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IT’S MORE THAN JUST OIL. IT’S LIQUID ENGINEERING.
I write this letter from the 2011 leadership retreat and board meeting in Chicago. In my previous letter—fresh out of CONEXPO-CON/AGG—I highlighted some of the partners’ and members’ accomplishments within AEMP leadership committees.

Today, after seeing the continued development and progress of these programs, I would like to revisit some of them.

The AEMP Telematics Standard continues to build within the industry. The cooperation and focus shown by competing equipment OEMs to create this standard is absolutely astounding. I think this communicates volumes about our Strategic Alliance Partners’ dedication to not only AEMP but the industry as a whole. As it was so eloquently stated in a committee this week, our partners “leave their guns and knives at the door,” and actually take time out of their schedules to help us produce an unprecedented product.

And now, the OEM partners are helping us again. Right after CONEXPO-CON/AGG, AEMP launched our latest initiative, a closer focus on Safety. The newly formed Safety Task Force is building up steam at an impressive rate. The Safety Task Force is zeroing in on precisely what the Equipment Triangle needs to monitor safety in real time and work with OEMs to develop solutions for a safer worksite.

Last but not least is AEMP University.

For those of you who remember being awed by futuristic technology in shows such as The Jetsons or Star Trek, the same feeling bubbled up after seeing the vision for AEMP University. (For those of you who don’t understand this feeling, ask a person like me whose hair is “blonding” and “follicle-y challenged.”) Although I have honed in on my ability to efficiently boot up a computer, I sit in amazement seeing how far AEMP University has come since the original concept. AEMP University Committee Chair Carl Porter and developer John Jameson, Ph.D., are true visionaries. The concept of an online university for equipment managers shows unequaled innovation. The beauty of the University lies in the flexibility. Study from the comfort of your home or office. Begin and leave a course at your leisure. Take essential level education or executive level. Study for certification or simply fill gaps in your current knowledge set. In a nutshell, you can plan, read, learn, test and track progress all from one place.

AEMP University will help countless individuals—from novice to experienced, equipment manager to executives in other areas of your company—build an education path where the sky is the limit.

I ask you to take a little time to invest in yourself by visiting AEMPU.org. Take a few minutes to browse the course catalog and see if there is a course that might enhance your skill set. With the mass of education that AEMP offers online, get ready—because the race is on.

Thanks,

Dave Gorski, CEM
Chairman of the Board and CEO

“Life is NOT about waiting for the storm to pass, LEARN to dance in the rain”
Utilization, location and maintenance status.

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AEMP will present its annual Asset Management Symposium Nov. 1 through 2 in Nashville, Tenn. Incorporating the theme, “Making Yellow Safe, Green and Profitable,” several industry professionals will share their expertise on current fleet-asset issues and management tactics. The event will be highlighted with this year’s special keynote speaker, Pat Quinn, President of the American Trucking Association, and co-founder of U.S. Xpress.

The Symposium sessions will focus on AEMP’s executive tract, providing insight to fleet owners, managers and other company-level executives. In addition to seminars, discussions and peer-to-peer networking, attendees will also have the opportunity to take advantage of AEMP’s Professional Development Institute (PDI). Through the PDI, participants will be able to attend classes and attain professional certifications, including Certified Equipment Manager (CEM), Equipment Manager Specialist (EMS) or Certified Equipment Support Professional (CESP).

Opening day events will begin with a welcome from Stan Orr, CAE, AEMP President and CSO, and be followed by several seminars, presented by knowledgeable industry professionals.

“As in previous years, we’ve established a first-rate team of presenters at this year’s Symposium,” Orr says. “Attendees can be assured they’ll leave with a quality, educational experience and valuable information they can take back to implement in their company.”

Seminar topics on the first day will include finance and telematic options, budgeting, saving money in the load/haul operation, hazardous materials and safety. The PDI will also hold its first day of classes. Additionally, updates on AEMP’s Green Fleet Initiative, Telematics Standard and AEMP University will be discussed.

“There has been some exciting progress for our initiatives already this year,” Orr says. “We’ve achieved some significant milestones, from the official launch of AEMP University to certifying our very first Green Fleet company. There will also be some news on an exciting new safety initiative that will have industry-wide implications. We’re really looking forward to sharing what’s new, and continuing to educate on our programs and what they offer to the industry.”

The Symposium’s second day will kick off with additional AEMP updates, and continue with seminars on integrating telematics, leveraging partner agreements, life cycle analysis and repair/replace decisions. In addition, the PDI will continue to be in session, and hold its final day of classes.

Registration for the 2011 Fall Asset Management Symposium is now open. Visit www.aemp.org for more information or register online. Those looking for more information on AEMP’s PDI and certification opportunities, or wishing to apply for the certification program may also visit the website.

AEMP Offers Online Learning Center for Fleet Management Professionals – AEMP University

AEMP has launched the industry’s first online learning center designed specifically for those practicing the art and science of fleet asset management. The program, AEMP University, was officially introduced in March 2011 at AEMP’s 29th annual Management Conference in Las Vegas.
AEMP University is an online-based education program that provides participants with the same high-quality learning opportunities and peer-to-peer interaction found in traditional schools, yet in a format that’s convenient, flexible and financially viable. AEMP Vice-President of Education Jim Phillips explained the reasoning behind the design of AEMPU and the need for this type of higher-learning institute for the industry.

“Evolving economic conditions have challenged the traditional paradigm of education,” Phillips says. “More often, the constraints of time and financial resources are impacting how a learner receives and utilizes education. AEMPU was designed to address those issues, while still providing a quality educational opportunity for our industry’s professionals who are seeking advanced knowledge.”

