

SPECIAL REPORT

Next Generation Military Vehicle Recovery Solutions

Pulling For the Warfighter

The Power Behind Military Might

The Heavyweight Case for Recovery Vehicles and Maintenance

21st Century Demands for Heavy Tactical Wheeled Vehicles

Facing the Future



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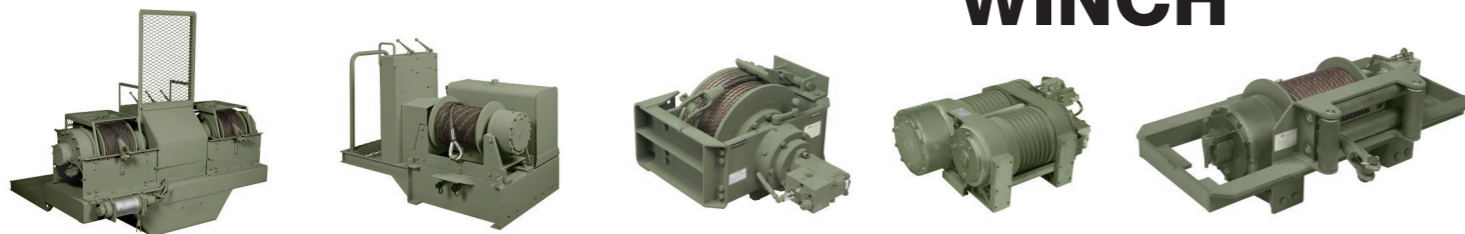


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Contents

Foreword	2
<i>Mary Dub, Editor</i>	
Pulling For the Warfighter	3
<i>Eric Sallee, TWG-Dover</i>	
Performance under Pressure	
DP Winch by TWG: Pulling Every Day for the Warfighter	
Going Forward	
The Power Behind Military Might	7
<i>Mary Dub, Editor</i>	
'The Age of Gloom' Argument	
United States and Western European Forces Face Stringent Cutbacks	
Mixed Forecast in the United States for FY15	
Dispersing the Gloom Arguments and Going for Growth	
The Heavyweight Case for Recovery Vehicles and Maintenance	9
<i>Don McBarnet, International Security Correspondent</i>	
The Value of Recovery and Repair During Conflict	
The Importance of Recovery and Repair	
The Problem of Weight	
Recovery Vehicles and Extreme Mobility Truck Systems	
'Project Land 121' for the Australian Armed Forces	
21st Century Demands For Heavy Tactical Wheeled Vehicles	11
<i>Don McBarnet, International Security Correspondent</i>	
The Rheinmetall HX and the SX Series	
The Benefits of Joint Partnerships with Navistar Defense and TWG	
Oshkosh Offers an Equally Competitive Product	
Military Benefits of the Oshkosh Products	
Facing the Future	13
<i>Mary Dub, Editor</i>	
The Future is Robotic	
Drive for Greater Force Protection and Safety in Load Handling	
The Need for Further Modernization	
The Growth of Defense Budgets in the Asia Pacific Region	
References	15

Foreword

THIS EDITION of Defence Industry Reports looks at the gentle giants of the Heavy Tactical Wheeled Vehicle force, the popularly named Wreckers or recovery vehicles and their load carrying variants. Their load lift, push-pull and hoist capability is delivered by the latest technological developments in winches and hoists.

The opening article looks at the vital importance of the recovery winch which, in the heat of battle, can become a lifeline to survival. Having to deal with military grade vehicles means that recovery winches must deliver power, ruggedness and dependability to recover anything from light body trucks to main battle tanks. TWG is the leading global provider of gearing and electronic systems for hydraulic winches, hoists and rotation systems. Their DP Winch delivers the field-proven design and engineering that meets today's challenges in the field.

The second piece dispenses the arguments about 'gloom' in the world of land forces, where Heavy Tactical Wheeled Vehicles are the central building block of the force. It offers a realistic and optimistic review of the role that land forces play. The follow-on piece looks at the military and commercial case for effective disabled vehicle recovery and repair in battle. It includes the key arguments of strategic thinkers who see vehicle resilience as one of, if not the most important, features of a land forces capability to prevail in battle.

Vehicle mounted winches and hoists are the integral load lift capability of Heavy Tactical Wheeled Vehicles. The fourth article discusses how they are integrated into two of the most salient products in the market place from Rheinmetall and Oshkosh. The heavy weight line-up includes the Rheinmetall MAN Military Vehicles (RMMV) and the Oshkosh Corporation HEMTT (Heavy Expanded Mobility Tactical Truck) A4 M984A4 Recovery. Both these products are offered with variants, modular add-ons and other through life maintenance features that reduce the total cost of ownership. The weakest link in any heavy loading system can be the load cell units, and this article covers the importance of operator protection and awareness of this issue.

The future is based on the present and the trend line forward from the NATO countries looks different to those of the Asia Pacific region and Latin America, where defense spending is on an upward trajectory. However, the role of robotics in guiding tactical wheeled vehicles is a strong trend and is in advanced stages of development.

