

A detailed 3D BIM model of a building's Mechanical, Electrical, and Plumbing (MEP) system. The model shows a complex network of pipes and ducts in various colors (blue, green, pink, cyan, orange) running through a building's structure. The pipes are connected to various fixtures and equipment, illustrating the integration of different building systems.

# Best practices in BIM for MEP:

## 10 Tips for a Successful BIM Workflow



**Trimble**





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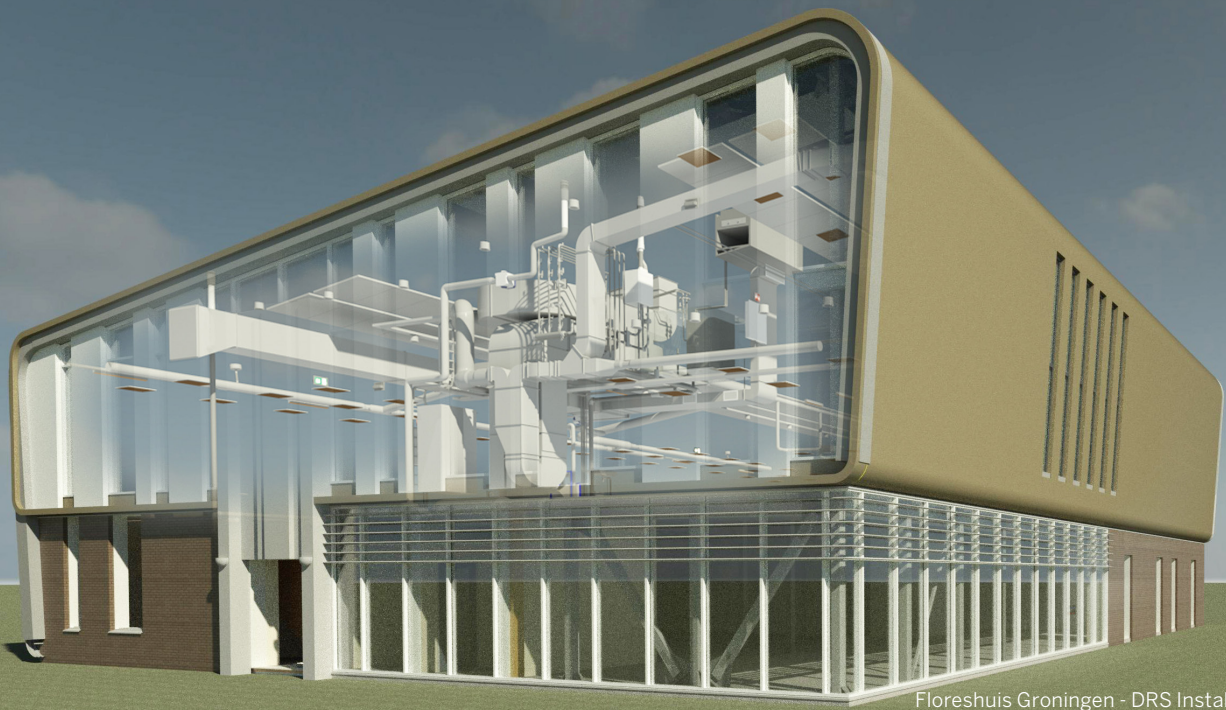
BIM is transforming the way the MEP industry works. Across the world, firms are facing new standards and requirements and are adjusting to this new way of working. In some countries, firms have been quick to adopt BIM. In other countries, firms have been more hesitant to reorganize existing processes. But BIM doesn't need to be risky - if you play it smart and if you learn from the mistakes and successes from others. And where to better look for these lessons learnt than in one of the countries that is leading in BIM?

**T**he Netherlands is one of the countries where many impressive BIM projects have been realized already. In this whitepaper, leading Dutch contractors share their stories and tips that are useful to MEP contractors across the globe. And, because technology is an essential part of BIM, tips are also included on using BIM tools to optimize your workflow. If you are a MEP contractor just beginning with BIM or improving your BIM processes, read on.

