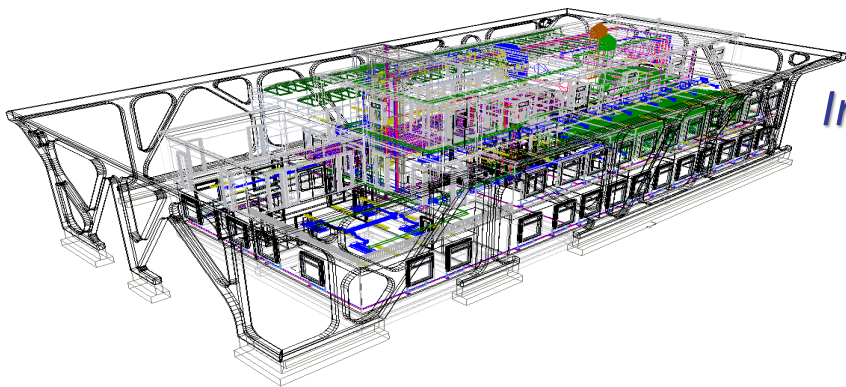


# *Il BIM per la progettazione impiantistica*

*Ordine degli Ingegneri di Pistoia*

*04 Aprile 2017*



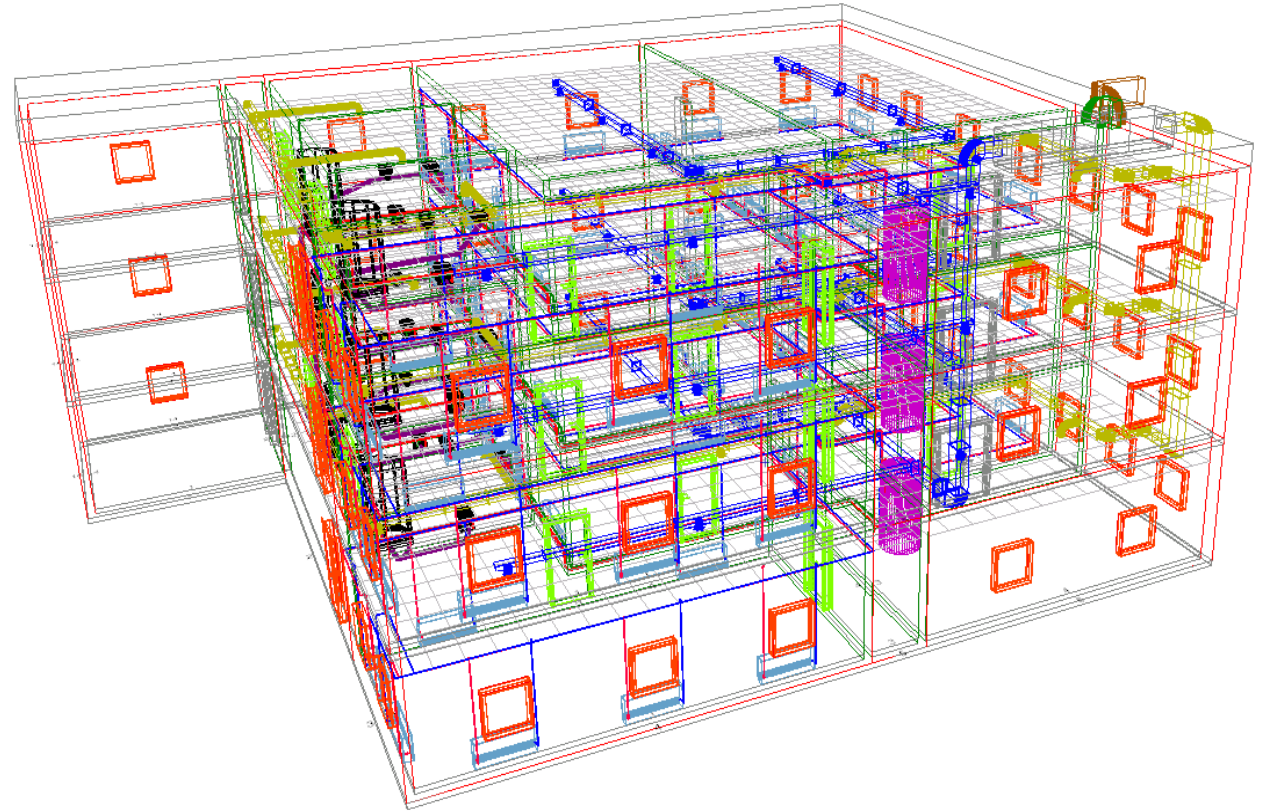
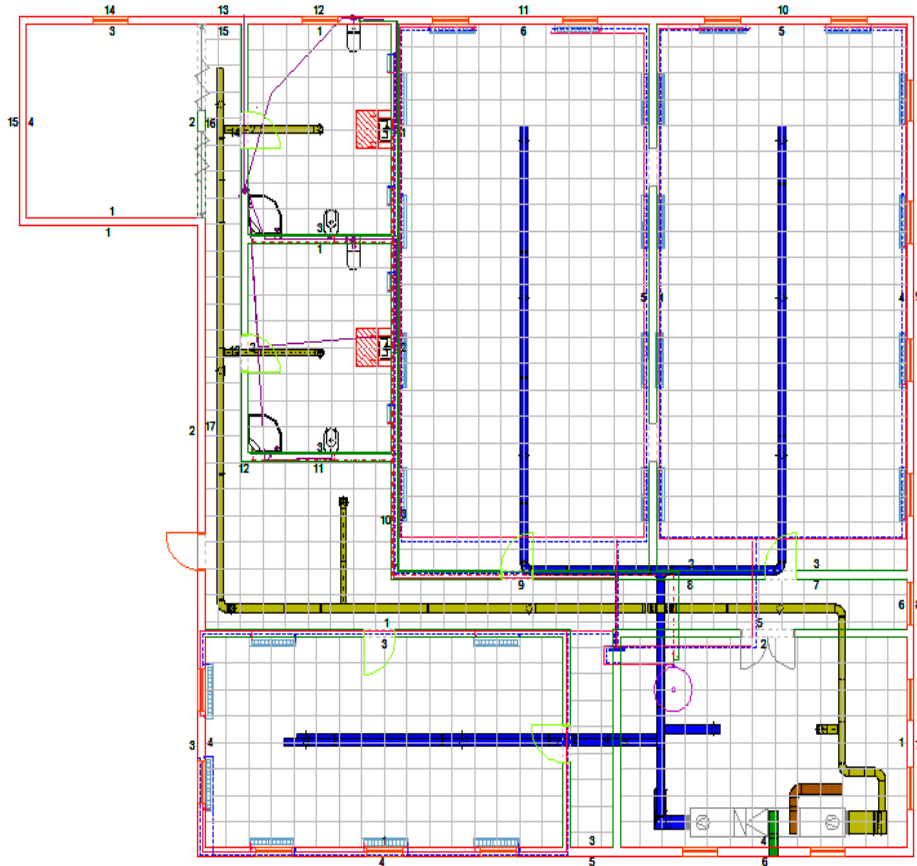
*Ing. Marco Rognoni (rognoni@harpaceas.it)*

