STRIKER® VOLTERRA® ELECTRIC ARFF VEHICLE GUIDE

OSHKOSH AIRPORT PRODUCTS

Communities worldwide are leading by example and prioritizing environmental programs by choosing hybrid or electric vehicles. There are many reasons fire departments are seeking electric fire trucks – from environmental goals to reduced emissions and carbon footprint, to cost savings. This Oshkosh Striker Volterra ARFF Vehicle Guide covers all the information ARFF crews need to take a deeper look at how and why they should consider integrating this innovative apparatus into an existing fleet.

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Oshkosh Striker Volterra ARFF Vehicle

In June 2021, Oshkosh Airport Products introduced the Striker Volterra electric ARFF vehicle, designed around Oshkosh proprietary and patented technology, as a solution for the growing demand for environmentally focused airports of all sizes around the world. The innovative plug-in electric technologies built into the Striker Volterra ARFF vehicle were developed to offer airport fire and emergency services a way to meet regulatory demands while maintaining and enhancing the level of performance expected from Oshkosh emergency response vehicles.

History of Oshkosh Electrification Development

Oshkosh Corporation has a long and extensive history developing electric drives and electric vehicle (EV) technology. Oshkosh Airport Products, a division of Pierce Manufacturing Inc. and a subsidiary of Oshkosh Corporation, developed the Striker Volterra ARFF vehicle utilizing this proven technology.

Oshkosh has nearly 30 years of work in electrification developing purpose-built battery electric powered products and technology. This patented technology has been developed in-house with feedback from a wide range of customers and partners with the critical mission of the fire service in mind, backed up with Oshkosh's experience and capability.

Learn more about Oshkosh's history of developing solutions for electric vehicles

What is The Striker Volterra ARFF Vehicle?

The Striker Volterra ARFF is a Plug-in Hybrid-Electric (PHEV) ARFF vehicle and was developed to meet the increasing calls for environmentally conscious solutions at airports of all sizes around the world. Utilizing a powerful combination of onboard batteries and a diesel engine, the vehicle is designed to reduce emissions which protects the environment, improves firefighter safety, and offers a lower cost of ownership through reduced fuel consumption and engine maintenance. The result is an emergency response vehicle that can operate primarily in fully electric mode but has a hybrid electric emergency response mode that provides an uncompromised approach to firefighting and emergency response at an airport.

Most daily operations can be completely run on battery power, but an automatic switch to the diesel engine if the situation requires ensures operation and performance remains uninterrupted when it's needed most. The Striker Volterra ARFF vehicle is built on traditional Striker ARFF platform configurations allowing for fleet continuity and smooth training and maintenance processes.

What are the Benefits of the Striker Volterra ARFF Vehicle?

Airports around the world continue to implement initiatives directed toward reducing pollution. Electric vehicle innovations have been vital to the ability to meet sustainability goals without impacting operations or the safety of the traveling public. The Striker Volterra ARFF vehicle is an innovation which uses industry-leading Oshkosh patented technology for fire truck electrification and operation.

Capabilities and benefits include:

- **Reduced Emissions** - An Oshkosh patented hybrid-electric drivetrain featuring an electro-mechanical infinitely variable transmission (EMIVT) allows zero-emissions operation and stand-by mode when powered by the onboard batteries.
- **Improved Firefighter Safety** - Reduced emissions and engine noise reduce firefighters' exposure to air toxins and sound pollution generated from a standard diesel drivetrain, lessening the impact on their health.
- **Lower Total Cost of Ownership** - There is up to a 40% reduction in fuel consumption and a reduced need for engine maintenance, creating cost savings for the department.
- **Continuous Readiness** - The onboard batteries can be coupled to the internal combustion engine to provide continuous and uninterrupted power to the pumping system or drive systems.
- **Hybrid Driving for Faster Acceleration** - Setting a new standard for rapid response time performance, the Striker Volterra ARFF's hybrid mode activates automatically when needed for acceleration and to maintain the batteries for maximum readiness. Reaching 0-50 mph (0-80 kph) in 25 seconds, the Striker Volterra ARFF accelerates 28% faster than traditional diesel-powered ARFF vehicles which typically reach 50 mph (80 kph) in 32 seconds.
- **Unaltered Performance** - No matter the state of the battery, the performance and operation of the vehicle is never altered.
- **Regenerative Braking** - This feature increases efficiency and reduces brake wear by converting the vehicle's kinetic energy to electricity, which recharges the batteries, and reduces brake temperature and wear.

Why is There Demand for Low-Emissions ARFFs?

