

# THE American Surveyor

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## Asset Management

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# Laser Scanning Changes the Rules!

**3D laser scanning is a game-changing technology. Surveyors, contractors and business owners have only begun to see how this breakout technology is driving big changes in the way physical assets are designed, built and managed.**

Demand is evident across the board—in aerospace, transportation, civil infrastructure, architectural projects, automotive plants, offshore construction, shipbuilding, and semiconductor manufacturing. For example, in civil infrastructure the public's impatience with lane closures and traffic shutdowns is driving use of laser scanning to minimize public disruption. In automotive plants—one of the last bastions of 2D CAD in manufacturing—some of the world's most sophisticated manufacturers are beginning to use laser scanning to wrestle the management of their production assets into the 3D world. To us, this breadth of demand is an unmistakable sign that laser scanning is real, and here to stay

Why now? The answer, we think, is that laser scanning has crossed the threshold from being just for the technologically curious, to an investment driven by the business benefits. What's happening is that enough successful projects have been carried out to convince people that—when practitioners know what they're doing—laser scanning delivers real economic value. Our research has uncovered five ways laser scanning changes the game in surveying, engineering, constructing and managing built assets and civil infrastructure. *continued >*

**>> By Tom Greaves and  
Bruce Jenkins**

Intensity image taken from a laser scan of  
an offshore production platform.  
*Image courtesy Quantapoint.*



Offshore production platform shown in the scan on the preceding pages.

## 1 Laser scanning changes the dynamic between contractors and owners.

Asset owners are starting to seize on laser scanning's power to reduce project execution risk—beginning with more accurate, higher-confidence bids. Correct and complete information about existing physical conditions is a prerequisite to accurate engineering and construction bids. But too often this information isn't available—and the result is low-confidence, inaccurate bids, and correspondingly high contingencies.

Today, some owners are contracting for laser scanning in the bid phase, to boost bid quality, reduce bid variance—making competing bids easier to compare—and making it possible to reduce contingencies. Likewise, some contractors are offering reduced contingencies if the owner agrees to fund laser scanning as part of the project.

More and more owners are concluding that the old “we leave that to our contractors” attitude—trying to outsource the exposure to existing conditions—at best chances leaving money on the table, and at worst exposes their projects to no-longer-acceptable risks in schedule and cost.

## 2 Laser scanning is driving owners' tolerance of project errors and rework toward zero.

In greenfield capital projects, field rework greater than 1% of the project budget is generally unacceptable. But in brownfield situations, rework can be in the range of 5% to 10%. Indeed, it's not uncommon for contracts to specify up to 10% contingencies. But with owners seeing more and more cases where laser scanning drove revamp rework below 1%, contractors' time-honored practice of burying project mistakes in field fixes is getting close scrutiny. Reducing construction growth is on many owners' minds.

But the news for contractors isn't all bad—far from it. In fact now, just at the beginning of mainstream adoption, laser scanning offers engineering and surveying firms an opportunity for differentiation and competitive advantage. For lump-sum work the opportunity is to boost margins by reducing errors and rework. T&M contractors can underbid rivals who haven't mastered laser scanning work processes. Of course, longer term, having laser scanning in your toolbox won't be the path to riches any more than your other instruments—it will simply be one more requirement for being competitive and staying in the game.