*Supporto Tecnico*

*Settore Bim Architettonico Impiantistico*

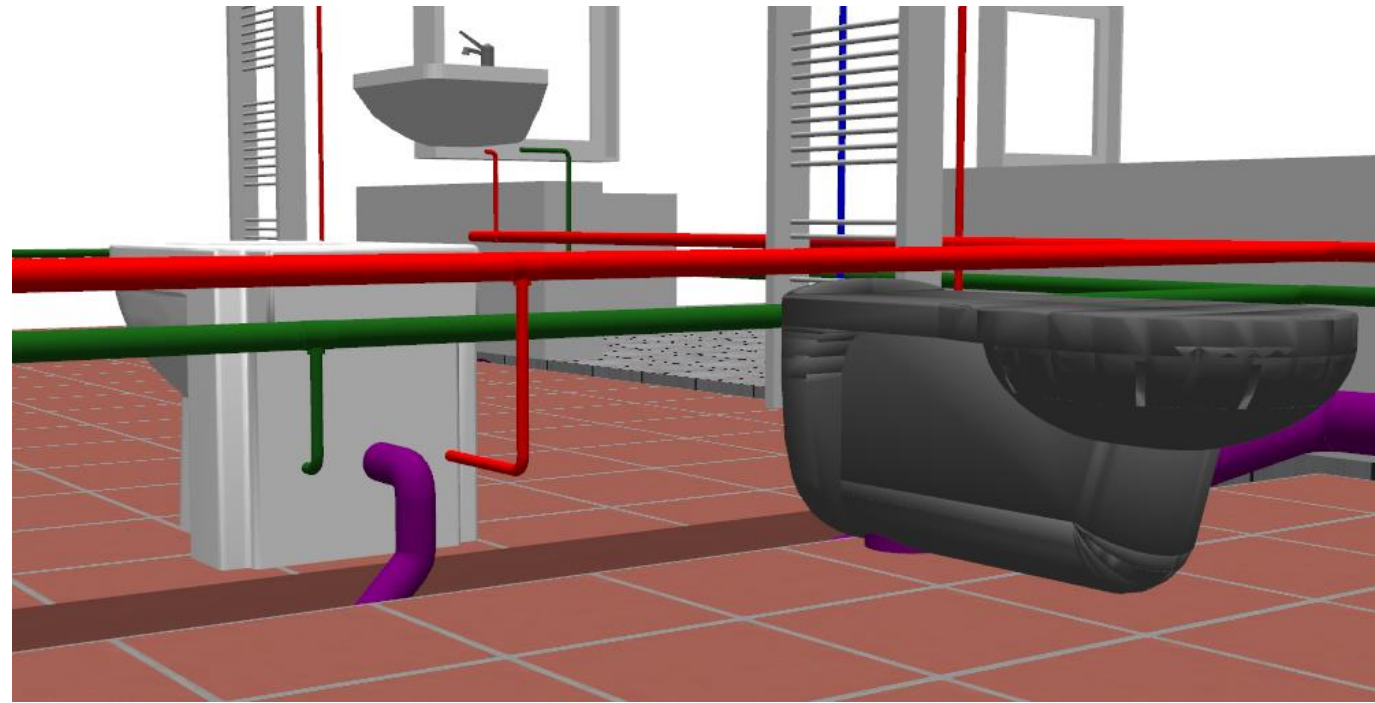
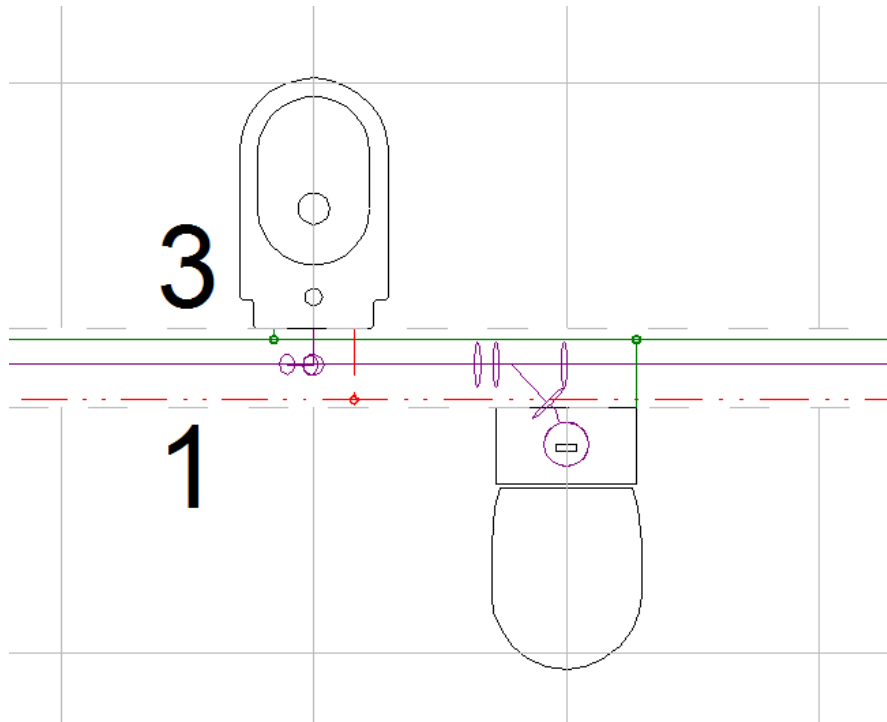


# MODELLO 2D vs MODELLO 3D



Prima il progetto nasceva in 2D con un controllo a posteriori sulla terza dimensione, **ora si progetta direttamente in 3D** con i vantaggi che indiscutibilmente ne derivano:

## MODELLO 2D vs MODELLO 3D

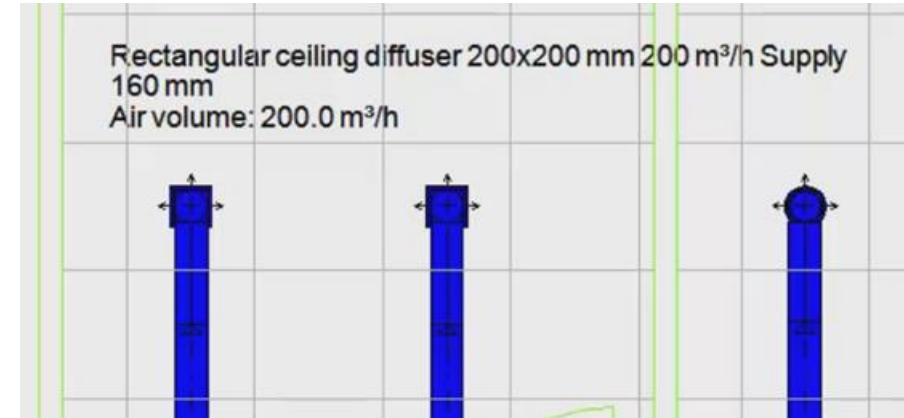
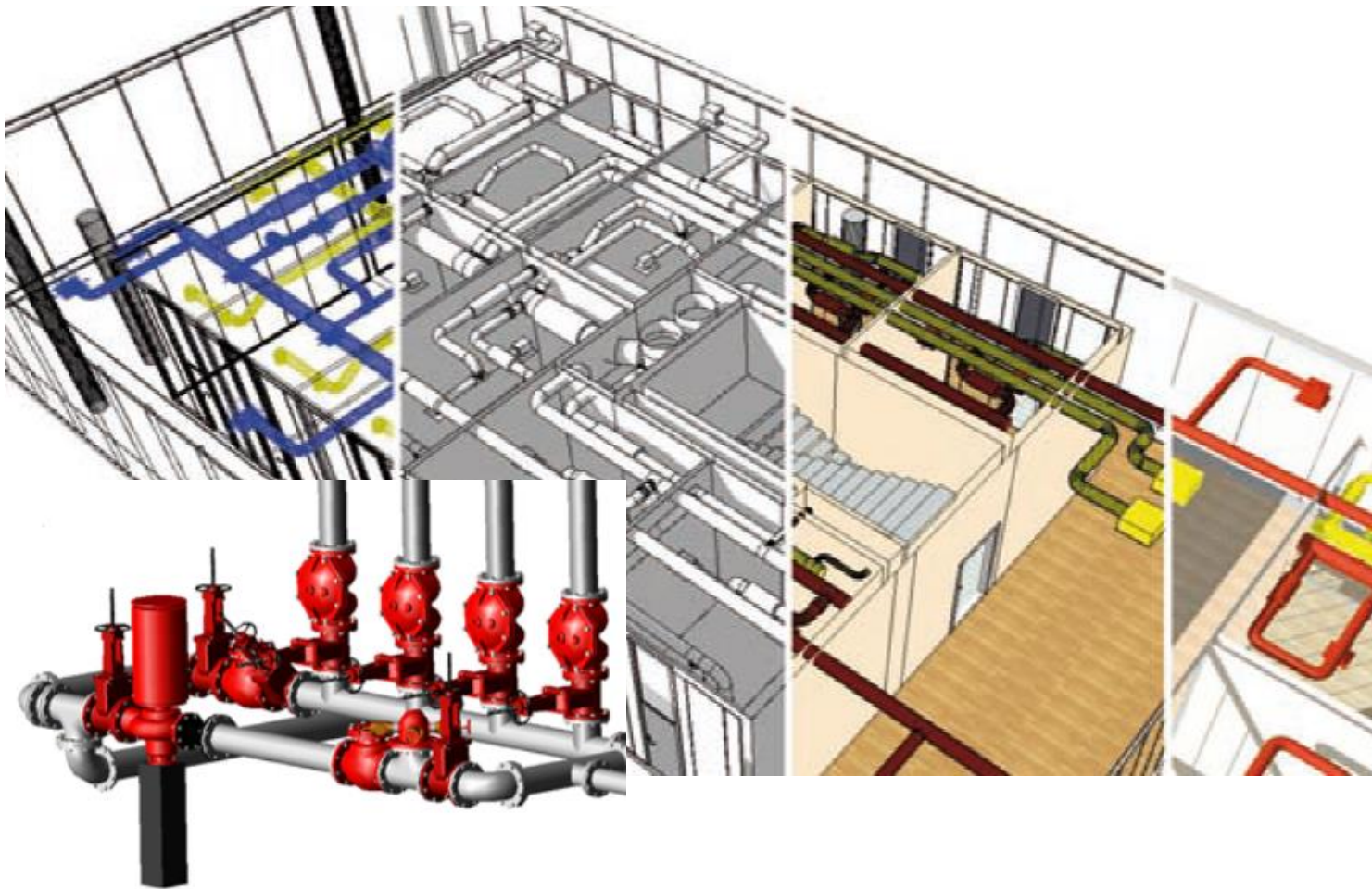


→ Visualizzazione di *dettagli costruttivi in ogni fase* del processo; anticipazione di incongruenze estetiche, geometriche, errori umani, etc.

→ Estrazione tavole architettoniche in ogni momento del processo. *Vantaggio (riduzione tempi attesa) per gli impiantisti;* conoscenza preventiva di costi, materiali necessari, condizioni di installazione, etc.



