

TECH NOTE

PMC Technology Update

How do I get my factory in 3D?

As the drive to increase efficiency and reduce rework for factory planning continues to grow many factory owners look to 3D factory design to help. This leads to the question, how do I get my factory into to 3D?

Getting the 3D Data

The first step in getting a 3D factory is gathering the 3D information. Traditionally this was done using manual measurement techniques. More recently this work has been almost entirely replaced by laser scanning. The reason for this shift is two fold; first the cost per square foot has dramatically reduced while the quality of the data has increased by over 10x. These two factors have lead to a dramatic shift in data acquisition since 2010.

Not apples to apples

Even though scanning now cost less the data being collected is far superior to that which is collected through manual means. The scanner does not miss or forget dimensions. The scanner also collects information that simply is not reasonable to collect through manual means.

“The cost per square foot has dramatically reduced while the quality of the data has increased by over 10x”

COST TO SCAN VS. MANUAL CHECK OF 100K SQ. FT.

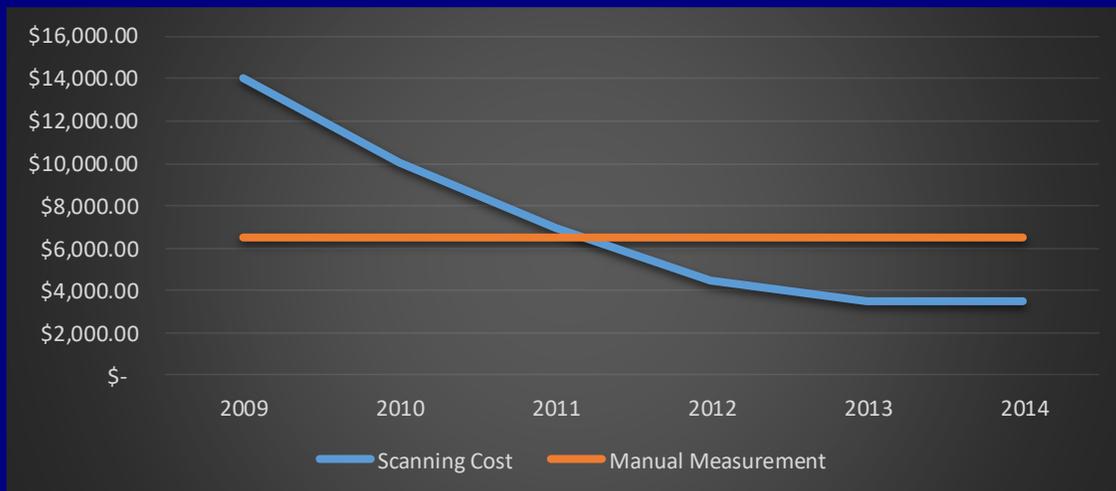
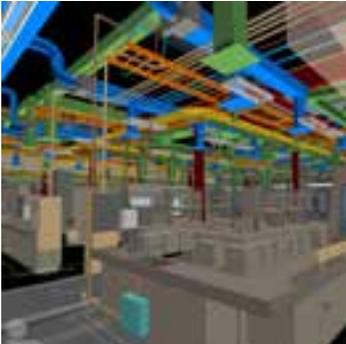




Image from an individual scan

Modeling Options

Although it is possible to model your factory in any application from Catia to AutoCAD you will get the most out of your model by using specialized factory design applications. Currently there are two dominant applications in 3D factory design, Siemens FactoryCAD and Autodesk Factory Design Suite.



Siemens FactoryCAD

The first 3D factory tool to hit the market FactoryCAD is a full featured AutoCAD add-on similar to many other applications such as AutoCAD MEP. FactoryCAD features many pre-made systems covering most assets typically found in factories such as floor and overhead conveyors, mezzanines and cranes to material handling containers and operators.

Autodesk Factory Design Suite

It is now possible to develop 3D models to any LOD in almost any format. Although some automated tools exist most model geometry is still created using tracing techniques. Cost effective options of generating 3D models typically involve having portions of the model completed by overseas partners.