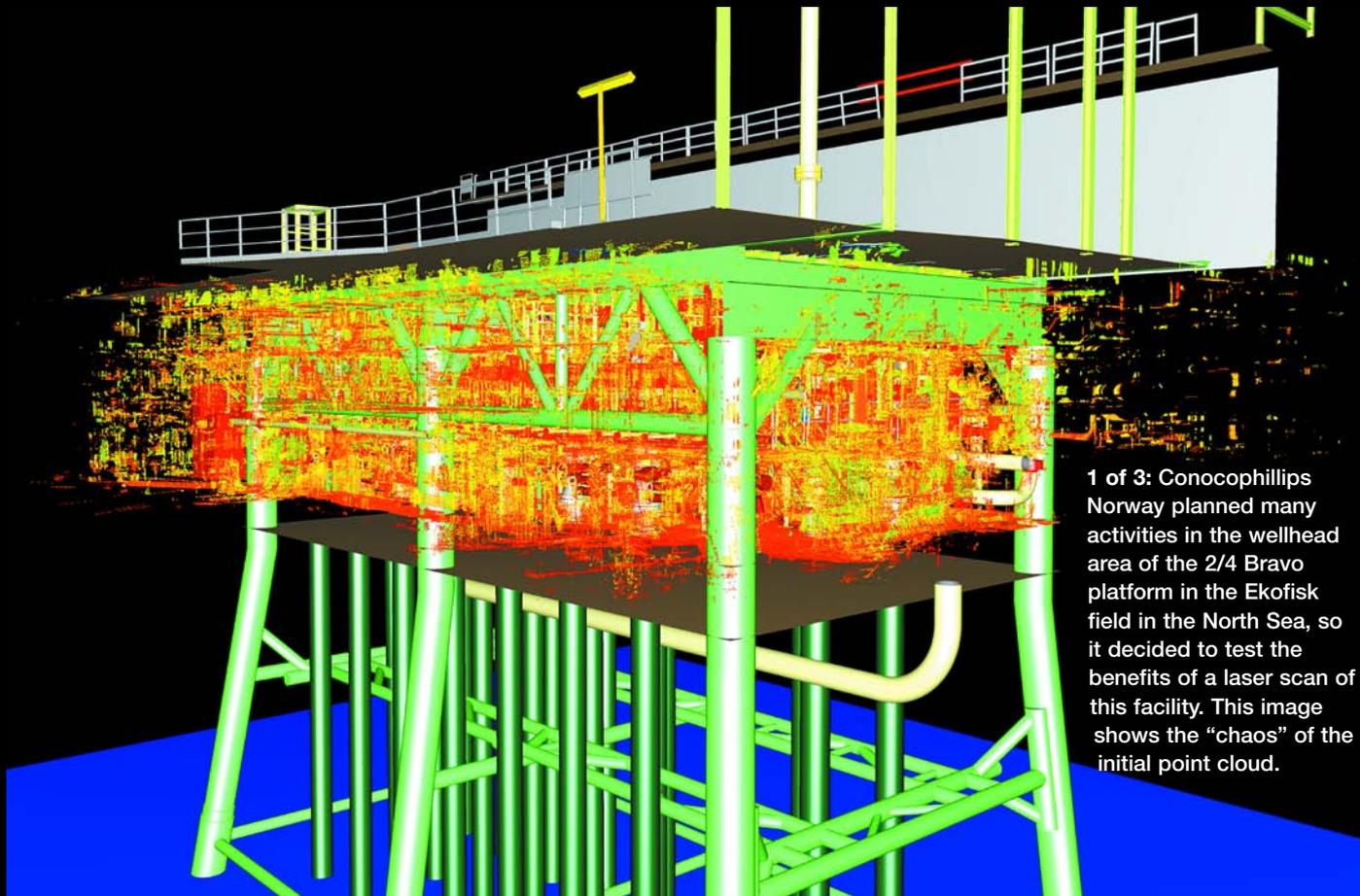
## 3 Laser scanning challenges local advantage—now the revamp design can be outsourced.

Unlike capital, people and ideas, plants and infrastructure aren't portable. This has long given regional engineering and construction firms an edge over big global contractors, especially in medium and small projects. But laser scanning undercuts this. Once a facility is captured digitally, contractors with global reach can ship the data to high-value engineering centers. Then as the project advances, laser scanning can be used to control quality by enabling clash detection between existing conditions and the new detail design work.

