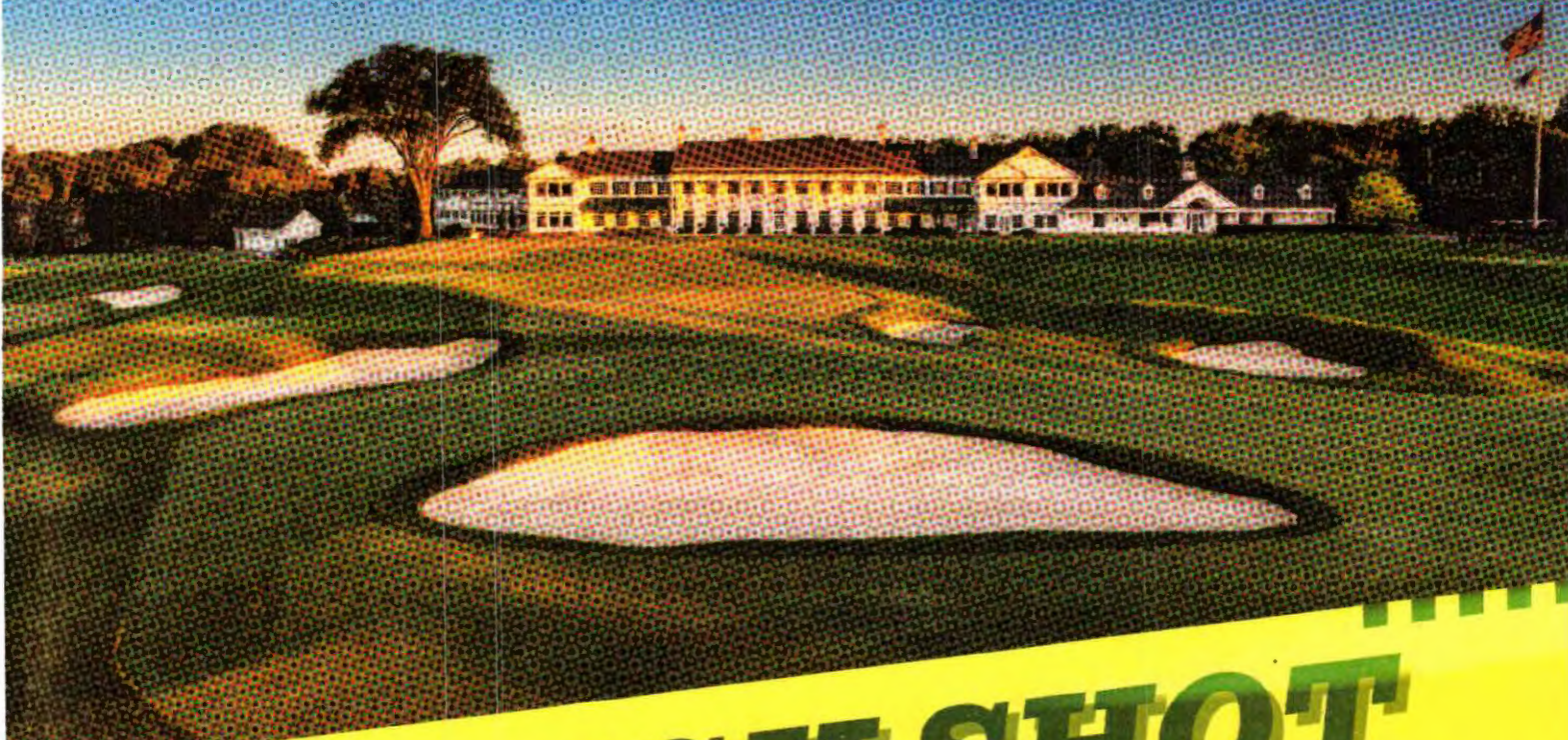


INSIDE: 30 IN THEIR THIRTIES | ACG M&A ALL-STARS | CAMP INNOVATION

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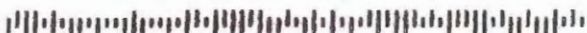
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Oakland Hills Country Club in Bloomfield Township is rebuilding after a devastating February fire burned much of its iconic century-old clubhouse to the ground.

