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Equipment managers are proving outsourcing pays big dividends — reducing costs, increasing productivity, improving quality and minimizing liability.

Build Better Vendor Relationships
Creating a harmonious relationship between fleet and vendor is good for everyone involved.

Machine Ergonomics Enhance Efficiency
New ergonomic features may at times be invisible, but they certainly won’t go unnoticed.

Fluid Recovery Comes of Age
Reuse and recycling technology has advanced to once again prove one man’s waste is another man’s treasure.

The President’s Pen
What’s being done elsewhere?

AEMP News
• AEMP welcomes new partners.
• AEMP Foundation awards new scholarships.
• AEMP members speak out on the need for easily accessible and usable telematics data.
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There’s a corny old story about the rooster that comes to the hen house carrying an ostrich egg; the rooster declares, “Girls, I’m not complaining but this is what’s being done elsewhere!” I think of this corny old line often these days as I struggle to meet the challenges of fleet management. Environmental regulations, fuel management, technology issues, the technician shortage, inflation and budget worries are on my short list of key problem areas and beg the question: “What’s being done elsewhere?”

In difficult economic times, it’s very tempting to slash the budget across the board. Training, travel and expenses are tempting targets. In the short term, we can all cut back on any number of fleet maintenance and management expenses. I know it’s a cliché but maintenance management really is “pay me now or pay me later!”

I strongly urge you to consider attending the 2009 AEMP Management Conference and Annual Meeting March 15-17 in Orlando. And yes, while I was asking for permission to attend, my boss gave me that look (you know the one—over the top of the reading glasses?) when he heard the word “Orlando.”

But as he took a closer look at the conference agenda, he gave me the opportunity to discuss a few of our current fleet management issues and the “pain in my day.” Trying to close the deal and knowing his interest in succession planning I told him I was also taking two of our managers for CEM testing.

But the “Ostrich Egg” story is what closed the deal because all of us need to know “what’s being done elsewhere?”

By Dick Brannigan, CEM, 2007-2008 AEMP National President
### Association of Equipment Management Professionals

#### Membership Application

<table>
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<td>Organization</td>
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#### Additional representative(s)

Who recommended you to AEMP?

**Please check main industry involvement:**

- [ ] Aviation ground equipment
- [ ] Construction
- [ ] Dealer/Distributor
- [ ] Education
- [ ] Energy
- [ ] Environmental
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- [ ] Manufacturer
- [ ] Mining
- [ ] Parts Supplier
- [ ] Logging
- [ ] Utilities

**To apply for full membership as an equipment user, please choose one of the following options:**

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- [ ] Individual or Trade Press ($200)
- [ ] University, Trade School, etc. ($105)
- [ ] Retired ($50)
- [ ] Add-on ($200)

**To apply for associate membership as a vendor, please choose one of the following options:**

- [ ] Manufacturer ($1,550)
- [ ] Service, Support, Dealership-1 (Under $1 million in gross sales) ($545 - includes one member)
- [ ] Service, Support, Dealership-2 (More than $1 million in gross sales) ($775 - includes up to two members)
- [ ] Add-on ($200)

**Please designate an allied organization:**

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- [ ] Central Ohio
- [ ] Central Illinois
- [ ] Central Illinois
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- [ ] Indiana
- [ ] Northeastern Ohio
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Glenwood Springs, CO 81602  
Phone: (970) 384–0510  
Fax: (970) 384–0512  
www.aemp.org
AEMP Welcomes New Partners

The Association of Equipment Management Professionals (AEMP) is pleased to announce that International and Trimble have joined the AEMP/Construction Equipment Partnership for Growth program.

Partners in the program, which include Castrol, Caterpillar, John Deere, Komatsu, Manitowoc, Qualcomm, and Volvo Construction Equipment, play an integral role in development of AEMP programs designed specifically for equipment management professionals.

“Partners in our Partnership for Growth program make it possible to provide our members with cutting-edge training and solutions to asset management challenges,” says AEMP President Dick Brannigan, CEM, equipment operations manager for John R. Jurgensen Co. in Cincinnati, Ohio.

In addition, partners join AEMP members in their dedication to the “Equipment Triangle”—which represents the commitment to increased communication and cooperation between manufacturers, distributors and end-users—and to AEMP’s Standards of Ethical Conduct.

Partners also provide critical support to the Certified Equipment Managers Institute (CEM) and the premise that equipment management professionals that earn CEM certification are their most efficient and effective partners in the field.

International is a leading producer of medium trucks, heavy trucks and severe-service vehicles.

Trimble applies technology to applications, including surveying, construction, fleet and asset management, and mapping. In addition to utilizing positioning technologies, such as GPS, lasers and optics, Trimble solutions can include software content specific to user needs.

Plans Being Finalized for the 2009 AEMP Annual Meeting and Exhibition

Plan now to attend AEMP’s 2009 Management Conference & Annual Meeting, March 15-17 in Orlando, Fla. This unique event is the industry’s only conference specifically designed for fleet management professionals.

It will include AEMP’s 2009 Trade Show & Exhibit, 2009 Technician of the Year Award and 2009 Fleet Masters Awards. AEMP will also hold its Spring 2009 Certified Equipment Managers Institute, with the CEM exam following on March 18.

AEMP Foundation Awards Eight Scholarships

The AEMP Foundation has awarded eight scholarships to students planning to enter the heavy-equipment technician profession.

“Presentation of the scholarships reflects a new milestone for the Foundation and demonstrates its commitment to solving the shortage of qualified technicians in the industry,” says AEMP Foundation Chairman Bob Decker of Ace Asphalt, Phoenix.

According to the Bureau of Labor Statistics (BLS), by 2012, annual demand for technicians will reach 101,184.