# MODELLO 2D vs MODELLO 3D

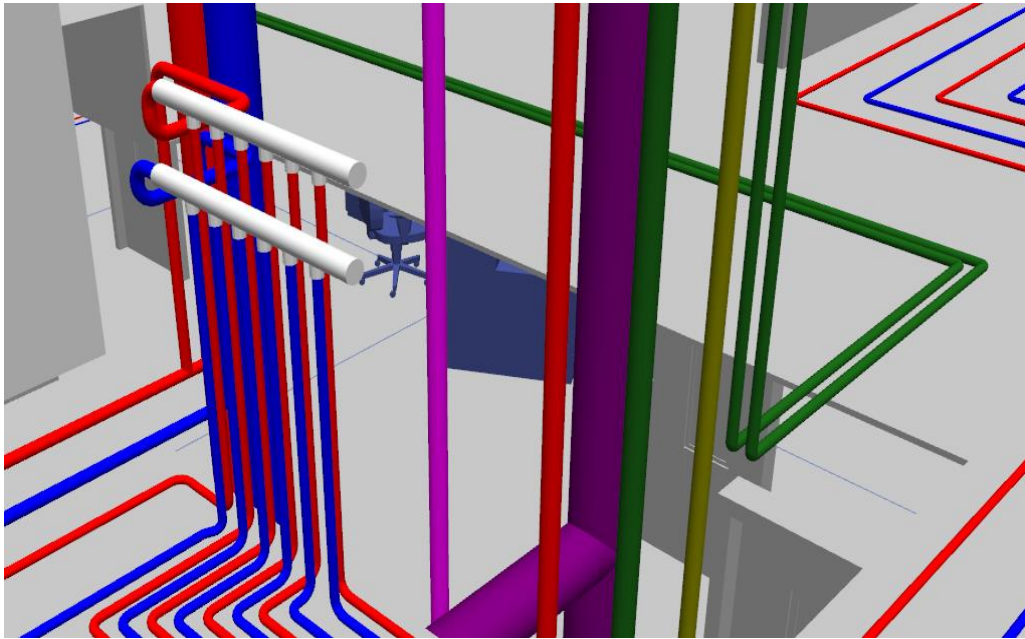


→ *Progetto presentato in forme più chiare* (anche con l'ausilio di opportune colorazioni, etichette numeriche, svariate possibilità di visualizzazione etc.)