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Camp Innovation

The U.S. Army and the Michigan National Guard are opening their training centers and military bases in the state to private industry, in a bid to advance new technologies on the battlefield and within the consumer marketplace.

BY CALLI NEWBERRY

The future of innovation has found a home in Michigan, where military assets and capabilities are being used as testing grounds and creating synergies for private businesses to invent, test, and produce technologies in protected and safe environments.

The companies are revolutionizing military vehicles, developing the next iteration of flight, taking mission planning to the next level for the private and public sectors, and providing crucial satellite information to soldiers on the ground, improving — and saving — lives in the process.

This activity can all be found within the National All-Domain Warfighting Center (NADWC), an effort by Michigan's National Guard to unite four different existing capabilities spanning the Lower Peninsula: the Camp Grayling Joint Maneuver Training Center, the Alpena Combat Readiness Training Center, the

Battle Creek Air National Guard Base, and Selfridge Air National Guard Base in Harrison Township.

Together, these four locations offer everything necessary to propel innovation, thanks to the unique combination of Michigan's inherent land and climate, and the intangible leadership and vision of those in charge of the resources within NADWC.

Maj. Gen. Paul Rogers, adjutant general of Michigan, is an experienced and visionary leader who previously served as the director of the U.S. Army's Tank and Automotive Research and Development Engineering Center (TARDEC) in Warren, where he worked alongside businesses, startups, and academic institutions in addition to the U.S. Army.

"I think that experience really gave me an appreciation for the strong dynamics in the Detroit area between the business sector, academia, and the government sector, and the influence (that collaboration)

has across the entire state," says Rogers, who earned a doctorate in mechanical engineering from Michigan Technological University in Houghton.

"Getting into this role, I've recognized that we have some capabilities to bring to the table. We're always seeking ways of making people aware of the capabilities/resources available within the NADWC and showing them how they can leverage the resources here in Michigan to really amplify their business models, their research, and their development, in any different form or fashion."

Rogers has turned his sense of appreciation into a new vision for what Michigan's National Guard could do not only for the U.S. Department of Defense, but also for industry partners with — and even without — a military nexus. He wanted to promote Michigan's capabilities in a new way, making them more attractive and accessible to businesses with civilian purposes, which was one of the key reasons Rogers was appointed adjutant general of Michigan, according to Capt. Andrew Layton, deputy state public affairs officer.

Since his promotion in early 2019, Rogers has moved at the speed of business. By July 2020, he and his team had successfully rebranded the four individually existing installations within the National Guard into one entity: NADWC.

"It was a way for us to take all of the separate entities and put them into one brand, and then present it

U.S. AIR NATIONAL GUARD | STAFF SGT. JAY GRABIEC



READY AND WAITING

An Air Force MQ-9 Reaper from the Arizona Air National Guard 214th Attack Group, parked on the flight line at the Alpena Combat Readiness Training Center in Alpena, as its crew prepares to participate in the Northern Strike exercise on Aug. 5, 2021. Northern Strike is a National Guard Bureau-sponsored exercise that is a tailored readiness producer bringing together 5,100 participants from various states and countries at the National All-Domain Warfighting Center at Camp Grayling.



JOINT FORCES

The National All-Domain Warfighting Center was formed in July 2020 to unite the Camp Grayling Joint Maneuver Training Center, Alpena Combat Readiness Training Center, Battle Creek Air National Guard Base, and Selfridge Air National Guard Base.

to the Michigan market and the national market as a resource that can be harvested,” Rogers says. “Coming into this position, even after being a part of the (National Guard) for three decades, I never had full visibility until I became the adjutant general of what we had available and (saw) the possibilities of connecting it all together to really make something that’s unique to Michigan and unique within the entire nation.”

