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Summary



The U.S. Department of Homeland Security, Preparedness Directorate, Office of Grants and Training (G&T) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders in performing their duties. The mission of the SAVER Program is to

- Provide impartial, practitioner relevant, and operationally oriented assessments and validations of emergency responder equipment.
- Provide information that enables decision-makers and responders to better select, procure, use, and maintain emergency responder equipment.
- Assess and validate the performance of products within a system, as well as systems within systems.
- Provide information and feedback to the user community through a well-maintained, Web-based database.

The SAVER Program established and is supported by a network of technical agents who perform the actual assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community, "What equipment is available?" and "How does it perform?"

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Hydraulic Rescue Tool Systems Assessment Report Summary

Hydraulic rescue tool systems (HRTS) are essential to a community's emergency responder services. Used by both fire services and police services, the systems are primarily used for extracting victims from vehicle accidents in which damage to the vehicle prevents access to the victim. Although the technology has been commonly used for many years, the systems are evolving and many options are available to emergency responders.

Texas A&M Engineering has recently completed a comparative assessment of six hydraulic rescue systems in support of the SAVER Program:

- Amkus Rescue Systems
- Champion Rescue Tools
- Holmatro Rescue Equipment
- Hurst Jaws of Life Rescue Systems
- Phoenix Rescue Equipment
- TNT Rescue Systems



As part of the SAVER assessment, four components of the systems were tested – the power units (including pumps and hoses), spreaders and chains, cutters, and rams.

Emergency responders participated in the assessment, which focused on component characteristics, the procurement process, operational performance based on field use by subject matter experts (SMEs) in simulated response scenarios, bench performance in laboratory settings, and after-sale support and tool rehabilitation by manufacturers and vendors.

This is a summary of the contents of the Hydraulic Rescue Tool Systems Assessment Report. The report should be reviewed for the full discussion and recommendations. The report is available to emergency respon-

ders and can be found on the SAVER Web site at <https://saver.fema.gov>.

HRTS Assessment Criteria

Each system was rated according to the SAVER assessment categories of affordability, capability, deployability, maintainability, and usability. Emergency responders who were asked to assist in this assessment ranked deployability as the most important feature of a hydraulic rescue tool system. They also identified the power unit as the component of most importance.

Underlying criteria for each SAVER category was defined by a focus group made up of 14 fire, police,

| Affordability | Capability | Deployability | Maintainability | Usability |
|---|---|--|--|--|
| Cost of individual components, including pump, hose, spreader, chain, cutter, and ram | SME's observed capability of components, including pump, hose, spreader, chain, cutter, and ram | SME's observed deployability of components, including pump, hose, spreader, chain, cutter, and ram | SME's observed maintainability of components, including pump, hose, spreader, chain, cutter, and ram | SME's observed usability of components, including pump, hose, spreader, chain, cutter, and ram |
| | Pump speed | Pump weight | Pump durability | Spreader field effectiveness |
| | Two-tool effect on pump speed | Pump size | Hose durability | Cutter field effectiveness |
| | Low temperature effect on pump speed | Spreader weight | Spreader durability | |
| | Spreader chain kit | Spreader size | Cutter durability | |
| | Spreader cycle time | Cutter weight | Ram durability | |
| | Spreader spreading force | Cutter size | | |
| | Spreader pulling force | Ram weight | | |
| | Cutter cycle time | Ram stroke length | | |
| | Cutter force | | | |
| | Ram cycle time | | | |
| | Ram force | | | |

Table 1. HRTS evaluation criteria.

and emergency medical services subject matter experts (SMEs). Table 1 lists the criteria used by Texas A&M Engineering for the evaluation of hydraulic rescue tool systems.

