WHITEPAPER

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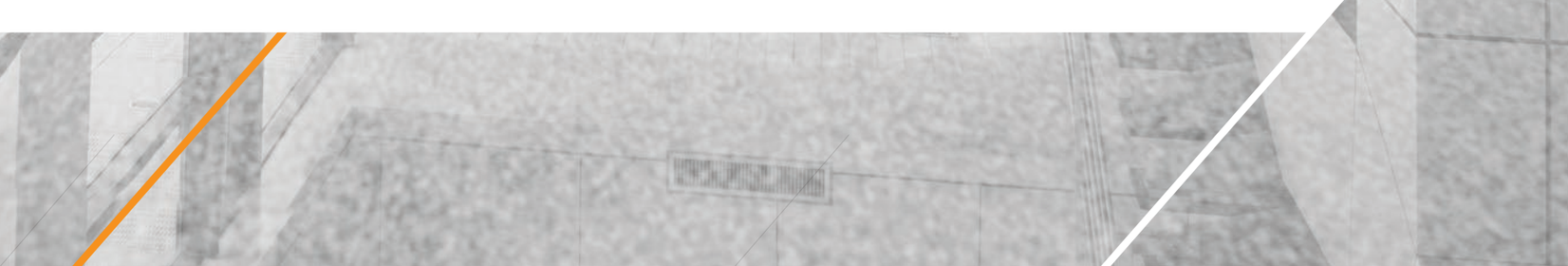
BEHIND THE SCIENCE OF CLEAN



BEHIND THE SCIENCE OF CLEAN

Many people, when cleaning their homes, like to take their time and do not bother worrying about efficiency. They might enjoy a podcast or whatever new music they have recently discovered while they work. When it comes to contract cleaners, however, time is a valuable resource, and so companies want to maximize that scarce resource by working as efficiently as possible.

In fact, a company's time is such a valuable resource that there is a science behind it, believe it or not. It is called industrial engineering. Just like any subspecialty in engineering, it is exacting, precise and enlightening in the way it can radically transform a company's processes. It is an invaluable resource that inspired our Cleanpath™ system that we use to determine the most efficient routing and procedures for our clients' buildings.

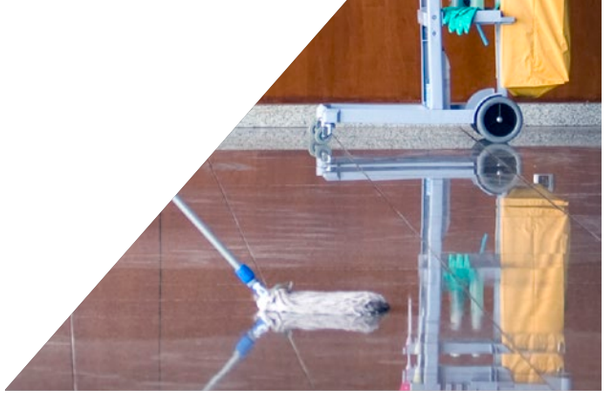
The principles of the science of industrial engineering include reducing waste in movement, energy and processes. In the cleaning industry, in addition to any other industrial service in which physical tasks are performed, there are countless movements and processes. Industrial engineers examine these down to the smallest details and determine the most efficient way to perform them, saving workers from wasted time and energy.

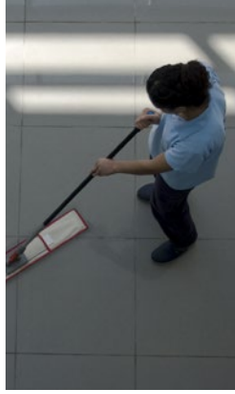
Industrial engineers create more efficient workplaces through analyzing and improving a number of different facets of a worker's day, from their workstations to the equipment used – and even the workflow itself – down to the smallest motion. Not only do their findings keep workers healthier, happier and more productive, but

it also puts them in a position to succeed consistently with more predictable results, maximizing the potential of each worker.