Over the last year and a half, the 148,000 acres of ground maneuver space at Camp Grayling, the 17,000 square miles of restricted airspace at Alpena, the 9,000 feet of runway at Selfridge, and the 35,000 square feet of classified processing areas in Battle Creek have been owned and operated as one under Michigan’s National Guard.

“Those two words are very key: ‘own’ and ‘operate.’ We schedule, we manage, (and) we own the largest overland air space complex east of the Mississippi River,” says Brig. Gen. Bryan Teff. “When you combine all of those things together on the airspace side, and (see) how it overlaps and integrates with the ground maneuver space, we have tremendous capability in Michigan.”

Last year alone, Teff says 7,000 military aircraft were able to rack up 60,000 training days — and that’s only a portion of the military training conducted within NADWC. With events like Northern Strike, a semi-annual military exercise that offers some of the most

extreme conditions in the cold of January and heat of August, Michigan presents itself as one of the best places for such training to occur. It also allows opportunities for innovators to test their latest technologies.

As the military and private industry come together for exercises like these, they’re not only bolstering the strength of the DoD, but also the productivity of Michigan’s economy. As reported by the Michigan Department of Military and Veterans Affairs, the Northern Strike generates approximately \$30 million in military pay, travel, and local spending each year.

Beyond its natural landscape and resources, Camp Grayling offers an urban environment that simulates small towns in Michigan. Details such as roundabouts have proven to be big factors when testing ground mobility vehicles.

“(Grayling has) roundabouts and paved streets and underground tunneling with sewer systems and multi-floor complex buildings. All of those things provide an environment that’s extremely useful when we talk about mobility or ground mobility,” says Col. Scott Meyers, the commander at Camp Grayling. “We’ve had a couple (industry) partners reach out who want to test some of their ground mobility vehicles and (find out) how they work in a roundabout, unmanned.”

As a result, businesses from around the state, and even around the nation, have been able to take advantage of the resources at what Meyers calls a “disgustingly

inexpensive” rate, noting that one industry partner was able to use 3,000 acres for just \$150 per day.

Meyers says that in the past, the National Guard didn’t necessarily advertise the opportunities available at Camp Grayling, but as more and more businesses have come to the site for testing and demonstrating their products, word has gotten out.

“Ever since we unveiled NADWC, my phone has been ringing off the hook with private industry trying to get into this space. And the advantage is that we have a lot of availability and a lot of land for folks to come out here and play,” Meyers says. “The interest I have as the commander here at Grayling is to try to create an environment where you always have the latest technologies around those war-fighting functions when they’re ready.”

There’s still plenty of room for more interest, as Rogers says they’re nowhere near the point of having to turn people away because of how much land there is to support demand. The facility and its environs attract companies like EOTECH in Ypsilanti, an award-winning optics company recognized by the National Rifle Association, and AM General, an automotive company that produces specialized vehicles for military and commercial use — most notably the Humvee. After using the facilities at Camp Grayling for its product testing and development, EOTECH decided to open a manufacturing facility in Traverse City. AM General, meanwhile, has found great value in the real-time feedback it receives from the military at Camp Grayling.

“One of the things we’re looking at is how we can better improve the effectiveness of soldiers and provide better survivability. We currently tow artillery systems behind our vehicles, and the way they’re currently in place hasn’t really changed since World War I and World War II,” says Michael Evans, director of soft recoil technology and mobile fires

CLEARED FOR TAKEOFF

WHEN ALEX TAYLOR WAS 14 YEARS OLD, HE STARTED his own drone company. But with a desire to do more than create the latest technology, he decided to pursue a more humanitarian mission, meeting the needs of people around the globe.

And so, while still in high school, Taylor studied aerospace engineering and built a new company, Orb Aerospace, just two years later.

"Our products (are called) 'Orbs' because they're not eVTOLs (electric vertical takeoff and landing vehicles, or aircraft), according to the traditional paradigm of eVTOLs," Taylor says.