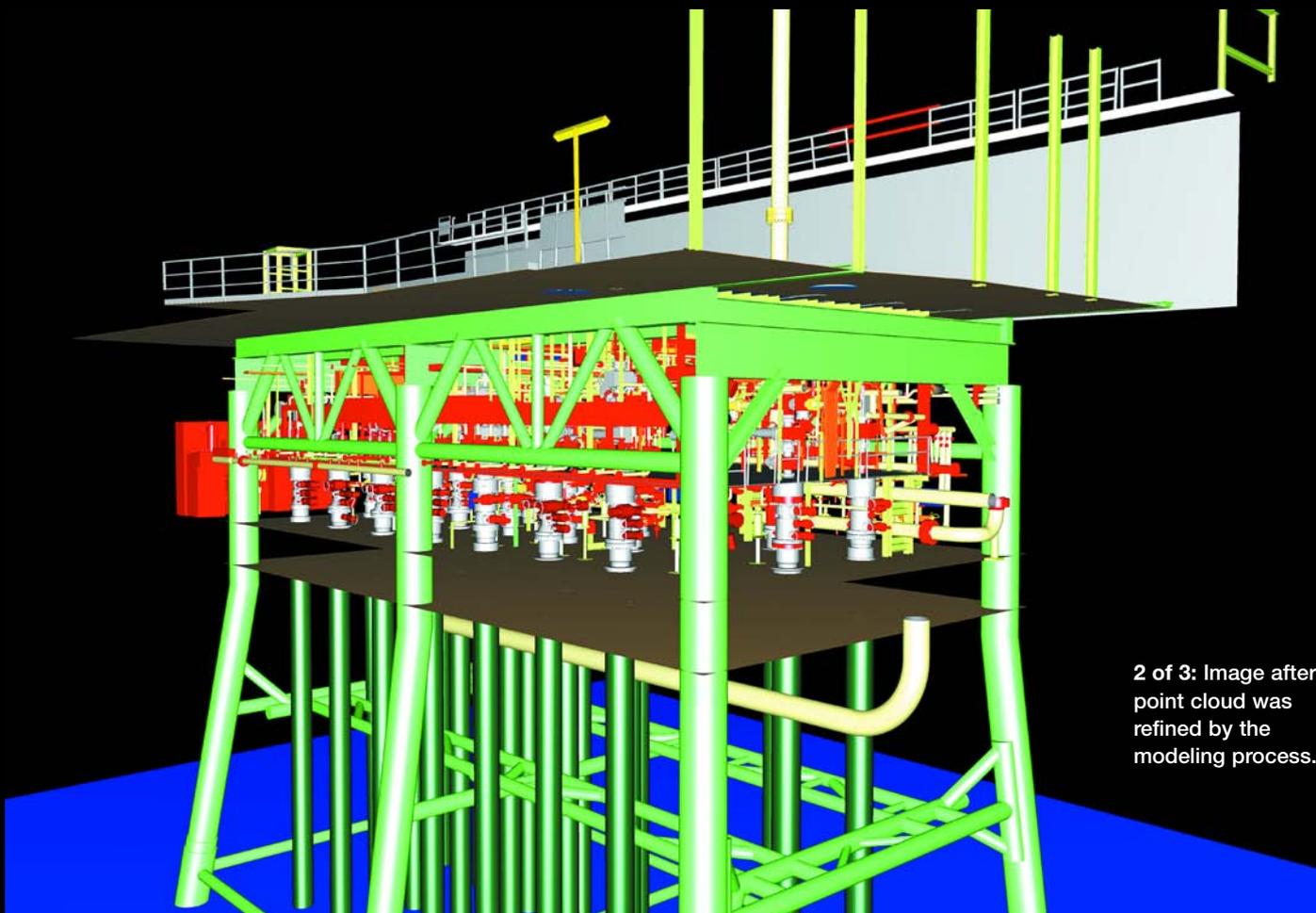
Contracting firms with regional customer bases and last-century 2D work processes are in the bull's-eye of this trend. It won't happen all at once, but project by project—but it's underway already. For such firms, we think now is the time to master this new technology, upgrade their 3D capabilities, and leverage their existing advantages while they still matter. Obviously being close to the asset still matters. No one claims laser scanning can capture every relevant detail—sometimes nothing can take the place of field verification and often there's no substitute for experience and history with a particular facility.

The good news is that few owner companies want to be involved in the technical and engineering details of laser scanning. Even those owners making the most use of it today prefer to work with contractors that have mastered the technology and work processes, and have a network of service-provider subcontractors with local presence ready to execute the work. For local and regional surveying and engineering firms, this is a bright opportunity, and something of an offset to the way it facilitates offshoring of engineering work.

