



**Homeland
Security**

Science and Technology

Summary

U.S. Department of Homeland Security



System Assessment and Validation for Emergency Responders

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions.

Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective operational tests on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL).

The SAVER Program is supported by a network of technical agents who perform 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 the 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 system 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 all the full discussion and recommendations. The report is available to emergency responders and can be found on the SAVER Web site at <https://www.rkb.us/saver>.

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 for most importance.

Underlying criteria for each SAVER category was defined by a focus group made up of 14 fire, police, and emergency medical services subject matter

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 pulling force	Ram weight		
	Cutter cycle time	Ram stroke length		
	Cutter force			
	Ram cycle time			
	Ram force			

Table 1. HRTS evaluation criteria.

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

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 controls. They though 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
- Cutter weight
- Cutter size
- Ram weight
- Ram stroke length

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.

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/ Hoses	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	13-9, 21-33
Phoenix	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,

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

SAVER QuickLook

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

preferences. Figure 1 is the QuickLook 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://www.rkb.us/saver> and go to the QuickLook.

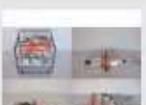
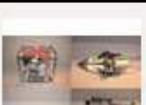
Product	COMPOSITE	AFFORDABILITY	CAPABILITY	DEPLOYABILITY	MAINTAINABILITY	USABILITY	Features
  TNT TNT System	★	★	★	★	★	★	<ul style="list-style-type: none"> • Power Unit/Hose :: BT-6.5 • Spreader :: S100-32 • Cutter :: C-20 • Rams :: R-20, R-30, R-40, R-50
  Champion Champion System	★	★	★	★	★	★	<ul style="list-style-type: none"> • Power Unit/Hose :: 6.5 HP Power Unit, "Simo" • Spreader :: RS-18 • Cutter :: RC-5 • Rams :: 13-19, 21-33
  Amkus Amkus System	★	★	★	★	★	★	<ul style="list-style-type: none"> • Power Unit/Hose :: GH2S-XL Power Unit • Spreader :: AMK-30CX • Cutter :: AMK-21 • Rams :: AMK-20R, AMK-30R, AMK-40R, AMK-60R
  Phoenix Phoenix System	★	★	★	★	★	★	<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
  Holmatro Holmatro System	★	★	★	★	★	★	<ul style="list-style-type: none"> • Power Unit/Hose :: DPU60PH Gasoline • Spreader :: 3242-UL • Cutter :: 3035-UL • Rams :: 3321UL, 3322UL, 3340 Telescopic, 3350 Telescopic
  Hurst Hurst System	★	★	★	★	★	★	<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 overall rating. Included in the report are the ratings for all the criteria that make up each category as well as comments and observations from the emergency responders who performed that 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://www.rkb.us/saver>.

Opinions or points of view expressed in this document are those of authors and do not necessarily represent the view or official position of the U.S. Government.

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

