The NAVAIR Lakehurst Aircraft Platform Interface (API) Lab Facility

In August 2002, The Lakehurst API Lab Facility officially opened. Fourteen labs, scattered about the Naval Air Engineering Station in seven different locations, some in seventy year-old buildings were consolidated into a 66,000 square-foot state-of-the-art facility. A facility dedicated to advancing the art of API technology - the technology that makes naval aviation possible.

Launching a 66,000-pound, fully armed F/A-18 E/F from the noisy, oppressive, heaving, wind-blown deck of a 97,000-ton nuclear aircraft carrier traveling at 30 knots is a challenging task. Recovering the aircraft on the same deck, often in the black of night, is even more daunting and more demanding - for the pilots, the flight deck crew and the equipment. The pilots and crew are superbly trained and fiercely committed to their responsibility. The same can be said of the men and women, the scientists, engineers, logisticians and technicians who research, design, test and support the equipment that makes it possible.

Developing and supporting the equipment and systems for the interface between the aircraft - jet, prop or helicopters, and its platform, the aircraft carrier, smaller air capable ship or marine's expeditionary airfield, is a highly specialized niche. We call that niche the Aircraft Platform Interface or API.

Much of the research and development of this equipment, takes place at the API Lab Facility. The facility provides a synergistic environment where API-related technologies and equipment such as catapults, arresting gear, visual landing aids, flight deck marking/lighting systems, aircraft and weapons handling equipment, and aircraft servicing and maintenance equipment can be designed, prototyped, and tested.

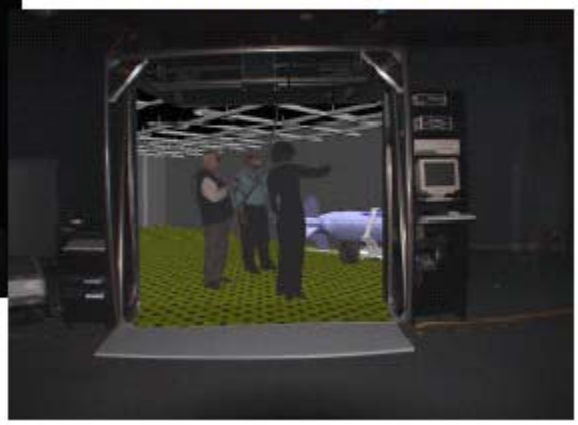
The fourteen individual labs are grouped into five categories:

Modeling, Simulation and Data Analysis/Management labs

- The **Modeling and Simulation lab** provides the ability to immerse the user in a virtual 3-D environment so the product/system can be modeled and simulated before final design and development.

In the VisCenter up to 15 individuals can experience three-dimensional visualization.

The CAVE allows up to six individuals to be immersed in a virtual environment.



- The **Advanced Launch and Recovery Control System (ALRCS) lab** uses humans-in-the-loop in a virtual environment to define capabilities and generate requirements for advanced catapult and arresting gear control systems (and other new product/system designs).

Two visualizations and one emulated workstation.

- The **Aviation Data Management And Control System (ADMACS) lab** provides the expertise and equipment to design and develop systems to track the status of aircraft on a carrier (or to track the status of practically anything, anywhere).

Integrated Diagnostics and Measurement labs

- The **Aircraft Wiring lab** is used to develop technologies to improve the testability, repairability, reliability and maintainability of wiring systems for naval aircraft (or for the entire military and commercial aviation industry).

