QuickMark Layout

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Abstract

All interior construction trades are looking for ways to be more productive, more efficient and more confident about accuracy when doing layout. General contractors would like layout from different trades to be in harmony with each other instead of having to referee conflict.

Today Interior layout is performed with tape measures in much the same way as 25 years ago, or with total stations.

Use of tape measures is tedious, requires workers to spend most of the day on their knees and is fraught with potential for errors. Total stations are expensive, require extensive training and are not well suited for some interior layout tasks such as drywall.

The *QuickMark Layout* system recently introduced by Spectra Precision represents an actual technology breakthrough that dramatically reduces layout time and increases accuracy. The product locates desired points with a bright visible laser "X" on the floor and ceiling.

QuickMark Layout can locate points in 5 seconds with an accuracy of 1/8". A medium sized floor can be laid out in a matter of hours rather than in days. Accuracy is improved. Calculation errors are eliminated. Marking errors are not compounded by measuring from a previous mark.

Less labor, less elapsed time, greater accuracy – and your crews will love it because they will spend less time on their knees. In fact, your current crews can operate *QuickMark Layout* with little training.

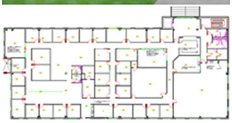
Introduction

Shortly after the concrete is poured, crews from many trades compete for space and begin stacking material on the floor before layout is complete. The space quickly becomes a quagmire of competing trades and interests.

According to a survey published by "Walls and Ceilings" in May of 2014, workers spend an average of 64 minutes a day looking for material and another 34 minutes moving material (because it is in the wrong place) – 22.4% of their day. Labor accounts for 40 to 60% of a job, according to the same study.

Any opportunity to reduce labor and elapsed time to complete a task is valuable to the construction effort. *QuickMark Layout* has been developed specifically to address these concerns.

Case Study



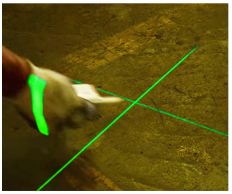
In a recent case study of a medium size office building with 48,000 sq ft, results from using *QuickMark Layout* are striking.

Floor	Planned Hours	Actual Hours	Point File
3rd Floor	54 Hours	32 Hours	2 Hours
2nd Floor	44 Hours	12 Hours	2 Hours
1st Floor	44 Hours	12 Hours	2 Hours
Total	**142 Hours**	**62 Hours**	
65% reduction in labor hours		66% reduction in elapsed time (1 day instead of 3)	
Design errors caught sooner in the process		Single point marking errors not carried forward	
In & Out before other trades place material on floor. Floor Layout used to guide mech, elect and plumbing. General Contractor is back on schedule.			

Wall layout labor was accomplished with less than half the planned labor hours. Each floor was complete in one day instead of three.

The layout crew, a journeyman and an apprentice, quickly adapted to the *QuickMark Layout* system. Their confidence grew as they checked their work and found no errors. In fact, the crew lost interest to use tape measures because they could sense that *QuickMark Layout* resulted in more square and more accurate layout. Chalk lines were snapped as they normally are while the crew progressed with layout.

Accuracy



Accuracy needed for layout tasks varies from trade to trade and job to job.

Most workers proudly claim that their layout is dead-on perfect. The reality is that the building columns and floor decks are not perfect to begin with, the architectural drawings do not always allow for physical constraints and the trades reference different datum points.

Further, walls are normally dimensioned from the previous wall so any marking errors are carried forward to the next wall and compounded over distance.

QuickMark Layout accuracy is typically 1/8" and repeatability is amazing. No tape measure reading errors. No calculation errors. *QuickMark Layout* is an improved solution for all interior layout.

An interesting aspect of *QuickMark Layout* is that accuracy is not affected by sloped floors or floor flatness. The laser X actually extends from floor to ceiling. If the floor is not flat, or if a point is over a divot, the laser X is still placed at the correct position.

Simplicity

Two lasers form a bright visible laser X at the point to be located. No calculations are needed and no reading errors are possible. The lasers are class II – approved safe for job sites.

The *QuickMark Layout* controller has been designed to be used by current wall layout crews with little training needed. Instructional videos are included on the controller.

Anyone can master the controller within minutes. For those who have never played a video game, a little extra time will result in familiarity with the simple controls.

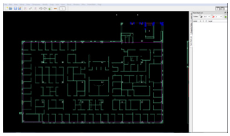
BuildView Application Software

QML800 now includes our new *BuildView* application software that allows end users to load architectural drawings directly into the controller.

You can view the floor plan on the screen as you lay out using QML800. Locating a point is as simple as tapping on a drawing line intersection or the point to be located – the lasers will form an "X" at the desired point within seconds.