“We are only limited in awarding scholarships by the funds required to provide them,” says Foundation Executive Director Stan Orr, CAE. “For as little as $2,500, a company can fund a student for two years.”

This year, scholarships were awarded to

- Charles Campbell of Flat Rock, Ill., attending Wabash Valley College in Mt Carmel, Ill.
- Jason Griffin of Vershire, Vt., attending Universal Technical Institute in Norwood, Maine
- Klayt Kinyon of Lewiston, Idaho, attending Lewis-Clark State College in Lewiston
- Scott Wilbur of Delhi, N.Y., attending the University of Northwestern Ohio in Lima, Ohio
- Jacob Heldt of Cynthiana, Ind., attending Wabash Valley College in Mt Carmel, Ill.
- Michell Colyer of Fairfield, Ill., attending Rend Lake College in Ina, Ill.
- Don Warren of Hardin, Mont., attending Wyotech Advance Diesel in Laramie, Wyo.

The AEMP Foundation is a 501(c)3 organization. For more information on the Foundation and its programs, contact Stan Orr at stan@aemp.org.

www.aemp.org
AEMP Members Express Need for Data

Early in September, AEMP members were surveyed on their current usage and future needs for telematics data. The information members said they’d find most valuable if it were available were run and idle time (94 percent); start and stop time (75 percent); production data, such as cycle time (60 percent); and fuel usage and consumption (49 percent). Others want to see:

- faults, warning lights, alarm codes
- low coolant, low oil, overheating, over-speed
- GPS detailed location
- information on machine abuse
- hydraulic pressures and certain voltages
- temperature of coolant, transmission and hydraulics

The data is so important to fleet management, the majority of AEMP members (53.7 percent) said they would “ping” the machine (refresh the available data) daily and 7.4 percent would check it hourly.

While some of the information is currently available from OEM Web sites, only 40.7 percent of respondents are accessing the data. Among those that do, however, 47.7 percent must retrieve the information manually to use it to manage their fleets; 43.2 percent said they look at the numbers but don’t use them. Only 6.8 percent have developed a way to integrate the information into their enterprise solution software.

Currently 50.5 percent of AEMP members use or plan to use a third-party telematics provider, citing ease of integration (64 percent) and competitive pricing (52 percent) as the top two reasons.

Telematics initiative

AEMP is working with several manufacturers on an industry-wide solution to providing key telematics data directly to end users. Representatives from Caterpillar, John Deere, Komatsu, Manitowoc, Qualcomm and Volvo recently agreed standardized file transfers of non-proprietary information to end users will allow more effective management.

Initial planning calls for development of a standard file format to allow end users to pull certain data streams from OEMs’ servers automatically, eliminating the need for the end user to retrieve data manually.

For more information on this telematics initiative, contact Stan Orr at stan@aemp.org.

Half of AEMP members now use or plan to use third-party telematics providers. The primary reason given is ease of integration.

Source: Association of Equipment Management Professionals survey, September 2008
Join the equipment industry’s top fleet managers and industry experts and educators March 15-17 for the Association of Equipment Management Professionals’ 2009 Management Conference & Annual Meeting. This unique event is the industry’s only conference specifically designed for fleet management professionals.

- Discover solutions for the most critical fleet management issues.
- Examine strategies for more effective asset management.
- Develop skills for working more efficiently in today’s fast-paced environment.
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- Earn 15 CEUs toward CEM certification.
- Network with the country’s top fleet managers.
- Participate in AEMP’s 2009 Trade Show & Exhibition.

PLUS...the 2009 Technician of the Year Award and 2009 Fleet Masters Awards

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AEMP News

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Join a distinguished group of peers nationwide who have chosen to attain this high level of excellence. For more information, visit www.aemp.org.
Building a Top Supplier Team

Outsource to a vendor who can do it better and cheaper.

By G.C. Skipper, Contributing Editor

As the Association of Equipment Professionals (AEMP) so aptly explains, “Outsourcing represents change. Change presents risks. Most employees resist change and avoid risks.”

That leaves fleet professionals in a quandary, because they know the investment necessary to build an infrastructure with enough capacity to handle minor, major and specialized repairs is too risky to justify. There is no acceptable ROI, not to mention the fact that adequately trained technicians may not be available.

The alternative? Outsourcing. One way to overcome the fear of outsourcing and the tendency of workers to resist change is to build an ace supplier team.

Fleets that outsource successfully can be found in both the public and private sectors, located in states as different as Florida, Texas and Wisconsin. Each has taken a hard look at its operations, evaluated the risks and benefits, examined the cost factors and developed, each in its own way, a successful outsourcing strategy.

“Outsourcing has gotten a bad name because everybody thinks you’re handing over your fleet to someone else,” says Marilyn Rawlings, CEM, fleet director for Lee County Government in Ft. Myers, Fla. “But all of us outsource every day. Every fleet manager does it at some level.”

Before dismissing the idea, Rawlings recommends you take a closer look at types of outsourcing.

“There is total outsourcing of your whole facility where a vendor comes in and runs the operation for you,” she says. “In that situation, the employees of a municipal fleet are no longer yours but rather are employees of the private sector. The second type of outsourcing, which we do every day, is partial outsourcing.”

For example, Lee County outsources paint and body work.

“I outsource that work to a local vendor who can do it better and cheaper than I can,” says Rawlings. “I also outsource the environmental and enforcement issues that come when you build a paint and body shop.”

Rawlings also outsources towing.

“A lot of companies will spend $250,000 to buy a tow truck, but in Lee County, I can do a lot of $50 tows and not spend a quarter of a million dollars,” she says.

One cost-saving move Rawlings implemented was to select a vendor to handle large-tire maintenance. The vendor travels to the jobsite and does the work there.

