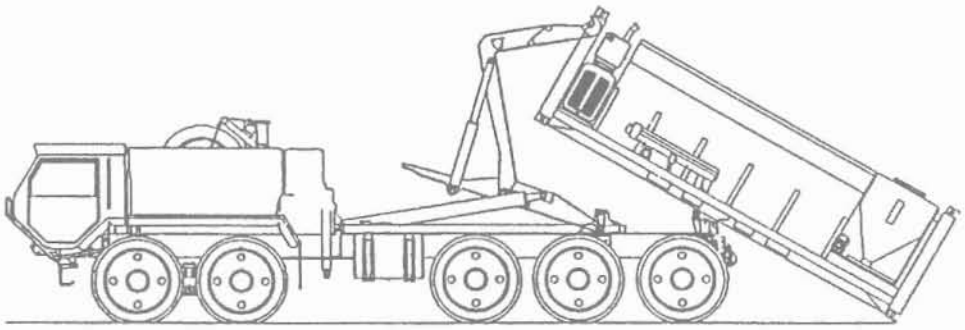


Applying PLS Technology to the Engineer Fleet

By Alan Schlie

Unable to find parts for your old equipment? Too many old trucks in your motor pool? Too much low-density equipment? More equipment than you have operators? The critical mission item you need is running, but the truck it's mounted on has to go to 3rd shop! Frustrated? You bet you are! We've all been there. Why doesn't somebody do something about it? Well, now there's hope! The introduction of Palletized Load System (PLS) technology into the Army offers an opportunity to resolve some of these long-standing systemic problems in the engineer fleet.

The engineer truck fleet, even more than the earth-moving construction fleet, has never fared well in budgetary battles against combat weapons systems. The prevailing attitude has been that only minor purchases were required. Significant wartime needs were met by buying or leasing commercial equipment straight from civilian sources—buy it and paint it green. This attitude, of course, fails to consider the logistical and training impacts of not having the same models, in density, in the force. And since the engineer work-load package is secured directly to the chassis, there is no opportunity to replace that work-load package without also replacing the truck (or vice versa), significantly increasing the cost of replacing one system. Consequently, some engineer units in the Active and Reserve Components have M51-series, M817-series, and M929-series 5-ton trucks in the same motor pools, complicating repair parts stockage and training of both operators and mechanics. While some common trucks, such as 5-ton cargo and dump variants, have been replaced by more modern versions, other aging engineer-specific trucks remain in the inventory because of budgetary constraints.

Potential PLS Modules

General Construction

Bituminous distributor	Pipeline construction
Water distributor	Bulk-water tank truck
Concrete mobile	Hydraulic excavator
Dump truck	Crane-attachment trailer
Wood fabrication shop	Cargo pallet
Crane (20 ton)	Tilt-bed equipment trailer
Crane (7-1/2 ton)	Rock crusher
Well-drilling rig	Snow-removal equipment
Pneumatic/hydraulic tool and compressor outfit	Utility boom (cherry picker)

Other

- Improved common bridge transporter
- Topographic van
- Wheeled unit TOCs (Bn, Gp, Bde)
- Maintenance van
- HYSTRU
- Electrical maintenance van
- Fixed-bridge launcher