There are many different ways to address increasing efficiency within a company, and that methodology can be as varied and numerous as companies in the world. Because each company's situation is so unique, industrial engineers must become very familiar with not only each company's processes, but also the people who perform them. They do this through interviews, observations and anything to get a more intimate understanding of the workers' needs and habits. Perhaps the most famous example is the time and motion studies conducted by Frederick W. Taylor along with Frank B. and Lillian M. Gilbreth.

THE PRINCIPLES OF THE SCIENCE OF INDUSTRIAL ENGINEERING INCLUDE REDUCING WASTE IN MOVEMENT, ENERGY AND PROCESSES.





TIME AND MOTION STUDIES

The catalyst for the industrial engineering field of study is widely considered to be the scientific management movement, which began in the late 20th century with a young Frederick W. Taylor. Taylor was rising through the ranks of Midvale Steel Company and had just become a foreman at the plant when, in his new position, he set out to determine how long it should take workers to perform each of their tasks in order to increase efficiency, and so began the birth of industrial engineering.

The time studies performed by Taylor measured the cycle length of each task, from the overarching job to the smaller tasks performed within. They took into account how dissimilar or repetitive the tasks within the job were and what the optimal length of each cycle would be.

These studies received some negative feedback, however, as critics saw it as dehumanizing to the workforce. They said that it treated workers like machinery by pushing them to perform more quickly without enabling them with equipment or methodology to work at a faster pace. Among these critics were Frank and Lillian Gilbreth, who were inspired to measure and quantify the motions within each task to create data that could be used to optimize the job and allow workers to perform more efficiently.

While many people today recognize the Gilbreths from their autobiographical book, *Cheaper by the Dozen*, and movie adaptation, it was their split from Taylor and ensuing studies that resulted in their greatest achievements. Their methodology included documenting all of the movements in each worker's tasks down to the smallest detail. Their goal, in modern terms, would be to empower workers to "work smarter,

not harder." They shared the goal of efficiency with Taylor, but the Gilbreths strove to give workers the knowledge and tools they needed to become more efficient.

As the Gilbreths broke down each task they observed workers perform into the most basic of movements, they could eliminate any superfluous actions and streamline every task into the most efficient manner possible, with no wasted motion or delays, allowing workers to avoid expending any unnecessary energy while still increasing productivity. The Gilbreths' studies became a trusted resource for companies like 4M Building Solutions to streamline processes and provide their employees the tools to work both safely and more productively.

It was this hyper-focused attention to detail in the Gilbreths' motion studies that led to yet another monumental advancement in industrial engineering, this time in the automotive industry. Across the Pacific Ocean, Toyota used the principles from the time and motion studies as a foundation for what would become the model for industrial engineers in a wide variety of disciplines, including the cleaning services industry.

Gilbreth Innovations

SURGERY

INTRODUCED NURSE CADDY

MANUFACTURING

DOUBLED EFFICIENCY

CLEANING

INSPIRED ERGONOMICS

TOYOTA PRODUCTION SYSTEM

Throughout industrial engineering, it is widely agreed that the Toyota Production System (TPS) is the epitome of the discipline's best practices.

The TPS model and just-in-time manufacturing encourage employees to work more like the tortoise than the hare. Rather than working haphazardly without thought or reason, the theory behind TPS is to have structured processes in place that encourage a culture of doing things right the first time. It puts a priority on pausing a workflow to correct mistakes before they happen. By taking the time to do things right, this eliminates the time-consuming process of fixing mistakes or, even worse, starting from the beginning of the process.

With clearly defined processes, not only do workers have a clear idea of what exactly they need to do in order to perform their job to perfection, but they also have a specialization, which allows them to both achieve success and safety. These repeatable and easily digested processes empower workers to confidently perform at their highest level and provide the satisfaction of a job well done while avoiding the dangers of performing unfamiliar tasks.