“Outsourcing large-tire maintenance saves money because it eliminates workers’ compensation issues that could occur if one of our employees picked up a tire the wrong way and was injured,” she says.

But Rawlings doesn’t believe every task should be outsourced. She refuses to outsource preventive maintenance, for example.

“I don’t want to outsource PM because often you can make necessary repairs before a vehicle breaks down,” she says. “Some fleets may rely on vendors to alert them to upcoming problems but that requires more downtime. I have to send the vehicle somewhere else, it has to be analyzed and...
then they have to call me so I can approve the repairs. In the time it takes to do all that, I can have the equipment fixed and back to work.”

Mark Creel, president and owner of Creel Tractor in Ft. Myers, Fla., has worked with Rawlings for about 25 years. “From the vendor’s perspective, outsourcing repairs keeps our technicians occupied and that keeps money in the community,” says Creel. “It also gives the fleet manager time to concentrate on other issues.”

One thing Creel does for Rawlings is provide technicians with training on each manufacturer’s machine he carries. Last year, he trained 15 fleet mechanics, four of whom work for Rawlings. “We bring the fleet mechanics in and train them on our own time,” he says. “We provide them with all the schooling and all the technical support so they can go back and utilize what they’ve learned in their shops. I want them to work on their equipment. I want them to be comfortable working on the machines we sell. Then when they make a decision to buy new equipment and they’re already comfortable on the products we sell, there’s a good chance we’ll win that business.”

A total outsourcing approach

Greg Kittle, CEM, fleet operations manager for Ryan Central, Janesville, Wis., developed a plan that allowed him to close his repair facility completely.

Five Criteria for Outsourcing

- Will it reduce the total cost of a given function or activity?
- Will it increase the quality of a given function or activity?
- Will it reduce the number of full-time employees associated with a given function or activity?
- Will it reduce the number of owned assets that are associated with a given function or activity?
- Will it reduce liability and risk associated with a given function or activity?

Source: AEMP
“I don’t have a shop anymore,” he says. “All in-shop repairs are performed by a preferred vendor.”

The vendor maintains technicians on Ryan’s jobsites to perform field and shop repairs, and PM.

“There are three benefits to outsourcing,” he says. “One, you’re able to use trained technicians. Fleets have changed drastically over the past few years. Having the ability to train and properly equip technicians these days is practically impossible. Outsourcing provides access to qualified technicians.

“Two, outsourcing changes a fleet’s fixed costs. Once you employ someone, you’re loath to let that person go because you have invested a lot of money in them. Outsourcing changes a fixed cost to a variable cost. If you send a dealer mechanic back to the dealership, he’s still employed and he’s still accessible later.

“And three, you protect and manage the liability of repairs because the dealer can perform warranty work on-site. Repairs done by the dealer tend to be supported long-term by the manufacturer. This is important because you know the work is being performed according to the manufacturer’s recommendations. If there are any issues—safety, product liability, etc.—you’re able to engage the manufacturer and the dealer.”

About the only thing of value a fleet manager might retain in-house, according to Kittle, is fabricating equipment.

“If you take a dozer and add a component to make it more useful in a certain application neither the dealer nor the manufacturer is likely to have the expertise to do the job,” he says.

Beyond that, Kittle says no repairs justify exposing the company to repair liability.

Dennis Kelly, customer experience manager at Patten Tractor & Equipment in Northern Illinois and Northwest Indiana agrees.

“When you outsource, you have trained people doing the job for you,” he says. “If you don’t feel someone fits your game plan, you don’t have to go through the process of firing them. Also, you get a warranty in case anything goes wrong.”

Partial outsourcing

Another municipal fleet manager who believes in outsourcing is Irene Grant. As fleet manager for the City of Abilene, Texas, outsourcing repairs appeals to Grant because it decreases liability.

“You transfer responsibilities, such as meeting EPA requirements, to someone else,” she says. “In many cases, outsourcing can also be more cost-effective.

But the decision to outsource work, Grant says, depends on the type of fleet you have.

“Those of us who have very complex fleets that range from law enforcement vehicles to off-highway units find outsourcing can be a little trickier,” she says.

Although Grant says they have no intention of outsourcing fleet operations, some work is outsourced, such as transmission overhauls, engine rebuilds and major body work, vehicle inspections and hydraulic air tool repairs.

“You don’t have to do the things you aren’t good at,” she says. “By outsourcing that type of work you can concentrate on the things you really know how to do.”

For Grant, determining which work should be outsourced and which shouldn’t comes down to availability.

“In Abilene, we are a city by ourselves,” she says. “External
resources are limited to the neighborhood. Some jobs are worth shipping off, but that increases downtime.”

The availability of qualified technicians plays a critical role in an outsourcing decision.

“We are trying to determine if we can keep trained technicians and continue to train them,” says Grant.

Matching the outsourced task with the supplier depends on who is out there and who can have the job done in a reasonable period of time, says Grant.

“The choice is simple if the equipment is Caterpillar, John Deere, Komatsu, Case or New Holland,” she says. “Those OEMs have local dealers.”

But with other types of repairs—bucket truck inspections, for example—she has no choice but to ship it off to the nearby town of Snyder, about 85 miles away.

Considering cost

Rawlings says any fleet professional considering outsourcing should first take a hard look at in-house operations and costs.

“You absolutely have to be honest with yourself,” she says. “Nobody likes to admit they have weak areas, but everyone does. So first, do a cost analysis. Then ask yourself, ‘Can anybody else do the work better and cheaper and take on all the risks involved?’ Risk has to be part of the decision.”

Tasks that are done well in her shop are hydraulic repairs and air conditioning work. What’s not done so well are large engine repairs and engine rebuilds.

