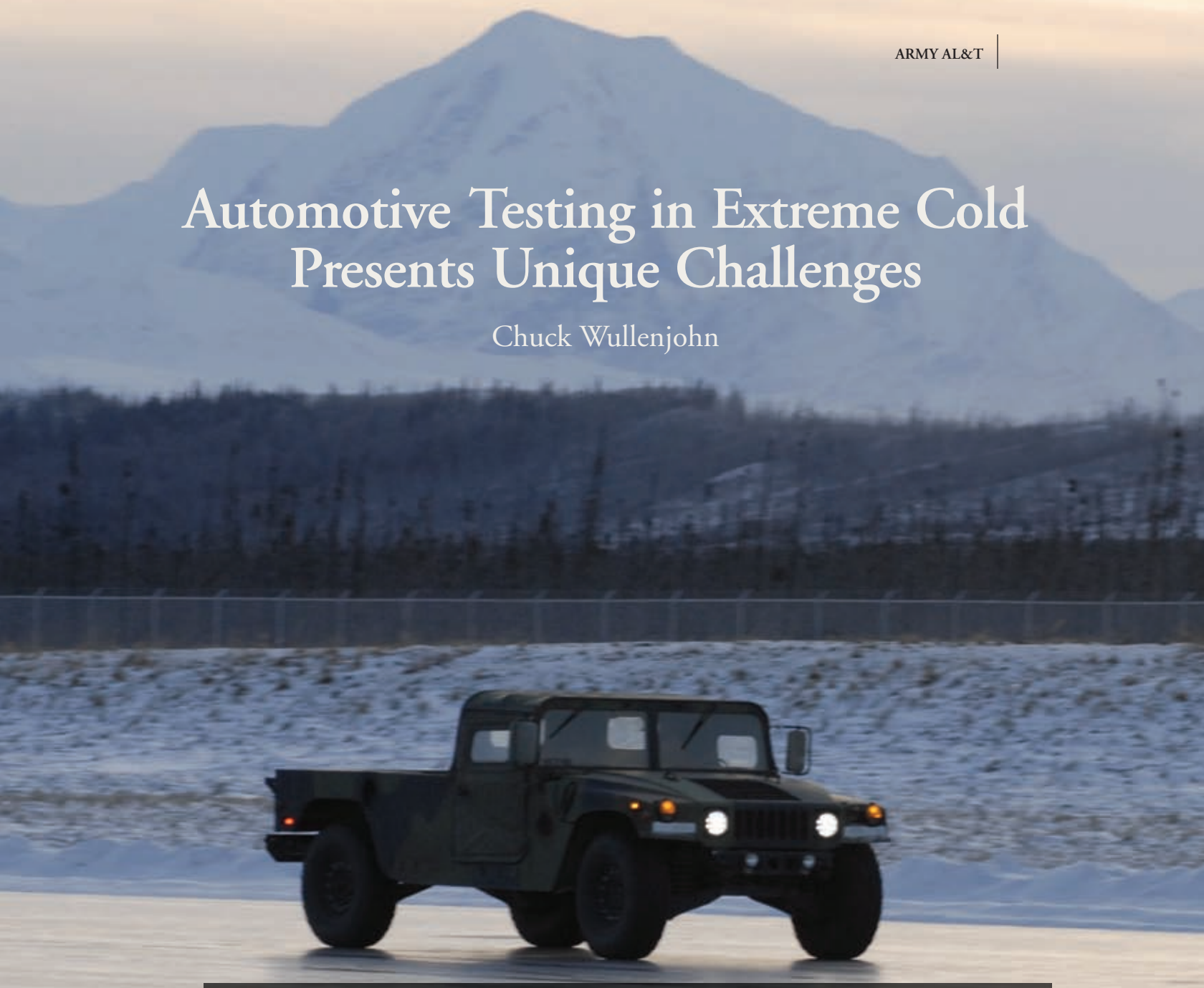
Automotive Testing in Extreme Cold Presents Unique Challenges

Chuck Wullenjohn



No matter what the weather, automotive testing is critical to assuring Soldiers that the vehicles they use in the field perform properly, are safe, and, above all, operate dependably. In the midst of America's coldest climate, automotive testing specialists at the Army's Cold Regions Test Center (CRTC) in Alaska ensure that America's military vehicles are equipped to achieve military success when temperatures plunge to well below freezing.