- Cutter weight
- Cutter size
- Ram weight
- Ram stroke length

HRTS Overall Assessment Rating

Overall, TNT had the highest performing HRTS. Emergency responders liked the TNT power unit’s stability and the in-line feel of the unit’s controls. They thought the spreader was fast and liked the cutter’s speed. Other systems performed well for some components and assessment categories and not well for other components and categories; thus, lowering their performance rating. See table 2 for the ranking of all systems in each SAVER assessment category.

Emergency responders stated that deployability is the most important characteristic of hydraulic rescue tools. Deployability criteria for the SAVER assessment included:

- SME’s observed deployability of components, including pump, hose, spreader, chain, cutter, and ram
- Pump weight
- Pump size
- Spreader weight
- Spreader size

The Champion system was ranked as the most deployable system, followed by TNT and Hurst.

HRTS Component Ratings

The HRTS components assessments show variability in HRTS component performance. HRTS components from TNT and Amkus had the average highest performance, while HRTS components from Hurst and Holmatro had the lowest performance score. Table 3 provides additional information on the HRTS overall component category ratings.

Emergency responders who participated in Texas A&M Engineering’s focus group determined that the power unit on hydraulic rescue tools is the most important component of a system. The assessment of power units revealed that the TNT power unit and the Champion power unit were the overall highest rated HRTS power unit components of those assessed.

Table 4 lists the components tested for each hydraulic rescue tool system.

| System | Overall | Affordability | Capability | Deployability | Maintainability | Usability |
|----------|---------|---------------|------------|---------------|-----------------|-----------|
| TNT | 3.73 | 4.40 | 3.92 | 3.23 | 3.61 | 4.23 |
| Champion | 3.58 | 2.36 | 3.49 | 3.81 | 3.93 | 3.75 |
| Amkus | 3.50 | 3.28 | 3.81 | 3.11 | 4.03 | 3.67 |
| Phoenix | 3.37 | 4.54 | 3.27 | 3.06 | 3.39 | 3.10 |
| Holmatro | 3.27 | 2.71 | 3.44 | 3.07 | 3.45 | 3.84 |
| Hurst | 3.14 | 1.64 | 3.97 | 3.16 | 3.08 | 3.71 |

Table 2. HRTS category ratings weighted by emergency responders. The ratings are on a 0 (lowest) to 5 (highest) scale.

| HRTS Component | Amkus | Champion | Holmatro | Hurst | Phoenix | TNT |
|-------------------------|-------|----------|----------|-------|---------|------|
| Power Unit (Pump/Hoses) | 2.92 | 3.54 | 2.77 | 2.64 | 2.89 | 3.58 |
| Spreader/Chain | 3.38 | 3.06 | 2.97 | 2.61 | 3.48 | 3.22 |
| Cutter | 3.14 | 2.80 | 3.18 | 3.30 | 2.82 | 3.09 |
| Rams | 3.41 | 3.25 | 3.11 | 3.24 | 2.67 | 3.46 |

Table 3. HRTS overall component ratings weighted by emergency responders. The ratings are on a 0 (lowest) to 5 (highest) scale.

| Hydraulic Rescue Tool System | Components Assessed | Model Number |
|------------------------------|---------------------|--|
| TNT System | Power Unit/Hose | BT-6.5 |
| | Spreader | S1000-32 |
| | Cutter | C-20 |
| | Rams | R-20, R-30, R-40, R-50 |
| Amkus System | Power Unit/Hose | GH2S-XL Power Unit |
| | Spreader | AMK-30CX |
| | Cutter | AMK-21 |
| | Rams | AMK-20-R, AMK-30R, AMK-40R, AMK-60R |
| Champion System | Power Unit/Hose | 6.5 HP Power Unit, "Simo" |
| | Spreader | RS-18 |
| | Cutter | RC-5 |
| | Rams | 13-19, 21-33 |
| Phoenix System | Power Unit/Hose | Ultra Hi-Flow |
| | Spreader | Model 25 |
| | Cutter | Model 25 |
| | Rams | 14/27 Mini Ram, Model 25/60 Super Ram |
| Holmatro System | Power Unit/Hose | DPU60PH Gasoline |
| | Spreader | 3242-UL |
| | Cutter | 3035-UL |
| | Rams | 3321UL, 3322UL, 3340 Telescopic, 3350 Telescopic |
| Hurst System | Power Unit/Hose | JL-4GH-SI |
| | Spreader | ML-32 |
| | Cutter | Xtractor II |
| | Rams | JL-20C, JL-30C, JL-60C, T-41 Telescopic |

Table 4. HRTS components.