Those wishing to learn more about fleet asset management are able to take online courses covering the 17 core competencies identified by AEMP as necessary to be an effective equipment professional. Each competency has distinct learning objectives, and is spread out in four learning levels, from entry-level “boot camp” to the executive and more strategic level. This allows AEMPU to effectively serve all professionals, from those just entering a career in the equipment management industry, all the way up to the most seasoned asset management specialist.

“Education is extremely valuable to equipment professionals, and it’s one of the key resources AEMP offers,” states Carl Porter, AEMP University Committee Chair. “AEMP University takes it to the next level by making quality education available to all participants, regardless of experience level.”

Although AEMP University officially launched in early 2011, Porter and the rest of AEMP’s University Committee continue to improve and enhance the program as part of the ongoing effort to offer the most complete educational package possible.

The program also records each student’s individual progress by tracking all courses taken and completed. At any time, students are able to access this information and compile a record of proof showing successful course completion. “AEMPU offers up-to-date progress tracking and allows students to see current records of all course activity,” Phillips says. “This is great for their own personal achievement tracking, but also offers a “resume of learning” to show potential and existing employers.”

AEMP FOUNDATION AWARDS 2011 SCHOLARSHIPS

The AEMP Foundation is pleased to have awarded 12 scholarships this year to students planning to enter the diesel technician profession. Thanks to generous company and individual donors, the AEMP Foundation is able to address the critical technician shortage by assisting those who wish to make a career in the heavy equipment industry.

THIS YEAR’S SCHOLARSHIP RECIPIENTS ARE AS FOLLOWS:

Michael Murphy of Queensbury, N.Y., is in the heavy equipment: truck & diesel technician program at Alfred State College.

Tyler Tuthill of South Royalton, Vt., is pursuing an associate’s degree in diesel technology at the University of Northwestern Ohio.

Jacob Novotny of Hot Springs, S.D., is currently studying diesel mechanics at Lake Area Technical Institute.

Jeremy Raney of Kearney, Mo., is studying diesel technology at Linn State Technical College.

Timothy Chartrand of Rindge, N.H., is studying mobile equipment technology at White Mountains Community College in Berlin, NH.

Thomas Finley of Bridgeport, Ill., is pursuing an associate’s degree in diesel equipment technology at Wabash Valley College.

Jacob Parnaby of Middlefield, Ohio, is studying at the University of Northwestern Ohio for hands-on training and certification as a diesel technician.

Zachariah Parnaby of Middlefield, Ohio, attends the University of Northwestern Ohio and is studying agriculture and diesel.


Tyson Mayhall of Grant, Ala., attends Wallace State Community College and is currently studying diesel technology.

Brian Appleman of Amboy, Ill., is studying diesel power technology at Kishwaukee College.

For more information on the AEMP Foundation, visit AEMP.org.
Mark Pivetta, Dave DeYoung, and John Gleim. Not exactly the kind of guys who'll talk your ear off. But they will, however, tell you exactly where they stand — especially when it comes to productivity. Which is why we couldn't have been more grateful that these contractors (and many more) volunteered so much of their own time to help us design Deere excavators. And why we hung on every word they had to say. From an Interim Tier 4-certified engine that actually helps increase productivity, to a cab with unmatched comfort and visibility, the new G-Series Excavators prove that when it comes to innovation, talk is priceless. Learn more from your John Deere dealer or our website.
Tuition fees for AEMPU courses range from $24.95 to $39.95 per class depending on complexity. Select classes will be priced a bit higher; conversely, there will be some online classes offered free of charge. For more information on AEMPU or to enroll, go to www.aempu.org.

**Asset Management Symposium to Host PDI in November**

AEMP’s Professional Development Institute (PDI) will be in session at the 2011 Asset Management Symposium, taking place Nov. 1 through 2, in Nashville, Tenn. Through the PDI, industry professionals will have the opportunity to obtain certification as an Equipment Manager Specialist (EMS), Certified Equipment Manager (CEM) or Certified Equipment Support Professional (CESP). Classes will be held the first two days of the Symposium, and exams will be administered on the third and final day, Nov. 3, from 8 a.m. to noon.

To date, the Professional Development Institute has certified more than 200 professionals as a CEM, EMS or CESP. Recognized as the industry standard, AEMP’s CEM program has been in existence since 1996 and is geared towards equipment management professionals with a minimum of five years experience managing fleet assets. The EMS credential is designed as an entry-level certification for those seeking to expand their skills and plan for a career in fleet asset management. Offered for the first time in March 2011, the CESP certification targets OEM/supplier representatives, and is aimed at strengthening the cornerstone philosophy of the association – The Equipment Triangle.

**AEMP Offers Certification Credential for OEMs, Distributors and Suppliers**

The Certified Equipment Support Professional (CESP) certification credential is the newest offered by AEMP. Available for the first time this year, the CESP certification is targeted towards OEM/supplier representatives, and aimed at strengthening the cornerstone philosophy of the association – The Equipment Triangle.

Created in response to requests from OEMs, distributors, suppliers and other members of AEMP, the
The Power of Knowledge Awaits

Turn knowledge into power at AEMP’s Asset Management Symposium and Professional Development Institute. From emission reduction to telematic integration to safety tracking and life cycle analysis – a wealth of information awaits to help you maximize your fleet’s profitability and performance.

November 1-3, 2011 - Nashville, TN
Symposium - November 1-2
Certification Exams - November 3

Visit aemp.org to register online and find out more about our Symposium and Certifications.

Certifications
• Certified Equipment Manager (CEM)
• Equipment Manager Specialist (EMS)
• Certified Equipment Support Professional (CESP)
CESP program is intended to educate equipment suppliers on the challenges equipment managers face when making the day-to-day decisions required in their profession.

“We want to ensure suppliers truly understand how an end-user makes a purchasing decision, be it the purchase of equipment, parts, maintenance, and so on,” says Stan Orr, President and CEO of AEMP. “This certification is designed to enhance a supplier’s understanding of the expectations of an equipment manager.

