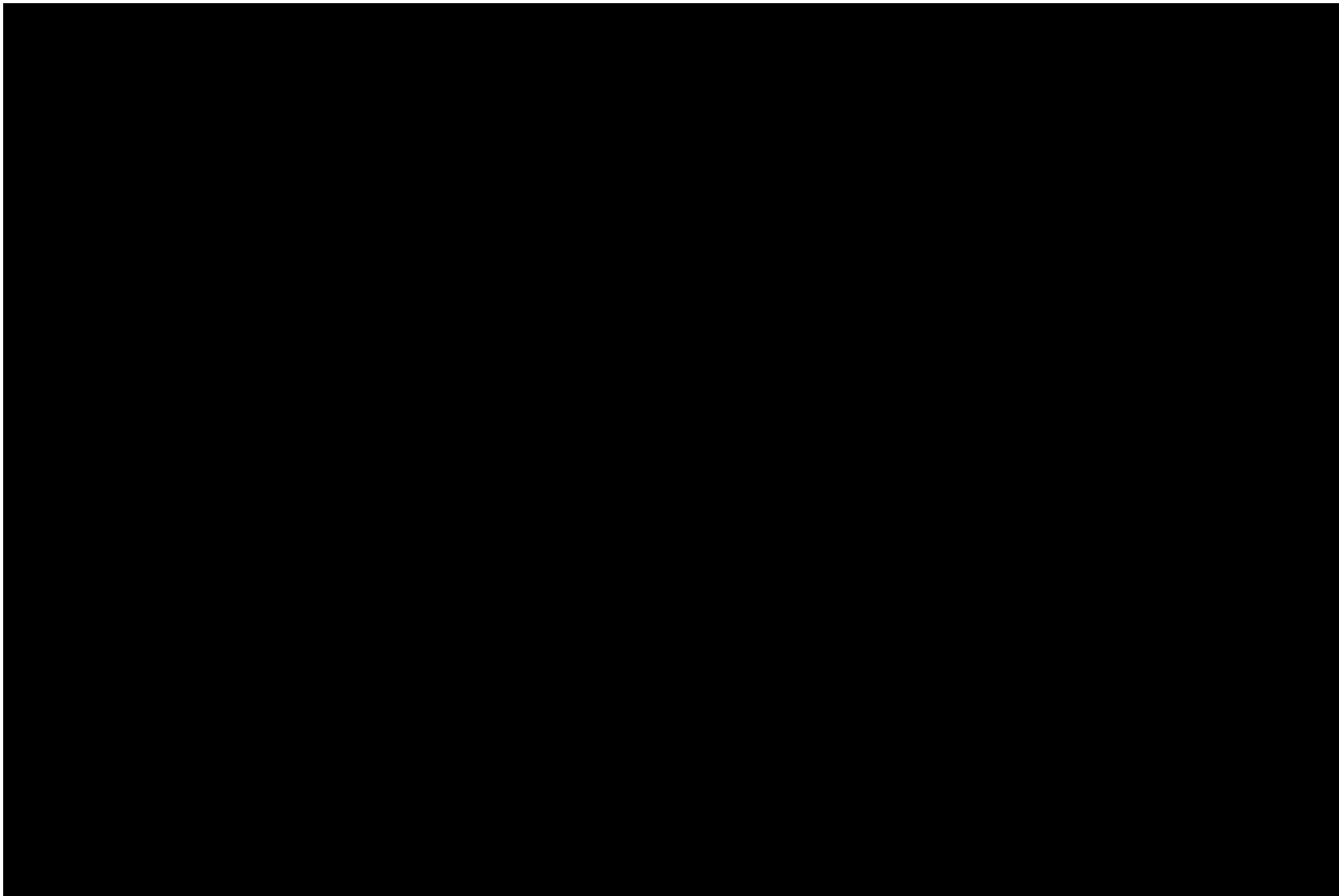


- **RADR 1.0 Fielded**
 - Complete & Traffic (120) 2.5 m X 2.5 m in 6.5 hours
 - Sustain 3500+ sorties or fighters & heavies
 - Day/night, -10F to 120F, rain or shine
 - Combines rapid set concrete/flowable fill & HMA
 - Used: Ascension Island, Qwest Iraq to retake Mosul
- **Sustainment Pavement Repair (SuPR) Kit**
 - Shop in a box (Five C-130 Transportable Conexts)
 - Using in SWA and Qwest Iraq to retake Mosul