Virtual Instrumentation

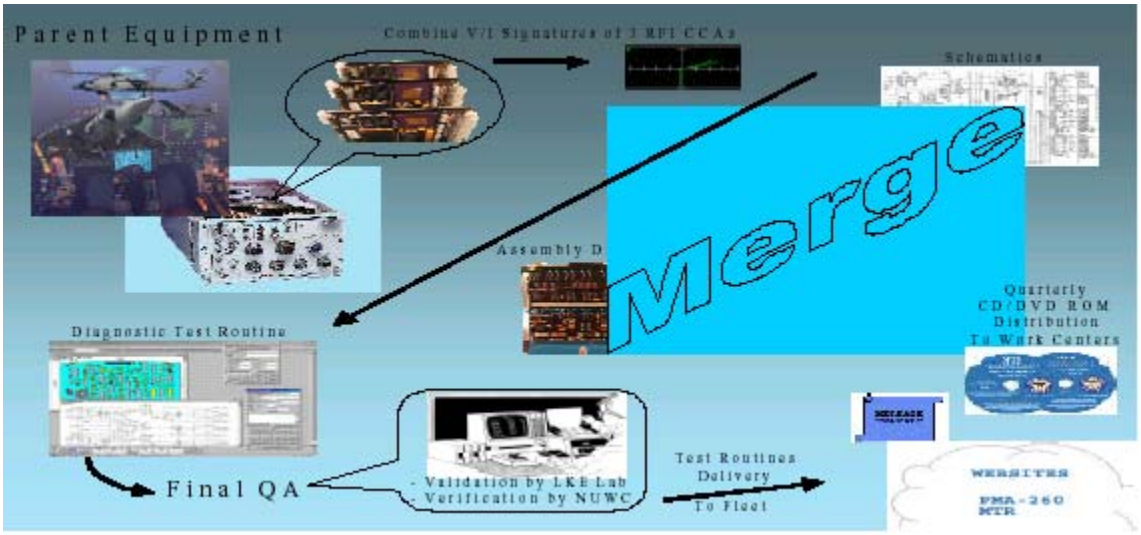
Cable Harness Repair or Manufacturing Equivalence (CHROME) Equipment

MIL-STD-1553 and MIL-STD-1760 Data Bus Testers

Platform Wire Repair Tool Sets

Battery Powered Heat Gun

- The **Electronic Component-Level Diagnostic Development lab** is used to develop troubleshooting routines (know as “Gold Disks”) that are used to fault isolate components in electronic modules and circuit card assemblies.



Component Evaluation and Measurement labs

- The **Component Analysis lab** is used to analyze failed components from the fleet and to investigate new materials, coatings and fabrication and treatment techniques.

Scanning electron microscope and energy dispersive analysis workstation

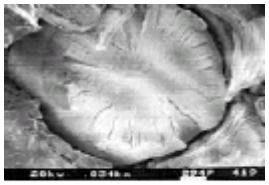
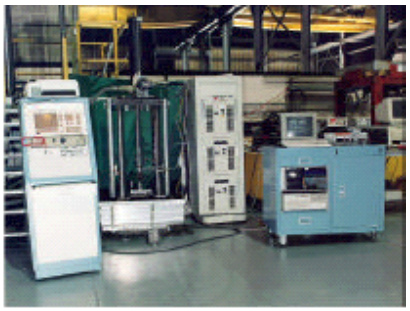


Image from scanning electron microscope of failed purchase cable wire

- The **Environmental Test lab** provides unique test capabilities including a 50,000 force-pound hydraulic vibration table, three load frames for structural testing up to 300,000 pounds, a combined temperature-humidity-altitude-vibration chamber, and a fully automated thermal shock chamber.

Military Standard test capabilities include:

- MIL- STD-810: Climatic, Shock, Vibration
- MIL- T-28800: Climatic, Shock, Vibration, Electrical, ESS
- MIL- STD-167: Shipboard Vibration
- MIL- S-901: Shipboard Shock
- MIL- STD-1399: Shipboard Electric Power and Ship Motion
- MIL- STD-202: Electronic Components
- MIL- E - 5400: Electronic Equipment
- MIL- DTL - 6363: Aircraft Lamps