Beyond Modeling

As teams become more sophisticated laser scan users they'll start to find new a creative uses for the scan data that don't always involve modeling. Scan data can be edited to remove objects that will be demolished right within the cloud itself. The scans can also be plotted directly on sheets for use by installers and fabricators.

LOD?

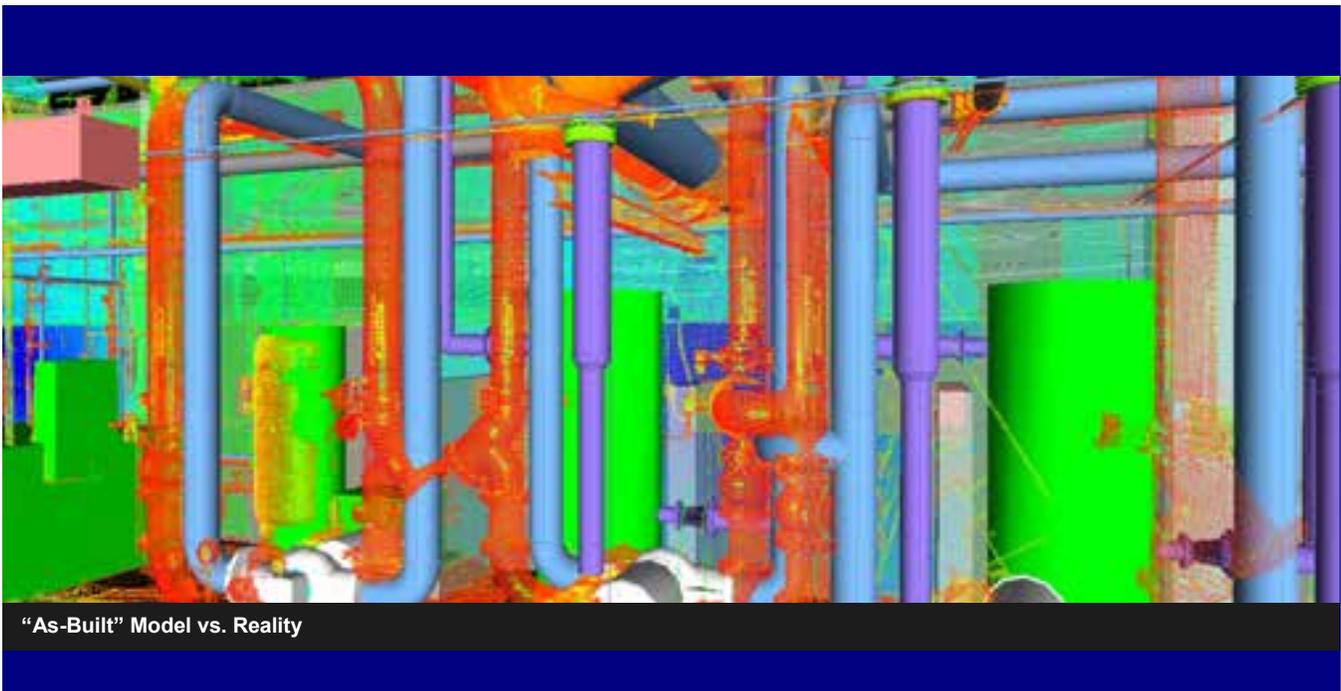
If you decided to convert your scan data to model data one of the most important decisions you'll make is what LOD should you're model be developed to. Within the AEC industry today even LOD has multiple definitions. It can either stand for Level of Detail or Level of Development. These are two distinct things.

Level of Detail is purely a CAD modeling visualization decision. Will generic objects be used within the model or will the exact item be modeled?

Level of Development, sometimes called Level of Design refers to the models development as it pertains to it use in construction of the building. This has little to do with the visual representation of the objects in the model and has more to do with the data behind the objects. For example if a model is in an LOD500 state it will contain warranty information for each item.



