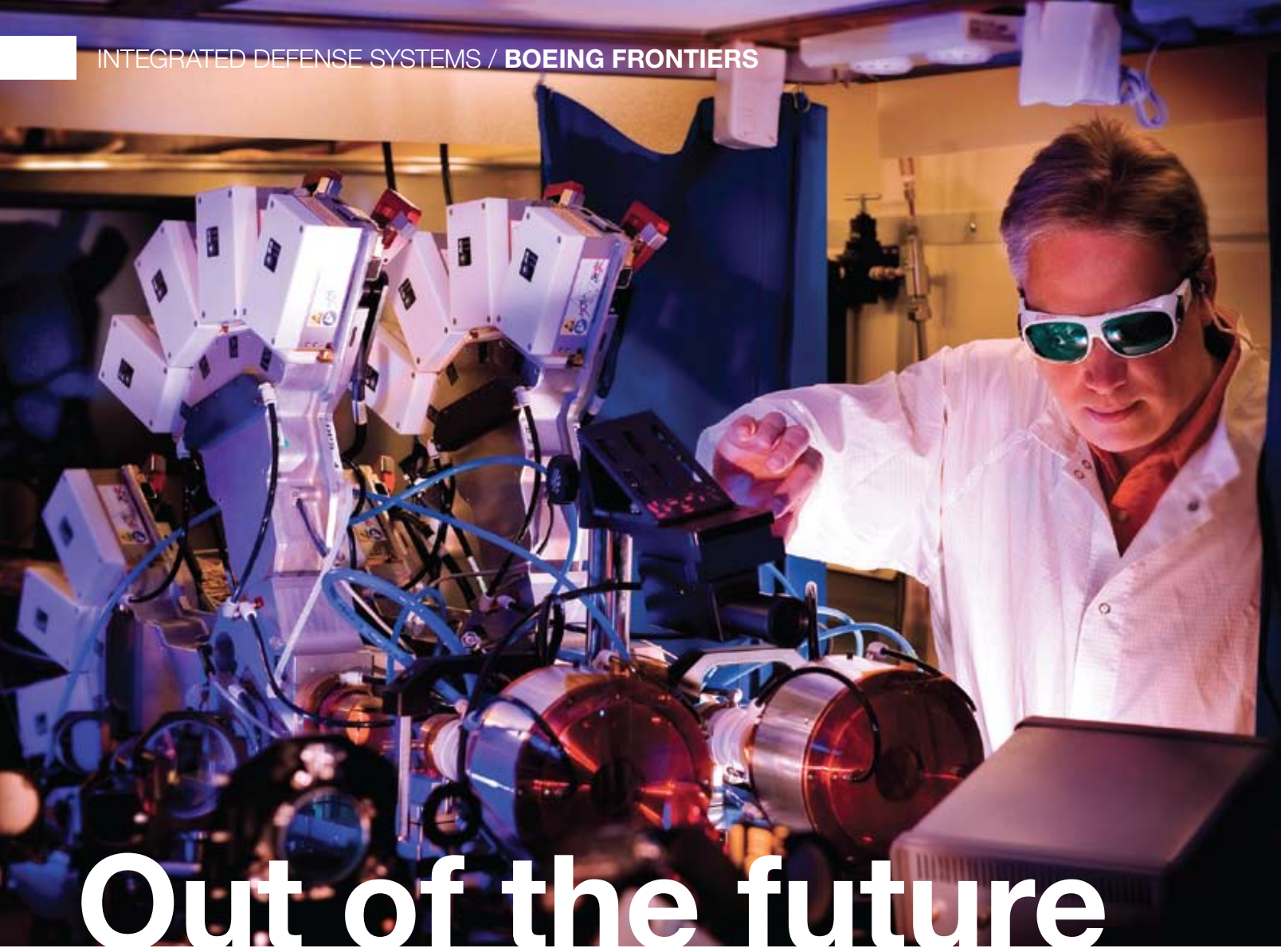

# Out of the future

## A team works on a system that will demonstrate laser weapons' capabilities

By Lynn Farrow

Lasers are the weapons of the future. And Lee Gutheinz and his team are taking Boeing's solid-state tactical laser weapon system—the Relocatable High Energy Laser System (RHELS)—out of the future and into the field.