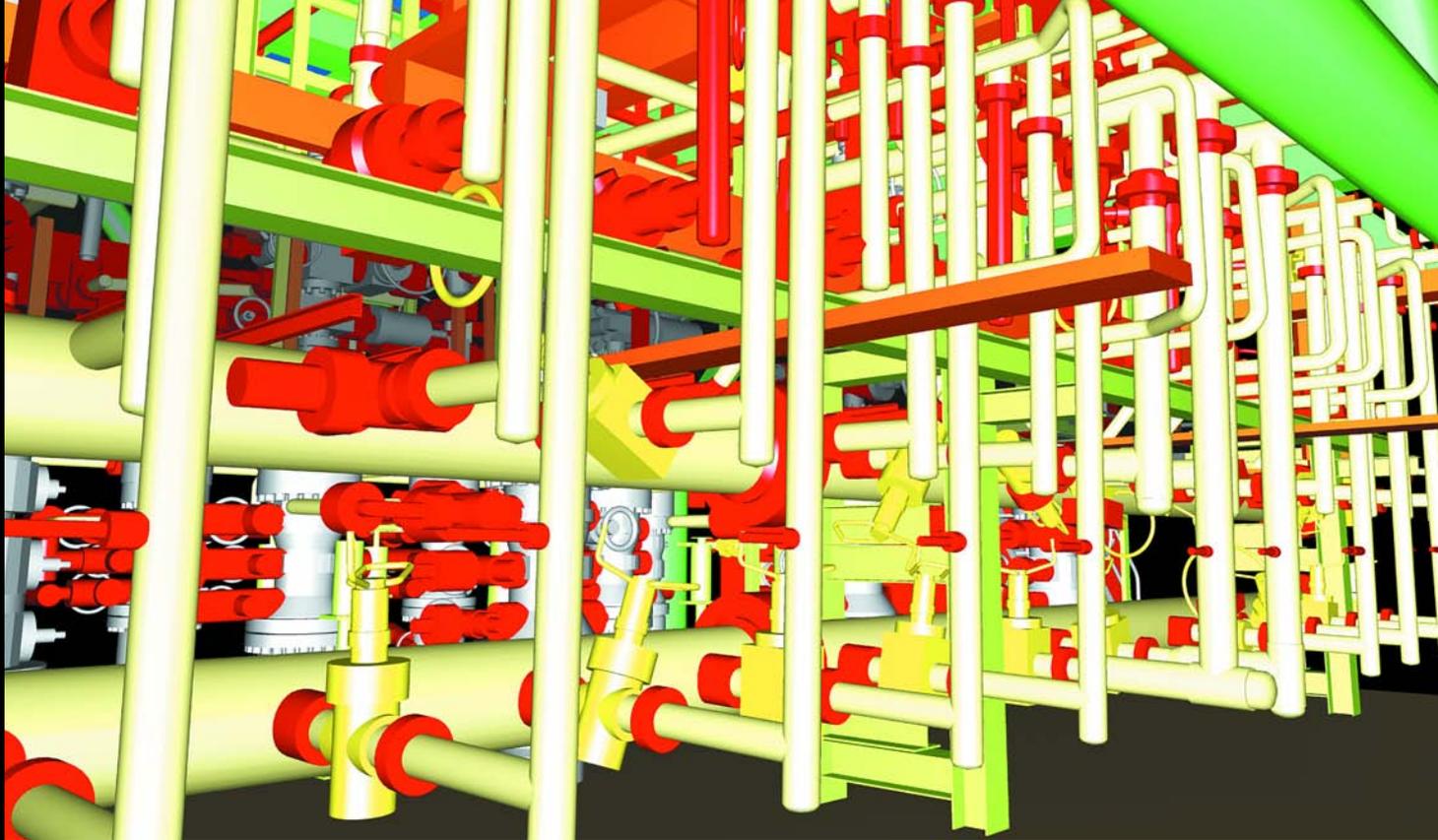
*continued on page 18*



1 of 3: Conocophillips Norway planned many activities in the wellhead area of the 2/4 Bravo platform in the Ekofisk field in the North Sea, so it decided to test the benefits of a laser scan of this facility. This image shows the “chaos” of the initial point cloud.



2 of 3: Image after point cloud was refined by the modeling process.



#### 4 Laser scanning will lift construction and fabrication to new heights of efficiency and accuracy.

Not everybody has the stomach to invest in project tools that won't pay back until late in the cycle. But that's where we believe laser scanning's impact on capital projects will ultimately be greatest—in the construction phase. In some cases laser scanning delivers more cost-effective surveying of existing conditions than competing manual methods. However, far bigger is its ability to keep construction on schedule and reduce expensive field rework. Construction management, installation sequencing, progress monitoring to control contractor payments, capturing current construction conditions and running options analysis to see the impact of changes on schedule and cost—laser scanning is poised to make a big difference in construction.

Over time, the construction phase is where we expect to see convergence of laser and other sensor measurements

taken from space, from airplanes, from tripods, and even with ground-penetrating sensors to manage subsurface features.

#### 5 Laser scanning for asset management—a long way off, but the biggest payoff.

Beyond laser scanning's impact on capital project execution, we believe its greatest economic potential lies in helping maximize the asset's value across its operational life—documenting the as-built facility to improve operations and maintenance. But this will probably take longer to be realized than anything else on our list. Following the well known new-technology impact curve, it will take longer to happen than seems reasonable—as with laser scanning in general—but it could be the area where, in the end, laser scanning delivers the greatest payback by far.

We predict laser scanning will become one of the tools you can't imagine being without. Today, few surveying, engineering or construc-

**3 of 3:** Close-up of refined model. The as-built laser scanned model has been placed on a server, and can be accessed by approved users. The model is updated every night with all new design from the day before from all users.

tion professionals could conceive of doing business without CAD, GPS, e-mail, cell phones, or Google. Will 3D laser scanning join that list? We think so—for more and more, it already has. 

Tom Greaves and Bruce Jenkins are co-founders, principals, and senior analysts of Spar Point Research LLC in Danvers, Massachusetts. Formerly with Daratech, Inc., each has more than 20 years' experience in business research and analysis.