Developed in late 2010 and early 2011, the new CESP program has completed its final field-testing phase. Field test participants were given the opportunity to complete the CESP certification at the 2011 Management Conference, held in conjunction with the CONEXPO-CON/AGG tradeshow in Las Vegas. The first-ever CESP certification was recently awarded to Jon Fazenbaker, CESP, Vice-President and General Manager of WearCheck USA.

Interested OEMs, distributors and others in a supply-side role in the Equipment Triangle will be eligible to test for the CESP certification at AEMP’s 2011 Asset Management Symposium, which will be held Nov. 1 through 3 in Nashville, Tenn. Those wishing to achieve this certification must complete the application, purchase and study the Career Equipment Fleet Manager manual and pass the exam. To assist with exam preparation, CESP participants can attend the Professional Development Institute, as well as take other optional educational classes offered at AEMP Conferences and online through AEMP University, aempu.org.

Similar to other certifications offered by AEMP, the CESP covers the 17 core competencies AEMP has identified as necessary to be an effective equipment professional: Benchmarking; Customer Service; Employee Training; Environmental Requirements; Financial Management; Human Resources; Life Cycle Analysis; Negotiations; Outsourcing; Parts Management; Preventive Maintenance; Risk Management; Safety; Shop/Facilities Management; Specifications; Technology; and Warranty.

To date, more than 200 individuals have received professional certifications through AEMP. In addition to the CESP program, AEMP’s existing certifications include the Certified Equipment Manager (CEM) and Equipment Manager Specialist (EMS). Recognized as the industry standard, AEMP’s CEM program has been in existence since 1996, and is geared towards equipment management professionals with a minimum of five years experience managing fleet assets. The EMS credential is designed as an entry-level certification for those seeking to expand their skills and plan for a career in fleet asset management.

For additional information on the CESP program or to apply, go to www.aemp.org. EM

The following individuals received professional certifications this March at AEMP’s 29th Annual Spring Conference in Las Vegas:

SPRING 2011 CERTIFIED EQUIPMENT MANAGERS
1. Robert Knouse, CEM, Spiniello Companies
2. Dana Cirks, CEM, Wanzek Construction, Inc.
3. Dan Builta, CEM, Flatiron
6. Steven McBride, CEM, HK Contractors Inc.
7. James C Schug, CEM, FMI Corporation
9. Andy Richter, CEM, Insituform Technologies
10. Mark Malamphy, CEM, Midasco LLC
11. Anthony Antonelli, CEM
12. Teddie Foreman, CEM, Zachry Construction Corporation
13. David Carson, CEM, Raytheon Technical Services Company
14. Chuck Cheatham, CEM, Virginia Department of Transportation
15. John Brunette, CEM, Virginia Department of Transportation
16. Phillip Leonard, CEM, Virginia Department of Transportation
17. Kevin Holden, CEM, Virginia Department of Transportation

SPRING 2011, EQUIPMENT MANAGER SPECIALISTS
1. Eric Friederich, EMS, Frontier-Kemper Constructors
2. Steve Lehmer, EMS, AES
3. Heidi J Vilhauer, EMS, Flatiron
4. Brian Hohenshilt, EMS, G.A. & F.C. Wagman
5. Cliff Gossett, EMS, Mulzer Crushed Stone

SPRING, 2011, CERTIFIED EQUIPMENT SUPPORT PROFESSIONALS
1. Jonathon Fazenbaker, CESP, WearCheck USA

For a full listing of all certified CEMs, EMSs and CESPs, visit www.aemp.org/certified.html
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Master these financial concepts and better evaluate machine-acquisition strategies

MIKE VORSTER, CONTRIBUTING EDITOR
Discounted cash flow, net present value and equivalent annuity are terms not all that important in the day-to-day life of an equipment manager. Yet the concepts must be understood, and all managers must be able to communicate effectively with specialists in the area. Discounted cash-flow analysis stems from the fact that a bird in the hand is worth two in the bush. Or, in financial terms, $100 in hand is worth more than $100 arising from a transaction scheduled to occur at some future date. Money in hand has value and can be used to accrue interest or reduce the cost of debt; future transactions contain a certain element of risk.

Future transactions are not as highly valued as transactions that occur in the present, which gives us the term “Discounted Cash Flow.” The term “discounting” in this context has exactly the same meaning as it does when a car dealer “discounts” or reduces the price on a car. Money has a time value, and the sooner it comes to hand the greater its value and the lower the risks involved. The mechanics of how the time value of money is included in a calculation involves the use of a compound-interest formula and some algebra. The formulae for calculating the future value of a present transaction and the present value of a future transaction are given below. Their application is illustrated in the two examples that follow.

First, let’s assume a machine was sold to someone and that they now come, hat in hand, with the following story: “I know I owe you $10,000 on the purchase of the excavator you sold me and that the debt is due now. But things are tight, and I would like to delay payment for two years. What will I have to pay you then?”

The $10,000 owed is “P,” the present value of the transaction now due. The interest rate, “i,” is assumed to be 10 percent per year based on the fact that a safe return of 6 percent per year is obtainable on money invested and that at least 4 percent needs to be added to cover the risk involved. Clearly “N” is 2 years. Therefore “F,” the equivalent future value of the debt due now comes to $10,000 x (1 + 0.1)^2 or $12,100.

F is greater than P because the present value ($10,000) has been compounded up to get its equivalent future value ($12,100).

Second, let’s assume that there is a final balloon installment of $10,000 due in two years on the trailer purchased some time back and that you would like to pay it now in order to take full ownership. The lender tells you that it is all right to pay early and that they are able to obtain a return of 10 percent on their funds.

