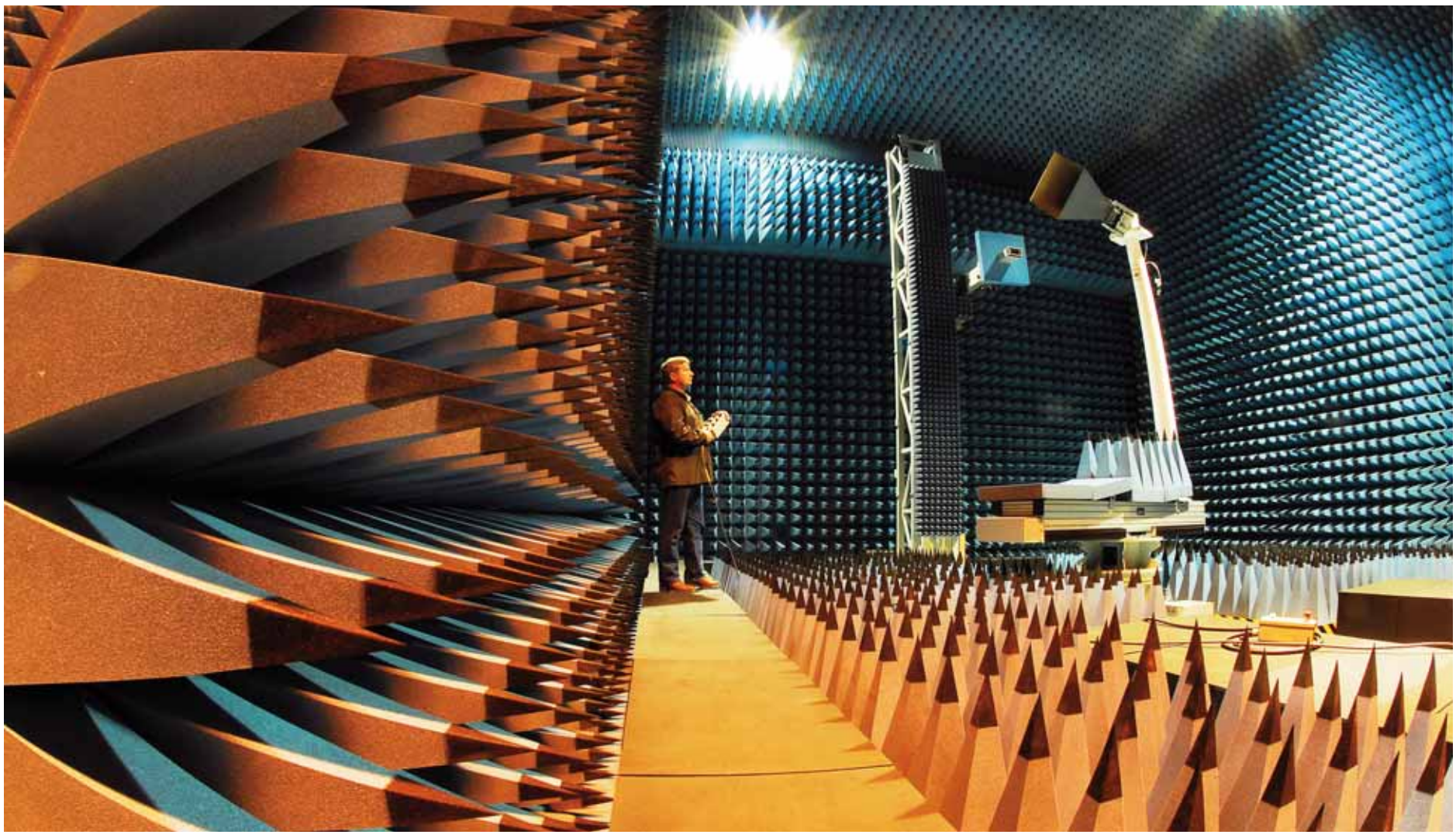

RANGE MANAGER WARD PATITZ checks out the just-refurbished anechoic chamber at the FARM, the Facility for Antenna and RCS Measurement. The chamber in the photo above is used for antenna characterization and related functions. The wall behind Ward is a partition; on the other side is an even larger chamber that is used to conduct radar cross section measurements. (Photo by Randy Montoya)

Sandia FARM team takes antenna/RCS measurement capabilities to the big leagues

By Bill Murphy

Sandia's Facility for Antenna and RCS Measurement (FARM), centered around Bldg. 9972 in a remote locale near Sandia's solar tower complex, is up and running full bore after a yearlong renovation and upgrade project.

The facility, operated by SAR Sensor Technologies Dept. 5345, features both indoor and outdoor test capabilities. The FARM's mission is to measure antenna characteristics and radar cross sections of materials, shapes, and devices ranging from a few inches across to several feet across.

THE ANTENNA/RCS TEAM: Kurt Sorensen (Manager), Steven Allen, Karen Coperich Branch, Billy Brock, Gary Froehlich, Hung "Jacques" Loui, Ward Patitz, Ed Powell, Troy Satterthwait, Matthew Sena, Bernd Strassner II

The FARM opened for business more than 20 years ago. It was brought on line to play a key role in DOE weapons programs, as well as to provide RCS analyses for ballistic missile defense applications. The facility has also been a key component in Sandia's development and refinement of synthetic aperture radar systems. Today, in addition to its long-standing applications, the FARM provides antenna and RCS measurement capabilities to a wide range of customers from Sandia, the military, and other government agencies.

The FARM's large anechoic chamber — it measures about 110 feet long by 42 feet wide by 26 feet high, enclosing 21,000 cubic feet — was the focus of major upgrades over the past year. The temperature-controlled chamber, actually a box within a box, is physically isolated from its host building (9972). It sits on its own isolated slab, with sensitive structures sitting on a shock-absorbing four-foot-thick concrete foundation, providing an environment that is as shock- and vibration-proof as possible. Even the overhead crane in the chamber — newly acquired as part of the upgrade — is not physically part of the chamber.

The FARM's anechoic chamber is covered — floors, walls, and ceilings — by thousands of blue-black foam cones designed to absorb RF transmissions. Those cones, vitally important in providing a suitable environment for RCS and antenna measurements, were upgraded in an improved, computer-modeled configuration, as well.

Other upgrades involved new radar instrumentation, on-site shop facilities, better temperature control, and other improvements.

ED POWELL (left) and Gary Froehlich mount an antenna for a series of tests at the FARM's outdoor range. (Photo by Randy Montoya)

The FARM's capabilities in a nutshell

- Near-field measurement system (planar, cylindrical, and spherical) for characterization of antenna-gain patterns, RF coupling, and electromagnetic transfer functions
- Broadband, high-resolution compact range for direct-illumination antenna measurements and for monostatic radar cross-section measurements (including low-observables)
- Shielded light-electrical lab for assembly, testing, and operation of electronic instrumentation in an RF-isolated environment
- Broadband, high-isolation measurement chamber for characterization of RF-transmission properties of thin materials and measurement of electromagnetic transfer-functions
- Precision Gaussian-beam measurement system for characterizing millimeter-wave properties of engineered materials
- On-site staff machine shop for custom fabrication or modification of antennas, mounting fixtures, and measurement-related hardware
- Outdoor measurement range with inverted-V diffraction fence and positioner stations at approximately one-eighth and one-quarter mile, for longer-wavelength measurements and/or larger objects
- Outdoor space for special test activities
- Underground rooms (large and small) that can be used for measurements needing reduced coupling to above-ground RF phenomena