### Tip 1

#### Facilitate a smooth information flow

BIM is all about managing sharing information. However, a common challenge in BIM projects is exactly this: sharing the right information in a way that's helpful to each party. Managing expectations is key here. What is expected from whom at which stage of the project? In order to prevent duplication of work, parties should come together and discuss what information is expected from each other in each phase. Here, it can be useful to look at examples of previous BIM projects and to discuss jobs to be done, like appointing a BIM manager who is responsible for the entire BIM process.



Floreshuis Groningen - DRS Installatietechnik

An efficient way to ensure a smooth information flow, is setting up a model from generic to specific. In the first stage, a consultant can deliver a generic design, which the MEP engineer can later enrich with manufacturer specific content – which contains calculation and trade data for example. This way, the level of information in the model changes as the project progresses, and duplication of work can be avoided.

## Tip 2

### Meet regularly with other parties

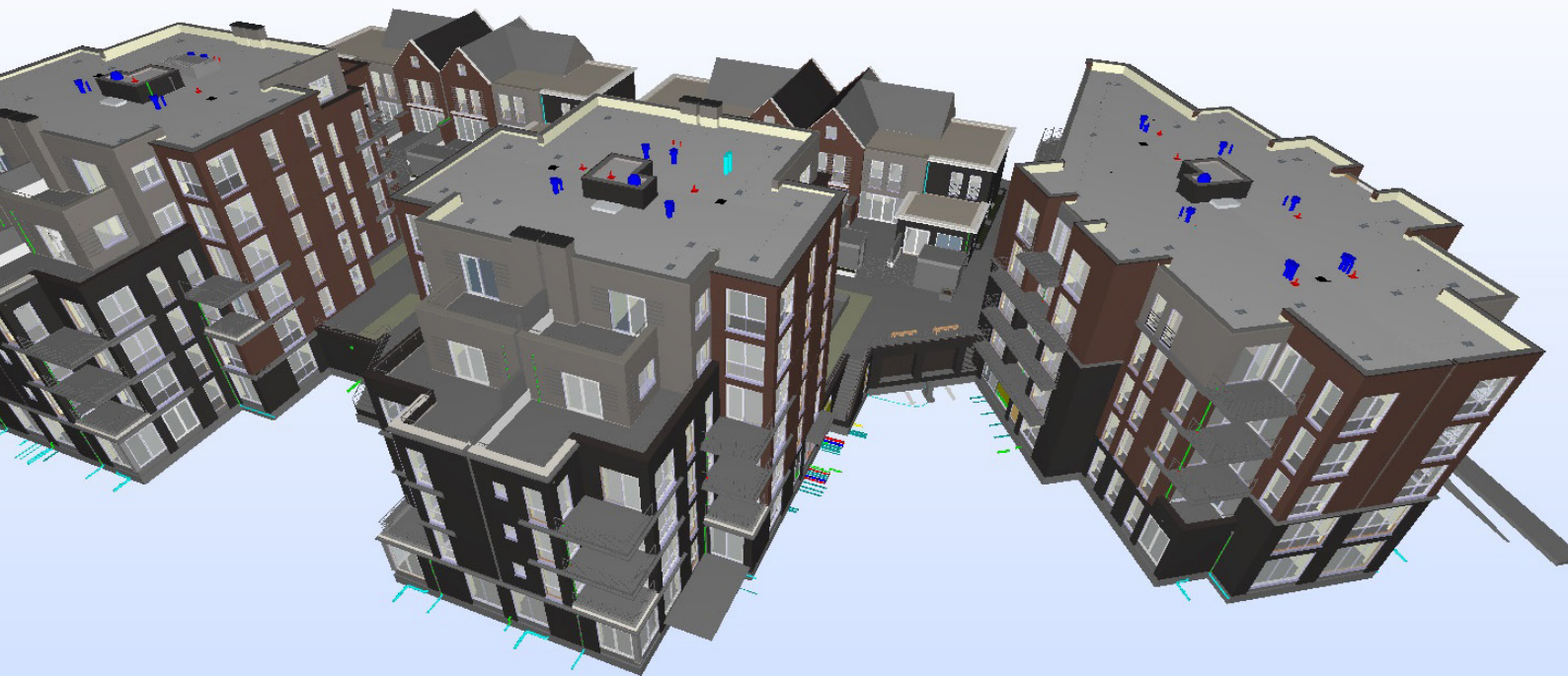
When making agreements with other parties, just discussing LOD levels isn't enough to guarantee success. The most successful BIM projects are those in which is truly collaborated. This can go quite far: some teams take on an integrated approach where all disciplines are physically in the same room to collaborate, from architect to MEP engineer. When a problem arises, it can be faced directly. However, this approach is not always possible. Another approach is to meet regularly to exchange models, perform clash detections and make agreements. This is what happened at the Floreshuis project, a community center in the North of the Netherlands. Draftsman Anton Mulder explains: "In the initial phase of the project, we met every two weeks to exchange models, perform clash checks and make agreements. We experienced this way of working as very pleasant. Given, among other things, the extensive steel construction of the building that we had to take into account. At the end of the design phase, all IFC models were collected and merged into a final design which served as a blueprint for the implementation."

