

In recent years, many university industrial engineering programs have relegated some of the traditional pillars of industrial engineering, including work measurement and engineered labor standards (ELS), to a 10-minute conversation over the course of an entire undergraduate program.

While this has been happening throughout academia, industry has continued to embrace work measurement, despite the challenges associated with finding young engineers who are trained and interested in it.

More than 100 years ago, Frederick Winslow Taylor published *The Principles of Scientific Management* and created a new vision of management. As an engineer, Taylor understood the importance of science, which explains his quest to develop a scientific approach to managing work – an approach that would, like every other scientific approach, rely on rules and equations rather than on intuition and feelings. A core pillar of his approach was to understand human capabilities thoroughly and to create the optimal way of performing a given task within a given amount of time. Work measurement was born as part of the desire to create a scientific approach that would improve the overall efficiency of enterprises.

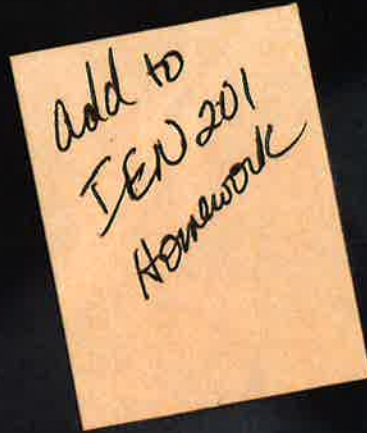
The tremendous impact that Taylor's work measurement methodology had on employee throughput was quickly recognized, and, to this day, work measurement is perceived as having only one goal: managing a workforce. Engineered labor standards, the direct product of work measurement, has been reduced to being the "stick" in modern performance management. Such a narrow view greatly limits the merits and overall contribution that ELS can have on optimizing operations.

The International Labour Office (ILO) defines work measurement as follows:

"Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance."

Clearly, the stated goal of work measurement is to establish the time – to provide knowledge on how much time it should take to accomplish a given task under defined conditions. When looked upon from this optic, work measurement should be considered as the tool used to populate the information system with data relative to time. This data is composed of the individual ELS associated with the various components that constitute a task, an operation or a job function.

Every business needs to plan, schedule, cost and deliver its products or services in a competitive and profitable manner. These fundamental management functions have one common thread: They all rely on a deep understanding of the time it takes to accomplish the various components necessary to build their products or deliver their services. Work measurement thus becomes a universal means by which to obtain quality information to improve decision-making.

