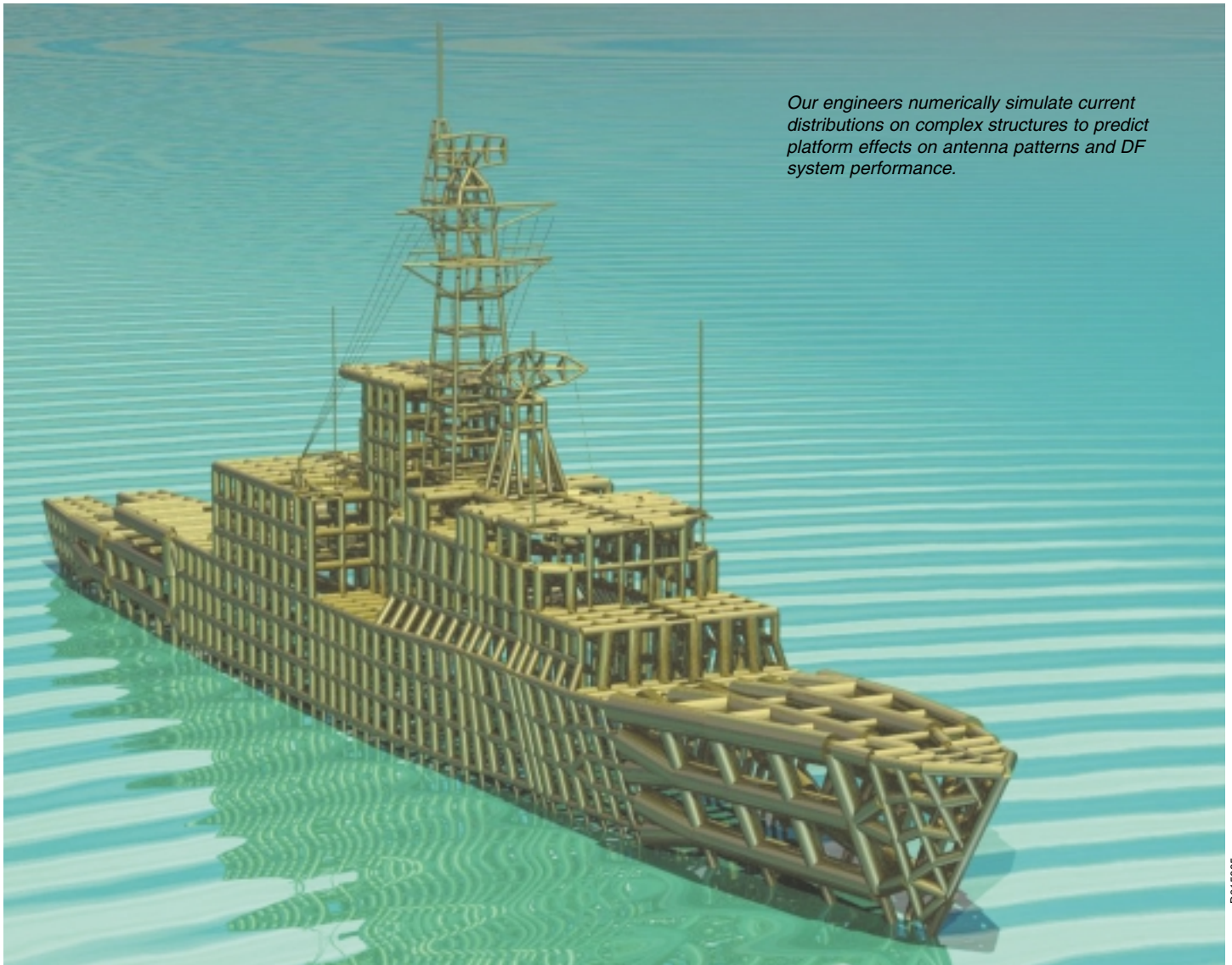


Signal Exploitation & Geolocation



Our engineers numerically simulate current distributions on complex structures to predict platform effects on antenna patterns and DF system performance.