“We want to supply the most efficient, least expensive and fastest service to our customers,” she says.

Managing vendors

Obviously, the one thing any fleet professional must do is manage the tasks that are outsourced.

“We ask the dealer to provide repair information electronically in our format,” says Kittle. “Their field mechanics fill out our time sheets, which are balanced against our invoices. They use our systems and processes.”

At her facility, Rawlings keeps the responsibility for outsourcing a repair at the shop level.

“Some fleet managers want to be the only person to approve outsourcing,” she says. “I empower my staff to make that decision. For

Outsourcing Dos and Don’ts

Experienced fleet professionals offer a few recommendations to contractors who are new to outsourcing:

From Greg Kittle, CEM, equipment operations manager for Ryan Central, Janesville, Wis.:

■ Don’t undertake something that changes your culture significantly without first understanding where you are today.

■ Know what your costs and needs are.

■ Engage dealers early in the process so they understand what your business model is today and where you want to take it. “Involving the dealer, and in some cases, the manufacturer, is critically important.”

From Marilyn Rawlings, CEM, fleet director, Lee County Government, Fla.:

■ Be completely honest when you evaluate your operation; that’s where we all make mistakes.

■ Ask customers what your strengths are, what they are happy with and what ticks them off.

■ Determine how long it takes your shop to do a specific repair on a specific piece of equipment. Then call a vendor and ask how long it would take that shop to do the same repair on the same piece of equipment. “If he says he can do it in a day and it takes you a week, you need to consider outsourcing.”

From Irene Grant, fleet manager for the City of Abilene, Texas:

■ Have a team approach to outsourcing.

■ Don’t begin outsourcing all at once. There will be devils in the details.

■ Understand that outsourcing is not a cure-all. “It has its own set of problems and issues.”

From Dennis Kelly, customer experience manager at Patten Tractor & Equipment in Northern Illinois and Northwest Indiana:

■ Start with a plan. “Start slowly and approach outsourcing as a transition. That gives you a chance to learn how the fleet operates.”

From Mark Creel, president and owner of Creel Tractor in Ft. Myers, Fla.:

■ Don’t promise anything you can’t deliver.

■ Give the contractor a good cost estimate and then repair what needs to be done on time.
example, if we’re backed up in the shop for two days, everything can go out during that time period. Whoever makes the decision to outsource follows the machine through the entire process. They are responsible for making sure the hourly rates negotiated are the rates that are on the bill. Then the bill is double-checked again when it’s paid. But the initial review is made by the person who made the call.”

According to Grant, the key to managing outsourced work lies in the data flow.

“Vendors and dealers will give you online, real time information,” she says. “Once you make the decision to outsource, you have to keep the data flowing. You can’t afford to lose that.”

While outsourcing may be looked on with skepticism by many, the truth is many fleet managers are already doing it. And it works.

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Equipment Triangle Dynamics

“In outsourcing, it takes all three members of the Equipment Triangle to be successful—manufacturer, dealer and end user,” says Greg Kittle, CEM, equipment operations manager for Ryan Central, Janesville, Wis. “As contractors, we have to recognize manufacturers and dealers have to have margins, and in return, we expect them to invest in their infrastructures. You have to be sensitive to your partner’s profitability.”

Irene Grant, fleet manager for the City of Abilene, Texas, says, “Outsourcing is a major part of the Triangle and it will be more so as things grow more costly and as personnel become harder to find and train.”

Perhaps Dennis Kelly at Patten Tractor & Equipment says it best: “Outsourcing is good for all of us. It’s a partnership. When times are tough, it’s tough for all of us. When times are good, it’s good for all of us. At this time, the good days have outnumbered the bad.”

---

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When a public fleet uses the private sector as a business partner, there is ample opportunity to test the ebb and flow of vendor relationships. In state government, for example, things have to be done a certain way with little or no wiggle room. And by the same token, there are vendors in the private sector who have their own standards for doing business and don’t like to deviate from their chosen paths. According to Erle Potter, CEM, state equipment manager for the Virginia Department of Transportation (VDOT), when public and private meet and it’s not a match, one of two things can happen.

“As far as we’re concerned, either the vendor goes back to his management to find exceptions that allow the vendor to work with us, or they go find other business,” he says. “The bedrock of a good vendor relationship is attitude.”

Potter has proven his point over and over again using a vendor-relationship strategy that creates a win-win environment. That best-practices approach has led to many successful long-term relationships in the private sector and, along the way, has brought VDOT public recognition from numerous industry organizations, including the Association of Equipment Management Professionals (AEMP), which awarded VDOT the 2008 Fleet Masters Award for Public Fleets.

Potter’s strategy is based on establishing a culture that doesn’t breed “we-they” confrontations, but rather establishes open communications in which both parties are comfortable expressing their opinions when issues arise. It also includes measuring performance on the delivery of agreed upon equipment, parts, supplies and services so improvements can be made from the perspective of both parties.

To develop a mutually beneficial business relationship, Potter recommends you start with the contract.

“We advertise specifications that we require on a piece of equipment, and vendors bid based on the specs,” he says. “You have to clearly define your requirements for the products or services so vendors who are bidding understand your needs and can respond appropriately. It’s probably a little more difficult in state government because we have to stay within the restrictions set by state law. There are certain things we have to do in a specific manner, and all that has to be spelled out in the contract.”

Once the bids are received, bid packages are thoroughly reviewed to make sure all VDOT specifications have been met and, if necessary, a visit is scheduled to examine the equipment and make sure it meets the specs. The vendor is then selected based on price from all those that met specs.

“It’s relatively cut and dried,” says Potter. “The vendor either meets our specifications or he doesn’t.”

Before the contract is signed, however, Potter schedules a face-to-face meeting to explain VDOT’s expectations.