The value of the future transaction (“F”) is $10,000; “i” is 10 percent; and N is 2. Therefore “P,” the present value of the balloon payment that is due to be paid in two years, is $10,000 ÷ (1 + 0.1)^2 or $8,264. Note that “P” is smaller than “F” because the value of the present value formulea

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Image credit: Copyright iStockphoto.com/Leontura
future transaction ($10,000) has been discounted to get its equivalent present value ($8,264).

In essence, that is all there is to discounted cash flow. If a transaction is to be “moved” from now into the future, it is compounded up to arrive at an equivalent future value. If a transaction is to be “moved” from the future (the two birds in the bush) to the present (the one bird in the hand) then it is discounted back to arrive at its equivalent present value. The term “discounted cash flow” is used because, in the vast majority of cases, transactions occur in the future and these must be discounted back to the present.

It is easy to see that if one transaction can be discounted back to the present then the process can be repeated for each transaction in a set of future cash flows. The cash flows, when discounted back to the present, can be added up to determine the total of the discounted cash flow or, as it is more commonly known, the net present value (NPV) of the future cash flows. The net present value (NPV) of an investment is the total of all cash flows resulting from the investment after they have been discounted back to an equivalent present value using a discount rate that reflects the time value of money.

The numbers given in the “Purchase” table give an example based on the purchase of a $180,000 machine (row 2) that is owned for five years and sold for $50,000 (row 4). It is expected to generate an operating gain of $40,000 in years 1 and 2; $35,000 in years 3 and 4; and $25,000 in year 5 (row 3).

This gives the annual cash flows shown in row 5. The total of the cash flows is $45,000: a tidy sum on the $180,000 investment.

Let’s now assume that the time value of money and the risk inherent in this investment justify using a 7 percent discount rate. This produces the discount factors given in row 7 and the present value of each future cash flow (row 5 x row 6) in row 8. The total of the discounted cash flows, the NPV, is $1,066.

The net present value of the cash flows at 7 percent per year ($1,066) is different from the arithmetic total of the cash flows ($45,000). This is because most of the inflows,
and particularly the $50,000 from the sale of the machine, occur in the future and are therefore heavily "discounted" in the NPV calculation.

The "Lease" table gives the same numbers as a purchase except that the machine has been leased for an initial advance payment of $50,000 and four subsequent advance payments of $20,000 per year. The annual cash flows still total $45,000, but the net present value of the cash flows is now $27,673. The change in the way the machine is acquired means that the venture becomes "cash positive" close to the end of year 3, and thus it is not sensitive to or severely impacted by the time value of money.

The accompanying cash flow diagram gives an alternative and frequently used way of presenting the annual cash flows given in the lease table. The layout improves understanding of the fact that the transactions occur at different points in time and that future transactions are heavily discounted when they are brought back to the present.

The decision to invest in equipment invariably gives rise to a number of transactions spread throughout the life of the machine. Simply adding the annual cash flows without appropriately discounting future transactions neglects the time value of money and can easily result in less-than-optimum decisions. The added complexity of using the compound interest formula to calculate the net present value of future cash flows rather than simply adding them up to arrive at an arithmetic total is justified under two conditions.

First, when the time value of money is high or the time horizon is long and the value of the discount factor calculated using the \( P = F \times (1+i)^{-n} \) formula cannot be neglected. The example shows that 7 percent per year over five years yields a factor of 0.71. This can certainly not be neglected.

Second, when alternative financing schemes are being considered and the cash flow patterns in the alternatives being compared differ substantially. The example clearly shows how two alternatives with the same arithmetic total for their annual cash flows ($45,000) differ dramatically when it comes to their net present value.

Investments made in equipment are recovered over an extended period, and managers are frequently more interested in an average cost per year than in a single lump-sum total. This means that they need to convert the NPV into an equivalent annuity. An equivalent annuity is a uniform payment which, when interest is taken into account, can either a) build up toward a set future amount in a given period of time, or b) pay back a given sum in a given period of time as well as provide interest on the outstanding balance.

The concept is relatively straightforward and well understood by everyone who has a home loan where the monthly payment is the equivalent annuity required to pay back the original loan in the stated period plus interest on the outstanding balance.

The following example is one way to do the calculation. This calculation is the theoretically correct way of allowing for the time value of money and is the preferred way of way of calculating the cost of depreciation and interest in the owning-cost calculation. Calculating the value of an equivalent annuity is a little complex. Two situations are possible: first, to calculate the annuity when the wish is to build up toward a set future amount in a given period of time, and second, to calculate the annuity when the wish is to pay back a given sum in a given period of time and provide interest on the outstanding balance. The second situation is the one that occurs most frequently in equipment management and is the only one considered.

The important thing is to understand the concept and to know that the calculated equivalent annuity provides sufficient funds to pay back or pay down a given loan in a given period as well as to pay interest on the outstanding balance at the stated interest rate.

Mike Vorster is the David H. Burrows Professor Emeritus of Construction Engineering at Virginia Tech. This article is excerpted from his book, "Construction Equipment Economics," a handbook on the management of construction equipment fleets.

Mike Vorster is the David H. Burrows Professor Emeritus of Construction Engineering at Virginia Tech. This article is excerpted from his book, “Construction Equipment Economics,” a handbook on the management of construction equipment fleets.
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Component Health Check

Monitor life cycles of the parts in order to better manage overall machine life  G.C. SKIPPER, CONTRIBUTING EDITOR

John E. Dolce, fleet specialist for the New Jersey-based architectural and engineering firm, Wendel, Inc., came up with some interesting numbers. He says a single mobile construction vehicle consists of 15,000 parts and about 300 of them, as they age, need to be monitored for erosion of quality. These components, including the engine, have life cycles of their own and ignoring their condition can lead to a world of hurt.