"They're not necessarily airplanes. They're the next iteration — the next step or quantum leap — that was supposed to happen probably 20 years ago and didn't, because of the national defense industry — large bureaucracies not doing what they should with the technology that they have."

Over the past five years, Taylor has challenged the slow-moving system with a strong sense of urgency, which he says stems from his background working on multiple missions overseas. After his experiences with the wreckage and poverty many people are living in around the world, he's not wasting any time.

"It's both the greatest opportunity in my life and the greatest burden in my life to know exactly what I was supposed to do with (my skill set) from a very young age, and that was to solve some of the hardest problems in the world with aviation," Taylor said recently, in an episode of the "Asleep in the Storm" podcast.

With this purpose in mind, he has engineered the technology necessary for delivering aid, conducting rescues, and even offering personal transportation to places that don't have the infrastructure required for traditional land and air vehicles.

"At Orb Aerospace, we started developing aerial solutions for developing nations," Taylor says. "(Our mission became), 'How can we get into some of the most hard-to-reach places in Papua New Guinea and Polynesia?'"

His company, based in Lowell, east of Grand Rapids, quickly proved its concept, found venture capital funding, and became "in demand" by the U.S. Department of Defense.

Taylor's growing team of engineers has completed several rounds of venture capital funding to design its first prototypes, including the first full-scale model of the "Nomad."

Taylor calls it "the proverbial crossover," as it's not quite a plane or a drone, or even a flying car, but more of a combination of an airplane and a helicopter. It will fly up to 1,000 nautical miles at 185 miles per hour, carry up to 500 pounds of payload, and provide an uncommon solution to an all-too-common problem.

"Nomad is a design we think will serve a lot of missions extremely well. We're excited to bring the platform to where the needs are most, letting need drive adoption in developing nations," Taylor says. "Our initial deployments will be to beta programs in partner nations, and we're considering sales of experimental kit-built options locally in the U.S. as an efficient way of getting Nomad in the hands of a few American pilots for everyday use." ■

— By Calli Newberry



capabilities at AM General. "We're fighting new and improved enemies with much better capabilities, so what we were looking at was developing howitzers that could drive into position, shoot, and drive out, and convert their existing towed cannons into a mobile wheel platform."

Over the last two years AM General provided soldiers at Camp Grayling an opportunity to test the new soft recoil technology, and from those exercises the company obtained a contract with the U.S. Army to buy two prototypes for further testing.

"We can fail and not have to worry about having the whole world come down on us, as if we were in a formal test," Evans says. "I think it's really important to get the engineers out there in the real environment, not just a test track, and actually take (the equipment) out and put it through the rigor of going over various types of terrain and various weather conditions."

Orb Aerospace, an electric aviation company based in Lowell, east of Grand Rapids, is another example of the impact of the testing grounds and facilities at Camp Grayling. Since 2017, Orb Aerospace founder Alex Taylor has received several contracts with venture capitalists, a Thiel Fellowship, and most recently, a Phase II contract from the U.S. Air Force, which he says has helped his company scale by 1,200 percent in the past four months.

"We just got our Phase II Air Force contracts, in large part due to the support of (Camp) Grayling and the Michigan National Guard, by making sure the Air Force knew it was able to provide Orb the opportunity to demonstrate at a military exercise at the end of this contact," Taylor says.

"There's no other test range that has four seasons, there's no other test range that has the spectrum availability, there's not another test range that has even just the personal relationships. So when it comes to being the first electric aircraft company to take four special ops guys and drop them on the roof of a mock school or a mock bank, we can only do that because we're in Michigan."

Personal relationships are something Taylor has found to be pivotal for the growth of his company. As Orb Aerospace and other pioneers within this community of innovators test their wares while military leaders work on their own projects, Taylor says they're able to share common goals, values, and even frustrations.

FIRING LINE

Charlie Battery, 120th Field Artillery Regiment, 32nd Infantry Brigade Combat Team, Wisconsin National Guard, conducted a fires mission at Camp Grayling in January. The event took place during Northern Strike 22-1, a National Guard Bureau exercise with participants from several U.S. states and partner forces.