SAVER QuickLook

The SAVER QuickLook chart gives Web site users the ability to rank products according to their own prefer-

ences. Figure 1 is the Quick Look chart associated with the rankings given by emergency responders who participated in the assessment. To see which hydraulic rescue tool system will suit your department's needs, log on to <https://saver.fema.gov> and go to the QuickLook.

| Product | RANKING | | | | | | Features |
|---|-----------|---------------|------------|---------------|-----------------|-----------|---|
| | COMPOSITE | AFFORDABILITY | CAPABILITY | DEPLOYABILITY | MAINTAINABILITY | USABILITY | |
|   <p>TNT TNT System</p> | ★ | ★ | ★ | ★ | ★ | ★ | <ul style="list-style-type: none"> • Power Unit/Hose :: BT-6.5 • Spreader :: S100-32 • Cutter :: C-20 • Rams :: R-20, R-30, R-40, R-50 |
|   <p>Champion Champion System</p> | ★ | ★ | ★ | ★ | ★ | ★ | <ul style="list-style-type: none"> • Power Unit/Hose :: 6.5 HP Power Unit, "Simo" • Spreader :: RS-18 • Cutter :: RC-5 • Rams :: 13-19, 21-33 |
|   <p>Amkus Amkus System</p> | ★ | ★ | ★ | ★ | ★ | ★ | <ul style="list-style-type: none"> • Power Unit/Hose :: GH28-XL Power Unit • Spreader :: AMK-30CX • Cutter :: AMK-21 • Rams :: AMK-20R, AMK-30R, AMK-40R, AMK-60R |
|   <p>Phoenix Phoenix System</p> | ★ | ★ | ★ | ★ | ★ | ★ | <ul style="list-style-type: none"> • Power Unit/Hose :: Ultra Hi-Flow • Spreader :: Model 25 • Cutter :: Model 25 • Rams :: 14/27 Mini Ram, Model 25/60 Super Ram |
|   <p>Holmatro Holmatro System</p> | ★ | ★ | ★ | ★ | ★ | ★ | <ul style="list-style-type: none"> • Power Unit/Hose :: DPU60PH Gasoline • Spreader :: 3242-UL • Cutter :: 3035-UL • Rams :: 3321UL, 3322UL, 3340 Telescopic, 3350 Telescopic |
|   <p>Hurst Hurst System</p> | ★ | ★ | ★ | ★ | ★ | ★ | <ul style="list-style-type: none"> • Power Unit/Hose :: JL-4GH-SI • Spreader :: ML-32 • Cutter :: Xtractor II • Rams :: JL-20C, JL-30C, JL-60C, T-41 Telescopic |

Figure 1. SAVER Web site: HRTS Assessment QuickLook.

Conclusion

All HRTS successfully performed the operational scenarios designed by Texas A&M Engineering and emergency responders. However, there were key differences in the way HRTS components performed.

The Hydraulic Rescue Tool Systems Assessment Report provides additional information about each of the component assessments as well as the HRTS's overall rating. Included in the report is the ratings for all of the criteria that make up each category as well as comments and observations from the emergency responders who performed the assessment in a simulated response scenario. Along with the full assessment report, additional documents pertaining to the HRTS assessment project can be found on the SAVER Web site at <https://saver.fema.gov>.

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For more information on the hydraulic rescue tool systems project please see the SAVER Web site or contact the SAVER Program Support Office.

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