



**Uncovering the Value of As-Built Laser  
Documentation™ for the Process Industries**

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A Quantapoint White Paper

## **ABSTRACT**

### Meeting Objectives Through Quantapoint As-Built Laser Documentation™

Given the reality of today's competitive environment, companies in the chemical, oil & gas and refining industries are increasingly using laser scanning. Quantapoint as-built laser documentation (interactive and highly accurate as-built documentation created using laser scanning) has significantly increased the profitability and reduced the risk of both maintenance and modifications for existing facilities. Based on our extensive industry experience and proven track record, Quantapoint has performed an in-depth analysis of the key challenges facing the process industries and the significant value that as-built laser documentation can provide for cost, schedule, quality and safety.

## **CONTACT INFORMATION**

Quantapoint, Inc.  
275 Curry Hollow Road  
Suite M100  
Pittsburgh, PA 15236  
Phone: (412) 653-0100  
Web: [www.quantapoint.com](http://www.quantapoint.com)  
E-mail: [info@quantapoint.com](mailto:info@quantapoint.com)

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## **QUANTAPOINT WHITEPAPERS**

As the acknowledged industry leader in laser scanning technology, Quantapoint has published several papers, some of which are listed below. These are available in the Resources section of [www.quantapoint.com](http://www.quantapoint.com).

- Understanding and Specifying Laser Scanning Services
- Seven Things Every Project Manager Should Know About Laser Scanning
- Contract Terms & Conditions for Laser Scanning Services
- Combining 3D CADD with Laser Scanning
- Uncovering the Value of As-Built Laser Documentation for Engineering Firms
- Uncovering the Value of As-Built Laser Documentation for the Power Industry
- Uncovering the Value of As-Built Laser Documentation for the Processing Industries

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## Key Challenges Facing the Process Industries for Revamp Work

With the adoption of 3D CAD tools and new work processes, the process industries have enjoyed year-over-year quality and efficiency improvements on capital projects. In particular, grassroots (“greenfield”) projects have become considerably less risky with more predictable costs and schedule. Quality has even evolved to the point where some organizations have come to expect near zero design errors.



Unfortunately, there are several challenges facing the process industries in improving revamp work, which is key to staying competitive. One major issue is inaccurate and incomplete information on physical dimensions and location of piping and equipment (the “as-built documentation” for the facility). Based on our extensive industry experience, Quantapoint has performed an in-depth analysis of the key revamp challenges facing the process industries. The following four challenges were identified as the key roadblocks in preventing processing companies from achieving world-class performance.



### Challenge 1: Improving Profitability on Capital Projects

Project managers are being pushed to control costs as a means to improve capital project profitability. However, they have also come to expect certain incremental costs on maintenance and modification projects that have to be covered, whether they are budgeted or not. Recreating as-built documentation is one such item that must be completed early in the project to ensure that accurate and reliable information is available for design, fabrication and construction. This is a crucial step in the design process as all subsequent steps are based on this information. Manual measurement processes are time-consuming, expensive and error prone, which drives up costs and adds pressure to the project schedule.



“The average large size revamp project (\$50MM total installed cost) requires either a constant crew presence in the field throughout the design phase or a dedicated three- to six-month data collection period to create the as-built documentation we need.”

- Piping Designer, Major Engineering Company

Another cost is the need for field fit-up welds to compensate for inaccurate and incomplete as-built documentation. This limits the amount of fabrication work that can be accomplished before the turnaround and increases the amount of field routing that must be completed during the turnaround.

“We plan for one fit-up weld per tie-in across approximately 70 to 80 tie-ins and approximately 150 new pipes on (a typical) project. Only a handful of rewelds can be performed in a given day.”

- Senior Manager, Foster Wheeler

There are additional cost savings that can be gained by optimizing the engineer and design processes. However, confidence in the as-built documentation and inability to effectively share this information across geographically diverse teams limits ability to take advantage of some of the non-traditional approaches to reduce engineering costs.

“The man-hour rates in India are about 50 percent of that in Houston.”

- Piping Engineer, Major Engineering Firm

## Challenge 2: Meeting the Shutdown Schedule

Given the inherent obstacles associated with field construction, project managers face a significant risk from turnaround delays. Lost production can cost a typical process plant \$500,000 per day or more. Inaccurate and incomplete as-built documentation used for designs significantly increases the risk of field rework and change requests. This is due to many reasons, such as as-built documentation that assumes all equipment and structures are orthogonal, piping is always round and columns that are always plumb, which is rarely the case in the real world. Additionally, many installed components – such as small-bore piping, conduit, cable trays, ductwork and instrumentation – are often not documented at all. These challenges add not only cost, but also time to projects in the form of rework, field trips and re-design.



“In a process related turnaround, you always push yourselves to meet or beat the schedule, so cutting a 19-day turnaround by even one day is very meaningful. If you can avoid interferences and ensure the pipe is going to fit at the site, that’s worth a lot.”

- Venture Manager, ExxonMobil

## Challenge 3: Achieving Quality Targets

Despite quality improvement initiatives, it is not uncommon for maintenance and modification rework rates to run as high as 5 to 10 percent of a project’s total installed cost (TIC). There is considerable pressure to bring this quality metric down, but the lack of accurate as-built documentation and resulting rework or interferences cause constructability issues that keep this rate high.



“Rework rates are traditionally 6 to 15 percent of TIC.”

- CAD Manager, Major Engineering Firm

## Challenge 4: Protecting Safety in Hazardous Conditions

The inherent safety risks of working at the plant site increase as a result of having to send crews to the field for prolonged periods to collect as-built documentation. Active plant hazards include material exposure, having more personnel in the plant for manual data collection and having to measure structures in cramped work environments.