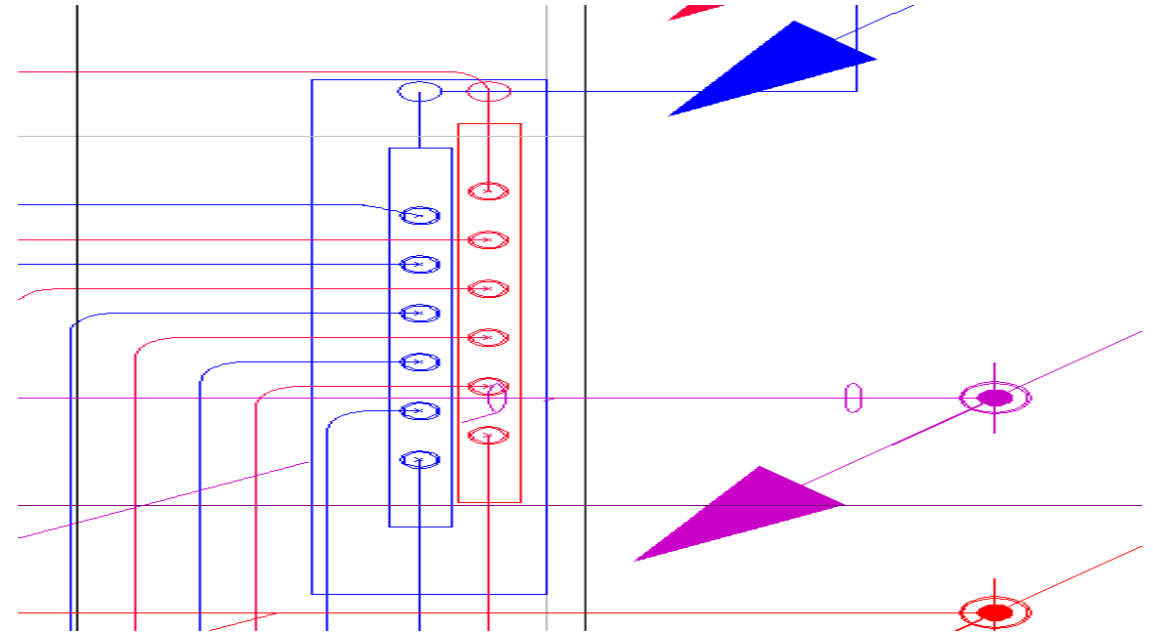


# MODELLO 2D vs MODELLO 3D

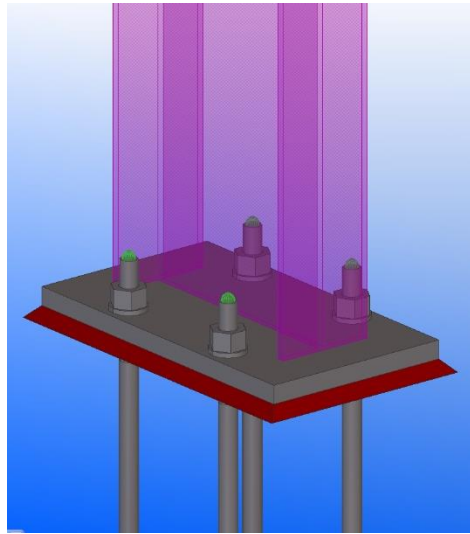
→ Modello 3D assicura maggior chiarezza, livello di dettaglio, accuratezza e riduzione delle tempistiche nelle varie operazioni



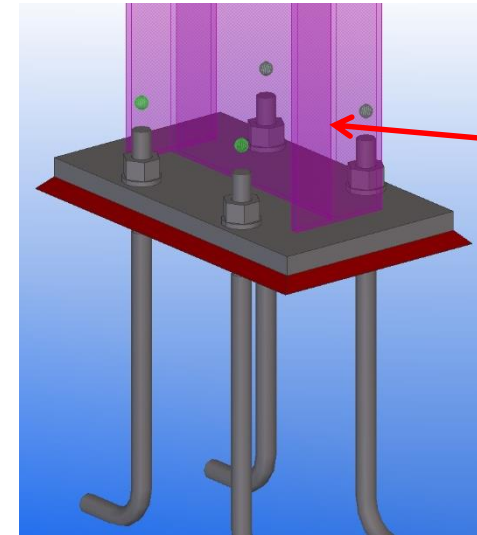
VS



# MODELLO 2D vs MODELLO 3D



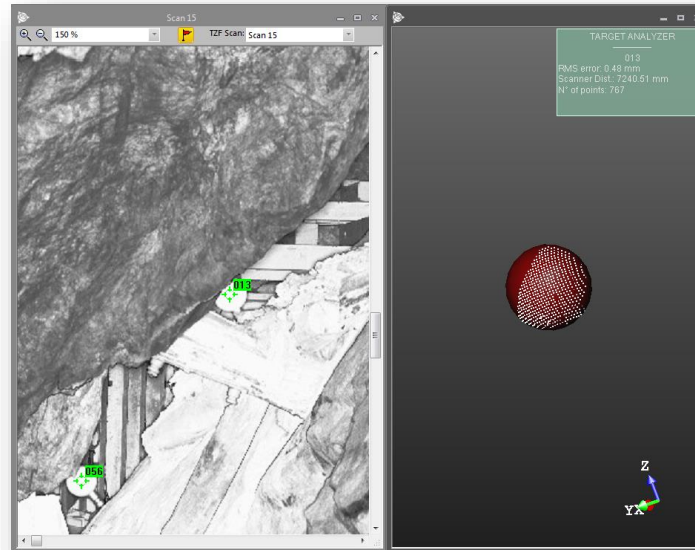
Trasferimento di punti notevoli dal modello Bim al cantiere e ritorno



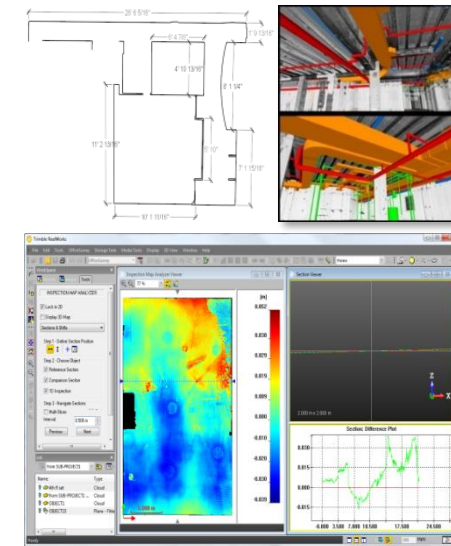
Posizione reale più elevata rispetto alla quota riportata a modello. Aggiorno modello → As built



