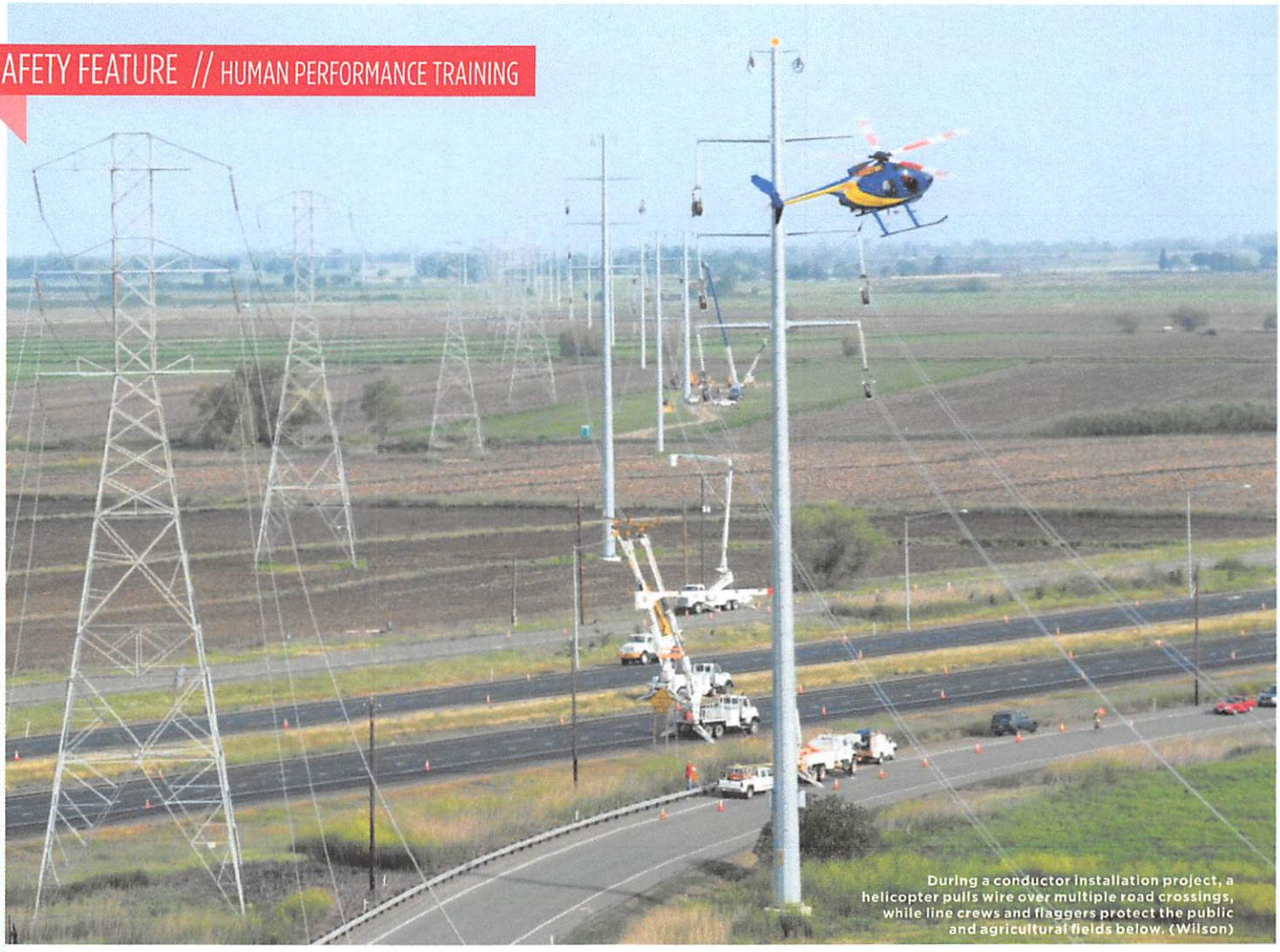


During a conductor installation project, a helicopter pulls wire over multiple road crossings, while line crews and flaggers protect the public and agricultural fields below. (Wilson)

MOBILIZING PERFORMANCE TO ENHANCE SAFETY AND OPERABILITY

By Brendan Abshier, Wilson Construction Company

When faced with a task, how do contractor employees communicate, process and react to situations in order to produce anticipated results?