**Mary Dub
Editor**

Mary Dub has covered the defence field in the United States and the UK as a television broadcaster, journalist and conference manager.

Pulling For the Warfighter

Eric Sallee, TWG-Dover

How proven, military grade recovery winch performs under pressure, when it's all on the line



THE ACRID smoke filled the air. Dust, sand and the crack of bullets rained all around. Superior mobility wins wars, mobility won the Iraq war. In war, nothing goes as planned 100% of the time. In one instance, a vehicle was disabled and loss of life became a real possibility. Mobility was lost and a recovery was needed. The recovery winch had a job to do; a soldier's life was in the balance. The recovery needed to happen expeditiously and without failure. DP Winches by TWG not only completed its mission this time, but have performed when it counts for over 30 years.

Military grade vehicles demand military grade recovery winches. Military grade means delivering power, ruggedness and dependability to recover anything from light body trucks, armored personnel carriers, to a main battle tank, any time and every time. On the battlefield, the recovery winch becomes much more than a machine to tow a vehicle; it literally becomes a lifeline to survival.

Performance under Pressure

Lifesaving is nothing new when it comes to recovery operations. In one such instance, the lifesaving performance of a DP Winch in an extraordinary firefight situation came from a

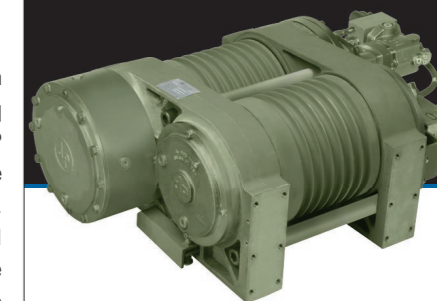
former employee at our company. This gentleman had served in the U.S. Army during the Iraq War. He told the story to his colleagues at DP Winch of being in an armored personnel vehicle traveling slowly down a highway on a mission. On this mission, his vehicle hit an improvised explosive device (IED) and encountered hostile gun fire at approximately the same time. The vehicle sustained critical damage; however, the occupants were alive and began engaging the hostiles even after the IED explosion.

A Heavy Equipment Transport vehicle traveling with the convoy made its way to the damaged armored personnel vehicle. Because of the damage sustained to the armored personnel vehicle, it was unable to move on its own. However, with the help of the Heavy Equipment Transporter and DP Winch's Heavy Equipment Recovery Unit (HERU), the Armored Personnel Carrier was winched onto the Heavy Equipment Transporter. This performance under pressure, guaranteed that the damaged armored vehicle could move away from hostile fire and most certainly saved the lives of those on board.

Onboard the armored personnel carrier was our fellow employee. He credited the crew of the Heavy Equipment Transport Vehicle and the performance under fire of the HERU from



**WHEN IT'S
ALL ON
THE LINE.**



dp®
WINCH

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DP Winch has been trusted by the US Army for supplying its heavy duty recovery winches for decades and saving lives

DP Winch for saving his life and the lives of his fellow soldiers. After his service was completed and he returned to the home front, he came to work for DP Winch. He worked on the assembly line building the very same HERU winches that saved his life.

A winch can be much more than a winch. But stories like the above are nothing new to the customers and employees of DP Winch. DP Winch has been trusted by the US Army for supplying its heavy duty recovery winches for decades and saving lives.

DP Winch by TWG: Pulling Every Day for the Warfighter

TWG is a leading global provider of gearing and electronic systems for hydraulic winches, hoists, rotation systems and monitoring torque and load. TWG's DP Winch brand is the number one supplier of hydraulic planetary gear winches for the United States defense industry and foreign militaries around the world. DP Winch manufactures a complete line of hydraulic planetary gear winches, capstans and bumper packages for major Original Equipment Manufacturers and the Defense Industry.

Since 1970, DP Winch has fielded more than 40,000 winches on military vehicles – from heavy equipment tank transporters and assault vehicles, to wreckers and over-the-road tractors. As the Defense industry raises the bar on product reliability, quality and performance, DP Winch delivers the field-proven design and engineering that responds to emerging challenges in the field. As these challenges arise,

DP Winch prides itself on providing unmatched reliability and exceptional performance.

DP Winch began in 1970 by Don Pruitt in Haskell, OK. Originally, the company designed and manufactured guardrail straightening and post driving equipment. The first winches built by DP were developed to support the M916 defense program contract. With that contact the company expanded and moved to Eufaula, OK. To accommodate another contract to build heavy equipment recovery units for Egypt, the company expanded again and opened a facility in Broken Arrow, OK.