Instead of pursuing ideas that have already been tested and found unworthy of further pursuit, or instead of waiting months for research to be finalized or to find the perfect contact, the trailblazers at Camp Grayling and across NADWC often share information and experiences, collectively expediting their successes.

"Having a group of people who are running into the same struggles is always beneficial, and we can, I hate to say, use

each other, but sometimes that's what it comes down to. We can all benefit from each other," says Aaron Schradin, co-founder and interim CEO at Virtual Sandtable in West Olive, south of Grand Haven. "The saying is the tide raises all ships, so when we're able to get ahold of (Meyers) or someone else and have a question answered, it's not on (Meyers') shoulders, necessarily, to go and convey that information to everyone else. That's something that sometimes we can do ourselves."

Virtual Sandtable is a virtual reality technology company that creates both the hardware and the software for soldiers and civilians alike to use when planning missions or events. The technology allows users to fully rehearse a situation through an immersive experience before anything ever takes place — a large improvement from the dirt and sticks that Schradin says his friends were originally using for mission planning in the special forces.

"We had friends in the special forces that, believe it or not, when they planned missions, they were using dirt, sticks, rocks, and little army figurines. They reached out to me and said, 'Hey, is there maybe a better way that we could go about planning our missions so that we could have a more realistic idea of what we're up against?'" Schradin recalls. "I went away with a question and came back in a couple of months with a prototype, and that was the first Virtual Sandtable. This was six or so years ago."

Now, Virtual Sandtable is being used across all industries, from military missions in the Middle East to private organizations planning events. It's even used in schools, to prepare for active shooters. Soon, groups looking to test and train at Camp Grayling will be able to prepare in advance, as the company is in the process of creating what Schradin calls a "digital twin" of the facilities and environment at Camp Grayling, allowing people to come in even more prepared.

This fast-moving innovation and tight-knit

collaboration between military and industry partners is all part of Rogers' vision for NADWC and the unique role he expects it to play within the DoD. There's a sense of urgency here, something Taylor says used to exist in Michigan, and he's determined to bring it back — and it's becoming possible because of NADWC.

"Michigan used to be known for mobility. In fact, the very first regularly scheduled commercial flight was from Grand Rapids to Dearborn," he says. "So, long ago we were the first, and we've kind of lost that through the Great Recession and automotive companies becoming complacent and Tesla taking that crown from them. We sort of lost that 'What is more bold? What is really the next 10 years versus the next two years or three years?'"

Helping that transition is Steve Jacobs, CEO of Velocity Management Solutions, a defense contractor in Ann Arbor. The enterprise helps other private companies coordinate with Meyers and the rest of the team at Camp Grayling by offering logistic services like warehousing and ranges, while also providing the technology necessary for data capture and analysis.

"There's a technology platform that we can offer to help capture that data (and) computer systems, so folks can have those engineers iterate those development cycles faster because they can be right there," Jacobs says. "They can see the results of the test, and then they can make the change and test again immediately."

Jacobs calls his company "the easy button" for helping companies use the capabilities at Camp Grayling and make the most of their time there, which

is just another example of how NADWC is set apart in terms of speed and collaboration among private industry and the DoD.

"(This) is the very early stages of what (Rogers) would like to see happen as part of his strategic vision ... to create within the NADWC

framework a sustainable, long-lasting innovation ecosystem," Jacobs says. "(It's) all of us working independently on our own programs and our own systems, but also working very closely together, looking for opportunities to create (a) force multiplier effect on our innovation. At the end of the day, it's part of the reason Camp Grayling is going to become a very important place, because it gives the opportunity for that innovation to get into the hands of the warfighter quicker, and we can make that happen quicker."

And that's exactly what's happening. For example, Orbital Effects, a radar satellite imagery company in Ann Arbor, has developed new technology that provides satellite imagery directly to people in less than seven minutes from the time of their request.