"We want to get the system into the hands of warfighters who are in the best position to test and critique the system," said Gutheinz, site executive and program director of Boeing SVS, a Boeing subsidiary in Albuquerque, N.M.

With RHELS, Boeing has taken a more direct approach than some of its competitors, who are still trying to develop weapons-grade solid-state lasers in the lab. Boeing has applied to the system commercial, off-the-shelf, thin disk laser technology that's used in the manufacturing industry for welding. Using this technology requires less space, power and cooling; and because the technology's already been proven, Boeing is getting a jump on its competitors in the development of this system.

According to Gutheinz, RHELS is a "pre-prototype" of a tactical laser weapon. It's designed to demonstrate all the functions—including lethal engagement at short range—of a future tactical laser weapon. He noted that RHELS itself is not designed for operational deployment; instead, it's "a tool to provide future users with the opportunity to become familiar with all the capabilities of laser weapons in a quasi-realistic field environment."

Boeing's Directed Energy Systems group in West Hills, Calif., has repeatedly tested the type of laser system RHELS will use, achieving more than 20 kilowatts of simultaneous power plus beam quality and run time targets. The successful tests bring the system one step closer to being fielded—and indicate the laser can be scaled up to a 100-kilowatt-class system based on the same architecture and technology.

RHELS combines many futuristic ideas into one weapons-grade laser system. It brings together a solid-state laser, a high-performance tracking beam control system and the necessary laser cooling and power conditioning into an easily transported, 40-foot (12.2-meter) standard shipping container. RHELS runs on electricity and produces its beam by directly converting electricity

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> *– Ron Dauk, RHELS program manager*

into laser light. High beam power is crucial for military use, as is beam brightness (how well you can focus a spot on a target). The beam control, or pointing system, tracks targets such as rockets, mortars and unmanned aerial vehicles. It can place a high-energy laser beam on a target to destroy it.

The laser system features four industrial thin-disk lasers combined into a single 10-kilowatt laser, mirrors and telescopes that find and track the target, and a refrigerator and water pump to extract heat.

The fully-integrated RHELS system will begin testing this year at Kirtland Air Force Base, N.M. From there, it will be used to perform field demonstrations on a variety of Tactical High Energy Laser concepts—including Counter Rocket, Artillery and Mortar (C-RAM) applications, Counter Unmanned Air Vehicles, and potentially Counter Man-Portable Air Defense Systems. Boeing will also look to use the RHELS system as the ground laser source for the Tactical Relay Mirror System, which redirects laser energy to allow the system to "shoot over the hill" and engage C-RAM launch sites directly.

RHELS is designed to be transported on the back of a semi-trailer truck. Like the desktop computer, whose ancestors once filled whole rooms, this 10-kilowatt system may be large now. But it's just the first step in the development of a laser system that will eventually produce 100 kilowatts from a 20-foot (6.1-meter) container.

"We wanted more power and more capability in a smaller package," said Ron Dauk, RHELS program manager. "So Boeing integrated several commercial lasers, capitalized on its experience with optic systems and systems integration, and developed [RHELS]. It had to be rugged, reliable, compact and user-friendly. RHELS is all of the above." ■

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**PHOTOS: FAR LEFT:** Dave Bossert, laser system engineer, adjusts instrumentation inside the Relocatable High-Energy Laser System shipping container. BOB FERGUSON/BOEING

**LEFT:** top the Relocatable High-Energy Laser System, Karl Schrader (left), Associate Technical Fellow, and Paul Rodney, systems engineer, confer about the telescopes within RHELS. Below, Jerry Kienle, integration technician (white shirt), and Ron Dauk, RHELS program manager, review final checklists. BOB FERGUSON/BOEING