Figure 1

All artwork courtesy Oshkosh Truck Corporation

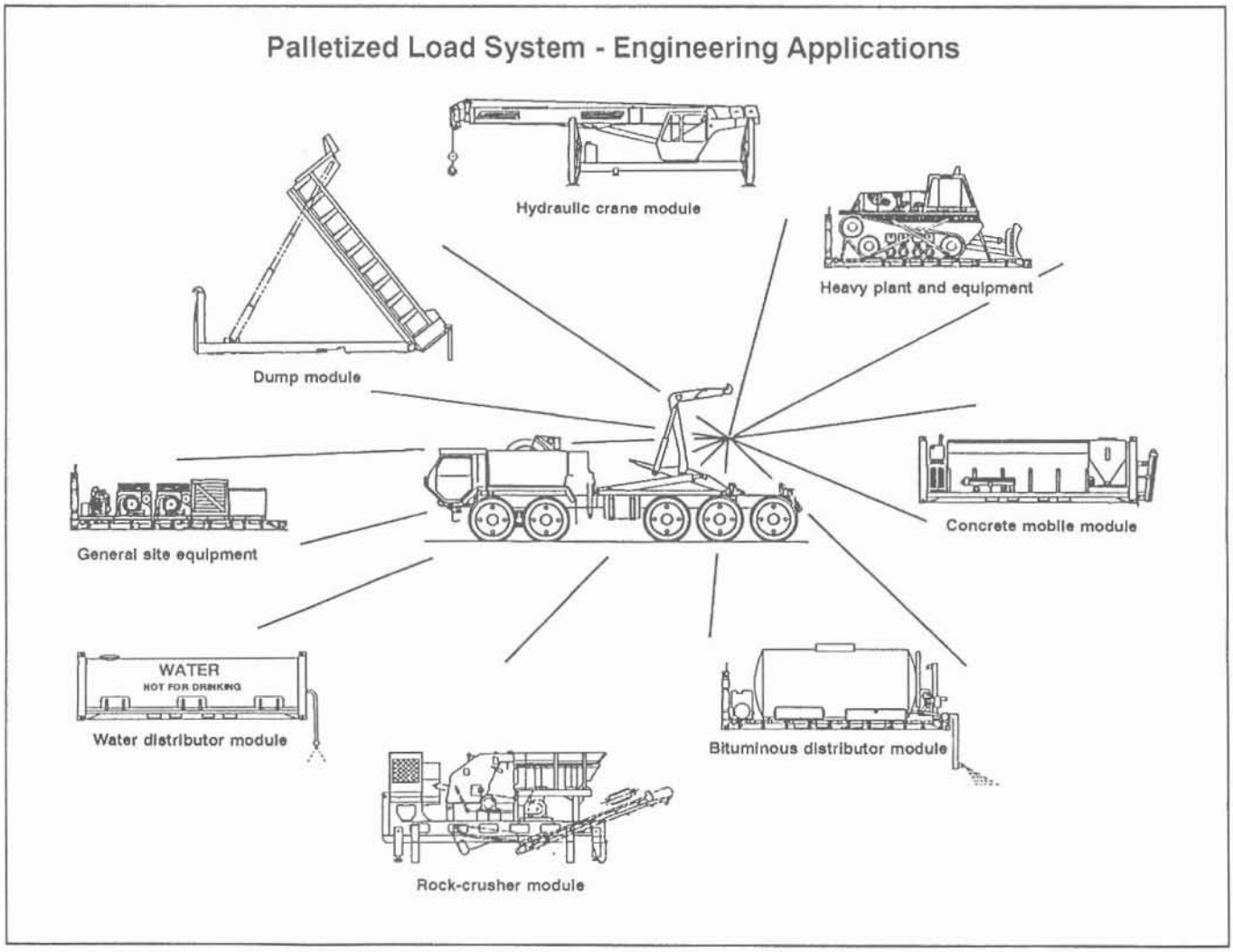


Figure 2

With decreasing procurement dollars, decreasing assigned and present-for-duty personnel strengths, and continuing pressure to train smarter with fewer training dollars, Army leaders now must consider all potential technological advantages.

Application of PLS technology to the engineer fleet could increase mission effectiveness by—

- Optimizing use of prime movers
- Increasing mission flexibility
- Increasing unit mobility
- Reducing maintenance burden
- Enhancing commonality with a modern truck fleet
- Reducing material-handling equipment requirements

PLS technology offers a potential for solving many of these problems by fielding a set of engineer work modules that can be uploaded on a truck chassis when required. Some possible applications are listed in Figure 1 and pictured in Figure 2. The PLS truck is a 16.5-ton-capacity vehicle that is capable of towing a 16.5-ton-capacity PLS trailer. Loads can be rapidly interchanged between the two. Enhanced mobility, central tire inflation (CTI), and built-in test are additional advantages of PLS. The manufacturer, Oshkosh Truck Corporation, is demonstrating the same palletized loading technology applied to the smaller heavy expanded mobility tactical truck (HEMTT). The HEMTT variant promises to be C-130 transportable, with a working payload of approximately 8 tons (Figure 3, page 26). Each of these payloads is attractive for engineer applications. For example, the 16-ton PLS can carry a heavy dump truck module, while the 8-ton HEMTT can carry a concrete mixer module. Either chassis can carry Class IV construction materials.