## Tip 3

### Manage BIM projects centrally

BIM is transforming the way we work, but the information that we are working with is nothing new in itself. It's just the way we deal with it that has changed. The work drawings from 'the past' are the digital sheets we use today. The need still exists to quickly search all the work drawings in a central environment. And for BIM projects in particular it is important to manage projects centrally. This way you can make sure that everyone works with the right information in the right way. Make sure you agree on a tool that allows you to manage and structure your documents, drawings and databases. The BIM manager or BIM consultant can use this tool to define settings that should be used by everyone in the project, which ensures uniformity throughout the process.





Torckdael Wageningen - AGO Groep

## Tip 4

### Share information through IFC

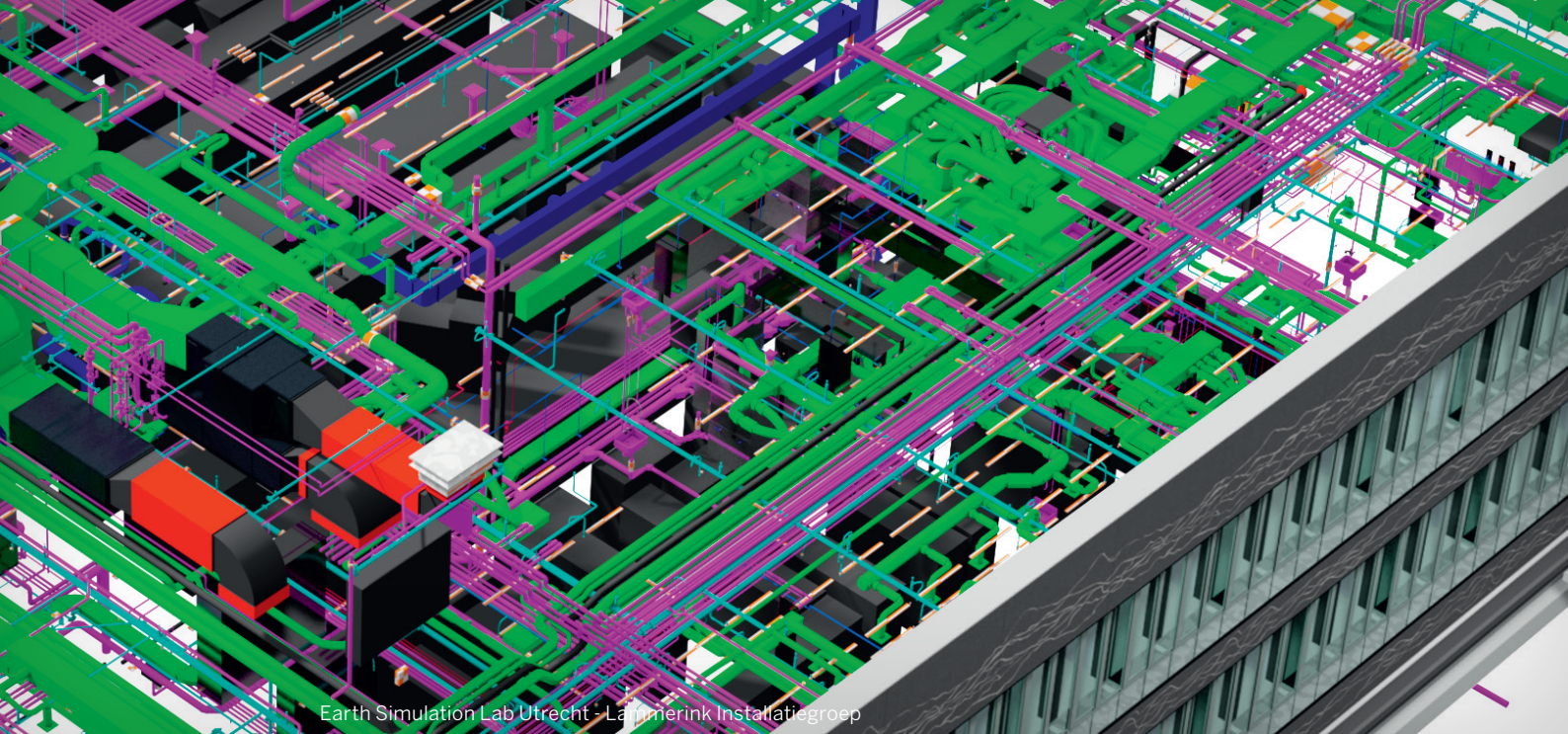
For the prestigious Golden Gate project in Amsterdam, contractors are collaborating in high detail in BIM. But a high level of detail is not the most important thing, BIM modeler Edgar Movsisyan explains: "What's most important is sharing information through IFC and deciding which codings to use. Another Dutch project in which IFC is used, is the Torckdael nursing home project. Ismail Yalman is draftsman at the project and explains: "IFC is ideal to work with, because it is a universal file format. Because you can't make any changes to it, it will not cause confusion. The useful thing about IFC is that this file format enables you to share information transparently, even when collaborating parties use different modeling platforms or viewers. By integrating prescribed classification codings, you ensure that all parties group, select, and view elements in the same way. In this way, information can be shared transparently while the different parties can choose for themselves to work with the software package that suits their own company best."