A military vehicle is put through its paces on the CRTC's skid pad, which is covered with a thick layer of ice. The vast majority of automotive testing that takes place at the center is for military customers. (U.S. Army photo by Chuck Wullenjohn.)

One of the potentially most deadly environmental extremes for the unprepared, freezing cold weather can bring military operations to a halt within minutes. Starting a vehicle is more difficult since engine oil thickens in the cold; parts, such as those made of rubber, become brittle and frequently break; lubricants and tires harden; and slick, icy roads can make driving a serious problem.

CRTC, established in the days after World War II when the importance of environmental testing was fresh on everyone's mind, is the only test site on U.S. soil that realistically combines the elements of a winter battlefield with a test season long and cold enough to guarantee suitable test conditions.

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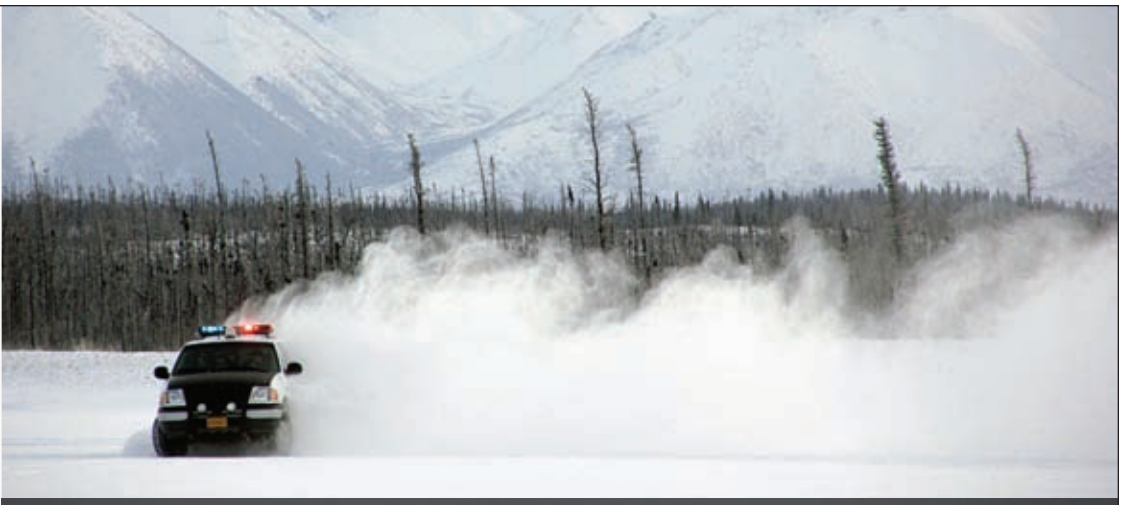
Dan Coakley, CRTC project manager, has worked at the test center for more than 25 years and has become an expert automotive tester. Stationed at CRTC's mobility test complex, on which construction began in 2004, he works with a wide variety of vehicles each year. Although the majority of the vehicles come from the various military services, about 30 percent derive from private firms that travel to the complex to take advantage of the modern facility.

CRTC's mobility test complex concentrates a variety of automotive test functions in a single area. These include a 3.2-mile, 2-lane paved oval track that allows high speeds. Test slopes offer grades from 5 to 60 percent and huge lateral acceleration and skid pads provide an ideal venue for dynamic vehicle control testing. Miles of rugged trails and secondary roads provide real-world test conditions in a private, secure environment. Maintenance and administrative buildings with voice and data connectivity make up part of the complex.

CRTC Civilian Customers

Early this winter, the Ford Motor Co. brought almost two dozen vehicles to the test complex, including assorted sedans, vans, and pickup trucks. Several test surfaces were arranged for them, including an ice circle and a broad snow field. Since natural snow coverage was not sufficient at the time, additional snow was manufactured right at the complex. Although Alaska's interior is extremely cold, with temperatures dipping beyond 50 below zero, it is relatively dry. "Ford tested here in the early winter," said Coakley, "because we have cold temperatures not available anywhere else in the United States.