Components that should be monitored fall mainly in the realm of engine, hydraulic, transmission and axle. They include, among others, alternators, starters, fuel injector pumps, water pumps, diesel fuel pumps, turbo chargers, air coolers, EGR equipment, filters and catalysts, Dolce says. For instance alternators come in different amps—80, 100, 125—as well as in different sizes. Some alternators, used on trains and buses, are as high as 350 to 400 amps.

“The alternator supports the load that the vehicle needs,” Dolce says, “so, if the vehicle runs at night and needs 100 amps to light its lights, then you want about a 125-, 140-, or 150-amp alternator to provide the necessary amperage.” Wear and tear reduces available amperage, Dolce says, and would reduce amperage to 90 percent, or 90 amps, which is less than the 100 amps needed. That, in turn, puts a strain on the battery, and the alternator core, because it has to work harder, will heat up.

“Before you know it, the alternator will drop to 85 amps, to 60 amps, to 50 amps and when it gets that low it’s not going to work anymore,” Dolce says. “The life cycle of that core, in a situation like that, has deteriorated so you can’t get it back.”

Most fleet professionals recognize the importance of scheduled preventive maintenance (PM). Condition monitoring of components could well be considered a more sophisticated attack on wear and tear. The spear point backing up the line of defense is a combination of technology and analytical data.

“We call it condition-based maintenance, which lets you know how a machine feels,” says Diego Navarro, aftermarket sales manager for the Americas, John Deere Construction and Forestry. “PM is scheduled maintenance based on hours of operation. By comparison, condition-based maintenance reacts to readings that are transmitted from the machine. Those readings can come from oil analysis, from wireless communication with a machine that is sending high-temperature data, warnings that the clutch is slipping, or alerts of water in a fuel filter and other potentially damaging conditions. All this is part of condition-based maintenance,” he says.

In addition to communications from the machine and analytical data from laboratories, condition monitoring of components also uses the human touch: thorough inspection conducted by adequately trained technicians who know what to look for. For instance, tiny leaks can be easily overlooked. Hoses rubbing against metal or other surfaces can go undetected, and differences in oil levels that can indicate potential problems can be overlooked. An over-filled engine is a sign of an “abnormal condition,” says Navarro.

“Any leak in a cylinder or a hose guarantees that you have dirt in the system,” he says. “That is 100 percent true. Many times people think there is no way dirt can get in if a leak is small. They are wrong. If you have a leak of any size, you will have dirt, and the longer you take to fix it, the more dirt the system will take in.”

Dirt, Navarro says, is “the most dangerous contaminant you can find. Silicon and aluminum and tin contained in dirt are the hardest contaminants in nature, and if you have dirt in your engine or your hydraulic system it will slowly wear out the components.”

Yet many of the hardest, most damaging particles are not easy to see, he says. For that reason, oil analysis is vital.

“If you don’t do oil analysis, you’ll never see these particles,” he says. “As a result, when an engine or hydraulic pump doesn’t reach its expected life cycle, you’ll never know why it failed.”
Technicians should also look at the condition of the oil, Navarro says. The color of the oil is important as is any sign of foam. Of all the feedback triggered by oil analysis, fleet managers should be most concerned with signs of contamination, Navarro says. “That is a big warning,” he says. “In an engine, the worst thing you can have is coolant or fuel or dirt in your sump. Engines are prone to contamination because they are almost self-destructive devices. They suck air all day, are injected sometimes with bad fuel, sometimes technicians put bad coolant in them, and we run them all day. Since they are consumers of air, oil, fuel and coolant, something wrong can happen. Oil analysis shows the symptoms of what’s going wrong.”

Oil analysis isn’t the only tool that fleet managers can use. A $2,500 tool is available, for instance, that can do a battery capacity test for voltage and, most importantly, measure cold cranking amperage in the battery, says Dolce. “The only way to test that is to put a load on the battery,” he says. “This machine will do all the diagnostics—battery capacity, voltage drop for resistance in the circuit, and alternator charging—in five minutes or less.”

What that boils down to, Dolce says, is that a fleet manager can look at a 125-amp alternator, for instance, and see that it is putting out only 105 amps. That’s pretty close to the maximum, if you need 100 amps to operate.

Condition monitoring of components, when implemented properly, can provide major benefits for a fleet, Dolce says. “To put it simply, condition monitoring of components will lower the overall costs of operating the fleet while increasing the overall reliability of the fleet.” Theoretically, Dolce says, you can maintain a piece of equipment and “it will last forever. You will never have to replace it. If you monitor it before it crashes and burns, you can make a conscious decision to replace the component, rebuild it, or replace the piece of equipment. The practical part is you can make sure the machine is configured to do the job. If you have a 3-yard bucket on it and you’re moving 300 cubic yards of material a day, then that’s fine. But when you go to 600 cubic yards of material, you have to put a bigger bucket on it. You can’t fabricate or modify the bucket or you could have a liability issue.”

Navarro says fleet size has a direct bearing on benefits and improvements fleet managers will see from condition monitoring of components. “If you have a large fleet, you won’t be able to do it with paper,” he says. “You have to use a website that allows you to do tracking and gives you graphics so you can pinpoint where your alarms are. By doing that, you can assign priorities to your worst cases. “Many, many contractors don’t even have time to do scheduled maintenance services. Imagine if you start having numerous alarms on paper. If that happens, you won’t be able to control it. You have to do it electronically and by using electronic tools.”

Taking advantage of the benefits from conditioning monitoring of components can be realized by first looking at the maintenance cycles recommended by the OEM. Then the fleet manager should look at his particular operating environment, calculate the overall costs to maintain the equipment and how the average age figures into the productivity cycle. “Armed with this kind of information, the fleet manager can go to the owner and say this piece of equipment is X years old and costs X per hour to own and operate in our environment. A new one will cost X.”

