HP SitePrint for General Contractor

Betonmast Buskerud-Vestfold achieves 8x more productivity at marking out



Highlights

15% cost reductions
compared to manual layouts

4x faster
Compared to manual

Enhanced coordination

Project background



- Description: Print interior layout for walls, partitions, and MEP systems across multiple projects
- Name: Horten Industrial Park (Vision Project), Goma School Project in Kristiansund
- Main Focus: Creating precise layouts for walls, partitions, sprinkler systems, and electrical elements
- Project Size: 2 projects covering an area of 12,000 square meters

Betonmast Buskerud-Vestfold, a Norwegian general contractor, and part of the AF Group operates across various segments in the Nordic construction market, including building construction, industrial, offshore, and residential projects. Betonmast follows a subcontracting model, outsourcing most surveying and layout tasks to dedicated partner, Ingeniørservice AS. Ingeniørservice is responsible for marking control points and gridlines which subcontractors use references to mark the installation of various elements such as walls and MEP systems. Ingeniørservice AS utilized advanced surveying tools, such as Robotic Total Stations to mark control points and gridline references. However, subcontractors relied on manual processes and tools, including measuring tape and chalk lines to mark their elements based on the established grids.

Known for its efficiency and innovation, Betonmast has embraced modern technologies to maintain its competitive edge in the Nordic construction market. Yet, manual processes performed by subcontractors introduced inefficiencies and the potential for human error in layout processes.

The Challenge

While Ingeniørservice AS utilized Robotic Total Stations to efficiently mark control points and gridline references, challenges arose when subcontractors relied on traditional tools and processes to complete layouts. The use of measuring tape and chalk lines required a two-person crew to spend extensive time and conduct substantial manual labor to complete layouts for multiple trades. Ensuring accuracy was a constant challenge and managing multiple trades (including walls, sprinkler systems, and electrical elements) often resulted in miscommunications and additional inefficiencies during construction. Lack of predefined storage space often meant tools, equipment, and material had to be moved during workflows, adding more time to the process.



To improve productivity and reduce errors, Betonmast needed a solution that would produce a clear and accurate layout that could easily be used by subcontractors performing multiple trades.

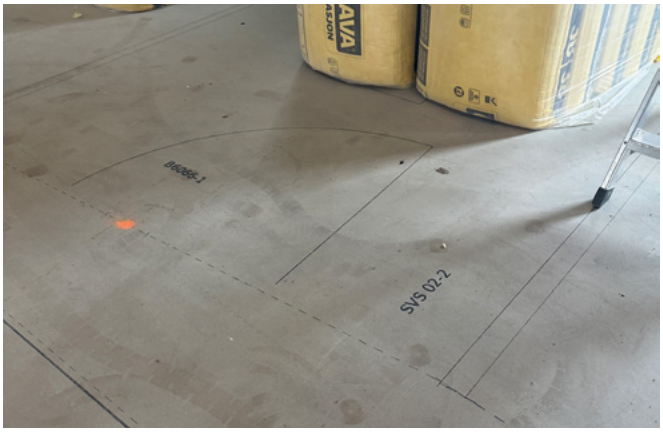
The Solution

Betonmast was attracted to HP SitePrint for the quality improvements offered by digital surveying. Since HP SitePrint prints floor plans 1:1 directly onto the concrete floor of buildings under construction, the technology minimizes human error and related rework retirement. The robot's advanced technology also allows it to execute several weeks of manual surveying in one day and addresses the materials storage problems the company experienced in the past.



Betonmast adopted HP SitePrint in two significant projects as part of its efforts to improve efficiency and accuracy in construction layout. Both projects require precise layouts for walls, partitions, sprinkler systems, and electrical elements to ensure smooth multi-trade coordination. The implementation of HP SitePrint involved close collaboration between Betonmast, Ingeniørservice AS, and the head of innovation.

The use of color-coded layouts allowing different building elements to be printed in distinct colors to guide installation sequences was a key feature, allowing teams to dramatically increase efficiency.



Foreman Oddgeir Almås is pleased with the innovation, noting, "It is very easy to arrive at a pre-marked area, but it is important that it is clearly marked what type of walls are to be built. The HP SitePrint robot can print with different colors."

Fortunately, replacing the ink cartridges can be done quickly and with ease, similar to the process of changing the ink in a home printer. The simplicity of ink changes enabled precise layouts that increased carpenter team efficiency by 20 %-30 %. HP SitePrint was also used to print specific storage areas for materials, optimizing logistics and reducing on-site handling delays. The method highlighted HP SitePrint's flexibility and Bentonmast's ability to integrate cutting-edge tools into its established workflows seamlessly.