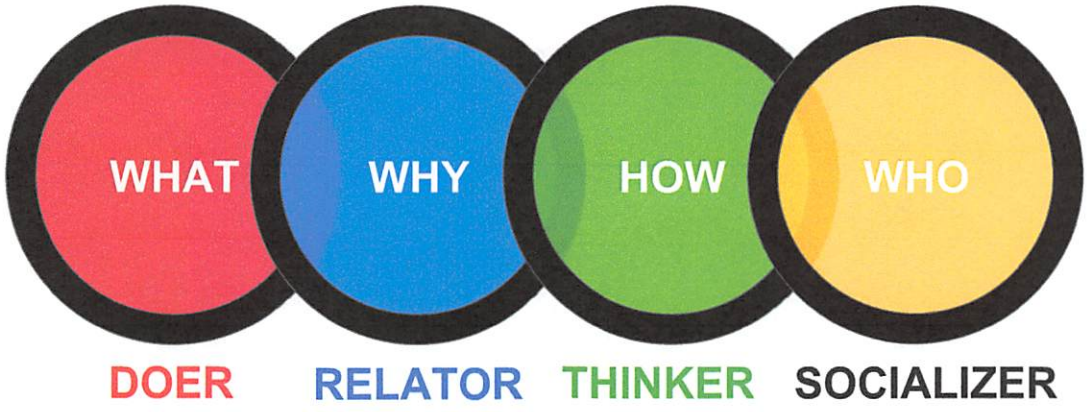
In early 2018, Wilson Construction Company (Wilson) mobilized human performance training to answer that question. We wanted to help ensure that every employee had the skills to face uncertainty, was aware of tendencies that could lead to mistakes, and could apply the right tools and methods to achieve optimal results.

"Human performance is about understanding that we are all susceptible to mistakes, and if we look at every task this way, we will identify better defenses," said Ward Andrews, Wilson's industry and government affairs director. "This way, contractors can improve efficiencies, processes, schedules, reliability and safety."

For electrical utility construction, this means reducing accidental outages, equipment damage, injury and even death.

Training specific to employee learning styles

Human performance training concepts are not new to the energy and utility sectors. Yet, contractors face challenges incorporating them into their cultures due to a lack of unified support from leadership, inadequate time for training, and an absence of fluid communication channels for employees to give and receive feedback.



Before training begins, employees complete a quiz that helps them analyze how they think about situations and make decisions based on four personality types. When given a task to complete, the questions in the circles are often the first ones asked by each personality type. (Wilson)

Wilson's approach to human performance training begins with having employees assess their personality types and communication styles. By understanding different personality types, individuals understand how they and others receive information and make decisions. For example, workers who are overly confident are more likely to work complacently or take shortcuts. A perfectionist may be afraid to speak up for fear of criticism.

A worker's comfort zone, instincts, background and previous experiences all change how he or she performs in a situation. This self-awareness adds a layer of protection by allowing a worker to understand personal tendencies that create vulnerabilities and a comprehension of how their decisions affect those around them.

Understanding personal decision-making processes

"We realized that there are a number of different approaches to human performance training," said Mike McGinnis, Wilson's corporate safety director. "As we continue to understand decision-making, workers will have a better understanding of their team, what they need to accomplish and how to accomplish it."

Workers make decisions based on their familiarity with a task at the time it is being performed. There are three performance modes, and each either increase or decrease the chance for error. An individual who understands which performance mode he or she is working in can identify potential mistakes and minimize the chance for error.

1 Skill-Based Mode

A person is operating in skill-based mode when he or she performs familiar tasks in familiar environments. They do not have to think too much about the task because they've completed it successfully at least 50 times. The error rate is the least in skill-based mode. Because activities are routine, errors can occur when attention level is low and there are small distractions.

2 Rule-Based Mode

An individual working in rule-based mode knows there is a rule or procedure to follow. The situation is familiar to the individual, but the individual needs instructions on how to navigate the task. The error rate is higher than skill-based mode. Errors occur when the rules and procedures are wrong or when the individual deviates from the rule, misapplies a rule or takes shortcuts.

3 Knowledge-Based Mode

Employees fall into knowledge-based mode when they are unfamiliar with a situation, unaware of the proper procedures to follow or unsure of what to do. They rely on assumptions or guess-work to guide their decision-making. Because the chance for error is so high, this mode signals the need for an individual to stop work and acquire help from procedures, supervisors and others who are familiar with the task and environment.