In the 1970s, the family of engineer construction equipment (FAMECE), a well-intended but ill-fated attempt to produce modular construction equipment, was developed—and canceled. How does this PLS approach differ? FAMECE was oriented primarily toward earth-moving equipment; this PLS effort focuses on truck- and trailer-mounted support systems. Most importantly, however, FAMECE was a complete developmental effort—including the



Figure 3. HEMTT LHS loading a cargo pallet

automotive design of the engine/transmission module and the complete design of the work module. In contrast, this PLS concept uses a proven and fielded truck chassis and lift mechanism. The only development required is configuring the work module loads to fit on cargo pallets (flatracks, in PLS jargon) or constraining them to the 20-foot International Standards Organization (ISO) container size.

Because of its cost, PLS is not likely to be cost-effective as a one-for-one replacement for any single truck-chassis combination. The potential for increased savings and effectiveness is in the use of interchangeable modules, keyed to unit mission demands. With PLS, fewer prime movers than work modules would be organic to each unit, reducing operating and support costs as well as operator requirements. For example, the available chassis could be equipped with dump bodies to conduct construction material haul missions. When required, one truck could download its dump module, upload a water distributor module, and provide water for on-site compaction, while most of the other trucks continued to haul fill. Two other trucks could download their dump modules, return to an equipment holding area, and pick up two compactors already secured to general-purpose PLS flatracks. After delivering the compactors, they could pick up their dump modules and continue to haul fill.

Some modules require the truck chassis to perform their mission. Dump trucks, water and bituminous distributors, and excavators are examples. Others, such as wood shops, maintenance shops, topographic equipment vans, power-generation sets, and rock crushers require the chassis only for transport to a work site. For these uses, the PLS trailer might be a better choice. After downloading the PLS module, the truck or trailer chassis would be free to load up a different module, thereby optimizing its value to the unit. Freestanding modules that require an adequate power source would have a power supply built into the module. For modules that operate while mounted on the truck chassis, electrical, hydraulic and/or mechanical power takeoffs and appropriate operator controls would be provided.

Dimensionally, the modules would be constrained during transport to the size of a 20-foot ISO container (approximately 20 by 8 by 8 feet). If a larger working size is required, the unit's sides could be extended at the work site, similar to the expando-vans already in the Army inventory. This efficient space utilization enhances deployment by using corps and theater transportation assets. Corps transportation units could provide transport for engineer units that require more than one lift to move in theater (as most engineer construction-type units do). A corps PLS truck company could augment the unit's organic assets to move the engineer unit. The many advantages of using a common, high-density vehicle include improved availability of repair parts and maintenance expertise.

Some of the engineer units appropriate for PLS applications are listed in Figure 4. While these units offer the greatest potential payoff for the investment, other units may also benefit.

As an example of the application of PLS technology, consider a combat heavy engineer battalion. More than 35 of these battalions are in the Army, most of them in the Reserve Components. Figure 5 highlights the major items that might be impacted by introducing PLS capability into these units. Note the quantity and variety of major items of equipment listed. Overall, introducing this technology will reduce the selected items of equipment from 79 prime movers (trucks and

Units Considered For PLS Technology	
Combat heavy battalions	Well-drilling teams
Wheeled combat battalions	Prime power battalions
Combat support equipment companies	Fire-fighting teams
Construction support companies	Quarry teams
Dump-truck companies	Utility teams
Port construction companies	Topographic companies (corps and EAC)
Bridge companies	Pipeline companies

Figure 4

Impact of PLS Technology Insertion on an Engineer Battalion (Combat Heavy)

Selected Equipment Changes

Before	After
7 - Air compressors 250 CFM	7 - Air compressor modules
1 - 12-1/2 ton crawler crane	3 - Crane modules
5 - 25-ton cranes	2 - Excavator modules
6 - Shop equipment, wood	6 - Wood-shop modules
6 - Water distributors, 6000 gal.	6 - Water-distribution modules
3 - Forklifts	2 - Forklifts
3 - Concrete mobiles	3 - Concrete modules
9 - 20 ton dump trucks	9 - Heavy dump modules
2 - Bituminous distributor trucks	2 - Bituminous distributor modules
6 - SEE	3 - SEE
2 - Asphalt melters	2 - Asphalt melter modules
28 - Medium equipment transporters	22 - Medium equipment transporters
43 - 1 1/2 ton trailers	8 - 1 1/2 ton trailers
5 - 5 ton trucks	8 - PLS flatracks
3 - 5 ton tractors	20 - PLS trailers
3 - 10 ton flatbed trailers	20 - PLS trucks
1 - Heavy HMMWV with SICPs	1 - SICPs module
1 - HYSTRU	6 - HEMTTs with PLS capability
5 - Lube and service units	1 - HYSTRU module
6 - Contact trucks	6 - Contact maintenance and service modules
2 - Van semi-trailer, repair parts	2 - Repair parts stockage modules
1 - Shop equipment, electrical	1 - Electrical shop module
1 - Shop equipment, general purpose	1 - General-purpose shop module
1 - Shop equipment, organizational	1 - Organizational shop module
1 - 22 1/2 ton flatbed trailer	