"We're talking a lower-level soldier on the ground getting satellite imagery upon request. That's just unheard of," Meyers says. "We're really opening that aperture and getting some unique technologies."

Just because these technologies are available, it doesn't guarantee that they'll be used immediately by the United States military, although they could be used in the private sector. That's where NADWC comes in. It offers unparalleled assistance by not only fostering the environment and community to allow such innovation to occur and provide the resources necessary to do so, but also by offering a third and crucial component: direct military access.

"Camp Grayling is a land of opportunity, a great framework proving ground to hang many successes on," Schradin says. "The current leadership of Rogers and Meyers understands that, and they're fighting the good fight to create those opportunities and are jointly risking, along with industry, to start something that could be big and self-perpetuating."

Many military groups and companies share this mission: creating many opportunities and solutions, all in one state. And that's what NADWC is fighting to promote. "The National Guard is a community-based organization, so if our communities are successful, then the National Guard in Michigan is successful. And those communities are never successful unless business is successful," Rogers says. "It's a tie that binds us all together." **IB**

RAPID FIRE

WHAT STARTED OUT AS A HORSE-DRAWN WAGON

manufacturing company in the mid-19th century has become a 21st century leader in military vehicle innovation and technology.

The company, AM General, has experienced several acquisitions and breakthroughs, but there's no denying it has come a long way in the last century and a half. To date, it has built 1.5 million vehicles, of which more than 300,000 have been Humvees, a staple in military transportation — and it's showing no signs of slowing down.

Based in South Bend, Ind., AM General operates its technical engineering center in Auburn Hills, where engineering, product planning, and prototyping take place. In recent years, the company has been tapping numerous testing facilities owned by the Michigan National Guard.

"We have quite a large presence in Michigan with our technical engineering center," says Michael Evans, director of soft recoil technology and mobile fire capabilities at AM General, formerly the general products division of Jeep when it was owned by American Motors Corp. "Michigan is the center of automotive technology, so we're hiring a number of people from the area. We're certainly looking for more engineers, as well."

Professionals considering working for AM General would be joining a team that's pioneering new technology, as Evans says the company has also been working on semiautonomous operations and new cameras. Most recently, its engineers have been working on artillery system technology — something that hasn't changed in nearly 100 years.

In an effort to keep the U.S. military at the forefront of technology, Evans says AM General is working hard to keep up with "new and improved enemies," and increasing the speed and efficiencies of towed howitzers is one key in the race to develop more nimble, yet powerful, weapon systems.

"Current towed howitzers are trailer-mounted and are emplaced manually. It takes a lot of labor for the soldiers to move the cannon into place and fire," Evans says. "It also takes precious time emplacing."

He referenced the most recent conflict in Ukraine, where artillery fire is abundant and rapid, and time is of the essence. "When you fire, you can expect enemy radars to pinpoint you and return fire quickly," he notes.

As a solution, AM General's Soft Recoil Technology Systems have removed up to 70 percent of the force produced when a shell is fired, allowing soldiers to mount and fire cannons directly from the platform — removing the need for a trailer and making the entire process quicker.

"Soldiers are able to emplace in under 90 seconds, fire, and displace in under 60 seconds," Evans says. "This allows them to transition from a move, quickly fire, and displace before the enemy can locate them and return fire. It will revolutionize the way many artillery units operate and increase the tempo of operations to keep up with maneuver forces."

Prototypes with the new soft recoil technology have now been accepted by the U.S. Army for further testing. It's an exciting milestone not only for AM General, but for the lives of the soldiers and the civilians it could potentially save. ■

— By Calli Newberry

U.S. AIR NATIONAL GUARD | MASTER SGT. SCOTT THOMPSON

PREPARE TO LAND

An A-10 Thunderbolt II from the Selfridge Air National Guard Base in Harrison Township prepares to land on a public highway in Alpena last August. The landing was part of Exercise Northern Strike 21-2, an annual multinational, large-scale military training event that tests the rapid insertion of an Air Expeditionary Wing into a bare-base environment.

