Enhancing Master Stream Effectiveness: The HEN® TITAN™ System

PLACEMENT OF WATER is 90% of extinguishment. Handlines excel because they can deliver optimal stream reach (velocity and volume) with unmatched nozzle mobility. Master streams—deck guns, elevated platforms—struggle by comparison: Fixed in place, they trade mobility for the ability to manage high volumes and reaction forces.

The Placement Imperative

Simply adding more water doesn't guarantee extinguishment if placement is poor. Additionally, excess flow can overwhelm water mains, impacting handlines. Efficient, targeted water applications are paramount for rapid extinguishment. If water is placed correctly, even 500 gallon-per-minute (gpm) master streams provide more than enough capacity to put out most heavily involved structure fires.

Traditionally, the fire service has chased even higher volumes to improve master stream performance. However, once flow demands exceed the critical flow threshold, adding more water yields diminishing returns. Existing master streams suffer from poor stream placement potential, sending thousands of gallons cascading out of structure openings or poorly coating exterior surfaces, wasting suppression water while the fire rages on and spreads. Poor placement leads to area water mains' maximum volume being overallocated to highvolume master streams. This will starve handlines, compromising critical interior and exterior handline operations found jointly on the master stream fireground.

How much well-placed water is actually needed? In his 1974 book *Fire Fighting Hydraulics*, Robert C. Purington noted that 100 gpm of water can absorb nearly 1 million British thermal units per minute (BTU/min) at 100% efficiency. Further, the National Fire Protection Association project "Operation School Burning" found that 1,400 pounds of wood pallets burn at a rate of 560,000 BTU/min. This suggests that a 100-gpm fire stream, even at 50% efficiency, could effectively extinguish such a fire with good placement.

It is important to remember that you don't need a one-to-one match between a fire's BTU production and water's absorption capacity. A significant amount of a fire's energy is lost to the surroundings through convection and radiation or absorbed by the building itself. This indicates that precise placement and effective application of master stream water significantly increase the likelihood of achieving rapid fire extinguishment, even when firefighters encounter large, established fires on arrival. For example, 500 gpm applied directly to the fuel can absorb roughly 5 million BTU/min. This represents a tremendous amount of suppression potential where placement of it is the main linchpin between success and failure. Additionally, while modern plastics have about twice the BTU potential per pound compared to cellulose fuels, they are highly vulnerable to rapid suppression once their surfaces are cooled, as they primarily burn on the exterior.

Effective placement—not raw volume—is master stream's primary limitation.

Introducing the HEN® TITAN™ System

The HEN® TITAN™ master stream system directly addresses these placement limitations through three core components (Figure 1):

- **Throttle:** Seamlessly adjusts stream reach.
- **Stream-IQ™:** Provides real-time flow volume readings.
- **BLADE™ Nozzle:** Offers versatile "BLADE™" (wide coverage, large droplet) and "Tight Jet" (focused stream, far reach) patterns.

The TITAN™ Operational Advantage

The HEN® TITAN™ master stream system directly addresses placement challenges by delivering wide coverage and variable reach from a single nozzle. Our master stream nozzles are based on HEN® BLADE™ nozzles, which can produce both a broad, stable fan (BLADE™ pattern) for efficient surface cooling and coverage and a focused, high-velocity stream (Tight Jet) for maximum reach through narrow openings. The BLADE™ pattern's efficient water application leads to faster suppression compared to traditional fog or tight patterns. Its orientation can be adjusted from horizontal to vertical remotely or manually. The vertical BLADE™ is ideal for applications like exposure control, rapidly covering an entire building side with a sweeping action.

Figure 1. The BLADE™ Master Stream and Three-Part TITAN™ System: Throttle, Stream-IQ™, and BLADE™ Nozzle

A key challenge with master streams has always been controlling nozzle reach. The HEN® TITAN™ solves this with an innovative throttle control system, based on the same scientific principles as HEN® TURBO™ back pressure devices. This manual or electrically driven throttle precisely manipulates water stream velocity, allowing effortless adjustment of nozzle breakover, volume, and velocity.

In addition to enhanced placement efficiency via the BLADE™ pattern and Throttle system, the HEN® TITAN™ offers an optional Stream-IQ™ flow measurement system. Stream-IQ™ is an advanced, ultrasonic-based flow sensor providing real-time gpm readings at the nozzle tip. With no moving parts, it offers a high degree of accuracy.

When used together, these components provide operators with the following:

- **Variable Range:** From near field (<50 ft.) to long reach (>135 ft.) with 500T, 750T, or 1000T models.
- **Adjustable Flow:** 350-1,230 gpm, 50-200 psi nozzle pressure.
- **Optimized Velocity:** 85-172 ft/s (60-120 mph), minimizing early droplet fallout and maximizing surface impact.

