



STIC Note



Remotely Operated Brush Cutter

BACKGROUND/PROBLEM

To fulfill the Coast Guard's mission of maintaining Aids to Navigation (ATON), visual line-of-sight must be maintained between vessels and ATONs. To ensure line-of-sight, some ATONs require the clearing of rapidly growing brush and vegetation that obscures the marker during the spring and summer seasons. Maintaining ATONs in these environments is difficult work in harsh conditions and is resource intensive.

Additionally, the ATONs can be surrounded by hazardous flora (poison ivy, sumac, and oak), fauna (snakes and spiders), posing health and safety hazards to crew, which may require hospitalization and steroid shots. In 2020, there were 7 mishaps from the USCGCs CHEYENNE and GASCONADE where crewmembers required urgent care due to brush clearing activities. Tyvek suits may mitigate exposure risks but increase the risk of heat stress/stroke.



Figure 1. Obscured shore-based ATON, overgrown brush, and crew member visible on the riverbank. (Source: U.S. Coast Guard)

The STIC conducted a review to determine if new classes of remotely operated industrial mowing/cutting land clearing equipment could improve USCG brush cutting operations

servicing ATONs. The benefits of this equipment would include the potential to lower the risk of injury to crew, reduce the number of required crewmembers and reduce the amount of time required to clear an ATON while meeting or exceeding current levels of clearing effectiveness.

METHODS

The STIC consulted with crews in Sector Upper Mississippi River (SUMR) where this type of ATON maintenance is common, and it was determined that cutting brush up to 6-inches in diameter was a priority requirement. After conducting market research, the Green Climber LV600 remotely operated brush cutter with forestry flail attachment was selected and purchased.

The LV600 is a diesel fueled, track propelled, configurable remote system that can operate on slopes up to a 60-degree incline. The dry weight is 2850 lbs. The forestry flail attachment can cut brush up to a 6-inch diameter, and weighs 500 lbs. A trailer with tie-downs and a reinforced ramp was also purchased for overland transport. The combined cost of the LV600, forestry flail attachment, and trailer is approximately \$110K.



Figure 2. Green Climber LV600 with operator using a Bluetooth control belt-pack (yellow) to direct the LV600 movements. (Source: U.S. Coast Guard)

The LV600 was delivered to St. Louis, Missouri for the crew of the USCGC CHEYENNE to test on a sloped bank of the Mississippi River. This operations area requires cutter barge deployment to reach the ATONs due to lack of available land access.

Subsequently, the LV600 was delivered to Aids to Navigation Team (ANT) Sabine in Sabine Pass, TX which utilized trailer deployment to relatively flat but densely overgrown and marsh areas for familiarization and testing.

EVALUATION

Testing of the LV600 was successful in both locations and problematic growth, including saplings up to 6-inches, were easily cleared. Operator feedback was very positive towards the brush cutter, focusing on its potential to improve operational efficiency and reduce crew injury.

For cutter barge operations, the weight and size of the LV600 was prohibitive. The LV600 and flail exceeded barge crane weight capacity and deck storage and movement was difficult. A smaller size brush cutter could be a viable option for barge deployment. No limitations were encountered during trailered deployment.

Other feedback from the field included the suggestion to add a remote camera to the front of the LV600 to assist with navigation and obstacle clearing and a self-extraction winch in case the brush cutter becomes stalled or stuck.

ANT Sabine reported significant efficiency improvement using less crew and equipment to clear a given area in less time with the LV600:

Table 1. Brush cutting efficiency comparison.

Equipment	Crew	Hours
Green Climber LV600 – Brush Cutter	2	3
Bobcat, Tow Brush Cutter, Walk Behind, Hand Tools	6-8	6+

CONCLUSIONS

The LV600 remotely operated brush cutter demonstrated the ability to greatly improve brush clearing operations in the test locations and could also be useful for other areas that have extensive brush growth in various difficult terrain types. Units may consider different size equipment and/or attachments for their application but increased efficiency, reduced risk of hazard exposure and crew operability and satisfaction are evident.



Figure 3. LV600 with cleared range marker. (Source: U.S. Coast Guard)

FUTURE WORK

ANT Sabine has planned use of the LV600 in varied environments to inform development of a Performance Qualification Standard (PQS) and an operations and maintenance guide. The LV600 will also be shared with ANT New Orleans.

The Science and Technology Innovation Center (STIC) is a DHS S&T and USCG collaboration.