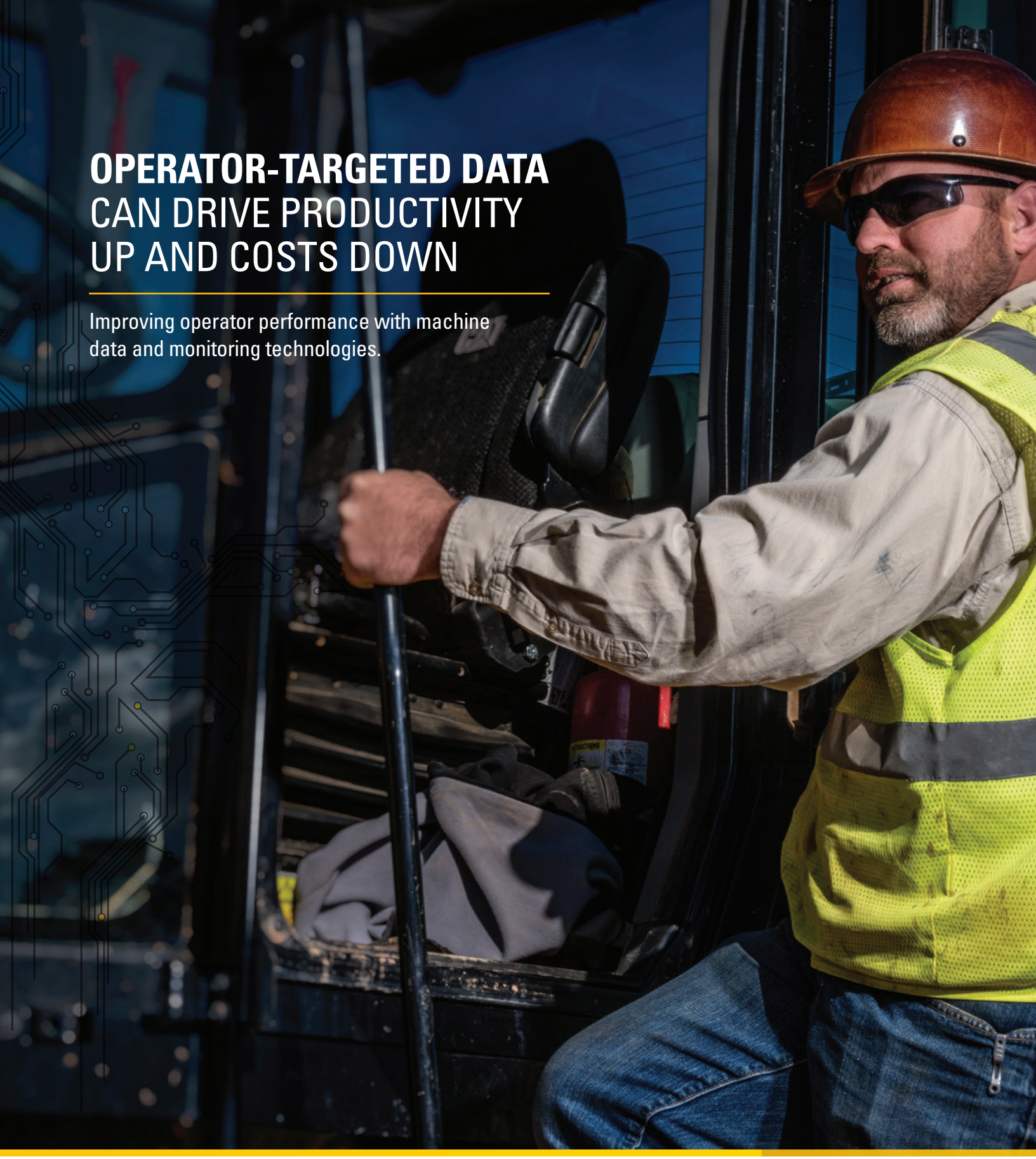


OPERATOR-TARGETED DATA CAN DRIVE PRODUCTIVITY UP AND COSTS DOWN

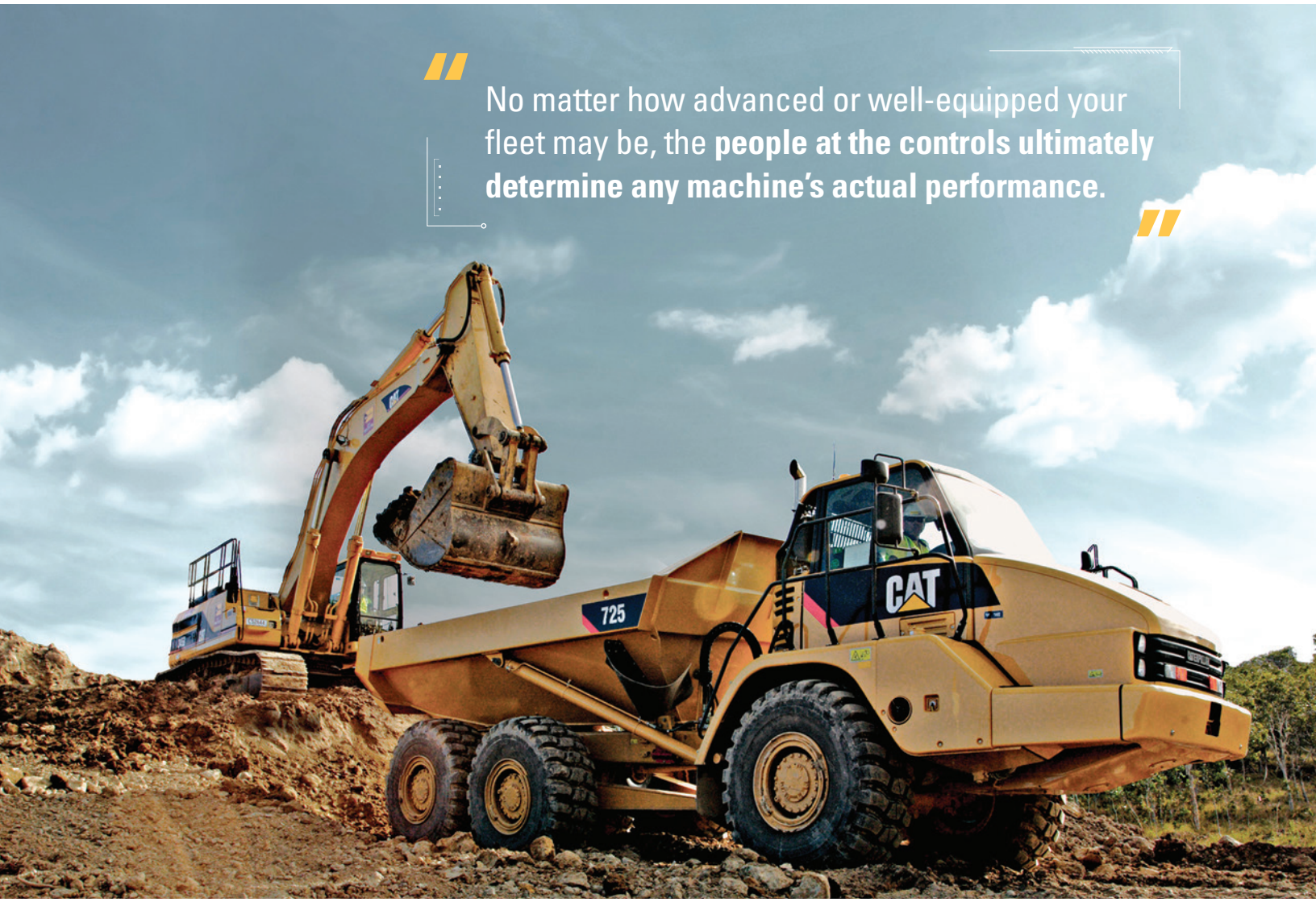
Improving operator performance with machine data and monitoring technologies.

+ BY
TIM NOON – GLOBAL CAT TECHNOLOGY & SERVICES SUBJECT MATTER EXPERT
MARTY DAINS – EDWARDS, ILLINOIS DEMONSTRATION & LEARNING CENTER FACILITY MANAGER
JOSHUA HAYES – SENIOR MARKETING TRAINING CONSULTANT

Take any two brand new machines built by the same company with the exact same specs and put them side-by-side on a job site. Give them the same work tools and the same tasks to accomplish and you can expect the same results from both, right?

The answer would be "yes" except that there are a couple of key variables at play in this thought exercise—the operators. No matter how advanced or well-equipped your fleet may be, the people at the controls ultimately determine any machine's actual performance.