A Wilson crew attends a human performance training session. (Wilson)

Think about these "red flag" moments:

- There are multiple ways to complete a task, but a worker is not sure which method to choose.
- A worker is trying to use his or her best judgement to meet expectations, but isn't 100 percent sure what those expectations are.

In both instances, workers are left to fill in the blanks with information they do not have. That means they have dropped into knowledge-based mode, where the risk for error is high. This acts as a warning signal, indicating that mistakes are more likely to occur and that the worker needs to verify their gut feelings by using various human performance tools before continuing.

Performance Modes

1 SKILL-BASED MODE: ERROR RATE IS 1:1,000. An individual performs familiar tasks without thinking too much because they've completed it successfully at least 50 times. Because activities are routine, errors can occur when attention level is low and there are small distractions.

2 RULE-BASED MODE: ERROR RATE IS 1:100. An individual knows there is a rule/procedure to follow. Errors occur when the rules/procedures are wrong or when the individual deviates from the rule, misapplies a rule or takes shortcuts.

3 KNOWLEDGE-BASED MODE: ERROR RATE IS AS FREQUENT AS 1:2. An individual is unfamiliar with a situation, is unaware of the proper procedures to follow or is unsure of what to do. The individual relies on assumptions or guess-work to guide their decision-making. This mode signals the need for stop-work criteria and to acquire help.

(Wilson)

Training at every level

Human performance training began with Wilson executives and management personnel during the start of 2018. Throughout the spring, Wilson's supervisors and field leaders received training during two-day frontline leader workshops. These workshops included jobsite personnel and leaders from every division of the company.

"Executive leader training was important for gaining understanding and support at the executive level," said Mike McGinnis. "It was critical that they understand the training and methods so they could support the frontline leaders and crew workers."

When the frontline leader workshops were complete, a task force of hand-picked Wilson leaders underwent additional train-the-trainer mentoring. This task force travelled between jobsites, leading crew training sessions at the field level. By fall 2018, nearly all employees nationwide had attended human performance training. In 2019 and beyond, Wilson plans refresher training courses.

Human performance training in action

A five-person crew safely uncovered an unmarked underground facility while digging pole holes on a distribution pole replacement project for a Pacific Northwest electric utility.

The worksite was near private property. The crew had already called the 811 call center and a locator had marked the approximate locations of underground utility lines. The crew examined the site during their pre-task inspection and noticed a sprinkler system and a control box. The crew double-checked their locate sheet, which indicated the utility lines that had been marked. They noticed no underground water facilities were listed on the sheet. Unsure of how to proceed, the crew stopped work and regrouped for a tailboard talk that reviewed the change in scope, proper procedures and a new plan of action.

The crew realized they had dropped into knowledge-based mode. Rather than relying on guess-work with a high probability of error, they double-checked proper procedures and decided to seek help from knowledgeable resources who had experience in similar situations.

Since the property owner wasn't available to provide any schematics of a sprinkler system, the crew called the onsite foreman's supervisor for advice. Based on similar situations from past projects, the supervisor reminded the crew that indicators such as aboveground pedestals, meters, drains or sprinkler systems are all signs that underground lines exist in the area.