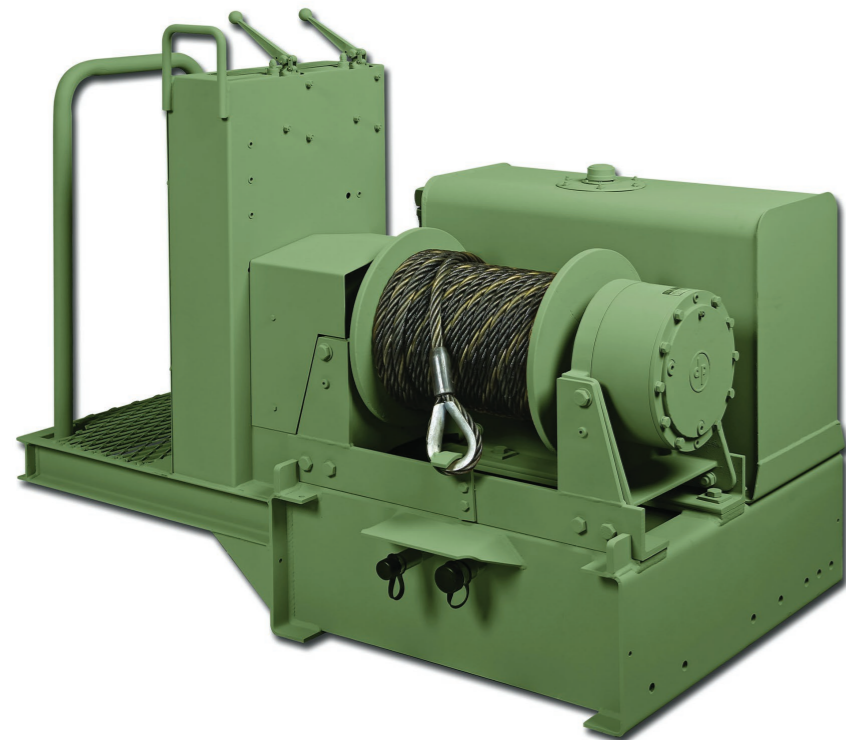
As additional military contracts were awarded, DP Winch began to expand into other hydraulic planetary geared products that served the crane, tow & recovery, utility, railroad, oilfield, mining, construction, marine and forestry industries. It was at the beginning of the first Gulf War that DP Winch began to set itself apart as a proven, rugged and reliable designer and manufacturer of recovery winches for military applications. Employees who were around at that time say that the inside of the factory turned beige from the paint, as recovery winch after recovery winch came off the line and onto flatbed trailers destined for the middle east.



TWG'S MANUFACTURING FACILITY IN JENKS, OKLAHOMA

The engineering philosophy of DP Winch was simple; make the design uncomplicated, make it out of the highest quality parts and deliver a winching system that could withstand the most challenging of environments. And that's exactly what they did. In 1999, TWG acquired DP Winch, primarily because of DP Winch's reputation for quality and reliability, and TWG has never looked back. To this day, DP Winch serves as the role model for the winch and hoist manufacturing industry.

Today, DP winch provides recovery winches for many military platforms around the world. DP Winch has participated as a supplier of military winches and provided complete logistics support for numerous Defense industry programs,



DP WINCH 45QM GOVERNMENT WINCH SYSTEM



ARMORED PERSONNEL CARRIERS TESTING RECOVERY WINCHES

including: M916, HEMTT, HET M1070, PLS, FMTV, MTRV, LVS, LVSR, M983 LET, HLVM and the remanufacture programs for the SECREPS and RESET. These programs have been successful in large part because of the exceptional quality of the design and reliability of the recovery winch system attached to them.

The reliability of the recovery winches is due to a combination of the highly efficient DP planetary gearing. This specialized engineered planet set of gears results in faster line speeds under load, cooler operating temperatures, less internal parts wear, extended duty cycles, smaller hydraulic system requirements, more compact designs and easier maintenance. DP Winches come in several forms to meet the needs to today's diverse military applications. Side mount systems with line pulls of up to 30,000 lbs. (13,608 kg) affix to a light duty truck, bumper winches that are installed within the bumper and offer a slightly



MONITORING OF WINCH UTILIZING LMI SYSTEM

higher line pull rating are common sights in military convoys around the world. All systems are hydraulically powered to provide optimal power and efficiency.

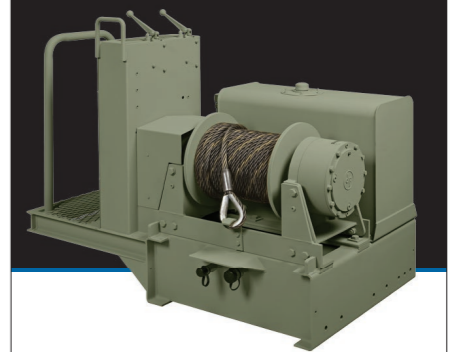
TWG is a complete lean manufacturing operation dedicated to excellence in design, durability and performance. TWG's DP Winch brand of hydraulic planetary gear winches are designed and built to perform at the highest level. All DP Winches are completely designed and manufactured in-house at our facility in Jenks, Oklahoma. A majority of component parts are also manufactured in-house. Manufacturing this number of components in-house helps to maintain a very high level of quality as well as a complete inventory of replacement parts. In addition, to a wide array of winch products, DP Winch also produces a number of standard and custom specialty component products. These include fairleads, brakes, manifold valve blocks. Special application winches and other products are designed to fit a customer's specific needs.