Dolce has a personal theory based on experience that says it’s time to replace a piece of equipment when you spend more than 30 percent of its residual value to maintain it. A piece of equipment loses 30 percent of its value during the first year, Dolce says, so a $100,000 machine is worth only $70,000 before you even use it. “Each year thereafter,” he says, “it loses 20 percent of its residual value. The $70,000 machine becomes $56,400 at the beginning summer 2011

THE PERFORMANCE – FAILURE CURVE (P-F)
of its second year. You look at the history of spending and if the residual value drops so that you reach a point where you have to spend $12,000 or $14,000 to maintain a machine that now has a residual value of only $8,000, the machine will be down most of the time to do the repairs."

At that point, Dolce says, management has three choices. One, buy a new piece of equipment with all the latest technology and reliability that can be configured to do a better job; two, rebuild the equipment; or, three, continue to repair the unit.

“The equipment manager has to forecast for the owner what it is going to cost tomorrow,” Dolce says. “For any unit that costs more than 30 percent of its residual value to repair, you know you have at least a year before it crashes and burns.”

Dolce cautions fleet managers, however, to provide company executives with management information, not accounting information. “All work orders have parts and supplies on them. That's easy. But the labor, for instance, is not the $25 an hour you pay your technician. You have to figure out the fully burdened labor rate. A technician may work 40 hours a week, 52 weeks a year, which is 2,000 hours. That amount of hours is what you pay him for, but after you deduct sick leave, jury duty, vacation time, you are actually getting about 1,200 hours of productivity during which he turns a wrench. That’s your true cost.

“Bean counters are zero-hour based people. Management people, however, must figure out the real cost to bill the customer, so he can make a little bit of profit. The fleet or equipment manager has to talk to top management in management-information terms and tell him what the real costs are.”

Navarro says the most important thing an asset manager can do in making condition monitoring of components work for him is oil analysis. But it has to be done on a regular basis, he says.

“You can make machines live longer if you know how the machine is wearing because you can change those conditions by repairing what is causing the wear,” he says.

Navarro says what is most important for the fleet manager is scheduled maintenance service (PM) and condition-based maintenance. “You still have to do PM,” he says, “but you have to read what the machine is telling you. Otherwise, it’s like a friend writing and asking you for help, but you throw the letter away before you read it.”

For fleet operators who want to get into condition-based maintenance, Navarro says, the first thing to do is make a commitment to do it, to understand what it is, have the tools to do it, and inspectors who are adequately trained.

There is also another requirement, he says: the ability to listen to and study the engine, and to be able to look at its functions to see if things are working properly.

Condition monitoring isn’t anything new in the market, says Roberto Bogdanoff, field technical support and training manager with Volvo Construction Equipment. However with today’s electronics, it is easier to implement.

“Condition monitoring is basically keeping an eye on components based on machine utilization, application and the environment the machine operates in,” he says.

Every manufacturer will give you some type of life expectancy on a component, but that number is based on engineering estimates. They will always give you the best case scenario, he says.

“Take a transmission, for instance,” he says. “The manufacturer may tell you that component has a life expectancy of 1,000 hours. If you put that transmission into a machine that is hauling all day, say mulch, it may last 20,000 hours. But if you put that same transmission into a machine that is loading rocks, or any other heavy application, the life cycle of that transmission can be shorter. Life expectancy can go up or down depending on a number of factors—wear and tear, vibration, temperature, oil samplings—all these things are part of condition monitoring.

The term can be summarized as systematic inspections of the machine while it is maintained. You keep track of what's going on with that particular unit.”

Bogdanoff says anything related to the drive train and anything that can be inspected visually or by instrument should be watched closely.

Oil sampling is critical because it monitors wear and tear. Each OEM has some type of values as to how much brass, copper or other contaminants that oil should contain to make sure the machine is “working healthy,” says
Bogdanoff. Record keeping of that data is necessary to let fleet managers spot any trend. “Our recommendation is that the oil be changed, then wait for another X amount of hours and take another oil sample,” he says. “If the condition persists two or three times, then you have a problem. If you find dirt or silicon only one time, it might be just a seal that is leaking. Condition monitoring allows you to catch those failures before they become catastrophic.”

With systematic inspections, fleet managers must have trained personnel. “Technology today is similar from machine to machine,” Bogdanoff says. “Everybody [is trying] to make it a little bit better. But you need to know the specifics of each machine. Sometimes you find, for instance, that a pin is worn. All you have to do is change it, which takes two or three repair hours, and you’re good to go. However, if you don’t do anything and wait until the thing falls apart, now you’re talking about three days of repair that costs $10,000.”

Trained personnel can spot something like a worn pin, but untrained technicians may not even look. That’s why Bogdanoff says that any company should have a training management program. “Unfortunately, very few do,” he says. “Not having a training plan causes a lot of issues. If you get a machine in the yard and realize you have no idea how to make the repairs, that’s a reactive plan.”

A situation like that can be avoided by condition monitoring. “That’s when it really becomes important,” says Bogdanoff. “When you have a $30,000 or $40,000 engine in a machine, you have to take care of it correctly. To do that you have to know what the heck you’re doing. Otherwise you can make a bad situation worse.”

Fleet managers/owners must also invest in technology—computers and software programs—that enables them to implement component monitoring. “You have to spend the money,” Bogdanoff says. “Technology takes money. Training many times is viewed as an added expense. There’s no way around it, and if you take advantage of your full investment you will see that the benefits of condition monitoring convert into dollar signs.”

A contractor who spoke recently at an AEMP meeting says his company didn’t know how to do condition-based maintenance until it decided to try. Navarro says. When Navarro went to one of the jobsites and spoke with a machine operator, the operator told him he had been complaining for two years that the grease zerks did not take grease, that bolts were missing, and there was a leak in the valves, but no one had fixed the problems.