## Tip 5

### Integrate openings in the design process

Particularly for projects that involve heavy structures, complex installations or limited space, it is recommended to integrate openings an early stage of the design process. An example is the Earth Simulation Lab, a heavy structure that used to contain a particle accelerator. Kris Jansma is manager of the project explains the challenge: "One opening here is easily just as big as one cuboid of concrete. Because of the limited space on site, it is difficult to make cut-outs in the construction. Therefore we made sure to model the openings correctly beforehand." BIM software was used to exchange requests for openings between parties: "This was extremely useful because new steel constructions had to be installed at various places in the building, for which also openings had to be specified. Now it was easy for the steel contractor to adopt the openings in his own BIM model."





Earth Simulation Lab Utrecht · Langerink Installatiegroep

## Tip 6

### Use integrated calculations

Different BIM software programs have integrated calculation functionality for modeling systems. By performing calculations in the BIM software environment itself, instead of in an external program, you can save a lot of time on exporting and importing data into your model and prevent duplication errors. Another advantage: the calculation is directly linked to the model. This means that when you change something in the model, the information in the calculation overview is automatically updated. Without integrated calculations, you'd have to work with three different documents when you are working on an air handling system for example; the air balance lists in Excel, the pressure loss calculation and the model. Integrated calculations make it possible to link all data together, so you can directly see the effects of any modifications.