The best operators can wring every ounce of productivity and efficiency from a given machine. Less experienced or less skilled operators often leave a lot of that performance untapped, costing equipment owners a pretty penny in wasted time, extra fuel and higher lifetime service costs.



+ TRACKING AND MONITORING MACHINE PERFORMANCE

To get the best from their operators, more and more construction companies are turning to machine data and monitoring technologies. These technologies offer new ways to monitor operator performance and target the key areas where operators need improvement.

Most OEMs and many third-party providers offer technologies that gather, transmit and analyze machine-generated data. In Caterpillar's case, we use Product Link hardware to collect fleet data, which is then analyzed and turned into useful information viewed through VisionLink, a web-based user interface.

All share the ability to generate fault codes when an operator misuses or abuses a machine—by, for example, coasting in neutral, improperly shifting the transmission or over-speeding the engine. They can also track operator-influenced factors such as idle time and fuel usage.

+ ADDRESSING OPERATOR-INDUCED FAULT CODES

As a general rule, operator errors that result in incident-based fault codes can often be addressed in a straightforward manner. If they can be directly linked to a specific operator, all that may be required is some focused operator training.

Keep in mind, however, that a single piece of data, such as a red alert on VisionLink, may not tell the entire story. A fault code may indeed indicate operator error, but it may also be caused by site conditions (such as a soft underfoot or sudden grade changes, weather-related factors, mechanical malfunctions or machine service issues).

[+] OPERATOR PERFORMANCE **FACTORS:**

+ Operator Errors or Abuse
+ Site and Weather Conditions
+ Machine Condition
+ Mechanical Failures
+ Business Goals
+ Management Decisions

> *To make the most effective use of machine data to improve operator performance, be sure consider all of the factors that may impact operating practices on a day-to-day basis.*

It pays to combine machine-generated data with site inspections, oil sampling and other elements of a larger condition monitoring program. That way, you can target the exact cause of the fault codes and apply appropriate solutions such as operator training, site alterations, changes in maintenance and service schedules or a combination of all three.

Remember, too, that business decisions and production requirements may be driving operator behavior, as well. Understanding the impact of these types of business decisions on operator behavior is yet another key to determining the appropriate resolution.

If the operator is gunning to meet a tight deadline or an ambitious production goal, a degree of aggressive machine operation may be warranted, with completion bonuses or avoided fines offsetting the costs in extra machine wear and tear. In cases where the cause of the fault code is related to the cost of doing business, additional operator training will have no impact.

+ IMPROVING IDLE TIME AND FUEL USAGE – A CASE STUDY

Machine data can also provide insights into operator performance that go well beyond incident-related fault codes. As we've mentioned, idle time and fuel usage are two areas where operator training and performance can have a huge impact.

Addressing these systemic operating factors can be a more subtle undertaking than correcting a specific fault-inducing behavior. It requires careful benchmarking up front, along with ongoing analysis, to identify the true causes of the issues under consideration.

To illustrate this approach, let's examine a recent customer case study. A new Cat® customer wanted to see if machine data could help reduce idle time and fuel burn in a very specific application—using wheel loaders to lift salvage cars onto transport carriers.

With 500 total machines in the fleet, even small reductions of idle time or increases in fuel economy would pay significant benefits. When the company began getting new Cat machines with advanced data gathering capabilities (via Product Link), the equipment manager decided to run some trials to see how they might work to improve operator performance.

After a year of careful benchmark testing, the company found that both idle time and fuel consumption varied widely among the 16 operators included in the benchmark program. Idle time ranged from 18% to 35%, and fuel consumption ran between 2.5 and 3.8 gallons per hour.

CASE STUDY BENCHMARKS

- **IDLE TIME RANGE: 18% TO 35% (AVERAGE: 23%)**
- **FUEL USAGE RANGE: 2.5 TO 3.8 GAL/HR (AVERAGE: 2.9 GAL/HR)**

> *Careful benchmarking over the course of a year provided an accurate snapshot of current idle time and fuel consumption.*

Benchmarking serves as a guidepost to determine the effectiveness of an operator, but it must be done carefully. Variables ranging from site conditions to machine configuration to production goals will impact how relevant a benchmark can be.

For example, if operators must utilize an undersized loading tool because that's the only machine available for the task, they may never achieve the desired standard benchmark, even though they're getting the best results possible under local conditions.

The company in our case study conducted their benchmarking carefully in a well-controlled fashion. Collected without the operators' knowledge to insure accurate data, this information enabled the company to set realistic, achievable targets: 17% for idle time and 2.5 gal/hr fuel consumption.