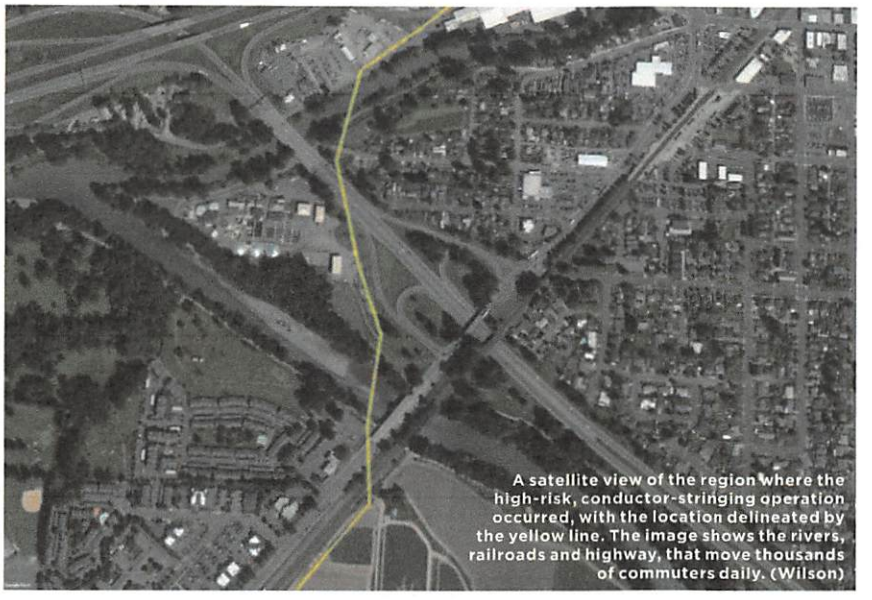
Following the call, the crew reviewed the excavation and trenching section of Wilson's Safety Manual, which outlines the proper procedures for digging near potential underground utility lines. Proper procedures required the crew to carefully hand-dig, rather than use a machine-powered auger, to uncover and positively locate any potential underground hazards that could have been unmarked, or mismarked, within their proposed dig area.

As a result, the crew safely uncovered an unmarked 8-inch water line, preventing any delay or additional costs to their job, as well as any disruptions to the property owner.

Fill in the blanks

Years ago, the Department of Energy developed human performance tools to raise task awareness and to predict where errors might occur.

During the past five years, Wilson improved or developed procedures and incorporated them into Wilson's Safety Program. Existing procedures, such as pre-task briefings and hazard analysis forms, were reviewed and updated. Stop-work criteria took on a newer, more-specific definition. Self-checking



A satellite view of the region where the high-risk, conductor-stringing operation occurred, with the location delineated by the yellow line. The image shows the rivers, railroads and highway, that move thousands of commuters daily. (Wilson)

tools, points of verification and effective communication methods created new methods to foster understanding of the task and jobsite environment. As a result, the company experienced a reduction in incident and injury rates, as well as a continued boost in project schedule and performance efficiencies.

Uncovering hazards on a high-risk operation

Wilson was tasked with a high-risk, conductor-stringing operation over a well-traveled state highway for a West Coast electric utility. In addition to traversing the highway, the conductor installation process would use a helicopter to pull wire over two rivers and two railroads, involve 25 flaggers and five state patrol officers, include input from the Federal Aviation Administration (FAA) and Department of Transportation, and affect thousands of commuters.

Crews face the mental stress of congested worksites near private property daily. (Wilson)

The pull was scheduled to take three days. The crews performed it safely in a day and a half.

"All crew members actively engaged in human performance training at the beginning of the job," said Chuck Woodard, senior estimator/project manager at Wilson. "Our field leaders developed the stringing plan, project management worked it through the FAA, transportation and railroad officials, and all parties effectively communicated safety and quality requirements. That's close to 50 people working in-step with each other."

Crews discussed work methods such as proper guard structure setup, grounding requirements, effective traffic control plans and implementation, helicopter flight paths, and proper puller and tensioner site setups. They also assessed hazards resulting from personality tendencies that could make them vulnerable to errors under certain conditions, such as stress caused by the complexity of the task, and the potential for poor communications caused by site congestion, poor visibility of the wire pull and multiple radio frequencies.

After assessing the individual capabilities of the crews, Wilson's field leaders established checkpoints within their task to stop and verify correct work procedures. This ensured that all personnel understood effective communication techniques and call signs on their radios, and reaffirmed the crews' common goals.

Job success was enhanced by the crews' ability to identify hazards caused by human nature and located onsite.

"There was no sign of stress or pressure," said Woodard.

The entire project finished four weeks ahead of schedule.

Continuous training

As procedures evolved, Wilson's leaders realized that since workers, especially line workers, often work in atypical environments, they need to feel confident that they can successfully complete their job in conditions where hazards are hidden or unpredictable.

Wilson's leadership has found that human performance tools help their workers achieve this level of confidence. By evaluating performance modes, workers avoid uncertainty, are aware of probable failure rates and can apply the correct human performance tools by providing effective communication to different personality types.

"We are all influenced by human nature, but we should always aim for constant improvement," said Andrews.

BRENDAN ABSHIER is a communications manager at Wilson Construction Company. Before joining the electrical utility construction industry, he was an editorial consultant for educational learning and development products specializing in student planning and teacher lesson plans.