The laser units and the laser lines are also shown in front of the drawings so it is easy to orient drawings with the floor.

BuildView Office Software



It might be useful to open architectural drawings on a computer to review the floor plans on a large screen.

Normally, either a license to full CAD program is needed or the files must be saved to pdf format in order to open and view the files.

Included with QML800 is a license to a computer program called *BuildView Office* that allows you to open many small- and medium-sized architectural files.

This is valuable to a company that does not yet have a CAD license and will expand capabilities of a company that already uses CAD files.

Work Crew Adoption

In addition to being easy to operate, work crews will appreciate that they will spend less time on their knees.

Within an hour, crews will get a good sense of control.

Before lunch the first day they will gain confidence that their output is extremely accurate.

By the end of the day they will take pride in completing the job way under the allocated time.

After using *QuickMark Layout*, crews will lose respect for the accuracy of tape measures to do interior layout.

Speed

QuickMark Layout can locate most points within 5 seconds. More time is needed to mark a point than to locate the point. 2000 linear feet of walls can usually be completed in a day with a typical two-person layout team.

When the layout is complete on the first day, competing trade crews and material will interfere much less with each other. The General Contractor will notice the schedule boost.

Complex Shapes

Complex shapes such as arcs, circles and serpentine curves are easy to layout. No measurements are needed. *QuickMark Layout* locates as many points along an arc as you wish.

Complex soffits too, are easy to set out. A ceiling fixture completely skewed from the floor grid is no more challenging than setting out a simple square. *QuickMark Layout* simply locates the needed points.

Trade Conflict

Trade conflict is a serious management issue at any construction site. Once a deck is poured, the mechanical, electrical, plumbing, fire stop, fire suppression, inspectors and wall installers begin competition for space to layout and to stack materials and tools.

Because of project delays, general contractors are reluctant to referee the trades and actually encourage a free-for-all environment for each trade to push on with their tasks.

At the case study site, the walls on each floor were laid out the morning following the deck pour. By the time the mechanical team arrived to begin stacking the sheet metal, they knew where to put their material and what areas to avoid.

Further the plumbers, mechanical and electrical teams used the wall layout to plan their own layout. The sense of organization on the deck was deeply appreciated by the general contractor superintendent.

Payback

QuickMark Layout can reduce layout hours by more than 50%. Medium sized jobs can be laid out in a single day instead of three to four days.

Rework is less likely as calculation and reading errors are eliminated. The payback period is typically about two to three jobs (50,000 sq ft per job, or about 5000 linear feet of walls per job).

Additionally, jobs are complete before other trades move material, accuracy is increased, a competitive advantage is demonstrated to the General Contractor, and complex shapes are made easy to layout.

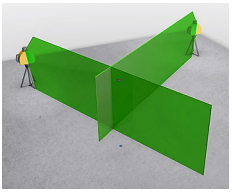
Setup

QuickMark Layout set up is straightforward. After setting up two lasers on tripods and launching the application on the controller, the lasers locate each other. Following this, both lasers need to be driven to two known reference points on the job site.

Most job sites have control lines set out 2-3 feet from column center lines. The intersection of perpendicular control lines often serve as one benchmark and a point 20 – 25 feet down one control line or the other can be the second benchmark.

Once set up is complete, *QuickMark Layout* can find any point within about 120 ft by 120 ft area within seconds.

A Bit about the Technology



Trimble has many patents covering the new technologies used in *QuickMark Layout*. A bright laser "X" is positioned on the floor and ceiling to indicate layout points. The "X" is formed from the intersection of two vertical laser fan beams. The laser fan beam positions are determined by extremely accurate radial encoders of the type used in total stations. The calculations and coordination between the lasers are controlled with a tablet application with high-resolution display.

It is an interesting concept to locate points over distance without measuring distance. There are no distance errors! Suffice it to say that Spectra Precision knows quite much about controlling lasers and the precise angles needed to position the lasers. They have been working with these technologies for 50 years.

Users will appreciate the new technology and they will never want to go back to the old way of doing interior layout.

Conclusion

The use of Spectra Precision's *QuickMark Layout* system can reduce interior layout time by more than 65%. Drywall layout of a medium sized deck can be done in a single day instead of three to four days. Labor hours are reduced by over 50%.

In addition to the reduction in layout time and labor savings, accuracy is improved while measuring errors are eliminated.

Perhaps the highest value is that layout can be accomplished quickly following a deck pour before material from various trades is piled up on the deck and the competition for space begins. Layout approval and authorization to build will be issued days earlier.