Many believe that any activity that drives up the time spent in the field as a percent of the total project time is bound to negatively impact recordables. Driving the risk factor even higher is the fact that the majority of processing companies are self-insured. Given the high cost of both medical and liability issues, companies are always looking for ways to improve safety.

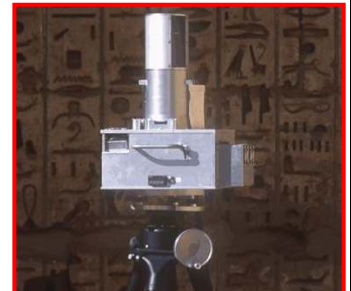


“Recordable incident rate (RIR) for the entire U.S. Petroleum Industry is 3.9.”  
- API, weighted average from 1999 U.S. Bureau of Labor Statistics

“1998 Construction Operations Recordable Injury/Illness rate of 2.98 translates into 1 out of 35 employees in construction operations incurring a recordable injury while doing offshore construction work during 1998.”  
- “Drilling Standards”, PMSC, 1998

## Key Sources of Value for Quantapoint As-Built Laser Documentation

In today’s highly competitive environment, processing companies are only able to achieve world-class performance and sustainable competitive advantage by seamlessly executing maintenance and modifications on existing facilities. To this end, processing companies are beginning to capitalize on the significant benefits that Quantapoint as-built laser documentation has offered the chemical process, oil & gas and refining industries for several years.



Quantapoint provides a “turnkey” solution that rapidly integrates billions of facility measurements to create 2D or 3D images that resemble a black-and-white photograph or CAD model, but are actually as-built laser documentation, with each point representing a highly accurate facility measurement. It is the fastest, easiest and most cost-effective way to obtain consistent and highly accurate as-built documentation for any facility. Our trusted as-built laser documentation is interactive and can be easily shared across the project team, with an accuracy of one-quarter inch or greater across the entire facility. Quantapoint clients have significantly increased the profitability and reduced the risk for maintenance and modifications in their existing facilities, with clients being able to reduce construction rework by 80%, with a greater than 10 times return on investment.



The value derived from using Quantapoint is immediate and demonstrable. The following example focuses on a typical revamp project commissioned by a representative processing company named XYZ and managed by a global Engineering firm. XYZ is a large, global processing company that generates \$100 billion in global revenues and a 7% profit margin.



They manage approximately five large revamp projects per year with an average total installed cost (TIC) per project of \$50 million. The typical plant turnaround target is 48 hours, and it takes a crew of 6 people approximately 16 weeks to collect as-built data on-site. Construction teams are generally 500 or more people and the work involves hundreds of pipes and an average of 250 tie-points per job. Their revamp rework rate is typically 5%.

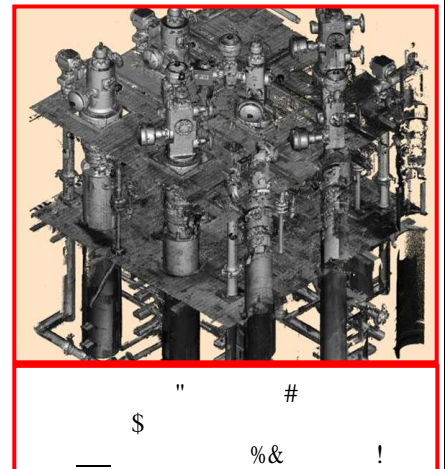
Using our proven track record, Quantapoint has identified the key sources of value as-built laser documentation for the process industries fall into four main categories: cost, schedule, quality and safety. The table below lists these main sources of value and the specific benefits clients receive that provide the value. These are detailed in the following section.

Sources of Value	Specific Benefits
Reduced Costs	Reduce field trips Reduce fit-up welds Improve operation and maintenance reviews Improved information sharing
Optimized Schedules	Reduce time to collect as-built documentation Reduce plant downtime
Increased Quality	Lower rework rates Increase shop fabrication Create better pipe routing and lifting plans
Improved Safety	Fewer personnel in the plant collecting data

### Source 1: Reduced Costs

Quantapoint’s laser scanning services have been proven to reduce costs in both the design and construction phases of large industrial maintenance and modification projects. Project managers point to a number of distinct cost savings, which include:

1. **Reduced field trips**: By collecting more comprehensive and trustworthy as-built documentation, Quantapoint practically eliminates the need to return for additional measurements or information. Whether flying engineers back to the job site to capture data that was missed or keeping several designers in the field throughout the design phase, the savings can be considerable.



Reduced field trips: eliminate 90 percent of return trips      \$210,100 in cost savings

“There is air travel expense 80 percent of the time and at least one day of safety training per project for each crew member. The scaffolding cost per day is typically absorbed by the plant, but is significant since it can equal the number of days for survey work.”

- Mechanical Engineer, Major Engineering Company

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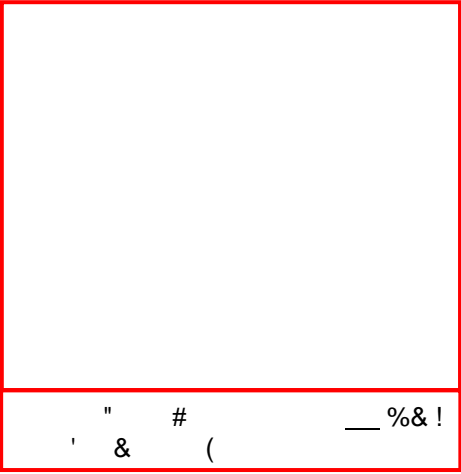
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