Dan Coakley, CRTC project manager (left), discusses a cargo area heater undergoing testing with Ben Feilner, test officer, at the mobility test facility. (U.S. Army photo by Chuck Wullenjohn.)



Alaska state troopers make good use of the facility for training each year. The track enables drivers to operate their vehicles in potentially hazardous conditions, garnering excellent experience. (Photo courtesy of CRTC.)

Later, Ford moved its testing back down to the lower 48." This allowed the firm to "extend" its annual test season.

Ford is one of several companies that have recognized the value of CRTC extreme weather testing. Others include General Motors Corp., Chrysler, Toyota, and Cummings. During the Ford testing, TRW (automotive suppliers) came to examine braking systems and suspension components, and tire manufacturers brought along two truckloads of new tires. "This is a world-class facility and customers seem to like it," said Ben Feilner, test officer. "There is a learning curve involved in operating this facility and every year we get better at it."

Challenges

One of the recurring challenges they face is the frost that builds over the surface of ice on the test tracks when the temperature falls below 15 degrees. Any change in the surface is important for testers, who must have valid, repeatable conditions over several days or weeks. If not, test data becomes unreliable.

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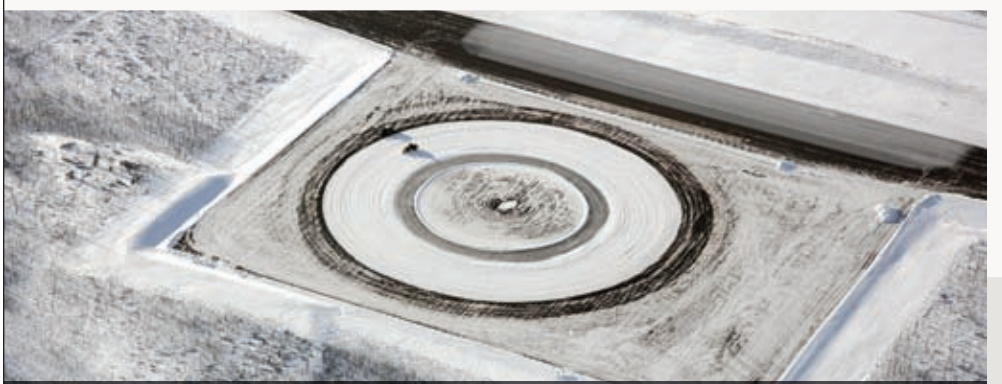
When the ice surface develops frost or rough peaks, a condition automotive testers call "peaky," a new surface must be laid over it. During the test conducted for Ford, the ice field used was quite large, measuring 160 by 950 feet. When the surface had to be recoated with water, it took several hours to freeze.

Challenges like this are a daily occurrence. Both Feilner and Coakley say they enjoy the challenges and find the most enjoyment in the satisfaction they help bring to customers. "It's good to see them depart with a smile on their faces," says Coakley, "and the quality of our testing brings them back." Numerous customers, both civilian and military, have returned over the years.

To Coakley, the return customers that mean the most are the civilian firms. "A private firm can test anywhere it wants and has to make a conscious business decision to return to CRTC," he said with a satisfied smile. "They must accept additional expenses to test here, such as increased transportation costs. But they get great results and excellent customer service, which is what it's all about."

CRTC falls under the management authority of Arizona's U.S. Army Yuma Proving Ground (YPG), a component of the U.S. Army Test and Evaluation Command and the Army's extreme weather testing expert. The proving ground manages testing at Yuma Test Center, AZ; Tropic Regions Test Center facilities in Panama, Honduras, and other tropic locations; and CRTC.



A variety of testing takes place on the CRTC's snow and ice circle, only one of many facilities making up the state-of-the-art test facility. A variety of automotive test data comes from use of the circle regarding suspensions, acceleration, tires, braking systems, traction control, and much more. (Photo courtesy of CRTC.)

CHUCK WULLENJOHN is the YPG Public Affairs Officer. He holds a B.S. in political science from Humboldt State University.