Navarro says condition-based maintenance affects fleet operations “big time.” “If you do condition-based maintenance, your equipment costs per year will be half of that of reactive maintenance,” he says. “The cost of doing condition-based maintenance is one-third cheaper than those who do preventive maintenance only. The big impact is machine availability. Uptime is going to be improved because you will be preventing failures by replacing components before they fail.”

As the contractor told Navarro, he hired the right person, purchased the software that was needed, began using oil analysis on a regular basis, and now he has implemented true condition-based maintenance. “Before,” Navarro quoted the contractor as saying, “we just extinguished fires. Now we don’t even let the fires start.” EM

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**DRILLING DOWN TO SAVINGS**

Getting the best bang for the buck by using condition monitoring of components is a matter of arithmetic, says John Dolce, fleet specialist for Wendel Architectural and Engineering, Inc.

As a component nears the end of its life cycle, asset managers have a decision to make: replace or repair the part. If the fleet owner/manager decides to replace the part, there are three considerations, Dolce says.

A new OEM part, which is the best quality part, is the most expensive. A remanufactured part is disassembled, inspected and tested to determine if it can be brought back to almost new condition, or about 95 percent. It is usually available for 5 to 10 percent less cost than a new part. A rebuilt component could be restored to 75 percent of the life of a new one for 50 percent of the cost of new.

The math, he says, looks like this: If the machine has 300,000 miles or X number of hours left on it and you can get 100,000 miles from a rebuilt, you would have to put three rebuilts or one new part on to cover the 300,000 miles remaining on the vehicle.

If you include labor and the numbers come out to a choice of spending $1,600 for a new part or $1,500 for a rebuilt, you have to decide what you want to do.

“If you have a vehicle with a seven-year life cycle and you are in the sixth year, then you’d want to put a rebuilt part on it,” Dolce says. “That makes cost-effective sense. If the vehicle is only four years old, then you make an economic decision. If you have three years left in a life cycle and you have 100 vehicles, you save $100 per vehicle. That’s a considerable savings because you have watched the condition of the components through diagnosis,” he says.

Numbers don’t run businesses, Dolce says, but numbers provide information on which to make good decisions.
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Guy Gordon, CEM and director of asset management for Insituform Technologies, has a business philosophy that goes like this: “There are ways to do things fast, and there are ways to do things right.”

A strong believer in AEMP’s core competencies, you might say he is a best-practices practitioner. AEMP and Construction Equipment magazine named Insituform a 2011 Fleet Master at its Annual Conference in March.

Although best practices have now become a way of life for Gordon, there is one career accomplishment that he is proudest of: taking a fragmented fleet operation, pulling it together in a cohesive framework and creating an efficient, productive and successful structure. Although pleased with the end results of his efforts, Gordon, in typical fashion, credits the success to his entire team.

Here’s how it came about.

While serving as vice president for a Missouri construction company, he was asked in October 2005 to join Affholder, which at the time was an Insituform Technologies tunneling division. In July 2006, Gordon assumed responsibilities for overseeing the entire Insituform fleet operation. The company is international in scope, with operations in the North America, Europe and Asia-Pacific markets. The fleet is made up of approximately 1,800 specialty-built on-road vehicles designed for pipeline protection and rehabilitation, plus another 110 to 120 off-road units.

When he took on his new job, Gordon approached it with a methodology that allowed him to, first, thoroughly analyze the structure he had inherited.

“You can’t just assume what has to be done,” he says. “I don’t think coming in with preconceived ideas is an effective approach. So to find out what we had, the first thing we did was to conduct a thorough evaluation of the fleet and identify, then prioritize, the most pressing issues. By looking at the overall equipment operations, we were able to see what was working and what was not.”

Some goals had to be reached in a relatively short period of time. Other goals had less of a sense of urgency. One of the first things Gordon noticed was the way the company was charging equipment out to jobs.

“They were not charging equipment out to jobs at the unit level,” he says. “They spread the costs that were collected in the equipment accounting buckets out to the jobs.”

After looking at life cycle costs on the equipment and analyzing the data, Gordon’s team established rates to be charged out on a per-unit basis. Another first step was to...
implement the equipment-management module of the J.D. Edwards software system already in place. Hope Kemper, office manager, was instrumental in this effort, Gordon says.

“Within six months, we had the equipment operations organized and ready to go in a direction that we felt would be most impactful on the organization,” he says.

Gordon made sure each Insituform business unit “owned its equipment costs,” he says.

“We made an effort to help them understand what drove the various aspects of the costs in their individual operation. By doing that, I think it definitely helped us, not only to get buy-in from them on what we were doing, but to gain ownership and help us control the costs.”

This approach helped break down existing “walls between the various business units throughout the country,” he says. “Those walls started to come down, and we were able to share equipment across business unit lines. By sharing those costs, both utilization and efficiency improved.”

Gordon and his team changed the equipment department structure completely.

“There really wasn’t any centralized involvement or comparisons between the various business units,” he says. “We put some standardization in place to help with the comparison between the units. That gave us the ability to quickly see where efficiencies were and where the inefficiencies were. Then we were able to correct the problem.”

It drove the costs down considerably, Gordon says. “We saw a 42-percent decrease from where we started in January 2007 until now.” During the same time period, preventive maintenance compliance climbed from 75 percent to 97 percent. PM compliance, which tells Gordon how many units are within their PM schedules, is measured weekly.

Another step was to make sure that personnel had a thorough understanding of the new structure and where Gordon was going with it.

“I was very fortunate to have people who quickly understood where we were going,” he says. “In fact, two of them—Tom Burbank, area equipment manager for north, central and east regions, and Cliff Francois, area equipment manager for south, central and west regions—have now become CEMs. They were very motivated in making the transition.”