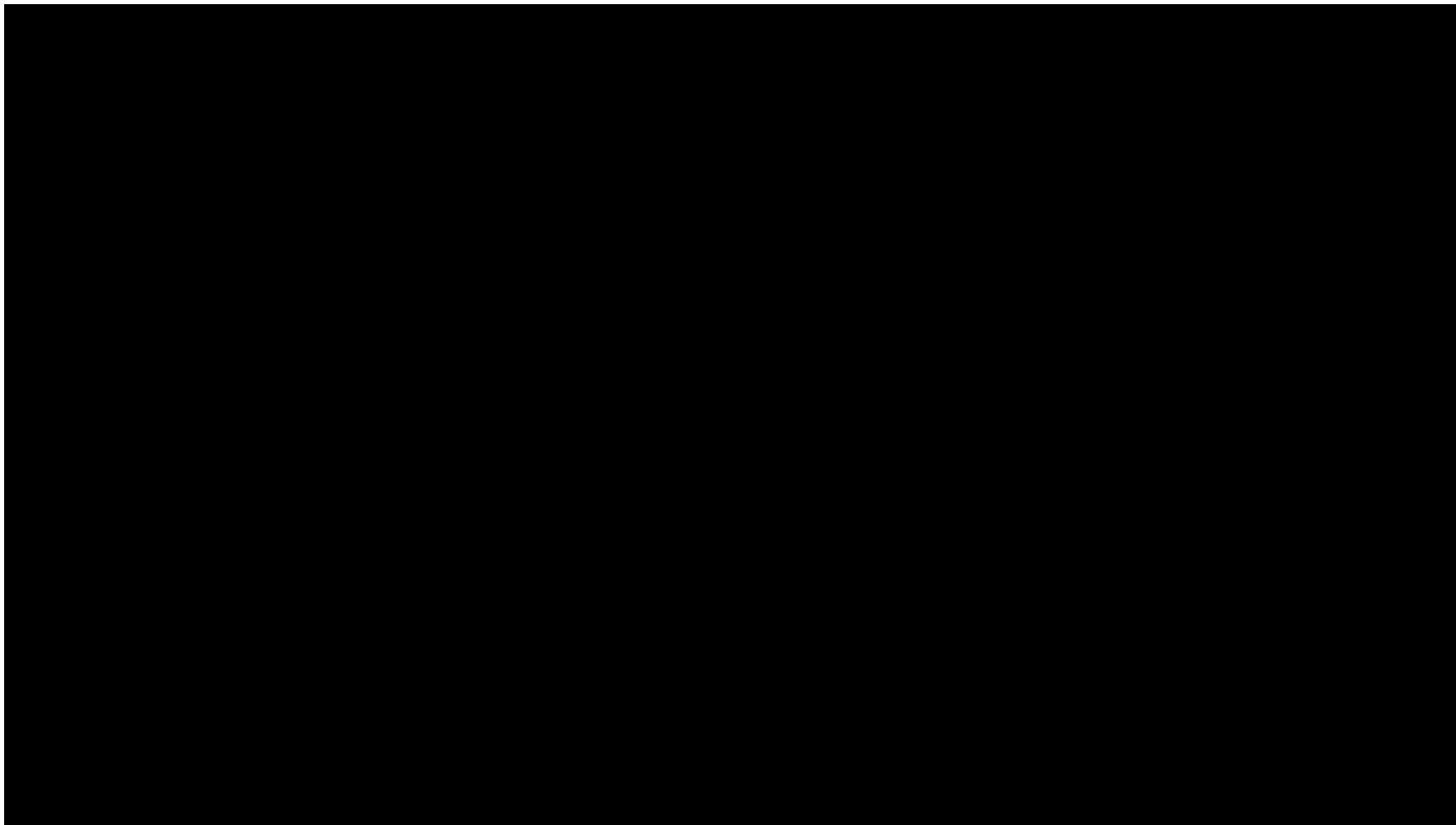


Rapid Airfield Damage Repair





Rapid Airfield Damage Repair





Rapid Airfield Damage Repair



- **RADR 2.0 R&D Underway – Lighter & Leaner**
 - Reduced Back Fill Requirements
 - Smaller Equipment Footprint
 - Improved Productivity
 - 2 hr Return to Ops





Rapid Airfield Damage Repair



- **RADR 2.0 R&D Underway – Lighter & Leaner**
– **Foam Backfill Pump System**



System Weight:	1,800 lb
Dimensions:	6' W x 7' L x 34" H
Production Rate:	30 gpm (20 ft ³ /min of expanded material)
Average Power Consumption:	11 kW (14-hp)
Motor Control:	Independent VFD, Automated Operation





Pavement Preservation



- **Keeping Good Pavement in Good Condition
(Making Bad Pavements Less Bad)**
 - **Asphalt**
 - Seal Coats
 - Slurry Seals
 - Microsurfacing
 - **PCC**
 - POL Removal (Stain Remover)
 - Seals: Sodium Silicate, Methyl Methacrylate (MMA), Polymer, others
 - Heat Resistance

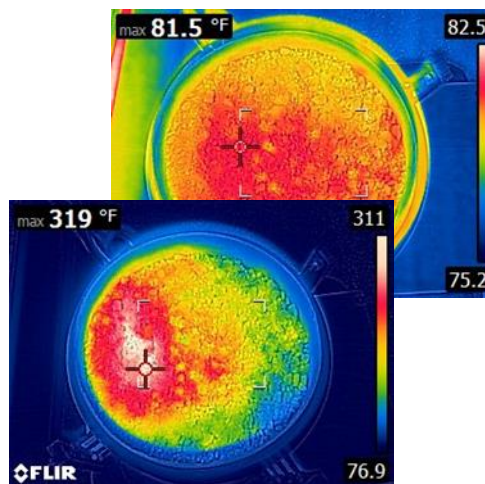


Preventive Maintenance Planning



- **Determine when Rubber Removal Needed**
 - Friction Measure via Cell Phone App
- **PAVER**
