JM COULL, INC.

BIM & Cleanrooms: What are the benefits?

BIM. What exactly is it? BIM – Building Information Modeling – is exactly what it sounds like. It's using software and technology to develop multi-dimensional (3D-6D) models of a space that an owner wants to build or renovate, whether an entire building or one specific area. The models are created based upon drawings and specifications that the project architect and/or engineer has already produced, and can including varying levels of project details. Models can be used for a number of purposes, from supporting estimating efforts, to detecting system clashes, to ensuring constructability of design.

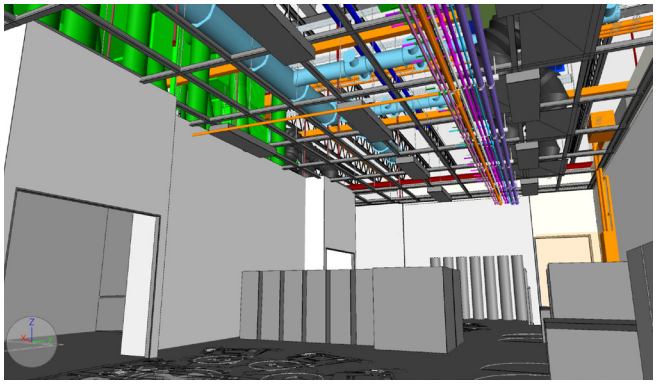
What are the benefits of BIM in a clean environment?

Clash detection

BIM is an incredibly useful tool for nearly any type of project; cleanrooms are no exception. In fact, these sensitive spaces are ideal for modeling because cleanrooms require significant process, mechanical, electrical, plumbing, and fire protection systems, all of which need to fit together in condensed spaces in ceilings and walls. BIM allows us to reduce risk when constructing or renovating a cleanroom. Yes, there may be design documents of all the systems, but the constructability of the design cannot truly be tested until either a model is developed or the work actually begins.

A BIM model identifies all of these systems so that you as an owner can see the actual locations of ductwork, piping, wiring, etc. to ensure there are no clashes. The model can also indicate whether or not the current design provides adequate space to house all of this equipment, and identify points of access for maintenance. Any issues identified by the model can then be redesigned or re-engineered before any construction begins, which can ultimately save you time and money.

Considering the heavy costs you incur to maintain MEF/P and process systems, each system must run continuously at optimal efficiency. Your entire business depends on your facility's ability to meet ISO requirements, and obviously the more stringent the class, the more important this becomes. Since cleanroom requirements are so precise, significant changes can occur throughout design development. This is where BIM really comes into play. By adding appropriate levels of details, models can be updated to reflect any necessary modifications to system design. While this could take some time, the alternative is discovering the space doesn't meet requirements until after it is built, leading to corrective work and more time and costs.



Skyworks Solutions, Inc. – ISO 5 GaN Cleanroom

JM Coull's BIM coordinator created several models for our current work at Skyworks in Woburn, MA. We have had a presence at Skyworks for the last number of years, and our latest project involves constructing an ISO 5 clean manufacturing suite in a former non-clean space. Though the cleanroom itself is only 1,500 sf, the MEP and process scope is quite extensive. JMC implemented BIM during preconstruction to ensure constructability of the A/E's design and to detect any clashes among the space's electrical, HVAC, plumbing, and process equipment overhead.

Preconstruction accuracy

BIM is also a huge benefit to a project's preconstruction team during pricing efforts. It provides more accurate data for estimating, which typically results in a number that is more reliable.

In many situations, and for various reasons, there may not be enough time to produce highly detailed bid documents for bidding purposes. This can lead to significant uncertainty during the estimating process. As a result, more contingency than necessary may be built into the number, or the estimate may be accompanied by so many qualifications, that it doesn't accurately reflect pricing for the complete scope of work.

However, developing even simple models during the preconstruction process can help clarify any ambiguities in drawings, and identify incorrect or incomplete information. Rather than submitting a

long list of qualifications to the owner, construction managers (CM) can use the information produced by models to have an open dialogue with you and the design team to resolve these issues.

Bottom line – accurate bid documents means accurate pricing, which prevents surprises down the road (and helps eliminate a potentially contentious situation between you and the CM). If drawings aren't as detailed as they should be, BIM can help fill in some of the gaps. It can also enable CMs to determine alternate methods for accomplishing the same projects goals, alternatives that may be less expensive or faster than what was originally identified in the scope of work.

Are there any drawbacks?

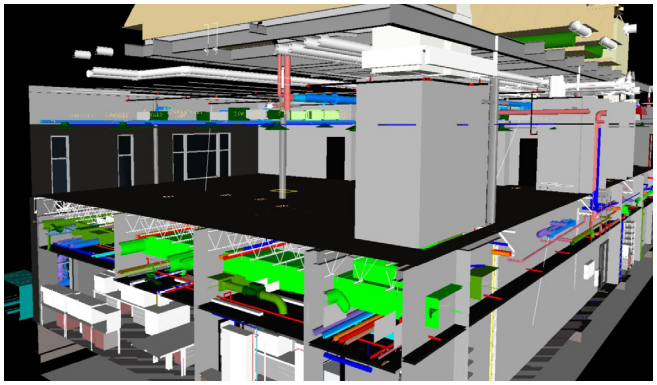
Generally speaking, using BIM for your cleanroom projects doesn't have many disadvantages. There is a cost associated with modeling, which is the BIM coordinator or manager's time. Obviously, the more complex the project, the more time it will likely take to develop detailed models, thus increasing costs.

However, when compared with the costs you may incur by not using BIM, it's a small price to pay. For instance, let's say your company needs to build a new ISO 7 cleanroom that's approximately 10,000 square feet in size. Because the project is on a condensed schedule due to funding issues, you decide to forego BIM in the interest of saving some time and money. The project is now 6 months into construction, and you discover there is an error on the mechanical drawings – the duct size specified won't fit into the space allowed. Any costs or time that would have been spent on BIM at the project's onset, thus preventing the problem, are now minimal compared to removing and replacing the incorrect ductwork.

That said, while there may not be any serious drawbacks associated with BIM, it is worth determining if modeling is right for your project. If the size of the project is small and the scope is relatively simple, BIM may not be necessary.

Spending time modeling a 1,000 sf ISO 8 cleanroom, for example, probably isn't a good use of project funds and time.

But, if that same cleanroom includes a particularly challenging component to the scope of work, then you might want to reconsider. Take the time to evaluate your project's complexity, schedule, and budget to determine how BIM can support your objectives.



E Ink Corporation – Innovation Center

When constructing E Ink's 140,000 sf Innovation Center in Billerica, the JMC team had to fit literal miles of ductwork, piping, wire, and cable, and hundreds of diffusers and VAV boxes into an extremely tight space. About half of the facility was dedicated to cleanrooms and lab space, thus resulting in the massive MEF/P scope.

To address these system complexities, we created models of the equipment and interstitial space to determine the exact location of where each component would be installed. Once the models were finalized, plans were conveyed to our subcontractors in the field for implementation. We were able to successfully maneuver all systems into the specified space by using the models.

About JM Coull, Inc.

JM Coull is an award-winning construction management, design-build, and general contracting firm specializing in new construction and renovations for the life sciences, advanced technology, commercial/industrial, education, and healthcare markets. We have been providing solutions to our clients' building needs since 1984, bringing a focus on quality, safety, and partnership to each project.