Going Forward

As military technology advances in the 21st century, DP Winch has worked to develop the next generation of recovery winch technology. Advanced monitoring and control technology for winches and hoists have been developed for other applications by TWG, and DP Winch will be leveraging that technology to help military personnel start working safer and smarter. The winch and hoist monitoring technology has been successfully fielded and supported in the Middle East. It has included Load Monitoring Indicators (LMI),



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To this day, DP Winch serves as the role model for the winch and hoist manufacturing industry

torque sensors and communication to other sensor networks on equipment.

Machines play an important role in our lives especially for the safety of those serving in the Armed Forces. They do the tasks for us that we could not do ourselves. Certain machines endear themselves to us when they perform at such a high level and are consistently reliable. We depend on these types of machines and they become important for our very existence. This is when a machine becomes much more than an assemblage of parts performing an untold number of operations.

But there are some machines, like a recovery winch, which endear themselves because of what it does for us, and how it performs under pressure. Recovery winches are the unsung heroes of modern day life. Our modern existence would literally grind to a halt if these heavy duty pulling machines did not exist to help us get going again. And nowhere is this truer than on the battlefield, where military grade vehicles demand military grade recovery winches.

With so much uncertainty in the world these days, one never knows when the call will come to take up arms. As these challenges arise, DP Winch by TWG will be ready for the recovery.

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The Power Behind Military Might

Mary Dub, Editor

“US, NATO and European armies have to contend not only with such budget cuts, but also with the prevailing gloom, in the wake of Iraq and Afghanistan, around the utility of force.”¹

THE HEAVY lifting ability of winches, hoists, and heavy tactical wheeled vehicles are the basic support on which each wing of the armed forces depends. Without the use of new high technology winches and hoists, today's naval forces would fail to load or unload or moor or anchor. Similarly, manned and unmanned aircraft and helicopters are dependent on winches and hoists. Every activity from refueling, to launching, to landing on an aircraft carrier deck is dependent on the rigorous engineering of hoists and winches. It has become easy to question the value of land forces and the heavy tactical wheeled vehicles that give them their support in what some call 'The Age of Gloom'. The case for 'gloom' is influential but not pervasive. Many areas of the world beyond the United States and Western Europe are expanding and modernising their land forces. Many are increasing the size of their defence budgets.

'The Age of Gloom' Argument

'The Age of Gloom' case is stated cogently by Brigadier Ben Barry (rtd). In NATO countries the long and costly wars in Iraq and Afghanistan have eroded confidence in the utility of land forces. Some influential US commentators now suggest that the US 'pivot' to Asia means that air, maritime, amphibious and Special Forces capabilities are of greater utility and less risk than land forces.² And the reason for this lies in the rising importance of air superiority and the nature of counter insurgency warfare. The US-led attacks on Afghanistan and Iraq, the 2008 Russo-Georgian War, the NATO attacks on Libyan regime forces in 2011, and the French operation in Mali all showed the vulnerability of conventional ground forces to an opponent with air superiority. Leaving on one side for the moment arguments for the importance and value of mobile armored land forces, it is

important to confront the consequences of these 'gloomy' conclusions.

United States and Western European Forces Face Stringent Cutbacks

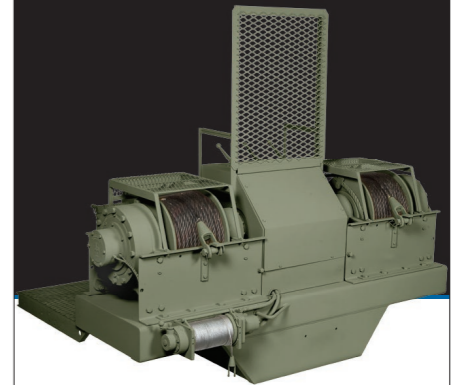
The French and British, meanwhile, have significantly reduced their operational ambitions, including the size of forces to be deployed overseas. The British Army, as a result, is undergoing its most radical re-organization for fifty years, including a 20 per cent reduction in regular manpower. The remaining 'Reaction Force' will have a division of three heavy armored infantry brigades with a mixture of tanks and armored infantry. The Air Assault Brigade will retain its mixture of parachute battalions and attack helicopters, although its ground element will shrink, as will the army's contribution to the Royal Navy's amphibious force. At the same time, a mixed regular-reserve 'Adaptable Force' division of infantry brigades will be able to generate up to two, largely regular, combined arms light brigades for an enduring stabilization operation. Concurrently, the French government's Livre Blanc sees the French Army reducing from eight to seven its all arms brigades (two heavy, three medium and two light). Meanwhile, in the United States sequestration and stringent budget cuts are the order of the day.