 - Preventive Maintenance Planning Tools
 - Translation Tool
 - French: Ministère des Transports du Québec
 - Italian, German, Arabic, Portuguese, Spanish, Greek
- **Project Development**
 - Defining Risk and Uncertainty
 - Buying Down Risk and Uncertainty

- **Accelerated ASR Susceptibility Test**
 - 3 day test vs DoDs 28 day ASTM C1260
 - 3 independent labs
 - Good correlations for reactive aggregates
 - Fine tuning for borderline aggregates
- **Early Age Spalling Elimination**
- **Not-So-Cold Patch**
 - HMA in a Bucket
 - Inductive Heat





Contacts



- **Whole Building Design Guide www.wbdg.org**
 - www.wbdg.org/ffc/dod/tri-service-technology-vendor-portal
 - Criteria Change Requests
- **AFCEC Reachback Center**
 - Phone: 1-888-232-3721
 - Email: AFCEC.RBC@us.af.mil
- **Pavements SME**
 - Email: craig.rutland.1@us.af.mil
 - Address:
 - AFCE/COSC
 - 139 Barnes Drive, Suite 1
 - Tyndall AFB, FL 32409





Construction/Repair



- **Post Paver Air Entrainment**
- **Joint & Crack Sealing**
- **Drainage**
- **Alternative ASR Mitigation Methods**
- **Quality Measures**
- **Grinding Tolerance**