

CASE STUDY: Wamore Inc.

ENCORE[®] AIRDROP

How Wamore Inc. successfully used the Encore GPS Solution to provide critical data in its airdrop technology project.



1 THE SETUP

A US Military cargo plane that is loaded with equipment needs to drop the cargo safely and accurately in a specific area, without landing the plane. Perhaps there is not an airstrip nearby, or at least not one large enough to land the plane. Perhaps the cargo needs to reach a restricted area where landing is not an option. Perhaps the issue is time – with the plane not having enough time to land, unload cargo, and take off again. Whatever the reason, these air drops are a vital part of disaster relief, humanitarian aid, and military logistics and are even harder to do than they sound. Tumble rate, wind resistance and fall path deviation are just a few of the many considerations that must be measured, tested, and accounted for. When equipment, supplies, or other cargo must be safely dropped from a plane, how do the armed forces, relief agencies, and other non-governmental organizations (NGOs) make that happen?

In this case, the United States Department of Defense turned to Wamore, Inc.

Wamore, Inc. is a full-service engineering, manufacturing, and production solutions provider to the defense industry. For nearly 25 years, Wamore has been involved in programs that utilize one of the company's core competencies: Airdrop Technology.

2 THE CHALLENGE

Wamore Inc. had been awarded numerous US Government contracts to provide airdrop technology, as well as private firms to perform airdrops of their payloads for impact testing. The project involved making drops of payloads of anywhere from under a hundred pounds to approaching almost ten thousand pounds - to be safely dropped from cargo planes flying at 500-25,000 feet above ground level. The Wamore airdrop technology system would involve autonomous guided parachute systems being tethered to the payload, pushed out of the rear of the cargo plane at altitude and speed and being able to precisely guide the cargo within the designated parameters, and land it there safely. The project also had another interesting variable: some of the cargo would be fitted with a parachute and guided delivery system – and some cargo would be dropped without a parachute at all.





Wamore needed a way to accurately gather important data during their testing of the airdrop technology system in order to study key variables including flight path, wind resistance, and fall path deviation. This data was especially important for the drops that would be conducted without a parachute to capture flight information and telemetry in order to ultimately design delivery systems that could safely deliver the cargo without sustaining damage.

- How fast were they falling?
- What was the speed at the time of impact?
- At what force did the cargo sustain upon impact with the ground?
- What was the flight path during the drop?

These were all questions the team had and a solution was needed to help answer them.

3 THE SOLUTION

Wamore contacted PassTime to discuss PassTime's battery-powered asset tracking solution, Encore, as a potential fit for their need.

PassTime, which has been in business for more than 28 years, provides advanced asset tracking solutions to a variety of industries and applications. The company established itself as a market leader in connecting and protecting vehicle assets using GPS location technology in the new and used automotive industry.

In 2019, the company launched Encore, a revolutionary new asset tracking device. Unlike many other telematics devices that came before it, Encore is a battery-powered solution that is completely self-powered – meaning it does not rely on an external source of power. Along with its small size and robust battery life, this self-powered device is amazingly portable and can be used to track all sorts of portable and fully mobile assets.



After reviewing requirements and the capabilities of Encore, the teams at Wamore and PassTime concluded that while this would not be a typical use case for Encore, it was expected that the device would be capable of meeting the needs of the project with some slight software modifications to perform higher frequency locates. Wamore chose to utilize the Encore asset tracking solution and incorporate it into its Airdrop Technology testing project.

4 THE IMPLEMENTATION

With Wamore's Airdrop Technology project well underway, it was time to do live testing. The team from Wamore, along with executive leadership from PassTime, headed to the undisclosed location of a private, class-one airstrip in the desert of the United States.

The team utilized a Skyvan and pilot to conduct dozens of test flights and over a hundred cargo air drops over the course of several days. The team at Wamore outfitted more than a hundred test packages and payloads to simulate the expected load weight of the intended cargo. From there, the cargo load was fitted with parachutes for those use cases. Additionally, PassTime's Encore devices were attached to the cargo.



Prior to the initiation of testing, the PassTime development team made some device firmware modifications to the Encore device to achieve the data results Wamore was looking for. The modifications included programming the device to automatically capture its location information every second after it had been activated and to flash the LED with each capture. This increased frequency of location data would allow Wamore to recreate flight patterns of the air dropped cargo as it came to the ground and also provided the aircrew with assurance the Encore was powered, recording, and ready for drop. Situational awareness inside the aircrew, just prior to drop, is critical to ensure mission success and easy to see and understand status indications are a core requirement in airdrop.



PARACHUTE TESTING

One aspect of Wamore's testing was using cargo payloads with guided delivery and parachute systems attached. This is airdrop technology is what Wamore is known for and providing these solutions is nothing new for Wamore.

That, however, doesn't make it any easier. Always knowing that these projects, once put into use by the defense department and other organizations, can have life-impacting consequences, the technology has to be as close to perfect as possible. In order to confirm the guidance system algorithms were working properly and optimized, Wamore attached Encore devices to these air drops and used the devices to monitor flight paths during the descent. In this case, the Encore device was able to confirm the accuracy of the guidance system in place.

FREE-FALL TESTING

A unique and interesting scenario of this type of testing was to drop cargo payloads without the assistance of a parachute at all. As you can imagine, objects being dropped from the air at 500, 1000, or even 2,500 feet sustained major damage upon impact. But the question was – how much? Think of the school-age science experiment where you had to create a design to safely drop an egg from a height without it breaking; it was like an extreme version of that! Wamore tethered Encore devices to the non-parachute payloads to test the impact with the objective to capture data for use in designing systems that could withstand the extreme impact forces and deliver the cargo intact.



Of course, the most important consideration was whether the Encore device itself could sustain the impact. After all, if the device was damaged, any data it collected during the drop and impact may be unobtainable. In order to be sure, the first tests conducted took the Encore units up to over a thousand feet and dropped them individually. And while the PassTime team was confident the device would survive; they breathed a sigh of relief in seeing the fully intact and working Encore units. Next, it was on to the first drops without a parachute which would accelerate to speeds far faster than the Encore drops alone. Even though the preliminary delivery systems were obliterated in the tests, Encore was able to sustain the impact, which was later calculated to have occurred at speeds in excess of 200mph and coming to a stop in less than 2 inches, resulting in over 3,300g's (3,300 times the force of gravity).

Upon the team's arrival to the impact sites, the Encore units were intact, LEDs still blinking, showing they were still gathering data on the ground and were able to provide the descent data to the Wamore team.

5 THE PAYOFF

Wamore, Inc. drew on their extensive experience and expertise in airdrop technology to conduct successful testing of cargo drops in order to deliver on their US Government contract as well for a private entity. The cargo drop testing included several variables – including whether the payload had a parachute attached to it or not. The company needed a way to measure various aspects of the cargo drop to make adjustments and recommendations as part of the project. When the Wamore team selected PassTime's Encore asset tracking device as part of the project, the PassTime team knew the device would be used in a way it had never been used before: to monitor and track flight data of parachute assisted and non-parachute assisted cargo airdrops in an extremely dynamic and chaotic environment. With only minor software modifications to the Encore device to perform more frequent locates, Wamore now had the ability to capture and analyze important metrics about their airdrop technology during testing. When PassTime launched its Encore asset tracking solution in 2019 it knew the device was innovative and revolutionary, but it had never envisioned the device being used as part of airdrop technology testing. PassTime was honored to help Wamore Inc. successfully achieve its project goals and is very excited to see where Encore will go next. ■



For more information:

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