Mixed Forecast in the United States for FY15

While the JLTV (Joint Light Tactical Vehicle) program is still proceeding with two planned variants – a four-passenger Combat Tactical Vehicle (CTV) and a two-passenger Combat Support Vehicle (CSV) – this is being done against a backdrop based on downsizing, as the Army plans to reduce its overall tactical wheeled vehicle fleet by 60,000 vehicles. Since these announcements, the 2014 Quadrennial



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Without the use of new high technology winches and hoists, today's naval forces would fail to load or unload or moor or anchor



Defense Review and FY2015 President's budget request suggest additional Army and Marine force structure could be cut, thereby likely further decreasing JLTV requirements.³

Dispersing the Gloom Arguments and Going for Growth

The gloom around defense spending in some NATO countries is not all pervasive in other parts of the world. The new Indian government under Modi has recently announced plans to modernize its aging armed forces and increase defense spending (Agence France Presse broke the story⁴) as India's new Hindu nationalist government cleared proposals worth nearly \$3.5 billion to modernize the nation's aging Soviet-era military hardware and boost its domestic defense industry. The move

underscored the desire of the government led by Prime Minister, Narendra Modi, to move quickly to update the country's military as India looks to defend itself against an increasingly assertive China and from rival Pakistan. The government earlier this month announced a 12 per cent rise in military spending in the annual budget as part of efforts to overhaul its armed forces, declaring "there can be no compromise" with defense. India imports around 70% of its military hardware and is keen to localize defense purchases, but in a parallel move to the spending announcement Defense Minister, Arun Jaitley lifted the cap on foreign investment in military modernization lifting the cap from 26% to 49%. And despite falling global defense spending, budgets are increasing in Russia, Asia, the Middle East and Latin America.⁵

The Heavyweight Case for Recovery Vehicles and Maintenance

Don McBurnet, International Security Correspondent

THE CASE for the recovery, maintenance and reset of tactical wheeled vehicles is not just a commercial, moral or economic one; it is a powerful military one. The difference between winning and losing a battle, or even a war can be attributed to the resilience of the wheeled and tracked vehicles. This piece is going to put the commercial/economic case for recovery vehicles and the maintenance and repair of fighting vehicles. But as importantly, it is going to put the military and strategic case for the recovery, repair, reset and maintenance of wheeled and tracked fighting vehicles.

The Value of Recovery and Repair During Conflict

In the United States and Western Europe much of the inventory of tactical wheeled and tracked vehicles is several years old. Those that support them in the US, the Heavy Expanded Mobility Tactical Truck (HEMTT), M983 tractor, M984 wrecker and the M985 cargo truck are often a decade or two old as well. Although it is also true to say much of their equipment may have been modernized. However, there is an overarching military point made by Zachary Shore, fellow at Stanford University's Center for Advanced Study in the Behavioral Sciences. His point is that during a conflict, when vehicles are damaged or break down due to their use in the extreme conditions of the battlefield, desert plains, mountain roads and improvised explosive devices, it is the speed and agility of the recovery and maintenance teams close to the frontline who are able to recover, repair and reset the vehicles that dictates the most likely winner of the conflict. Quoting the evidence of the 1973 Egypt-Israeli War, he highlights how the Israeli capability to recover, repair and rehabilitate its fighting vehicles close to the frontline that gave them a critical edge over the Soviet tanks which could not be repaired so easily and so close to the frontline when damaged.⁶

The Importance of Recovery and Repair

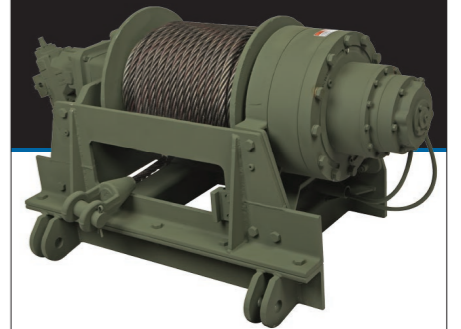
Placing firmly on one side the arguments against the use of land forces in a future conflict, there are numerous overwhelming facts that weigh in favor of land forces. First, whatever the case against 'boots on the ground', land forces provide the only way of demonstrating control over land. Ground forces remain essential to exercise control on land. Air and naval forces can deny an adversary the ability to occupy an area, but only ground forces can provide positive control of an area and its inhabitants.⁷ Secondly, the inventory of wheeled, tracked and heavy vehicles is at least an average of 10 years old and many are older. This means that their maintenance and modernization whatever the future uncertainty of conflict is a priority. The longevity of land vehicle systems means that modernization decisions now will have consequences for the way NATO countries and the United States will be able to fight future conflicts.

The Problem of Weight

Heavy tactical wheeled vehicles like the HEMMT (The Heavy Expanded Mobility Tactical Truck), LVS (Logistics Vehicle System), PLS (Palletized Load System) and HET (Heavy Equipment Transporter) are powerful weighty systems that can deliver significant horse power to hoist loads, even damaged vehicles, load containers and engineering materiel and carry it over rough terrain and unmade roads. This weight makes them more difficult to fly into operations overseas by C-5s and C-17s, which require longer runways. However, part of their weight is the necessary armor protection required for resilience on the battlefield. Another price of their weight and power in the field is their fuel efficiency. Some estimates say that vehicle fuel consumption accounts for one-fifth of the total logistical burden of deployed forces.