Figure 5

cranes) and 72 trailers to 53 prime movers, 28 trailers, and 60 work modules/flatracks.

The Army is not on the cutting edge of this technology, nor is it the leading user. Municipalities were the first to recognize PLS-type applications in road and utility work, disaster response, and refuse collection. They have increasingly turned to these applications in the last few years because of budgetary constraints. Industry has responded by expanding the functions and capabilities of the modules available. The research and development have been completed; the Army now must define its requirements. The potential use of PLS technology on tracked vehicles and numerous light and medium trucks must also be investigated. Swedish industries already manufacture small vehicles with PLS, and English, German and French industries are investigating PLS dumping techniques. Four or five American firms offer modules for many engineer applications, such as dumping, rock crushing, lubricating, and lifting.

Much work remains to be done. More detailed analyses are required to determine the appropriate set of work modules, the mix in any given unit, the quantity and sizes of PLS-equipped chassis, the quantity of trailers, and the impact on unit maintenance and deployability. The Engineer School's Directorate of Combat Developments, in concert with the Program Manager for PLS, is initiating a study to answer these questions. Thorough unit mission analysis and the application of this technology will allow engineer units to be more effective, more flexible, and more prepared to support the Army in the next century.

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(Personal Viewpoint, continued)

in this imperative is the need to study doctrine and anticipate how it may change to accommodate the constantly changing face of warfare. The soldiers of the 92d Engineer Battalion were not intimidated by the prospect of deploying to the austere environment of Surinam because they had performed their peacetime and wartime missions using the same tasks, conditions, and standards.

Train for War. You will go into battle as you are—not as you would like to be. Make the training management principles expressed in FM 25-100 and FM 25-101 a reality. Use the available time efficiently. Base training plans on a solid assessment of mission-essential tasks and how well you can perform them. Continued force reductions make this task especially challenging because few units retain the luxury of a single regional focus. The engineer soldiers who deployed to the Persian Gulf were confident that they would succeed—even with the unknowns of pre-positioned equipment—because they were trained and ready for all contingencies.

Maintain for War. A well-trained, highly motivated engineer force is only as effective as its equipment allows it to be. View maintenance time not as a distractor but as an opportunity to build and sustain combat power. Without complete and operational machines, weapons, and tools, you cannot make a meaningful contribution on the battlefield. Assume that there will be no time to correct faults or make up shortages before your equipment is moved to the port or departure airfield. Ensure that the maintenance support organization is responsive, deployable, and easily tailored to meet the needs of your task organization.

These four imperatives are held together by the glue of engineer leadership.

Prepare Junior Leaders for War. Engineer leaders in squads and platoons execute drills and run work sites—the building blocks of successful engineer operations. Versatile, competent, innovative, and confident junior leaders are more important now than ever. The increased tempo of deployments and the relatively small scale of operations require junior leaders who can make important decisions without the benefit of senior guidance and in the absence of well-developed orders. Many recent crisis-response operations required platoon- and company-sized engineer forces to execute hastily developed plans. For example, the young second lieutenant who led his platoon into Haiti was the theater's expert on mechanized engineer tactics and equipment.

While many themes run through these imperatives, the common element is time. Readiness is about time. It is only a matter of time before you are called. When that call comes, there will be little time to prepare. As you climb into bed tonight, ask yourself whether you, your soldiers, and your equipment would be ready if the phone should ring at 0300. Then think about what you will do tomorrow to improve unit readiness. Only then should you allow yourself to drift off to sleep. Isn't it about time that you made a personal commitment to the readiness imperatives?

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