

## Automated Blade Control for Navy Construction Equipment

### Technology Description

The U.S. Navy and U.S. Army performed an evaluation to explore potential benefits that come from automated blade control technology on earthmoving equipment. The evaluation was conducted at Naval Base Ventura County in Port Hueneme, CA on November 9-10, 2011.

This evaluation was performed using a U.S. Army conventional dozer and a diesel electric hybrid dozer. The hybrid dozer was equipped with an automated blade control system.

Dozers were run in the following test sequence utilizing a single operator:

- Hybrid dozer w/ automated blade control
- Hybrid dozer without automated blade control
- Conventional dozer without automated blade control

Each machine completed a simulated Helicopter Landing Zone (HLZ) consisting of a 100ft x 100ft square pad. A 0% grade was maintained in the lateral direction and 1% downhill grade was maintained in the cutting direction. Areas of investigation were: (a) Time savings, (b) Manpower reduction, (c) Productivity and production, (d) Quality of work. In addition, the setup time was determined using Global Positioning System technology compared to conventional slope staking methods applied by surveyors.

### Test Results:

Time savings: The conventional survey took two personnel 67 min 45 seconds to establish four corners of the Helicopter Landing Zone (HLZ) pad and associated grade references. The GPS survey required 24 min 45 seconds for two personnel to establish a starting point for the HLZ with involved resulting in a time savings of 43 minutes.

Manpower reduction: The hybrid dozer equipped with automated blade control required one operator with no surveyors compared to the conventional method that required two surveyors and one operator to determine excavation profiles and control points.

Productivity and production: Results indicated that 7% lower fuel consumption could be achieved by the hybrid dozer with blade control when compared to the hybrid dozer without blade control. Additional analysis incorporating volume excavated compared with fuel consumption shows that the hybrid dozer with blade control was between 15% and 32% more efficient than the hybrid dozer without blade control.



Diesel Electric Hybrid Dozer with Automated Blade Control

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**Quality of work:** Compared to the conventional system, the hybrid dozer with automated blade control produced a more consistent profile with an overall dimension closer to the 100 ft x 100 ft target. Additional survey time and fuel consumption would be expected for the conventional machine to achieve the same pad quality as the machine with blade control.

### **Value to the Warfighter**

Automated blade control has the potential to achieve higher productivity, improved efficiency, lower operating cost, and increased quality when performing complex site designs and finish/fine grading activities. When comparing the hybrid dozer conventional to the hybrid dozer with blade control, the automated system provided noteworthy improvement in fuel consumption, task efficiency and manpower allocation for a 100 ft x 100 ft HLZ site survey and rough grading project.

### **Technology Transition Documentation**

This technology can be classified as transition in Category 4 – provide the Government the knowledge base or information to make decisions. A test report is available upon request.

Participation in this comparison test enables the Navy to assess new, promising technologies to reduce the fuel consumption of expeditionary construction equipment used by the Seabees in deployment and training. Navy and Army engineers believe that automated blade control technology will ultimately result in a notable reduction in fuel consumption and lower overall operating costs.

The project is the result of a partnering effort between the U.S. Army's Tank Automotive Research, Development and Engineering Center (TARDEC), the NAVFAC Engineering and Expeditionary Warfare Center (NAVFAC EXWC), the First Naval Construction Division (1NCD), the 31st Seabee Readiness Group (SRG), and private industry.

### **Specific Applications**

- Expeditionary Runways
- Paved/Unpaved Roadways
- Building Pad Foundations
- Parking Lots
- Helo Pads

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