Reduced and zero emissions vehicles have become increasingly popular in recent years as consumers, businesses, and governments become more conscious of their impact on the environment. The Striker Volterra ARFF vehicle leverages the latest advancements of hybrid technology, giving airports and their fire departments a solution that helps them meet environmental goals and protects firefighters, while providing exceptional and uncompromised capabilities for emergency response.

Environmental Initiatives and Regulations

According to a 2020 report from the International Council on Clean Transportation (ICCT), airports in the United States, China, and the European Union are major drivers of commercial flight carbon emissions. Governments in the United States, United Kingdom, and worldwide, continue to develop and enforce new environmental initiatives and regulations that seek to protect air quality and reduce carbon footprints. For example, the Federal Aviation Administration's airport sustainability program encourages sustainable airport planning with the reduction of environmental impacts a core tenet of the program.

As regulatory environments continue to evolve and change, the Striker Volterra ARFF vehicle provides airports a tool to help them meet local and national environmental and sustainability goals.

Cost Savings

Fuel is a significant cost for airports and airport fire departments alike, and prices have been trending higher for several years. Plug-in hybrid electric vehicles offer potential fuel cost savings over traditional diesel drivetrain vehicles by lowering the amount of fuel consumed. Additional cost saving can be realized with fewer required preventative engine maintenance and repairs. The smaller diesel engine consumes less oil and fluid, while standby mode eliminates wear from idling.

Health and Safety

The health and safety of firefighters is the top priority for manufacturers and departments alike. Low-emissions ARFFs can help mitigate and even eliminate exposure to diesel emissions when being run completely on battery power. The Striker Volterra ARFF vehicle will utilize the on-board batteries when entering and exiting the firehouse, creating a zero-emissions environment and helping to protect the firefighters.

Charging Requirements for the Striker Volterra ARFF Vehicle

One of the top considerations for electric vehicles is how the batteries are charged. Most EV drivetrains require a power source that connects the onboard batteries to the power grid. The Striker Volterra ARFF stands out from the rest of the industry because connecting to the power grid is not required for it to maintain a state of charge when the batteries are coupled with the diesel engine. As long as fuel is available, performance will not be degraded.

Plugging in the batteries may be the most efficient charging option for some departments, and the Striker Volterra ARFF can charge from the standard 220 or 480 electrical grid. The Striker Volterra ARFF is not dependent on a specialized charging infrastructure. Customers may opt is to install 480V 3-phase at 32 amps to support the Striker Volterra ARFF's charging needs. ARFF vehicles typically do not experience the same volume of calls for service that a municipal apparatus does, so the need for fast charging, and the related expense, is a less critical consideration. If fast charging is important to the department, infrastructure investment would be a part of the planning process. Additionally, chargers could be integrated with renewable energy sources such as wind and solar, achieving further emission reduction.

How Does Emergency Response Change with a Plug-In Hybrid Electric Vehicle?

Ensuring uncompromised response to emergencies is vital to supporting firefighters and their critical mission to save lives. The Striker Volterra ARFF vehicle is fully tested and compliant to all NFPA 414 and ICAO standards.

NFPA 414 requires ARFF vehicles meet a two-hour full rated discharge requirement. A fully electric vehicle requires a very large amount of energy in order to meet this requirement. Once the power is depleted, the battery needs to be recharged, or a range extending energy source such as a combustion engine must be used. ARFF electrification using an all-electric or a mild-hybrid approach will force some compromises with overall performance.

In contrast, the Striker Volterra ARFF vehicle can continue to operate at full performance with respect to driving and pumping. The firefighter does not need to react or adjust to a reduction in performance based on the battery's state of charge, making the two-hour pump discharge requirement much easier to achieve.

The Striker Volterra ARFF's Uncompromised Performance:

Rapid Response - 0-50 mph (0-80 kph) in 25 seconds. The vehicle can achieve 28% improved acceleration when fully loaded, resulting in a quickened response time.

Pump and Roll - Utilizing both the engine and the battery, the advanced powertrain continuously powers the pump while the driver's input is smoothly applied to the vehicle's motion.

Stationary Pumping - Utilizing the internal combustion engine to efficiently power the water pump, the vehicle's Command Zone Control System optimizes engine RPM based on water pump requirements to reduce emissions and noise.

6x6 Striker Volterra ARFF Vehicle Configuration:

- Seating capacity: 5
- TAK-4® all-wheel independent suspension
- 50' (15.2 m) Snozzle® HRET with Oshkosh® K-Factor™ piercing tip alignment system
- 3,170 Gallon (12,000 Liter) water tank
- 2000 GPM (7,570 LPM) water pump
- 550 lb (225 kg) dry chemical powder system
- Scania DC13 engine
- Oshkosh power divider
- Modular cab design
- Center steer driving position
- Industry-leading forward visibility
- Ergonomic control placement

> Operation of the Striker Volterra ARFF is virtually identical to traditional Striker ARFFs with a diesel drivetrain, eliminating the need for additional operator training and ensuring superior response.