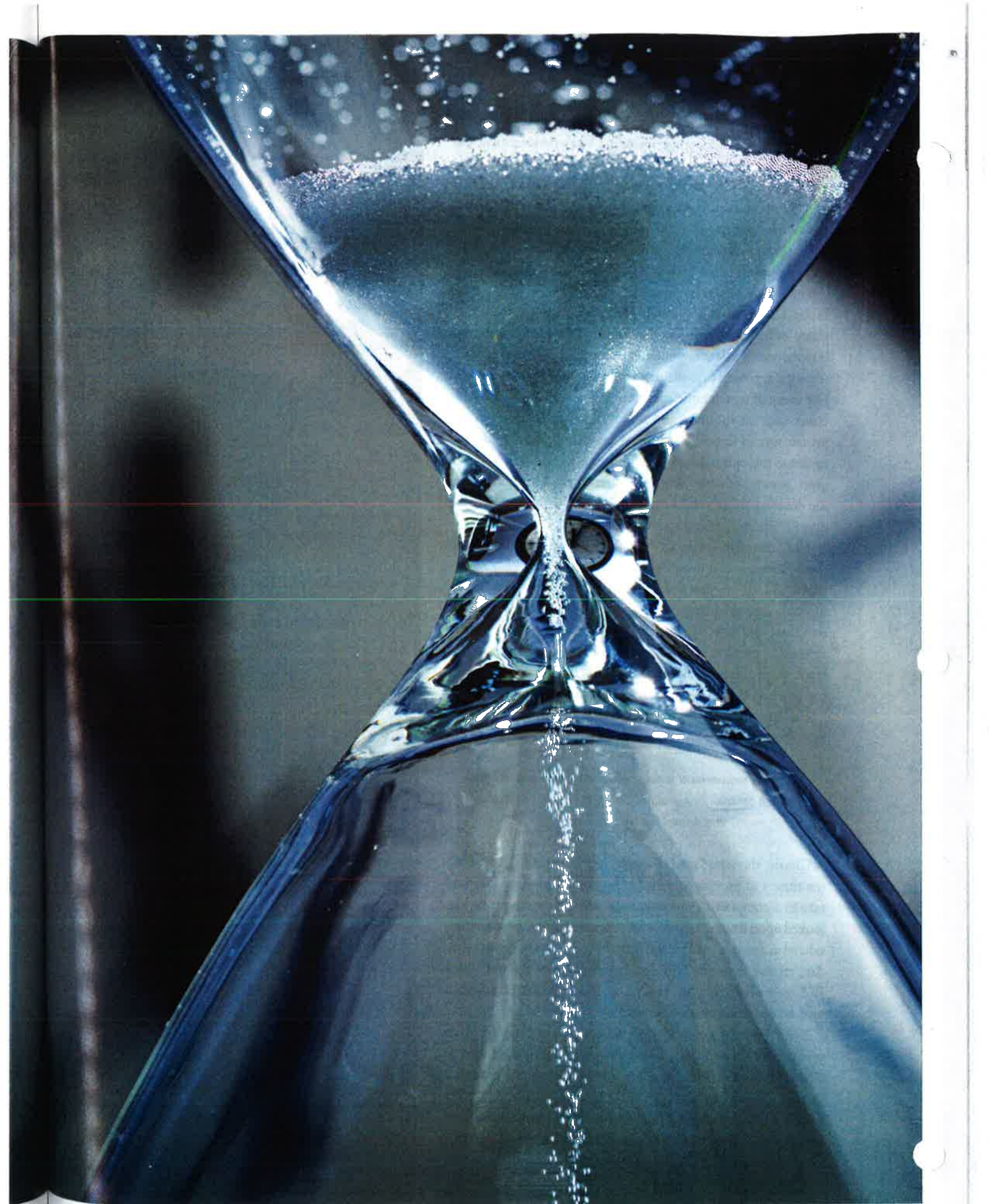


**TIME
TELLS ALL**



Work measurement is an indispensable source of knowledge for any business, leading to more accurate management decisions

By George Bishop



Initially, work measurement was mainly applied in the manufacturing sector, but today it contributes to the optimization of the entire supply chain. Still predominantly used in the private sector, there is no doubt that work measurement can benefit any type of organization that wants to improve the quality of the information it relies on to make fundamental operational decisions.

Performance management

Given the roots of work measurement, it would be hard to discuss its impact without starting with its contribution to workforce management. Four paragraphs into *The Principles of Scientific Management*, Taylor states:

"We can see and feel the waste of material things.

Awkward, inefficient, or ill-directed movements of men, however, leave nothing visible or tangible behind them."

One hundred years of evolution has not changed the veracity of this statement, and it is the main reason industries that need to focus on labor cost reduction implicitly rely on work measurement and ELS to reduce all labor associated expenditures. Work measurement anchors any successful performance initiative, and along with its industrial relations and human resources components it defines the rules and strategy by which labor performance will be managed.

To have any credibility, a performance measurement system must rely on accurate and fair measurement of performance; this is where work measurement intervenes by defining the time allotted to perform a given task and thus establishing what will be considered a performance of 100 percent. It is noteworthy that in the context of work measurement and its application in North America, a performance of 100 percent is recognized as being the normal level of performance, and when properly incentivized, associates will exceed this level easily. Time, as well as countless labor arbitrations, have shown that work measurement is the only reliable means to set the standard time that is used as the numerator in calculating an individual's performance.

Incentive-based compensation

Incentive-based compensation remains popular in many industries, and it is often referred to as the "carrot" to the performance management "stick" in overall workforce management strategy.

An incentive program can be carved to address the challenges of an organization as well as the aspirations of its associates. To meet these goals, incentive programs typically consider various criteria not only to be effective but also to mitigate the risks of negative behaviors. Individual performance is a criterion that is almost always part of an incentive-based compensation package.

The rationale behind incentive-based compensation is to give the associates an opportunity to earn extra compensation based on performing above what would normally be expected. With this in mind, it makes perfect sense to use ELS to establish the threshold for the performance component of the incentive package. A failure to establish what truly constitutes an incentive level is the main reason incentive programs fail by either being ineffective or, in the worst case, by rewarding associates for performances that should not be considered above normal expectations. It should be clear that venturing into incentive-based compensation without a clearly established work measurement program is careless and dangerous.