Laserscanning



Data processing

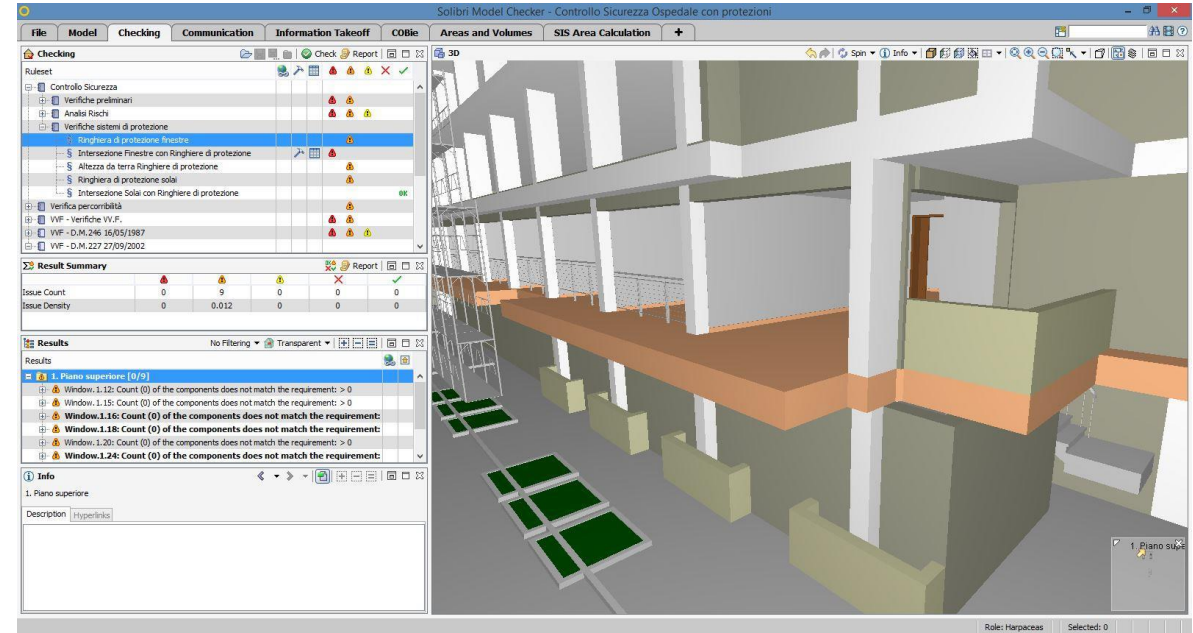




# MODELLO 2D vs MODELLO 3D

Vantaggio sia in fase di progettazione che in fase di costruzione:

→ Incremento della sicurezza per i lavoratori



→ Limitato utilizzo di documenti cartacei

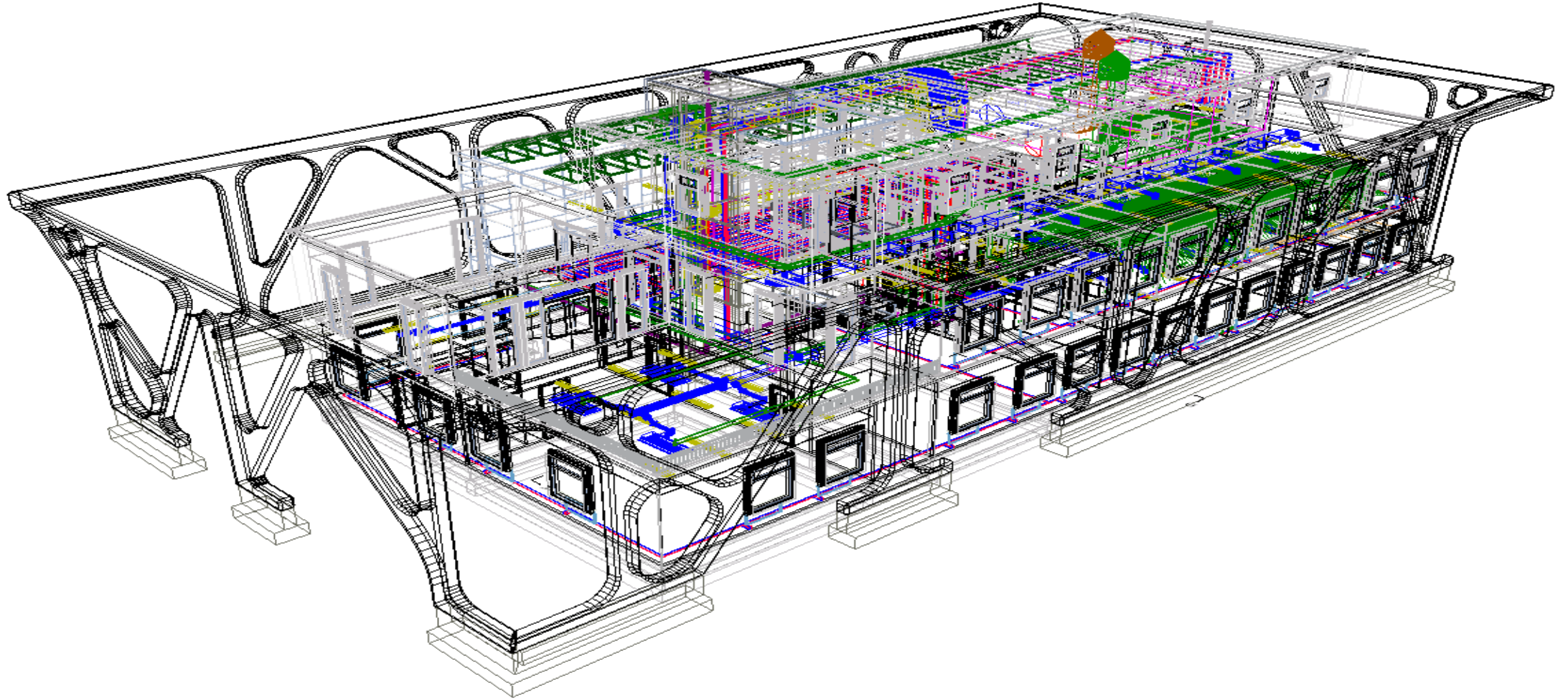


VS





# MODELLO 3D BIM MEP



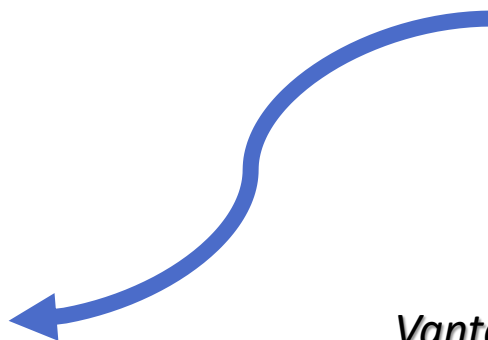
# MODELLO 3D BIM MEP

Intercollegamento tra:

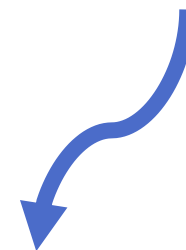
- *modello BIM*
- *computo metrico (estimativo)*
- *schemi e disegni di impianti*



Creazione automatica di distinte di computo, disegni di cantiere, schemi di impianto, etc. sempre connessi al