“That lays the groundwork for creating a win-win relationship for both parties,” he says. “If there are any issues or concerns from our side...
or the vendor’s, we can work them out at that point. We find using low-bid selection criteria doesn’t require as much time. It’s also completely straight-forward.”

VDOT also uses requests for proposal (RFP).

“We like to see proposals on how different vendors would go about filling a specific need”, says Potter. “When we use an RFP vendor selection process, the selection isn’t based entirely on price. It also takes into account the vendor’s ability to meet certain additional criteria. Depending on what the product or service is, a panel is formed with representatives from VDOT. It sometimes also includes representatives from other state agencies or from other organizations. The panel reviews each vendor’s proposal to see if they have an implementation plan that fills our needs.”

Potter then meets with the vendors before a contract is awarded. “You visit with them, hear presentations, ask questions, verify issues and negotiate,” he says. “Sometimes a vendor even proposes a better, less expensive alternative.”

Creating an environment that eliminates the “we-they” atmosphere can be difficult at VDOT, because of the seemingly endless government requirements involved in the process.

“It’s a very structured process,” says Potter. “And sometimes it’s hard to convince vendors you’re trying to partner with them. It all comes down to attitude. You have to explain that most of the complications are created by state law and it has to be done that way.”

Making sure vendors meet specific requirements is critical to improving the partnerships and strengthening the relationships.

“When it comes to equipment, it’s simple,” says Potter. “The requirements are in the specifications, and you can measure to see if the equipment meets the required dimensions.”

Another consideration is delivery dates. VDOT’s contract requires that a certain number of machines be delivered by a specific date. Many times the agreements include incentives for vendors if they meet the deadlines and penalties for failing to meet them.

Measuring performance is a little more problematic. But, says Potter, there are ways to do it—productivity, for example.

“Measuring productivity will require a test of the equipment in actual working conditions with the required payload,” he says. “But other areas are more subjective.”

One measure of performance for vendors is how soon they are paid. “They have a huge investment in manufacturing, buying or selling the equipment,” says Potter. “They also know the Virginia Procurement Act won’t let us pay them until we receive the goods. After the goods are received and accepted, it’s another 30 days before the vendors are paid.”

Measuring services can be difficult, but Potter puts the where-withal for doing so right in the contract. In some cases, for example, services must be completed by a specific date.

“We measure other things, as well, such as outsourced repairs,” he says. “We look at factors such as downtime, repeat repairs and number of preventive maintenance items completed on schedule.”

Creating a harmonious relationship between fleet and vendor is good for all parties involved. Keeping it that way requires continuing communication.

“When a contract is up for renewal, talk with vendors you’ve worked with previously to find out what kinds of problems they’ve encountered and what things they’d like to see done better,” says Potter. “They may have suggestions that result in a better contract.” And a better contract goes a long way toward establishing a positive vendor relationship.  

Erle Potter, CEM, state equipment manager for the Virginia Department of Transportation (VDOT)

“We like to see proposals on how different vendors would go about filling a specific need”.

www.aemp.org
The term “ergonomically designed” conjures up images of delicate instruments, pristine laboratories and highly sensitive gadgetry. But in the often harsh world of construction equipment, ergonomics is more than just another pretty face. It’s a subtle, sometimes unseen, ingredient that makes man and machine more productive.

“Before ergonomics took center stage, for example, access ladders were usually completely vertical, making it difficult for operators to climb into a large machine without slipping,” says Bruce Michael Dayton, sales engineer, articulated haulers and wheel loaders for Volvo Construction Equipment.

Today’s Volvo’s F-Series wheel loader has egress ladders that are sloped for easy movement into and out of the cab, he says, and the door handle is positioned at 45 degrees.

“When you put your hand on it, it’s a natural movement,” says Dayton. “You don’t have to twist or turn your shoulder to grasp the handle.”

In addition, the steps are slip-resistant—similar to serrated metal—and grab handles are located so operators can reach them from ground level.

Inside, the cab’s interior is 4 inches wider and 2 inches deeper than on previous models to accommodate today’s operators who prefer to have more room. The cab also has more glass for better forward visibility—22 percent better.

**Joystick controls**

One of the more obvious changes ergonomics has brought about in construction machines is replacement of steering wheels with joysticks. In 2005, Komatsu’s WA600-6 wheel loader was introduced without a steering wheel.

“With that model, Komatsu eliminated the steering wheel and went to a joystick steering control as standard equipment,” says Rob Warden, product manager for wheel loaders, Komatsu America.

According to Warden, initially the company was concerned they would have a hard time selling the idea to more-experienced operators. As it turned out, it wasn’t a problem.

“As we demonstrated the equipment across the country, the reaction was, ‘Wow this is easy to use,’” he says. “Once they had experienced the quickness and responsiveness of the loader’s joystick, it was easier for them to accept the change.”

Many Volvo products are also joystick converts.

“Across the board, Volvo’s products—excavators, wheel loaders, compacters, etc.—have joystick controls,” says Dayton. “This allows for boom and bucket control with one joystick instead of two levers.”

Although the joystick controls are still hydraulic-servo, the next evolution in operator controls will be the “electro-hydraulic” boom and bucket levers, according to Dayton.

“With electro-hydraulic controls, electronics activate the hydraulics,” he says. “The controls don’t require a lot of force from the hand or wrist to activate them. It’s all electrical, rather than mechanical.”

These controls will allow the operator to adjust boom height and bucket angle stops without leaving the cab. Another advantage to the improved control system is...
that it enhances heat dissipation inside the cab because no hoses enter it.

Deere machines have also moved to new types of controls.