Even when external calculation programs are prescribed, integrated calculations still deliver a speed advantage. The calculation functionality can for example be used for dimensioning ducts. By simply specifying the flow rate for example, the calculation functionality will automatically adjust the diameters of ducts, which is a very quick and easy way to specify the dimensions of a system.

## Tip 7

### Model with manufacturer specific content

In order to make sure that your designed system can actually be installed, manufacturer specific content is extremely useful. In BIM libraries such as MEPcontent, thousands of manufacturers already offer their products as files in different BIM formats for free. This way, you can model directly with up to date, ready to order products, complete with article numbers and price information. Some manufacturers even offer special apps, such as Mitsubishi Electric and ABB, that engineers can use as a free add-on to their BIM software. These apps contain product line sheets (PLS) with product information and allow engineers to design and model quick and accurately with the manufacturer content.





EPO New Main - Hoogendoorn

## Tip 8

### Integrate prefabrication in your workflow

Depending on the type of project, location and your team, it can be smart to integrate prefabrication in your BIM workflow. For projects where transportation or the weather can be challenging on the job site, it's useful to prepare as many elements as possible in a clean workshop. BIM software can be used to generate prefab drawings and cutting lists, which saves a lot of time on the job site. René Kamer is Head of Execution for the construction at European Patent Office in the Hague, and responsible for all sanitary systems, explains: "We work with prefabricated components as much as possible; this is necessary in order to work as efficiently as possible. Especially for the sewerage system, almost everything is supplied prefabricated. For this purpose we successfully use the prefabrication functionality in our BIM software, which generates prefabrication drawings and cutting lists for our men at the workplace. On-site engineers no longer need to measure the pipe lengths themselves and no longer need to calculate cutting lengths. In addition, the conditions in the workshop are better than on the construction site. Without a prefab in BIM, you can't work efficiently and you simply don't keep pace."

## Tip 9

### Order materials directly from your model

As mentioned before, a major advantage of BIM is that it is possible to work with manufacturer-specific content. These materials can then be ordered directly from the model, which saves a considerable amount of time in the workflow. There are several manufacturers and wholesalers that allow you to link your BIM software to their ordering system, by means of plugins, apps or some other sort of link between systems. If you decide upon a manufacturer and model with actual data, you can easily generate material lists and export the data to your ERP system. Here, you can generate a Bill of Materials and order directly from the suppliers. Nothing needs to be duplicated manually and materials can be delivered without errors.