CASE STUDY TARGETS

- **AVERAGE IDLE TIME: 17%**
- **AVERAGE FUEL RATE: 2.5 GAL/HR**

> *Setting achievable improvement targets helped operators see where they were starting from and enabled the company to tailor training programs to specific operators' needs.*

Next, the company instituted a tightly defined improvement program that included:

- Developing a set of Best Operating Practices designed to help operators reduce idle time and conserve fuel.
- A full month of classroom and on-the-job training.
- Showing operators current performance and what their targets were.

* Weekly review between managers and operators to review performance data reports and chart progress.

14%

THE RESULTS: After about six months of testing, the company achieved 14% idle time—a reduction of 9 percentage points, well beyond the initial target. The average fuel burn rate was 2.55 gal/hr—a savings of .4 gal/hr per loader.

CASE STUDY RESULTS

- **14% AVERAGE IDLE TIME** **(IMPROVEMENT OF 9 PERCENTAGE POINTS)**
- **2.55 GAL/HR AVERAGE FUEL BURN** **(SAVINGS OF .4 GAL/HR/LOADER)**

> *Success! The company not only met their operator improvement targets, they beat them through a combination of effective training, operator engagement and positive feedback.*

The company estimated that if the reductions in idle time alone could be applied to the entire fleet of 500 loaders, the projected savings would total about $3.5 million in the first year.

+ MAKING GOOD RESULTS STICK

In this example, the company did FOUR KEY THINGS RIGHT in applying data technologies to operator performance:

1. Gave operators a **MANAGEABLE NUMBER OF THINGS** to focus on.
2. **USED DATA** to engage people and provide positive feedback, so they could see their own improvement.
3. **PROVIDED TRAINING** to actively teach operators how to improve their performance.
4. Used the success of the initial program to **IDENTIFY, TARGET AND TRAIN OPERATORS** on more key metrics as part of a continuous improvement program.

The ideal goal of a program like this is to build data collection and analysis into a culture of improvement across the operation. When operators see that everyone is benefiting from data analysis and feedback, they're less likely to feel like they're being singled out or micromanaged.

Along with bottom-line dollar savings and profit margin increases, a data-based operator improvement program can lead to safer operations, lower overall operating costs, less downtime and unscheduled maintenance, higher productivity and better employee retention.

[+] OPERATOR MONITORING BENEFITS:

+ Cost savings
+ Profit margin increases
+ Safety improvements
+ Less unplanned downtime
+ Higher productivity
+ Better employee retention

Employee retention is particularly important in areas where skilled operators are hard to find. When operators are truly engaged in the own improvement, they are more likely to recognize that they have an opportunity to better themselves, learn new skills, and make themselves more valuable.

The key is to treat the data as positive feedback and an opportunity for growth, never as a disciplinary tool. With effective change management, operators will understand that monitoring is being done to help identify opportunities to improve safety, reduce cost, and win more work. It's vital to help operators understand that the cost savings and performance improvements can benefit their own bottom line, well as the company's.

An employee recognition program can add another level of positive reinforcement. Some companies offer rewards for meeting performance targets, such as days off, cookouts, gift cards and opportunities to work on newer equipment or apply for additional job opportunities.

+ DRIVING RESULTS FROM THE TOP DOWN

Of course, even the best operator improvement program takes time because operating habits are hard to break. Research suggests that it takes from 21 to 66 days to learn a new habit. With that in mind, it's essential to have buy in from company management, along with a long-term commitment to the program. The operators and field-level supervisors must see a high level of support coming from above to encourage ongoing participation and enthusiasm.

[+] MANAGEMENT COMMITMENT IS KEY:

+ Operator improvement programs driven from top down are always more successful. Management must commit to the program and stick with it for the long haul.

In our experience at Caterpillar, programs that are driven by operator support and recognition from top down are always more successful than programs driven from the bottom up. Top leadership teams must understand the importance of the initiative, the potential impacts it can have on the bottom line, and how it may affect employees at every level.

It takes commitment from company management, effective implementation on the ground and positive engagement from the operators themselves to make an operator monitoring and improvement program successful.

Implemented effectively, a program using equipment data technologies like Cat Link, which includes Product Link and VisionLink, can help operators achieve significant, measurable gains in performance and efficiency, while helping companies improve production, control costs and enhance safety. It's an investment well worth making.