D015095

Communications using radio waves continues to expand and grow ever more complex as the number of signals transmitted across the [radio spectrum](#) at any one time increases, the ways information is incorporated into signals become more sophisticated and higher frequencies are used for communications. Southwest Research Institute is at the forefront of these complex communications factors, which include the latest generation of cellular telephones, wireless computer networks, broadband satellite

communications, frequency hopping transmitters and the automatic linking (connection) of short-wave high-frequency communications systems.

The ability to exploit the [transmission of signals](#) from tactically and strategically interesting sites is of interest to various government organizations including the military, law enforcement and homeland security. Information such as the direction to the transmitter, its geographic location, the command and control structure of a communications network, and the data

being transmitted can all be determined. However, the ever more crowded spectrum and complexity of the newest signals make the exploitation of these signals increasingly challenging.

Our [signal acquisition](#) capabilities allow capturing specific signals of interest and providing general wideband and narrowband communications electronic warfare support. We have fielded new wideband communications intelligence systems that can instantaneously monitor a wide portion of the radio spectrum rather than

DF & radiolocation systems • automated & remote-controlled DF networks • wideband intercept • automatic signal recognition • electromagnetic modeling & propagation analysis • system production • satellite-based tracking systems • technical spectrum surveillance •

D015076



SkyWisp™ is an autonomous or remote-controlled glider launched by a lifting balloon and released at a predetermined altitude. The system can carry advanced sensor payloads tailored to collect audio, video, location or other data.

D014939-0066



A specialized facility enables a quality application of paint to ensure SwRI-designed and manufactured shipboard antennas will stand up to varying temperature, humidity, salt spray, icing, shock, vibration and water conditions.

required special-purpose devices rather than general-purpose microprocessors.

just one narrow bandwidth signal at a time. These state-of-the-art systems can gather millions of new transmissions in a short period of time. To process the massive amounts of data gathered by these wide-band systems, some of our systems use up to 1,000 high-performance microprocessors simultaneously to capture and analyze signals, identify those of interest, determine their location and demodulate them.

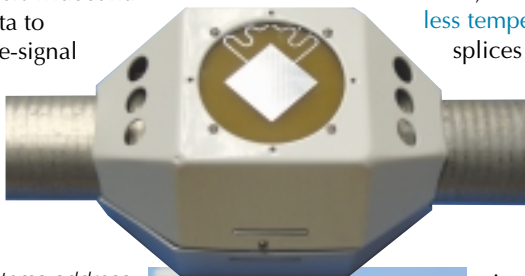
Special-purpose software is fundamental to the systems we build. We recently developed software channelization techniques to convert wideband radio frequency data to narrow-band, single-signal data that can be bulk-processed concurrently. This process previously

Our all-software solutions reduce the number of different parts needed to build systems while increasing supportability and lowering costs.

All our work is performed using an ISO-9001 certified system. We develop land-based fixed and mobile, airborne, briefcase and even miniaturized body-worn antenna systems. We can also model antennas and surrounding structures to address antenna performance even before installation.

For the Electric Power Research Institute, we developed a wireless temperature sensor for splices and disconnect switches. A second EPRI project led to a contamination sensor for ceramic insulators.

Other capabilities include tracking and tagging using high-altitude systems, such as balloons and unmanned aerial vehicles, to gather audio, visual, location and other data. Our internal research



Many of our systems address the special requirements of underwater, underground or other challenging environments. SwRI engineers developed this advanced sensor for use in the high-voltage environments typically found in the power delivery industry.



D015088

D004772



We offer technical support for all SwRI-built systems, including onsite installation, training, testing and repair of antennas, as illustrated by this pier-side shipboard system installation.

- special-purpose tagging & tracking devices • logistics analysis, military documentation & support
- repair & refurbishment • field engineering support • communications intelligence systems • signal analysis • high-speed distributed computing software • embedded system software