Not only does TPS provide a more efficient workflow with improved employee satisfaction, but it also allows Toyota to pass the cost savings associated with improved efficiency on to the customer. Much like any workflow, including the 4M Building Solutions Cleanpath system, the value of consistent, reliable quality goes far beyond the costs, benefitting everyone involved. It also allows for flexibility due to a lack of stress from an overburdened workforce and an ability to constantly evolve.

Beyond simply doing the job right the first time, encouraging respect for other people, and fostering true teamwork, another important aspect of TPS is continuous improvement. Embedded throughout TPS are the tenets of finding new and innovative ways with radical changes to the fundamental process have been adopted by many organizations, including 4M Building Solutions.

THE TPS IDEALS IN BUILDING MAINTENANCE

When 4M Building Solutions implemented the CleanPath system, it was inspired by this long history of industrial engineering pioneers. Just like the theories and practices developed by Taylor, the Gilbreths and Toyota can be adapted to a wide variety of industries and cultures, it was imperative that the CleanPath system be able to be effectively deployed into buildings of all types.

The first step in the CleanPath system, and one of the most important, is the preliminary planning stage, in which the routes are created. It is unlike outmoded models of work because it uses an entirely different methodology of assessing the situation and creating a plan for routing the cleaning cells. These cleaning cells are more akin to an assembly line work cell than traditional cleaning crews. It is comprised of varying amount of workers, depending on the needs determined during the planning stages. They are designed and deployed as a system based on the requirements of each facility and routed according to the calculations made during the planning stage, in which the work cells are constructed for optimal efficiency on their particular path.

This methodology divides the work in a way that allows the team as a whole, not to mention each individual team member, to be as productive as possible. By empowering each team member to be a specialist in his or her area of expertise, they can be both more efficient and take greater pride in their work. Because the specialists in the CleanPath system are so dependable and consistent in their particular tasks, it allows supervisors to map the team's progress down to the minute. This is especially valuable for high security areas because the predictability of the workflow means that each team member's location can be determined within 50 feet at any time.

This added efficiency creates a cleaner building for the customer with more consistent and predictable results. Working in this manner, a wide variety of resources are conserved, including time, water and energy like gas or electricity used by the work cell while cleaning. Not only within the cell, but also by the combined efficiency that is a result of the cumulative efforts of all the work cells complementing each other.

The goal on day one of implementing CleanPath is to seamlessly transition into the new work environment and deliver noticeable results, but a more important objective is to continue to find new and innovative ways to improve upon those results and reduce waste of all types.

CLEANPATH TEAM MEMBERS

- Reduce cleaning related energy and water usage by 50% or more
- Reduce variability of cleaning for higher standards
- Spend more time per employee performing active work
- Reduce the amount of equipment needed in the facility

BY EMPOWERING EACH TEAM MEMBER TO BE A SPECIALIST IN HIS OR HER AREA OF EXPERTISE, THEY CAN BE BOTH MORE EFFICIENT AND TAKE GREATER PRIDE IN THEIR WORK.

A CENTURY OF INDUSTRIAL ENGINEERING INNOVATION

Industrial engineering as a science has continued to evolve by leaps and bounds in the more than a century since the first scientific management principles were developed by Taylor, which is right in line with the spirit of the discipline. Each innovator has taken the work of the great minds before him or her and built upon it, creating a world of possibilities that could have never been imagined in the late 19th century.

When 4M Building Solutions adopted the CleanPath technology, it was as much an homage to those who paved the way for this system as it was a step forward in the spirit of continuous innovation. Once again, what may seem like menial tasks to many is the subject of a complicated and in-depth field of study, in which there is always more to learn and new ways to improve. It is exciting to see what industrial engineers have accomplished in this relatively short amount of time, and even more exciting to dream of what could come to be in the future and the science of clean.

1912
MICRO MOTION STUDIES

1924
ELEMENTS OF MOTION

1933
OFFICE STREAMLINING