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Recovery Vehicles and Extreme Mobility Truck Systems

In spring 2014 the Danish Armed forces ordered 14 Heavy Tactical Recovery Vehicles from Rheinmetall MAN Military Vehicles (RMMV). Weighing some 36 tons. The Heavy Tactical Recovery Vehicle (HTRV) is based on the tried-and-tested RMMV SX45 8x8 chassis, combining stability, safety and crew comfort with maneuverability on and off road. With an integrated Miller recovery module, the RMMV HTRV is able to pick up heavy disabled vehicles weighing up to 40 tons or 17-ton containers. Many of the tactical and logistical vehicles with protective modules used in deployed operations today have become heavier, making even heavier and more powerful high-performance recovery capacity necessary⁹. Both the Australian and New Zealand Armed forces have placed orders for the RMMV as well. The New Zealand armed forces have ordered 200 HX series military trucks. The order, worth around €54 million will be delivered this

year. The package also comprises an extensive training program, according to Franz Ortner, the head of the Logistical Vehicles business unit: "We are delighted not only to equip New Zealand's armed forces with our vehicle systems but also to support them with our extensive training program and services. RMMV is proud to offer a reliable customer service."⁹

'Project Land 121' for the Australian Armed Forces

The story in Australia is similar. RMMV was awarded the contract for the army's modernization program "Project Land 121." The Australians decided to procure around 2,500 vehicles from RMMV. The contract worth around €1.1 billion is scheduled to be delivered between 2016 and 2020. The order includes medium and heavy-duty logistical vehicles, recovery vehicles, integrated loading systems and various platform variants with cranes, fuel and water transport modules and dumper truck add-ons.

21st Century Demands for Heavy Tactical Wheeled Vehicles

Don McBarnet, International Security Correspondent

THE 21ST century marketplace has brought new perspectives to bear on the cost of buying and owning a modern heavy tactical wheeled vehicle for use as a recovery vehicle, or other load carrier. First, it is undoubtedly true that armed forces in the market for new heavy tactical wheeled systems look with an accountant's precision at the total cost of ownership of the vehicle or fleet of vehicles that are being bought. Secondly, to keep the total cost of ownership down, companies like Rheinmetall use modified components from their commercial ranges to benefit from economies of scale. Thirdly, products are marketed as modular so that they become multifunctional. They can add or shed weight to enable easier air transportability. They can increase the level of armament appropriate to the local threat levels at the destination.

The Rheinmetall HX and the SX Series

The Rheinmetall HX truck is part of its medium-mobility truck range, while its Extreme Mobility Trust system, the SX series, has a boxed frame structure that does not pass on any torsion, even when driving at full speed in difficult terrain. This, combined with their rigid axles, add to their military utility. These trucks also offer maneuverability, crew comfort and force protection. The 14 Heavy Tactical Recovery Vehicles (HTRVs) sold to the Danish Armed forces are based on the RMMV SX45 8x8 chassis, combining the qualities of stability, safety and crew comfort. With a coil-sprung (front) and HEPLEX-sprung (rear) chassis, this HTRV is able to recover heavy vehicles in both suspended and supported (underlift) tow mode in wheel grid (under wheel) and crossbar (recovery eyes) configurations. Fully air-conditioned for sustained operation in extreme climates, the HTRV features excellent built-in protection against ballistic threats, mines and improvised explosive devices, ensuring a high degree of battlefield survivability.

The Benefits of Joint Partnerships with Navistar Defense and TWG

Navistar Defense's International[®] MaxxPro[®] MRAP (Mine Resistant Ambush Protected) Recovery Vehicle can haul 81,000 pounds, and was designed to allow two- to three-man crews to retrieve damaged or mission-disabled vehicles and carry out other support missions. The MaxxPro utility variant provides its crew with the same ballistics, mine and Improvised Explosive Device (IED) protection used on all MaxxPro MRAP vehicles.

The MaxxPro Recovery Vehicle includes a rotating boom with a lifting capability of up to 81,000 lbs., designed for 360° continuous rotation. This is combined with DP winches from TWG. The boom-mounted DP Winch is used for lifting, pulling and righting vehicles; a DP main recovery winch with 25-ton single line (50-ton double line) pulling capacity; and an 18-ton under-lift lifting capacity enables recovery of white fleet vehicles (with wheel grids) as well as buses and heavy tactical vehicles with cardanic crossbars up to a gross vehicle weight of 40 tons.