“We’re trying to reduce hand motions and repetitive movement by the operator,” says Chris Johnson, engineering manager for cabs at John Deere Construction and Forestry Division. “You see some of that in joysticks that have multiple functions. They have pistol grips with auxiliary function buttons on top and other design features that help reduce motion. Low-speed machines are using joysticks for steering.”

On Deere skid-steer loaders, functions are combined.

“You have a choice of machine control and bucket and boom functions in the hand controls,” says Johnson.

But joysticks aren’t for everyone.

“The joystick-only steering system works well on larger quarry or mining machines,” says Komatsu’s Warden. “But smaller machines in a sand and gravel operation with trucks probably wouldn’t use joysticks. Those machines have more than one application and have to be adaptable to many situations. By comparison, larger machines typically are single-purpose units that don’t require as much flexibility.”

Even machines that still rely on steering wheels have been redesigned to require less effort to operate them.

“With Volvo’s Comfort Control Drive, for example, an operator can make steering and directional changes from the control system bolted to the side of the seat,” says Dayton. “This eliminates static muscle strain from constant steering and places controls in the operator’s fingertips. The steering

The steering wheel and mechanical levers on the earlier Caterpillar motor grader model (above) have been replaced with joysticks on a new Cat motor grader (below). The ergonomic changes reduce operator hand motions by more than 75 percent.
Seating and suspension

Ergonomic development has eliminated "one-size-fits-all" seating in off-road equipment and many seats are now pneumatic. "A pneumatic operator’s seat is like sitting on an air cushion," says Volvo’s Dayton. "They adjust for a more comfortable ride. The lumbar area is adjustable and there are options now that have multiple adjustments enabling the operator to work from a custom seat, one that fits him regardless of height, size or weight."

In cold climates, a heated seat option is often available. "Ergonomic studies have shown that the more comfortable an operator is and the easier it is for him to operate the machine, the more effective he will be," says Dayton. On some machines, it takes more than an adjustable seat to keep the operator comfortable. "Our wheel loaders have an option called boom suspension," says Dayton. "In layman’s terms, boom suspension actually puts a shock absorber on the boom itself. If the operator has a bucket full of gravel and is driving across a bumpy jobsite, the boom—not the machine and operator—absorbs most of the forces generated by machine bounce. The operator never feels the vibration and stress coming from a bouncing load."

At Komatsu, an entire design group is dedicated strictly to developing cab environments. "We design all our cabs—no matter what the product is—so that the features that control the functions of the machine are easily reached and accessible at any time during the operation," says Warden. "The operator generally doesn’t have to bend forward or reach far to either side. We try to position the controls within the normal working reach of the operator."

The result is that when an operator moves from a smaller machine to a bigger machine, or vice versa, the switches, levers and functions are in the same general location. "Operators can go from a small 2-cubic-yard machine to an 8-cubic-yard one—which is a huge jump in size—and when they step inside the cab, they’ll find themselves in familiar surroundings," says Warden.

Productivity results

Putting creature comforts on earthmoving machines isn’t simply to pamper the operator; it has a direct impact on productivity. "When an operator is in a more comfortable cabin—better seat, better working environment, etc.—that operator is more productive," says Warden. "If the seat is bad and the armrest is in the wrong position and hard to adjust, the operator is continually fidgeting rather than working. With an ergonomically designed cab, the operator can dedicate that time and energy to production and the task at hand."

Caterpillar enhances operator comfort by designing more ergonomic control systems and seating combined with visibility improvements and other dynamics that enable an operator to work more comfortably and more productively.

"Physical degradation over time results in fatigue and fatigue hurts performance," says Caterpillar’s Meegan. "How well an operator performs impacts productivity."

At the same time, the health, safety and comfort of employees has become paramount. "What we do in the ergonomics arena reduces the negative health impact while improving safety and productivity," says Meegan. That’s
a good reason for fleet managers to invest in machines that are more ergonomic. When an operator is more comfortable, he’s more productive and that goes right to the bottom line.”

Other machine changes that will improve productivity are the rear-view camera and rear obstacle-detection systems that are being introduced on Deere’s K-Series loaders.

“They are big improvements and will result in increased productivity at the jobsite,” says Johnson.

Another benefit of ergonomic design changes is the reaction of operators.

“Good ergonomics can help retain your work force,” says Meegan.

Another plus, he says, is that some insurance companies consider ergonomic investment a reason for lower premiums.

“Highly skilled operators are now a prime commodity and if you can keep them your business will profit from that,” says Warden.

Ergonomics has also impacted machine serviceability.

“We make sure filters are easy to reach, fluid fills are in the same location on similar machines, and when operators do service checks at the start of the day, they open a door and everything is right there,” says Jonathan E. Drum, vehicle ergonomics engineer for John Deere Construction and Forestry Division. “In the shop, technicians also have easy access and can make repairs faster.”

Emissions

Industry-wide, ergonomic advances are occurring more rapidly. Surprisingly, one reason is the current round of emissions regulations.

“Prior to tiered emissions regulations that must be met by specific dates, the more popular OEM machines were updated more frequently than low-volume units,” says Warden. “If you sold a lot of one model, that model got more upgrades and updates. Today, emissions regulations deadlines apply to all models so all models are upgraded at the same time.”

ROI

Clearly, ergonomics are continuing to improve the health, safety and productivity of both man and machine, but at what price? And what is the return on investment?

“You’d like to think there is a quantifiable ROI with ergonomics, but the ROI for the fleet owner isn’t going to be something he can see,” says Warden. “It’s not that you’re paying x dollars for the seat or the armrest. You’re
paying for a Tier 3 machine that includes the ergonomics.”

According to Johnson, Deere doesn’t approach ergonomics in terms of a dollar amount.

“You can’t quantify ergonomics in terms of ROI,” he says, “but we look at how we provide fleet managers with products that help them in their businesses.”

