



# REVERSE ENGINEERING

## OUR MISSION

Restore platform readiness, reliability and capability by expediting the development and transition of replacements for obsolete or unavailable legacy mechanical and electrical components and subsystems via for-fit-function reverse engineering.

## A DISCIPLINED APPROACH

### KNOWLEDGE CAPTURE

UDRI utilizes the full gamut of approaches and tools to capture all relevant knowledge and data of a legacy component or subsystem. First we gather and synthesize all existing documentation and inputs from current users and maintainers. Then we employ a host of techniques and tools to fill the gaps, such as: operating the system to learn all functionalities and processes; capturing geometry and material data; tracing circuits; tearing down and documenting all parts; and extracting and decompiling software/firmware.

### PROTOTYPING AND FABRICATION

Our in-house machine shop, electronics laboratory and software systems group collaborate to acquire materials and components, and fabricate and program the prototype. We also work with potential suppliers of the new equipment to develop first articles for qualification.

### TRANSITION

We provide our customers complete technical data packages, including CAD models, Level III drawings, development and test reports, user and maintenance guides and TO updates. UDRI does not manufacture products and therefore **we give our customers unlimited data rights to TDP**. We are skilled in formatting and uploading all data into DoD's Joint Engineering Data Management Information and Control System (JEDMICS).

## RE-ENGINEERING

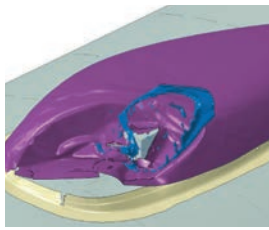
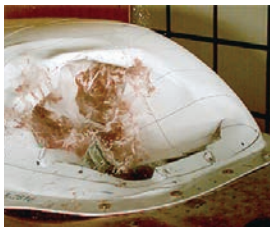
We use a rigorous ISO 9001 systems engineering and design approach to create and integrate a prototype with all mechanical, hydraulic, electrical, optical and computer components. We incorporate COTS components as appropriate. We employ state-of-the-art engineering analysis and simulation to verify the design's functionality, strength, life and other requirements. We interface closely with the customer, including formal review meetings (PDR, CDR). We generate a set of CAD models and engineering drawings for the prototype.

## VERIFICATION AND VALIDATION

UDRI has over 50 test labs available to conduct complete verification and validation testing. Tests can include fatigue, vibration, temperature, humidity, electromagnetic, impact and many others to verify that all requirements are met. We also conduct independent testing to qualify second source vendor products.

## IN-HOUSE TOOLS FOR REVERSE ENGINEERING

- Contact and non-contact laser coordinate measuring/inspection (Cordax, Metris, FaroArm)
- Point cloud capture software (Nikon and Metris)
- Mechanical design (SolidWorks or customer preference)
- Electrical design (Altium Designer)
- Engineering analysis and simulation (Abaqus, Fluent, Altium Designer/Analyzer)
- Material identification (SEM, TEM, XPS, FTIR, XRD, AES and other precision instruments)
- Full service machine shop with all requisite CNC machining, sheet metal and assembly equipment
- Full service electronics lab



### REVERSE ENGINEERING PROJECTS

- Unlimited rights JEDMICS TDP for F-15 main fuel line assembly
- ABAQUS simulations and impact tests to verify performance of UDRI-designed radomes and windshields
- Improved transparency systems for the F-15, F-18, B-1, F-16, F-22, F-35 and other high performance aircraft
- Automated optical test apparatus deployed at transparency manufacturers worldwide
- Designed/qualified the Next Gen Cargo Pallet to replace DoD's 1960s vintage 463L cargo pallet, improving durability and reducing life cycle costs
- Composite replacement C-5 Ram air inlet will eradicate water ingress corrosion issues
- Prototype replacements for the 1980s vintage AN/ARC-190 radio set. USAF owns the TDP and will be qualifying vendors, alleviating a severe DMSMS issue
- Modern software-based replacement for the 1960s vintage B-52 electrical system test set