To enable better lifting there is a 4-point stabilizer system with two outriggers on the left and right-hand sides and two ground spades at the rear, which provide enhanced stability in recovery and winch operations. The engineering allows extremely rapid recovery of damaged or broken down vehicles on the battlefield. The whole recovery system, including rotating boom, winches and under-lift as well as outriggers and earth spades can all be operated from one remote control unit, which facilitates operation and reduces rigging time. Without leaving the cab, to ensure crew safety, the equipment can routinely hook up a disabled vehicle in four minutes. The speed of this operation gives a decisive edge when operating in hostile conditions. The flexibility of the system is enhanced by features which make it suitable for military operation in extreme environments. These include large-capacity



**ADVANCED
RECOVERY
WINCH
MONITORING
AND CONTROL
TECHNOLOGY.**



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Fully air-conditioned for sustained operation in extreme climates, the HTRV features excellent built-in protection against ballistic threats, mines and improvised explosive devices, ensuring a high degree of battlefield survivability

storage bins for additional equipment, the ability to operate at temperatures ranging from +45°C to -30°C (recovery module) and -40°C (chassis), and assured mobility in rough off-road conditions. Moreover, the MaxxPro® MRAP Recovery Vehicle has a maximum fording depth of 36" w/out prep in salt and fresh water.

Safety monitoring is accomplished utilizing the Greer Load Moment Indicator or LMI. The LMI consists of an Insight in cab display, control unit, and various sensors.

Oshkosh Offers an Equally Competitive Product

The Oshkosh Corporation is heavily involved in the competition for the Joint Light Tactical Vehicle (JLTV) and has recently completed the Reliability, Availability, Maintainability process for the Engineering and Manufacturing Development (EMD) contract. The President - Oshkosh Defense, U.S. Army Major General (rd), John Urias, Oshkosh Corporation explained: "The nature of warfare has changed, and future battlefields will bring an unpredictable combination of terrain, tactics and threats." Oshkosh offer the HEMTT, the Heavy Expanded Mobility Tactical Truck and its variants. These include the load handling system M1120A4 LHS, M977A4 Cargo Truck, M978A4 Fuel Servicing Truck (Tanker) M983A4 LET (Light Equipment Transporter) and the M984A4 Recovery Truck (Wrecker). There is also the M985A4 Cargo Truck - MLRS Resupply (Expanded Payload Capacity), the M985A4 GMT (Guided Missile Transporter) and the HEMTT A3 Diesel-Electric. The HEMTT offer all terrain capabilities, mobility, power and flexibility. The A3 variant is also capable of delivering 100kW of exportable power.

Military Benefits of the Oshkosh Products

Military benefits of the Oshkosh HEMTT are integrated into the engineering. The HEMTT A4 M984A4 Recovery has a 500 horsepower Caterpillar C5 engine. It includes a crane and winch retrieval system and a lift and tow system



which allow recovery of disabled vehicles in as little as two to three minutes. The A4 is able to recover vehicles in excess of 10 tons. It can be ready for LTAS B-kit, (Long Term Armor strategy); it has integrated attachments for armor, plus under cab protection and is capable of keeping the crew comfortable with air conditioning. The vehicles are built for the most extreme conditions. There is the Oshkosh® TAK-4® independent suspension system which offers ride quality, mobility and maneuverability. The suspension is built to be able to handle off road. Oshkosh have taken the point about improving fuel economy and reducing the total cost of ownership by using ProPulse, a hybrid diesel-electric technology that, through a modular series-hybrid arrangement, simplifies the transmission of power to the wheels. This drives down fuel consumption because of a tailored engine control strategy. And life-cycle costs are reduced because the full electric system lowers torque throughout the drivetrain. In addition, regenerative braking increases brake life. After purchase there is the possibility of adding Technology Insertion Kits, Vehicle Platform Modernization, Recapitalisation solutions and Reset to factory standards. The traditional wrecker is the HET (Heavy Equipment Transporter). The HET is specially designed to transport mission-critical equipment such as tanks, armored vehicles, recovery vehicles and construction equipment. It has a 700 horsepower engine, which offers speed and grade-climbing performance which helps equipment and crews arrive in mission-ready condition.

Facing the Future

Mary Dub, Editor

"When it comes to predicting the nature and location of our next military engagements, since Vietnam, our record has been perfect. We have never once gotten it right, from the Mayaguez to Grenada, Panama, Somalia, the Balkans, Haiti, Kuwait, Iraq, and more – we had no idea a year before any of these missions that we would be so engaged."

Robert Gates, United States Secretary of Defense (2006-2011)

REFLECTING ON the quote from former Secretary of Defense Robert Gates on the failure of the proven capability of some of the best thinkers and intelligence agencies in the United States to predict the future, what hope is there of getting it right? Well there is some hope. Looking at the very shortest term future Maj Gen Karen Dyson director of the Army Budget points to the refocusing of training toward core competencies in the Joint, interagency and multinational environment. She pointed to the importance of adapting to the new environment of a smaller army, with enhanced Brigade Combat Team capability. She saw this meaning a readiness erosion with deferred reset and battle loss replacement in FY 2014¹⁰. There were small amounts of money put forward for Tactical Wheeled Vehicle Modernization. Looking further to the future, it may be impossible to predict exactly where the next war and commitment by the United States may be, but it is possible to look at the area of relative certainty and areas where rapid growth in the market for heavy tactical wheeled vehicles is likely.