One of the biggest challenges Gordon faced regarding “going live” with the new structure in January 2007 was Insituform’s strategic decision to “disengage from the tunneling business.” That disengagement was announced in March 2007. That meant, while implementing the new structure, Gordon simultaneously had to dispose of more than 1,000 pieces of off-road equipment.

Working closely with equipment manager Andy Richter, Gordon organized auctions of equipment, making sure the logistics of those sales were completed. Equipment auctions were set up in St. Louis; Charleston, S.C.; Chicago; and in the California cities of Apple Valley and Sacramento.

“We ended up contracting with an auction company and structured the auctions to best fit what we felt would give us the greatest return on those assets,” Gordon says. The end result, he says, was very successful. “The disbanding operation ended up financially much better than we initially anticipated,” he says. Again he gave credit for that success to the efforts of the people in the organization.

Although closing down a business is never easy since people are involved, Gordon made sure “we had Insituform’s best interest up front throughout the whole process. In some places we didn’t even pull equipment out for auction until the last minute when the projects were finished.”

The company started seeing results almost immediately, and still is, Gordon says. For him, meeting the complex challenges of two major undertakings once again proved his business philosophy of “doing things fast or doing things the right way.” 

"Within six months, we had the equipment operations organized and ready to go in a direction that we felt would be most impactful on the organization."
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The construction world is changing...changing for the better.

Heavy equipment has become easier to operate, more ergonomic and much safer. With machine control and job-site communication technologies, contractors are experiencing dramatic improvements in project productivity, accuracy and timeliness, as well as real-time access to critical fleet and asset information. Some heavy equipment manufacturers are offering both machine control and telematics solutions built into their machines from the factory floor.

Contractors can now track vehicles, schedule equipment maintenance, manage vehicle operator behavior, track tools and other portable assets, and manage jobsite assignments. Contractor management understands that with any piece of equipment down for repair or unscheduled maintenance, revenue is lost.

Fortunately, more robust machine-control technology combined with telematics is ensuring even better machine maintenance, less unscheduled downtime and greater management control over valuable machine and human assets.
Sophisticated software-driven systems are available that weave machine control together with the ability to track assets and communicate machine health.

Contractors have been seeing the benefit in the field of controlling the earthworks operations using machine control. Machines automatically follow an up-to-date 3D site plan for the cut and fill required to match the site-prep plan. This information has been invaluable to the machine operator and the site superintendent. It has made for better finish grading, virtually halted rework and eliminated costly staking. The benefits on the site have been reported to be huge.

Separately, there have been numerous fleet management, equipment tracking and employee monitoring systems that offer defined niche solutions. Many of these programs operate through wi-fi-connected laptops and smartphone alerts.

As grade control and fleet asset management solutions continue to develop, the integration of technology is the natural evolution. New software and hardware that truly connect the worksite to contractor management located in a home office or remote office has become real.

The idea of real-time, interactive communication between the work site and management has been on the wish list for some time now. The potential benefit of syncing data between the field and the office is enormous.

Recognize that advanced telematics solutions can now enable the contractor to empirically quantify the productivity, efficiency, savings and return on investment of machine control systems, which is one of the true powers of having an integrated machine control and telematics platform.

Consider the diverse needs found in a construction organization. There’s the machine health and maintenance...
interests of the fleet manager, equipment utilization and productivity information for the site manager, machine tracking and site-plan file information for the grade checkers and surveyors, and the project progress updates for senior management. All of this information and more is now available in one system for smarter decision making.

Highly sophisticated, robust software makes it possible for management to have easy access to real-time details and diagnostic information. Options for managing projects and improving the efficiency of maintenance operations, including overall fleet availability, are here.

Web-based solutions combine GPS-based positioning and communications technology hardware to provide real-time equipment and site productivity information such as the following:

- Project tracking—knowing if it’s on track and on budget
- Machine health and maintenance
- Location and hours
- Events
- User-defined alerts
- Production volume calculations

The efficiency of maintenance operations improves when critical diagnostic information can be sent directly from the machine to the fleet manager and/or service manager. For example, if machine diagnostics triggers an internal fault code, the notification can initiate both predictive and preventive maintenance. The fault code may be “overheating,” which alerts the operator or maintenance manager to check if the radiator is closed or is low on coolant before it creates more problems.

The system can also alert the fleet manager to the manufacturer-recommended service intervals to help prolong the life of the machine.

With this solution, fleet managers, rental equipment managers, as well as managers of all levels across the organization, have access to a range of real-time, valuable information. They have access to asset management as well as an overview of machine health, fuel management and working utilization. By centralizing and simplifying the management of onsite operations, contractors can maximize efficiency, raise productivity and lower owning and operating costs for the entire fleet.

Managers can use a web-based solution, such as VisionLink, to see map-based equipment views and
run on-demand reports or charts. Additionally, alert func-
tions can automatically notify users via e-mail or SMS
messaging.
A web-based application can provide managers with
freedom and control. Using an office computer, laptop,
computer tablet or smartphone, one can view equipment,
regardless of make, in a secure, web-based application.
Contractors can know when and where equipment is
working, which in turn could help improve logistics for
fuel, transportation or service dispatch. With high-
frequency updates as often as one minute, a software-based
solution can help managers:
- Control costs by monitoring fuel usage
- Monitor production and make informed changes to
  the process with cycle times and load count data
- Manage repair and maintenance timing and costs
- Ensure maximum machine productivity without
driving to the site
Information can be archived, too, enabling asset man-
gers to improve machine-cost accuracy by profiling
machines. With the information being web-based, manage-
ers have 24/7 access anytime they want it.
As the construction market continues to evolve, construc-
tion managers will be looking to site-office connections for
access to both telematics and production information. Gaining
access to a wealth of real-time data will clearly help managers
make better big-picture decisions on everything from proj-
et bidding, equipment utilization, production and the
health and maintenance of their heavy equipment assets.

John Biondo is market manager, fleet and asset
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