Traditional fog or smooth bore nozzles offer limited flexibility. The TITAN™ BLADE™ nozzle provides unparalleled adaptability, allowing operators to infinitely adjust ps from wide sweeps to concentrated jets and vary reach/breakover (Figure 2). This revolutionary, more precise "water mapping" capability, is long overdue in the fire service, and fundamentally improves master stream effectiveness. Whether manual or electronic, HEN® TITAN™ elevates fire suppression by raising the bar for water placement, enabling operators to:

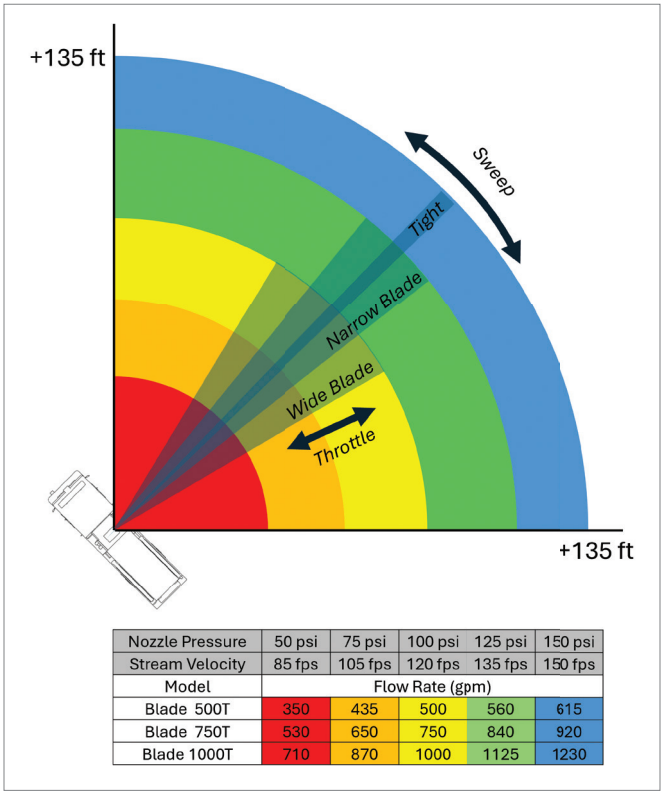
- **Sweep** burning surfaces with the BLADE™ pattern to knock down progressive fire spread, and/or thoroughly coat and cool exposure surfaces.
- **Pinpoint** focus on near and far hotspots or apply through openings using the Tight Jet.
- **Modulate** breakover and velocity on the fly by turning the throttle, adapting to reach required and penetrating through convection columns and high winds.

Why It Matters

There are three TITAN™ master stream BLADE® nozzles—500, 750, and 1000 GPM rated at a nominal 100 psi—with an operable pressure range of 50–200 psi. This yields stream velocities of 85–172 ft/s (≈60–120 mph). Stream speed is critical: reach can be traded between volume and velocity. A high-volume fog nozzle creates small droplets that evaporate or fall short, whereas a smaller-volume, higher-velocity stream of larger droplets carries farther and delivers more water to burning surfaces. The HEN® BLADE™ and tight patterns produce a wind-stable stream whose volume and velocity are easily varied via pressure adjustment—unlike automatic master stream nozzles. By reducing travel time through the convection column and increasing droplet mass, they overcome thermodynamic and environmental factors such as extreme heat, wind, and gravity. High-velocity streams therefore deposit a much greater percentage of suppression water on the fire, vastly outperforming traditional master streams worldwide.

Traditional master streams rely on either simple smooth-bore tips or fixed-orifice fog nozzles. Smooth-bore tips project a tight "dot" that depends almost entirely on secondary impacts to spread suppression water, while fog nozzles only offer a cone or straight stream constituted

Figure 2. Top-Down View of HEN® BLADE™ Master Stream Footprint of Suppression; Fixed Orifice Nozzle System with Variable GPM, Reach, and Velocity



Nozzle Pressure	50 psi	75 psi	100 psi	125 psi	150 psi
Stream Velocity	85 fps	105 fps	120 fps	135 fps	150 fps
Model	Flow Rate (gpm)				
Blade 500T	350	435	500	560	615
Blade 750T	530	650	750	840	920
Blade 1000T	710	870	1000	1125	1230

of inferior surface cooling small droplets. Neither option allows the operator to tailor the volume, velocity and reach, on the fly. The TITAN™ system solves this with an infinitely adjustable nozzle: the BLADE™ pattern for wide-area sweeps or exposure protection, and the Tight Jet for focused penetration. Operators can also generate a heavy surface-cooling "fall-out" line of large droplets by orienting the BLADE™ horizontally and modulating the throttle from minimum to full restriction. When flowing into a structure, the same throttle technique adjusts breakover and reach by altering nozzle pressure. See Figure 2 for a simulated corner-lot placement and throttle-controlled BLADE™ nozzle in action.

Nozzle reaction has been carefully managed: The BLADE® 1000T at 175 psi produces about 930 lbs. of reaction, fitting any master stream device rated up to 950 lbs. reaction force while discharging an astonishing 1,330 gpm at 160 fps. The 500T and 750T can run at the full 200 psi on most deck gun risers without exceeding safe reaction limits.

Perfecting Master Stream Placement

If your department has ever struggled to place master stream water accurately, the TITAN™ suppression system is the solution. It lets you effortlessly manipulate pattern, reach, stream velocity, and flow rate—because placement is nine-tenths of extinguishment, and until now master streams have been severely placement-limited. HEN® raises the bar for master stream deployment, delivering the first truly adaptive master stream water-mapping system for the modern fireground. Whether you choose manual or electronic control, the TITAN™ ensures you're covered efficiently and effectively. ■