The Future is Robotic

The Oshkosh TerraMax Unmanned Ground Vehicle is a vehicle kit system that advances perception, localization and motion planning to protect warfighters from IED threats and increase performance in autonomous missions. Designed for use on any tactical wheeled vehicle and backed by thousands of miles of field-testing, the Oshkosh TerraMax UGV is capable of supervised autonomous navigation in either a lead or follow role. Its multi-sensor system combines with novel registration techniques to provide accurate positioning estimates without needing to rely on continuous tracking through a lead vehicle or GPS signals. When equipped with the Oshkosh TerraMax UGV, each vehicle is capable of navigation to the objective independently.

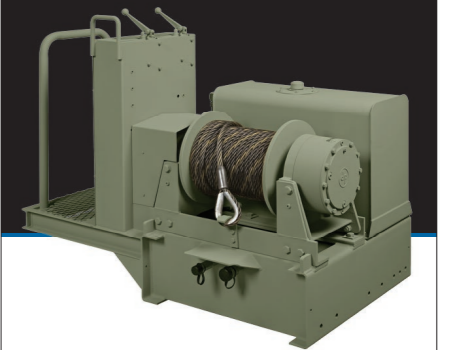
This not only facilitates tight convoy formation, but also enables the composition of the convoy to change as demanded by traffic conditions, road blockages or other obstructive situations. The user-friendly Operator Control Unit (OCU) allows operators to create/load route information and observe/manage internal operations and autonomous systems status over tactical data links. One operator can control several UGVs and these systems can operate even where GPS is denied. The Oshkosh Corporation rather aptly describes it as a system useful when "you'd rather not send anyone."

Drive for Greater Force Protection and Safety in Load Handling

Force protection and the reduction in risk to operators of heavy tactical wheeled vehicles is an essential priority. Load cell strain in external load cell units is now, and will continue to be, an issue for operators and managers of vehicles designed to lift, push and pull heavy disabled vehicles and loads onto and off heavy tactical wheeled vehicles. They are also important in loading and unloading helicopters. In Australia there have been two cases reported where the load on the hoist disengaged from the hook. In both instances the load rested on a protuberance (e.g. skid, footrest) outside the helicopter doorsill, thus relieving the hook of the weight of the load. With no weight on the hook it was easy to twist the "D" ring up the hook to rest on the safety latch. Thus, when the load was re-applied it slipped through the safety latch. However, the separation of a load from a winch hook is not limited to civil operations. In December 1995 a fatal accident occurred when a rescue strop separated from the winch hook of an Australian Navy S-70B-2 helicopter. The accident was caused by "D-Ring Reversal" as a result of the hook being relieved of the weight of the load when it



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and beyond*

touched the ground before being winched up. This can also happen due to torsion and load jolt. The Australians underline the importance of this issue after a fatal incident and improvements in D-lock design have been made.¹¹

The Need for Further Modernization

While no one would argue that modernized systems do not offer benefits denied by legacy systems, the inevitable consequence of budget cuts is that many legacy systems will be maintained and modernized piecemeal and that they will be used in the future. "If history is any guide, the ground vehicles designed and fielded in this decade and the next may still be in front-line service in 2040 and beyond. Defense planners and vehicle designers therefore must consider the future security environment that ground forces may face several decades into the future."¹²

The Growth of Defense Budgets in the Asia Pacific Region

Regional and cross border tensions in the Asia Pacific region combined with high levels of

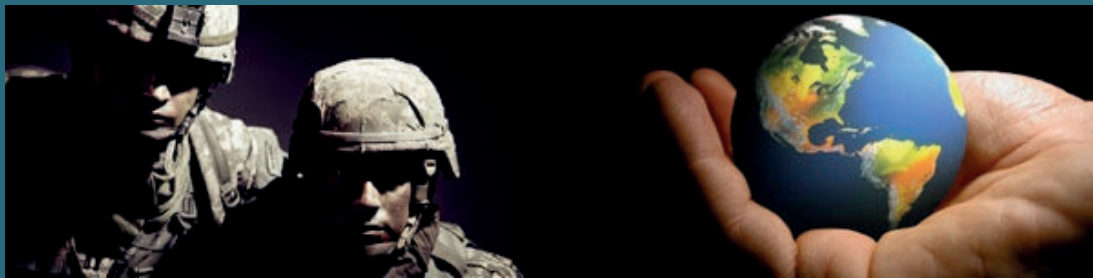


economic growth may well result in that region being the future growth market for the necessary hoists and winches and heavy tactical wheeled vehicles that the United States and western Europe produces. The official annual defense budget of China in 2013 was \$119.5 billion against India's \$39.2 billion, the Pentagon announced in its recent report on global defense budgets to Congress. The annual budget of South Korea was \$31 billion compared \$56.9 billion for Japan and \$69.5 for Russia. This upward growth in defense budgets is echoed in the high economic growth areas of Latin American.

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