EMALS Magnet Shock Test

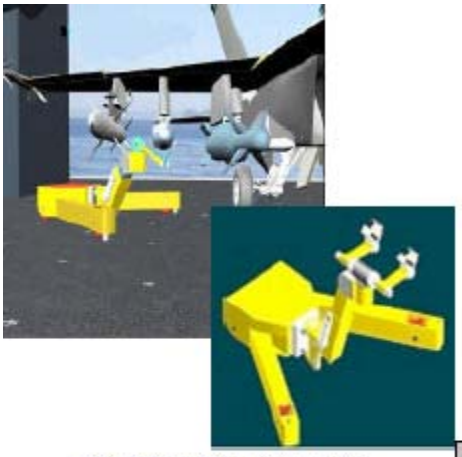
Altitude Chamber

Lightweight Shock Machine

Hydraulic Shaker

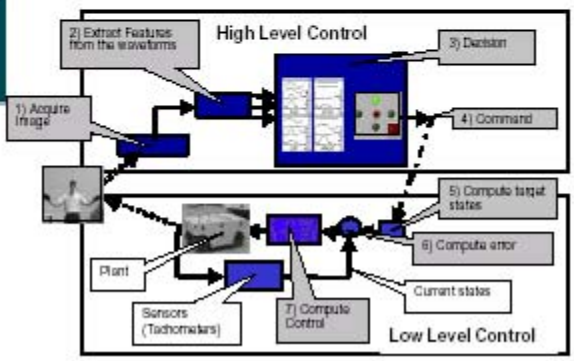
Applied Technologies labs

- The **Artificial Intelligence and Robotics lab** is used to validate concepts that eliminate labor intensive or dangerous tasks by conducting experiments with autonomous and semi-autonomous support equipment and information technologies including neural networks, intelligent data agents and expert systems.



Shipboard Weapon Loader

The omni-directional vehicle (bottom) replaces the towing vehicle (top)



Gesture Control Schematic

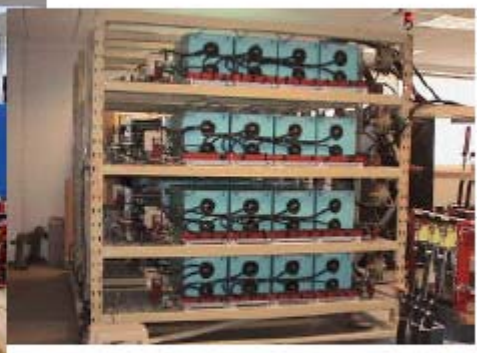
- The **Product Development lab** is used during the design phase to create engineering development models and breadboard systems for fleet equipment.

From concept development to Fleet utilization, the Improved Fresnel Lens Optical Landing System (IFLOLS) was developed in the Product Development Lab.

- The **Electromagnetic lab** is used to research, develop, demonstrate, and test electromagnetic, electromechanical, and electric power technologies related to the electromagnetic aircraft launch system.