**Coming attractions**

What lies ahead in ergonomics remains to be seen. However, certain trends in ergonomic design offer a few hints.

“I don’t think we’re going to see anything truly outrageous,” says Komatsu’s Warden. “The trend is to improve and simplify operator’s compartments to make it very easy for any operator to sit down and make adjustments quickly.”

Upcoming improvements may not even be visible to the operator.

“We try to make it seamless,” says Warden. “When an operator comes off a Tier 2 machine and moves into a Tier 3 machine, he eventually notices that the levers are easier to use compared to the old ones and that the cab is a lot more comfortable.”

One trend that’s coming is tunable controls, says Deere’s Drum.

“That is, if the operator is aggressive, the controls can be aggressive,” he says. “If he likes the controls to lag a little bit, they will.”

Another important trend is hybrids.

“Earlier this year, Volvo unveiled a hybrid diesel wheel loader that will be available in 2009 to certain key customers,” says Dayton. “The hybrid loader gives fleet managers a dramatic reduction in fuel costs.”

Meegan foresees the addition of more features that enhance the skills of the operator. For example, one Caterpillar backhoe-loader has an automated dig function that allows the operator to set up a control dig depth and maintain that depth to within a couple of millimeters.

“To encourage new construction industry workers, we’ll need to have some sort of automated features to enhance operator skills,” says Meegan.

Ergonomically designed cabs, joystick controls and machines that enhance an operator’s skills make an impressive list, but in the final analysis, does it mean a generation of X-Boxers and other video gamers can adapt more easily to future construction equipment?

No one knows for sure, but they are certainly a different breed.

“At ConExpo-Con/Agg, we brought in a motor grader simulator,” says Drum. “When the younger operators, got into it and found themselves in a virtual environment, they immediately adapted to the alternative reality with no noticeable performance decrease. Some of the more experienced operators, however, were still a little wary of something that was that radically different, even though the controls looked familiar.”

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Fluid Recovery Comes of Age

Reuse and recycling technology has advanced to once again prove one man’s waste is another man’s treasure.

By G.C. Skipper, Contributing Editor

Before the value of used motor oil, crank case oil, and hydraulic and transmission fluid was recognized, fleet professionals stored the fluids on-site and eventually paid a vendor to haul them away. Now several manufacturers offer alternatives that allow fleets to recycle those used fluids and cut costs.

Burning waste oil

Clean Burn manufactures heating equipment that burns used oil. Since 1979, when the company was founded, it’s built a customer base of facilities that generate approximately 700 gallons of waste oil per year. According to Michael Shirk, president and CEO, construction companies, car dealerships and repair shops, lube centers, carwash facilities, fleet service centers and other organizations that operate large equipment use their services.

“During the past few years, depending on what section of the country you live in, waste-oil haulers and re-refiners have valued used oil at somewhere between zero and $1 per gallon,” says Shirk. “But the value of waste oil isn’t in the market price of the discarded oil. It’s in how that used oil is used.”

Clean Burn’s customers turn their used oil into a free energy source to heat their facilities.

“Our customers don’t have to pay for fuel oil, propane or natural gas to heat their buildings,” says Shirk. “They transform waste oil into free heat. That adds up quickly, especially with fuel oil selling for as much as $4.50 a gallon in some parts of the country.”
There’s also an environmental benefit for on-site burning of waste oil for heat.

“While it may be easy to pay to have your used oil hauled away, you’re opening yourself up to liability during transportation and giving away valuable fuel that could be used for free heat,” says Shirk. “Transporting used oil on highways poses a considerable risk of spills and/or contamination to the environment. Anyone who generates used oil is responsible for making sure it is disposed of properly. If there is a spill, the blame and expense of clean-up could rest entirely with the company that generated the used oil and hired the company to haul it away.”

**Extending oil life**

Using a different approach to the problem of waste oil and fluids, Harvard Corp. makes equipment that recycles fluids to extend service life. The company manufactures a filtration system that has a depth media filter designed to remove very fine particulate matter and water.

“Water is the catalyst for a lot of acids that form in oil,” says Otto Knottnerus, company president. “We take out a substantial amount of water, but at the same time, keep the oil extremely dry. Our system has the ability to remove water and maintain it at lower than 50 parts per million (ppm), which is what most fleet professionals need.”

Knottnerus says used fluids should not be considered waste.

“Many companies don’t realize oil doesn’t wear out,” he says. “It just becomes contaminated to the point that it no longer serves its function. If you take the contamination out, the oil will last much longer. Some of our customers are getting anywhere from six to eight times more use on the same oil.”

One contractor in South Dakota operates a fleet of Caterpillar 657 scrapers using the Harvard system.

“Prior to installing our system, the scraper engines were running about 10,000 to 12,000 hours between overhauls,” says Knottnerus. “The company installed the Harvard system on both engines on the scrapers. They kept a close eye on the rear engines because that’s the engine that eats all the dirt. After the installation, technicians changed oil and filters every 1,000 hours and averaged about 24,000 hours on the engines. At that point, the equipment experienced connecting-rod fatigue, so the contractor backed up the time between overhauls to 20,000 hours.”

That customer also cleans new hydraulic fluid, steering fluid and engine oil that comes from bulk storage before putting it into his diesel equipment.

“Using the Harvard system to clean hydraulic fluid extends component life and the same is true for transmission components,” says Knottnerus. “Our system will clean transmission oil very quickly, and it makes a big difference in how long the torque converter, clutch pack and gears last.”

A fleet manager that wants to extend the life of equipment oil must have an oil-analysis program in place.

“This is very important in using a product like ours,” says Knottnerus.

**Portable purification**

Pall Corp. makes a portable fluid purifier designed to extend the service life of hydraulic and other fluids.