## Tip 10

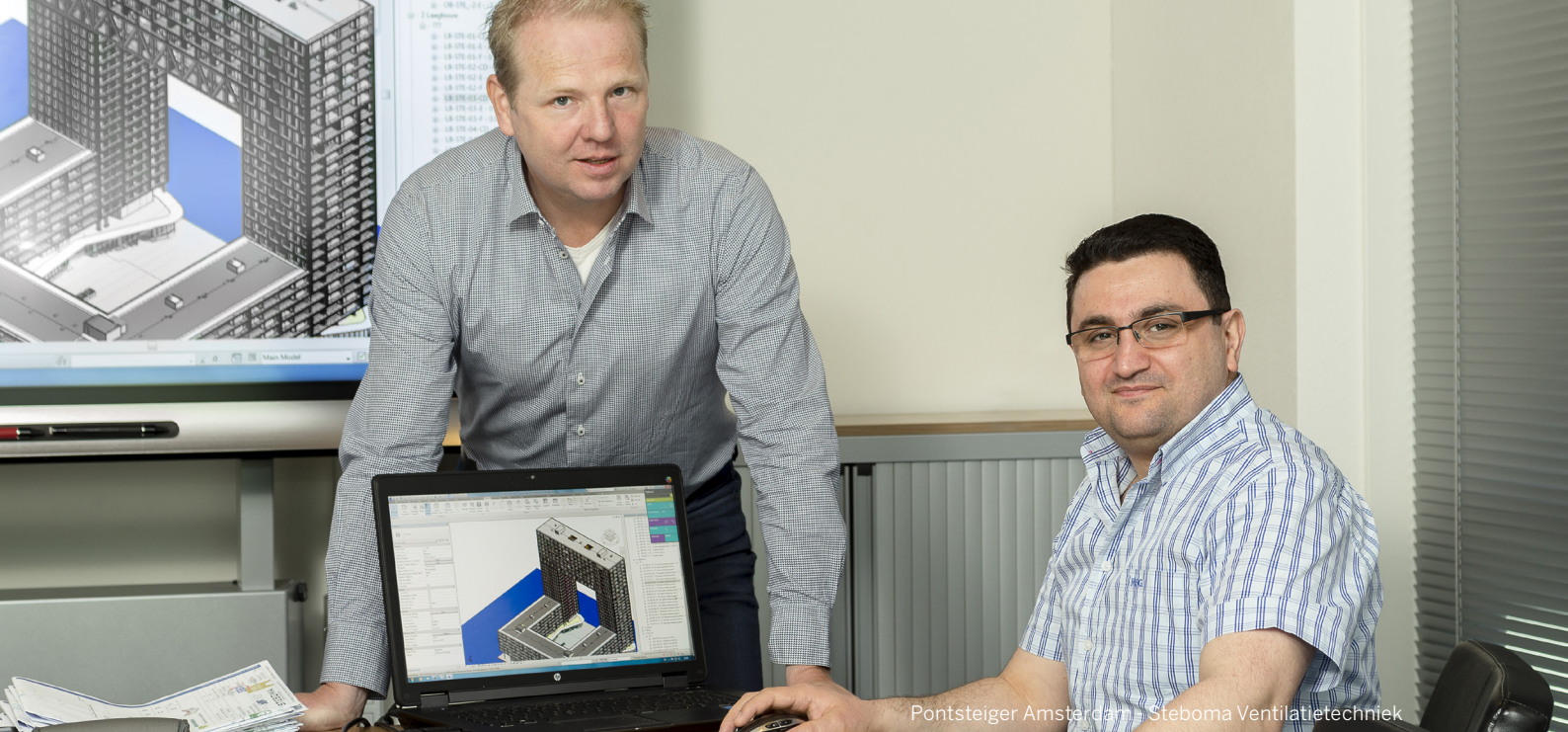
### Use your model also during construction

There are many ways in which processes on the job site can be optimized with BIM. The first MEP firms are experimenting with applications of Virtual or Augmented Reality and mechanics carrying tablets are starting to become more common. Having access to the Building Information Model on site can be useful to gain extra insight into the way systems need to be installed.

At the renovation of the Earth Simulation Lab for example, the paper project drawings contained QR codes. Scanning these with their smartphones allowed mechanics to quickly see how the installation has been modelled in 3D in that location. This provided the team with additional insights, which was useful for installing shafts or intersections.

Another example is the application of Virtual Reality. With VR glasses, it is possible to search in the building and to manipulate and measure objects. Everything you'd normally check and measure on site, can now be visualized from any location. At the MEP firm Kersten Retail, Virtual Reality plays a key role in the transfer of knowledge from the model to the execution phase. Bernard Gijsberts, company manager, explains: "Thanks to the BIM model we can give the mechanic a preview in VR of what he will encounter on site, so he is well prepared. Parts of installations that are hidden behind ceilings or walls, become visible with Virtual Reality in an almost magical way. The collaboration between the modeler, mechanic and client in this process is of inestimable value."





Thanks to the following MEP firms:

AGO Groep Installatiebedrijven - Torckdael Wageningen

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Lammerink Installatietechniek and People Power - Earth Simulation Lab Utrecht

Sanitair Installatie Hoogendoorn - European Patent Office The Hague

Steboma Ventilatietechniek - Golden Gate of Amsterdam

Would you like to know more about BIM or find out how you can successfully make a start with BIM?

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