Variable Voltage, Variable Frequency Power Supply, and Set of Load Banks

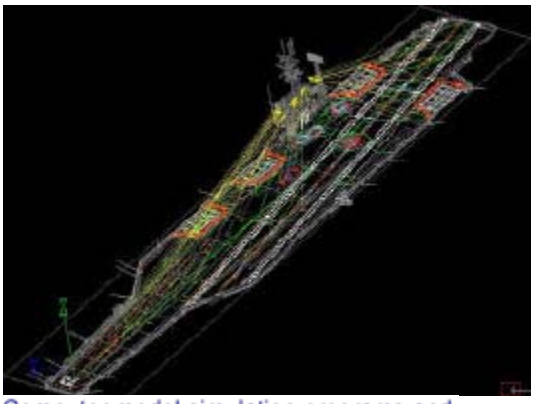
Linear Motor System



1-MJ Capacitor Bank

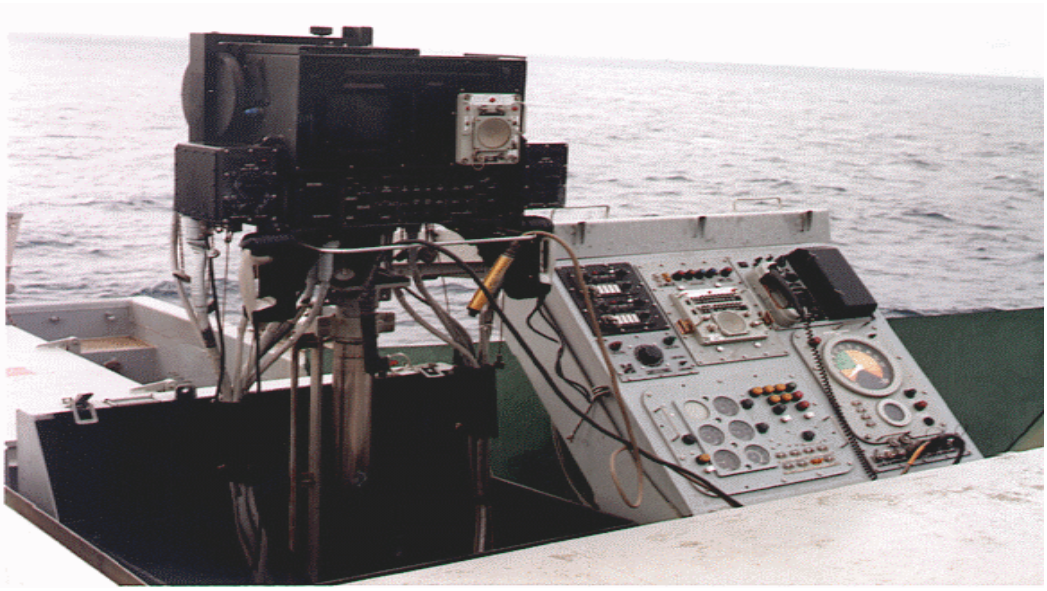
Laser and Electro-Optics labs

- The **Photometric lab** is a light-tight 200-foot long indoor range and a three-axis goniometer, which provides the capability to take photometric measurements and make three-dimensional models of the luminaire.



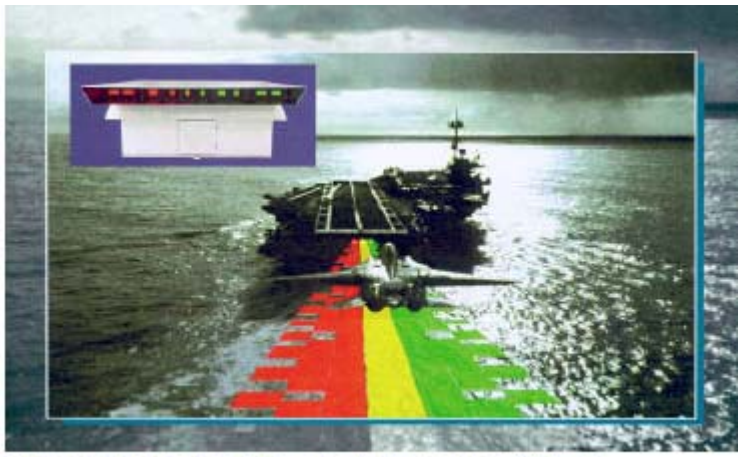
Computer model simulation programs and techniques coupled with physical goniophotometric data evaluate and simulate actual lighting conditions.

- The **Visual Landing Aid (VLA) lab** houses and maintains shipboard representative VLA systems that are operating in the Fleet and at various landing fields. The lab maintains the latest service change configuration of VLA systems currently deployed to support engineering investigations and provide Fleet technical assistance.



Landing signal officer heads-up display (LSO HUD)

- **The Laser lab** and Electro-Optics Laboratory are co-located in the API Facility and share space, equipment, facilities, and expertise. The laser lab is a high-quality dark room that can be used to measure and characterize the visible and near infrared optical properties of light sources that range from very dim such as starlight to very bright such as laser light.



The laser long-range line-up system provides pilots with information during a night-time carrier landing.

- The **Electro-Optics lab** supports ongoing work with electro-optical and optical systems including the design, prototyping, demonstration, and testing of laser based remote sensing equipment, development, and testing of an electro-optical tracking system, infrared radiometric measurements, and evaluation of visual and infrared imaging sensors.

EOTS tracks aircraft with a pointing accuracy better than 200 µrad

Approximate 0.5-mile clear line of sight enables outdoor testing to be set up directly from laboratory

In future *In The Spotlight* columns, you'll read about some of the exciting projects under development in the lab.

For additional information on the API Labs or API technologies, email to LKHR_API_Lab@navy.mil