Electric ARFF Vehicle Service and Maintenance

Development of the Striker Volterra ARFF vehicle considered the importance of fleet continuity for maintenance procedures and provides the same ease of maintenance as a traditional Striker ARFF with a diesel drivetrain. Like the traditional Striker ARFF vehicle, the Striker Volterra ARFF vehicle has a walk-in service port for easy access to filter and fluid points as well as the engine. The high voltage equipment is the only area requiring specialized maintenance personnel.

The Striker Volterra ARFF vehicle has the potential for reduced maintenance schedules and costs:

- Standby mode eliminates idling, which means there is less wear on the diesel engine
- The smaller diesel engine consumes less oil and fluid, requiring less frequent service intervals

Global Service Network

Oshkosh Airport Products is dedicated to providing customers with unmatched service and support. Across the globe we have resources available to ensure your fleet is always ready for the runway.

Runway Ready™ Telematics

Awareness of your fleet's maintenance needs can help your team to be prepared for an emergency response. Runway Ready telematics displays real-time data on your truck and is available at any location and time. An algorithm established by Oshkosh engineers calculates your vehicle's readiness and alerts you when attention is needed. To be prepared, specify your truck with Runway Ready telematics.

Learn more about how Oshkosh Airport Products has your back with service, support and training solutions

How Does a Fire Department Set Up for a Striker Volterra ARFF Vehicle?

The Striker Volterra ARFF vehicle is designed to seamlessly integrate with existing firehouses and infrastructure. While a connection to the power grid is not required to charge the truck's batteries, departments may choose to install chargers for convenience and as an additional way to reduce emissions.

Preparation for the Striker Volterra ARFF vehicle includes:

- **Assessment** - Determine what type of charger, standard or fast, is appropriate for your department's use.
- **Partnership** - It is recommended to collaborate with your electrical utility provider to ensure the power availability is sufficient to ensure capacity for the desired infrastructure setup.
- **Installation** - Your local electricians and electrical utility workers will assist in integrating the charging infrastructure into the firehouse.

Striker Volterra ARFF Vehicle in the Field

After its introduction in June of 2021, the Striker Volterra ARFF vehicle embarked on a road show tour throughout North America and Europe to exhibit the vehicle's innovative plug-in technology and exceptional performance capabilities. Demonstrations took place at seven locations in North America and nine locations in Europe, attracting attendees from over 13 countries from around the world. The events offered aircraft rescue and airport firefighting crews hands-on and immersive experiences with this new technology.

The tour provided Oshkosh the opportunity to connect with airport fire departments and share how the Striker Volterra ARFF can meet the growing environmental sustainability needs among airports of all sizes. Attendees appreciated the Striker Volterra ARFF's electrification technology which offers their airport fire fighters uncompromising operational performance, functionality, safety, and customization – while still meeting their sustainability goals and requirements.

Full Electric Drive with Hybrid Emergency Response

EV Driving Mode

Activates on startup without any user input when the vehicle exits the fire station. On re-entry, the vehicle can be seamlessly shifted to EV Driving mode once more. This mode utilizes only the onboard batteries to power the drivetrain.

Standby Mode

The vehicle operates at zero emissions utilizing onboard batteries to provide power to required systems. The engine starts as needed to maintain battery readiness.

Hybrid Driving Mode

The vehicle automatically shifts to Hybrid Driving mode as needed for acceleration, and to maintain the batteries for maximum readiness. The internal combustion diesel engine and batteries work together to maximize performance and improve response time, while reducing emissions.

Regenerative Braking

Regenerative braking increases efficiency and reduces brake wear. Kinetic energy is converted to electricity which recharges the batteries and reduces brake temperature and wear.

Pump and Roll

Utilizing both the engine and the battery, the advanced powertrain continuously powers the pump while the driver's input is smoothly applied to the vehicle's motion.

Stationary Pumping

Using the internal combustion diesel engine to efficiently power the water pump, the Command Zone Control System optimizes engine RPM based on water pump requirements to reduce emissions and noise.

Where Do I Learn More About the Striker Volterra ARFF Vehicle?

With technology innovations emerging faster than ever, it is essential to anticipate the future needs of firefighters, and how the next generation of fire apparatus will meet the demands these brave men and women around the world face each day.

What questions do you have about ARFF vehicles and how to select the best fire apparatus for your operation? Oshkosh Airport Products' knowledgeable and experienced team is ready to help.

- Striker Volterra Web page
- Oshkosh Airport Products and Pierce Manufacturing Introduce the Volterra Platform of Electric Vehicles
- Striker Volterra Resources

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