The implementation of a solid work measurement program should always be a prerequisite to the design of an incentive based-compensation initiative.

Advanced method analysis

The best practice when it comes to implementing ELS starts with optimizing the current process. Often you will hear, "You don't want to put standards on bad methods." Furthermore, given that a review of ELS is required following a change in the process or methods, it makes sense to start with the review of the processes and then follow up with the implementation of the ELS.

Given that many first-level predetermined motion time systems (PMTS) are closely linked to the notion of therbligs and the Gilbreth approach of analyzing motions, it stands to reason that these systems can be extremely useful in fine-tuning work methods. In the case of repetitive work, PMTS can offer a more granular analysis of the methods than typical process improvement methods. A more granular analysis will improve our ability to focus on finer details of the processes and lead to even more optimized processes. For example, a standard built using MTM-1 will quickly shed light on minute method improvement opportunities. The structure and granularity of MTM-1 makes it possible to outline improvement opportunities that arise from:

- A lack of simultaneous use of both hands
- Awkwardness and difficulties associated with the grasping of a tool, object or component
- Difficulties to position tools, objects or components due to lack of symmetry, tight tolerances and awkward grip
- A nonoptimal positioning of the tools, objects and components that will require longer reach and move distances
- The impact of bending and other body motions
- Additional eye usage due to the layout of the tools, objects and components

When applied to highly repetitive work or to work that involves many associates, this extra layer of method refinement can yield important and continuous savings. While perform-

A public defense of work measurement

Work measurement studies are not limited to manufacturing floors. In 2016, the Office of the Federal Public Defender for the Middle District of Florida received a much-needed staff and budget boost thanks to a national work measurement study.

Courts spokesman Charles Hall told Tampa Bay Online that the Judicial Conference of the United States approved new staffing formulas for federal defenders' offices late in 2015 in response to the study. The article stated that by the spring of 2016, the impact reached the Middle District of Florida office, led by Federal Defender Donna Elm. It was one of three offices nationwide found to be severely understaffed.

Elm said the study found that the caseload in the office was roughly the same as the caseload in the Southern District of Florida, where the public defender's office has about a third more employees.

In addition to looking at the number of cases, Elm said the study considered the amount of time needed for each case, which is affected by several factors. She noted that federal inmates awaiting trial are housed in jails some distance away from the federal courthouses and public defenders' offices, so when lawyers and staff meet with them, they have to add travel time.

"We have always taken every case that the court assigned to us, every case that there is not a conflict. . . . The office is extremely busy, and that's what the work measurement showed."

According to the article, Elm's office budget increased by at least \$5 million, and she received approval to employ 108 people based on the study results. Her staff had dropped to 78 in 2013.

"We have very dedicated people who have been working very hard to take care of the clients in the Middle District for many years," Elm said. "And it's finally being recognized, and we're getting the staffing we need."



ing this level of method analysis, the impact of any improvement is immediately quantifiable by comparing the resulting standard time to the previous time.

Ergonomics analysis

The MTM Institute and the Deutsche MTM Association is currently field testing and validating MTM-HWD (Human Work Design), a new system that combines work measurement and ergonomics analysis into one convenient package. In essence, MTM-HWD is a new “language” that captures, assesses and measures human actions.

A more efficient work design process is created by embedding the ergonomics component directly into the work measurement process. This approach yields many advantages, including the following:

- Time and ergonomic assessment is done concurrently, saving time in the design process and ensuring that both time and ergonomic risks are assessed.
- Methods design process integrates seamlessly.
- Ergonomic risks are considered early in the design process of both the product and the manufacturing process.
- ELS are calculated through a well-accepted methodology that yields accurate, defensible and homogenous standards.
- Health issues can be mitigated early enough in the process to minimize their impact.

Germane to this approach is a closer integration of three important fields of industrial engineering. Work and process design can now benefit from the synergy created by methods engineering, work measurement and ergonomics.