The Results with HP SitePrint

The implementation of HP SitePrint led to several benefits, including improved speed, accuracy, and coordination. The accuracy of the automated layout along with detailed information provided by accompanying text helped improve the quality of installations, and color coding systems enhanced coordination among different trades.

Ståle Bø Arnesen from Creo Nordic, noted a range of improvements. “The overall effect of HP SitePrint is a safe, efficient, and precise construction process. This leads to high quality, reduced risk, and a streamlined progress in the project”

> HP SitePrint provides very accurate placement of markings on the construction site, which reduces the risk of errors, especially when marking walls with angles and degrees. This precision provides confidence in the correct placement from the start and minimizes the need for adjustments along the way. - Oddgeir Almås, Project Foreman

> HP SitePrint ensures detailed documentation of all markings, which simplifies the work with checklists and quality control. This precise marking also makes the location of the building easier for installers, which can improve both efficiency and quality. - Ståle Bø Arnesen, Creo Nordic Construction Manager

The implementation of HP SitePrint also significantly increased productivity, achieving a rate of 112 square meters per hour, far surpassing traditional methods and improving wall marking productivity by 4 times in the Vision project in Horten.

- Total cost reduction: Operational layout costs were reduced by 15%. Precise markings also reduce waste and contribute to sustainability goals, further cutting costs.
- Total time saved: 101 hours, which is 4 times faster than the previous process.

Long Term Impact

Encouraged by its success in projects like Vision, Betonmast is considering broader adoption of HP SitePrint across the AF Group.

Christopher Carlsen, Betonmast’s innovation manager, expressed his enthusiasm after gathering data from more than 12,000 square meters where SitePrint has been used.

> We knew that digital surveying would improve quality, but now we also have data that confirms significant efficiency gains with 20%-30% faster progress for the carpenters. It creates room to push ahead in a very tight progress schedule. We have barely scratched the surface of the possibilities this technology can be used for. - Christopher Carlsen, Betonmast’s innovation manager.

This scalability demonstrates HP SitePrint’s potential as a transformative tool for improving efficiency and quality across various project types.



Comparative Analysis

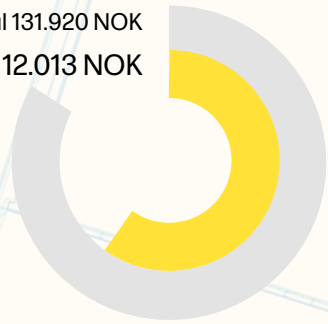
As a company known for innovation and efficiency, Betonmast recognized the inefficiencies and risks related to manual layout processes and chose HP Siteprint to address these issues. HP SitePrint exceeded teams' expectations by rapidly producing highly accurate layouts that cut costs and labor requirements while improving communications among different trades.

The results of early projects clearly illustrate the advantages of integrating HP SitePrint into Betonmast's workflow.

			
	Betonmast at Ny Barneskole Goma	Manual	HP SitePrint
Job Data	Printed Floor Area (ft²)	3.975 m²	
Labor cost rates	Layout Crew Size	2	1
	Layout professional cost/hour	485 NOK	1.100 NOK
	SitePrint Support Usage Fee (CAD/ft²)	-	17 NOK/m²
Time	Total Time (h)	136 h	35 h
	Total Productivity (m²/h)	29 m²/h	112 m²/h
Total cost	Labor Cost	131.920 NOK	38.500 NOK
	SitePrint Support Usage Fee	-	67.575 NOK
	SitePrint D&A (1 week)		5.938 NOK
	Total Cost	131.920 NOK	112.013 NOK

Manual 131.920 NOK

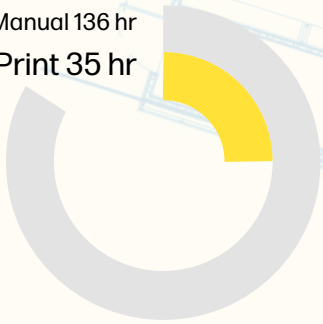
HP SitePrint 112.013 NOK



15% cost reductions

Manual 136 hr

HP SitePrint 35 hr



4 Times faster

Contact HP to learn how HP SitePrint can improve your construction workflows.

Contact us

Learn more at www.hp.com/siteprint

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