According to the company, the portable unit draws contaminated fluid into a spinning disk vacuum chamber through a mesh strainer. Fluid entering the chamber impinges on the center of the spinning disk, and as the disk rotates, the fluid flows outward to the edge of the disk. There it is thrown off, breaking into small droplets that create a large surface area. That larger surface area increases the water removal rate. As ambient air is drawn into the vacuum chamber through an air breather, the air expands to about five times its former volume, which reduces relative humidity by about 80 percent, and the dehydrated fluid from the vacuum chamber exits the purifier.

What all that means to fleet professionals is lower operating and maintenance costs, extended fluid service life and reduced system wear.

**The technology**

Obviously, the technology used to recover waste oil for heating purposes and to recycle used fluids for reuse is vastly different.

The Clean Burn waste oil system consists of either a hot-air furnace or a hot-water boiler, an oil storage tank (provided by the company or storage tanks already at the fleet.
facility) and an oil pumping system with metering pump technology.

“Our metering pump allows fleet managers to dump any mixture of used oils—diesel fuel, automatic transmission fluid, motor oil, crank case oil or regular fuel oil—into the same storage tank,” says Shirk. “It doesn’t matter. You can mix it all together and our pumping system accounts for the different viscosities so it always delivers the same volume of oil to the burners regardless of the oil mixture.”

The furnaces typically hang from the shop ceiling and can be used as space heaters or ducted as central furnaces.

Basically the waste oil is pumped from the storage tank to the Clean Burn furnace or boiler’s burner, which operates on 10- to 15-psi compressed air.

“We have the only burner on the market that is specifically designed to burn used oil, and we offer the best warranty in the business” says Shirk. “Our equipment is designed for optimum efficiency to obtain the maximum amount of free heat from each gallon of used oil and for ease of maintenance. It’s not just a way to dispose of used oil.”

Another benefit for fleet managers is the return on investment. The longevity of the equipment is one of its key features. The economic payback is typically within two to three years, according to Shirk.

“We still have systems out there that have been in use for 20 years,” he says. “Once the system pays for itself, it generates cash flow year after year.”

To reach the point where it is today, the technology behind used-oil heating systems had to go through a significant learning curve. But, Shirk says, the technology has arrived.

“Today’s Clean Burn systems offer significant improvements in used-oil combustion and pumping technologies,” he says. “The system’s reliability and durability are unmatched in the industry.”

On-board recycling

Recovering fluids for reuse, by comparison, using the Harvard system is accomplished by mounting the system onto the machine. On an excavator, for example, the system is installed about 3 or 4 feet from the engine. As it operates, it cleans the old oil, which in turn prolongs engine life.

“The oil is cleaned and then goes back into the engine,” says Knottnerus. “It’s like a kitty loop on the engine. The oil that is returned is actually cleaner than new oil.”

The Harvard system mounted on a Caterpillar 3406 engine, for example, runs at 1 gallon per minute and you have a 10-gallon sump. Every 10 minutes you’re turning over the 10-gallon sump. Within one hour, you’ve turned it over six times.

According to Knottnerus, that makes the Harvard technology unique is its ability to take out very fine material.

“By filtering down to about 1 micron, you take away the abrasive bridges that connect the film that’s between two moving parts,” he says. “Typically, the film between the two moving parts under pres-
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sure is about 3 to 5 microns in thickness. If you can filter to 1 micron, you can have two particles pass each other within the film without locking up and causing an abrasive bridge. This eliminates the “breeding material that causes wear to accelerate.”

Oil has four functions: to clean, cool, lubricate and seal.

“Customers have told us that, with the Harvard system mounted on a machine, they use less oil,” says Knottnerus. “That’s because the oil no longer has the contamination between the ring and the cylinder that breaks the seal. By taking out the contamination, it keeps the oil clean up to the end of the drain period.”

Last year, Harvard introduced a second way to reuse waste oil: a fuel-blending system that allows fleets to blend used oil with diesel fuel. The company has also begun to filter bulk diesel fuel.

“We had no idea how dirty diesel fuel is,” says Knottnerus. “It really surprised me. My first thought was, ‘You’ve got to be kidding.’ That’s like buying a new car with dirty ash trays and trash on the floor. We tell people that new oil is not clean oil, and we’ve been able to prove that by testing their oil supplies.”

Unlike some industries that have been hamstrung by tougher environmental regulations, the new requirements have actually helped the fluid-recovery business.

“We’ve been selling a lot more diesel fuel systems—not because we’re pushing them—but because low-sulfur fuel has caused a lot of problems,” says Knottnerus. “Right now, many refiners aren’t cleaning their tanks as often, and we’re starting to see a lot more water and dirt in the fuel.”

In other words, tougher standards have been good for the fluid-recovery and recycling businesses. Now that off-road equipment is going green, fluid recovery can only improve the situation.

**Products**

**Pall**

The Pall Portable Fluid Purifier is used to prevent pollution, extend fluid service life, recycle fluids and maintain optimum fluid cleanliness in equipment. Service life of hydraulic oil, lubricants and other fluids is extended by the system. 

For more information, visit www.pall.com

**Harvard**

Depth media filters designed to remove water, as well as very fine particulate matter, from used oil allows the oil to be reused in engines, according to the company. The system, which is mounted directly on the machine, restores the oil to cleaner-than-new condition. The system can also be used to clean bulk fuel before it goes into diesel equipment.

For more information, visit www.harvardcorp.com

**Clean Burn**

The waste-oil recycling center from Clean Burn is a self-contained, on-site recycling and heating system that allows fleets to store and efficiently burn used oil. The recycling center works in tandem with a range of Clean Burn used-oil furnaces.

For more information, visit www.cleanburn.com
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