Comparing alternatives

The decision to invest in new equipment, a new workplace layout or new methods should not be based on intuition or salespeople’s claims about the greatness of their products. It should rely on accurate data regarding the potential of the alternative versus the current situation. Unfortunately, the appeal of the “shiny new object” too often takes precedence over logic, and people head down a path from which it is difficult to recover.

One way to improve your decision process is to leverage your current ELS to assess the impact of potential alternatives to your current processes. For this process to be successful, your current standards need to be built around an elemental



approach where it will be possible to identify changes readily. Comparing the alternatives to the current situation becomes simple:

1. Identify how the current process will be impacted. What will disappear from the current process? What will be added? What will be modified?
2. Create a standard to account for what will be added.
3. Assess the impact to elements of the standard that will be modified.
4. Update the overall standard by removing what is no longer needed, adding the new elements and updating those that were impacted by the change.
5. Calculate the ROI based on the current standard and the projected standard for the alternatives.

The elemental approach makes it easy to swap blocks of the standards that would be eliminated for blocks that would be

come part of the new alternative. Being able to assess the impact of alternatives quickly will not only improve your ROI analysis, it may prevent you from wasting money and possibly your career.

In the end, if the new alternative is viable and subsequently implemented, you will already have an updated set of ELS to continue managing your operations most efficiently.

Planning and scheduling

Planning and scheduling resources are two of the most fundamental aspects of operating any type of organization. Lacking either of those skills has an immense negative impact on any endeavor; chief among the consequences are poor service levels, low customer satisfaction, low resource utilization and high labor costs.

All of these issues eventually lead to a dwindling business. For most organizations, the challenges in planning and scheduling do not reside with the activity itself; advances in software have simplified and greatly enhanced these business processes. Most organizations actually rely on proven resource scheduling and planning systems.

The issue resides with the quality of the information that is fed to those systems, most significantly, the information that relates to time. The “garbage in, garbage out” philosophy still holds true and by using unreliable sources (e.g., historical times, estimates) for the times used in the planning and scheduling tools, it should not be surprising that the plans and schedules fall short of their goals.

Additional challenges are placed on planning and scheduling due to a changing landscape that includes: shorter delivery expectations; high-mix, low-volume environments; and dynamic routing. These challenges can be met only with an improved understanding of the intricacy associated with cycle time variability.

Activity-based costing

The challenges outlined in planning and scheduling also impact an enterprise’s ability to cost its services and products accurately. Activity-based costing imparts a real understanding of all costs associated with a service or product. This knowledge reveals which products are profitable, which clients are profitable, what options yield higher profits, which services are “loss leaders,” etc. The answers to those questions will guide your decisions and set the path of the organization.

To be useful, any activity-based costing exercise needs to rely on accurate information. Work measurement will need to be used to supply a high level of accuracy to the labor cost component of the overall cost equation. The use of ELS will make it possible to associate the labor expenditures to the appropriate activities, services or products. Achieving a high level of granularity in accounting for all costs, including labor costs, is the only way to benefit from activity-based costing.

With customers expecting more flexibility and customization from their suppliers, it becomes imperative for those suppliers to understand the cost structure of their offerings in order to satisfy their customers and remain financially healthy.

Simulation

As was the case with planning and scheduling systems, simulation systems have evolved into very sophisticated, yet user-friendly tools. The animated representations are far from the old printouts of statistical data, yet present the same Achilles heel: Great-looking animation does not compensate for non-realistic input data.

A manufacturing process simulation will yield insightful information only if the process is modeled accurately and if the data, including cycle times, are accurate. The same can be said for a queuing analysis of the cashiering activities in a big-box store. Unless you have accurate times for processing items at the cash register, bagging products, accepting transaction payments and all other activities in the process, your queuing study will be flawed.

When dealing with sophisticated analysis and simulation tools in the era of big data, users often are under the impression that such a powerful tool cannot fail – that given enough computational power, we can crunch any data and make some sense out of it. Unfortunately, it is the user that fails in understanding the importance of quality data, including the importance of using ELS when modeling time-related scenarios.

Decisive measures

Work measurement should be viewed for what it truly is – the best and most accurate way of understanding the time attributed to a given activity.

Any decision that relies on time will greatly be enhanced by using work measurement. This article outlined where management can use work measurement and ELS to improve the quality of the decision process. Any activity that relies on the notion of time can benefit from accurate time measurement, which begs the question: How can you manage without ELS? You can’t. ❖

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