Data Capture with a Faro Focus3D

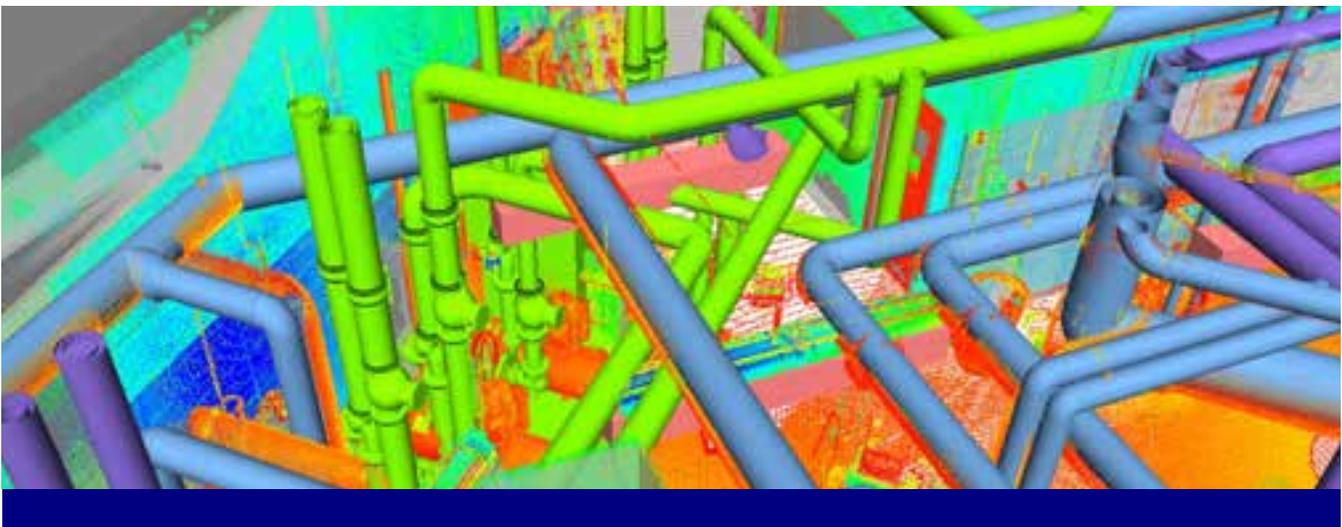


More than a planning tool

One common use within the AEC industry is to ensure that what was promised is what was delivered. This can be used at various stages of construction to accomplish different goals. It is often used as a quality check to ensure that installers are meeting their obligations to 'build to the model'. Another great use is to capture conditions before they are enclosed. Having a 3D scan of piping before it is encased in concrete can be a great asset for a building owner to possess.

In practice

The image above shows the results of scanning a utility room in which the installer of the MEP equipment had contractually agreed to install to the model. The purple piping shows what was planned within the CAD design environment while the orange shows the as-built scan data. Although painful at first, this process is a benefit for all involved. Seeing the power of scanning technology gave the contractor the confidence to begin off-site fabrication of the remainder of the project, making it more profitable for not only them but their client as well.



About PMC

PMC is the largest independent industrial engineering & simulation services firm in North America. For over 30 years PMC has been leveraging the latest in advanced technology to improve our Client's processes.

Established in 1979 PMC, has grown to have office around the world. With over 700 clients, 6000 completed projects, and over 150 employees PMC can work with you to find the right data-driven productivity solutions for your needs.

About the author

Our Laser Scanning/CAD Team is managed by Chris Mounts, a scanning veteran who has scanned over 100 million square feet of buildings and facilities. Chris continues to be a technology leader within the industry writing multiple regional and national CAD and BIM standards. He has presented at multiple industry conferences, and has been twice recognized by the American Institute of Architects (AIA) receiving the Technology in Architectural Practice (TAP) award in two consecutive years.

Contact Us

Give us a call for more information about our services and products

PMC

15726 Michigan Ave
Dearborn, MI 48126

(313) 441-4460

MoreInfo@pmcorp.com

Visit us on the web at
www.pmcorp.com