modello ed aggiornati in tempo reale. *Si lavora contemporaneamente sui tre livelli*



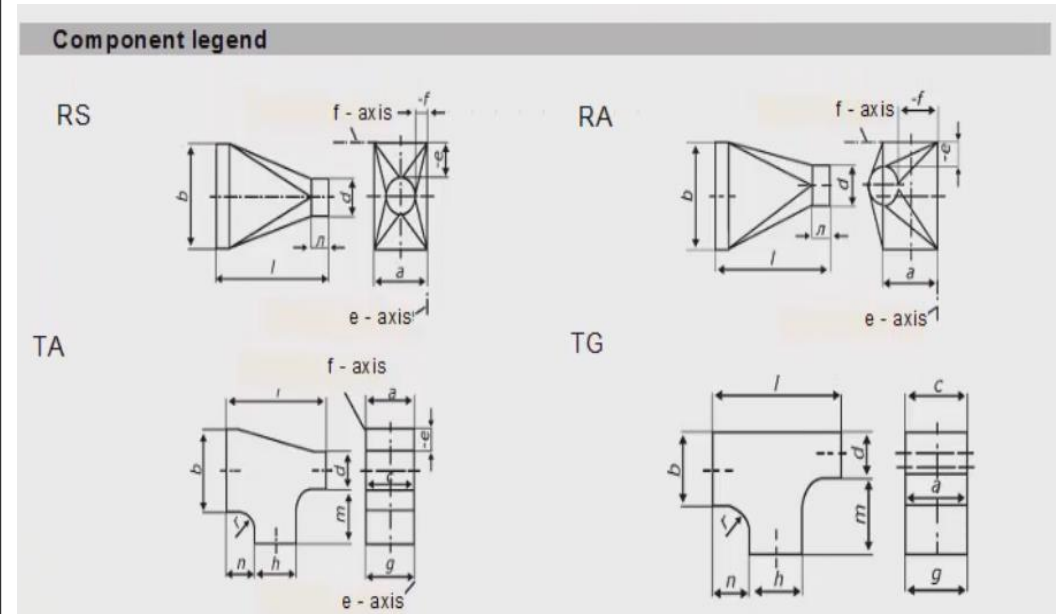
Garantita la *congruenza* tra le tavole emesse, la *qualità* e l'*autenticità* dell'informazione riportata



*Vantaggio post costruzione*: Un modello BIM finalizzato fornisce una fonte precisa di informazioni su spazi e sistemi as-built . Esso serve anche come un utile punto di partenza per la gestione e il funzionamento dell'edificio

# MODELLO 3D BIM MEP

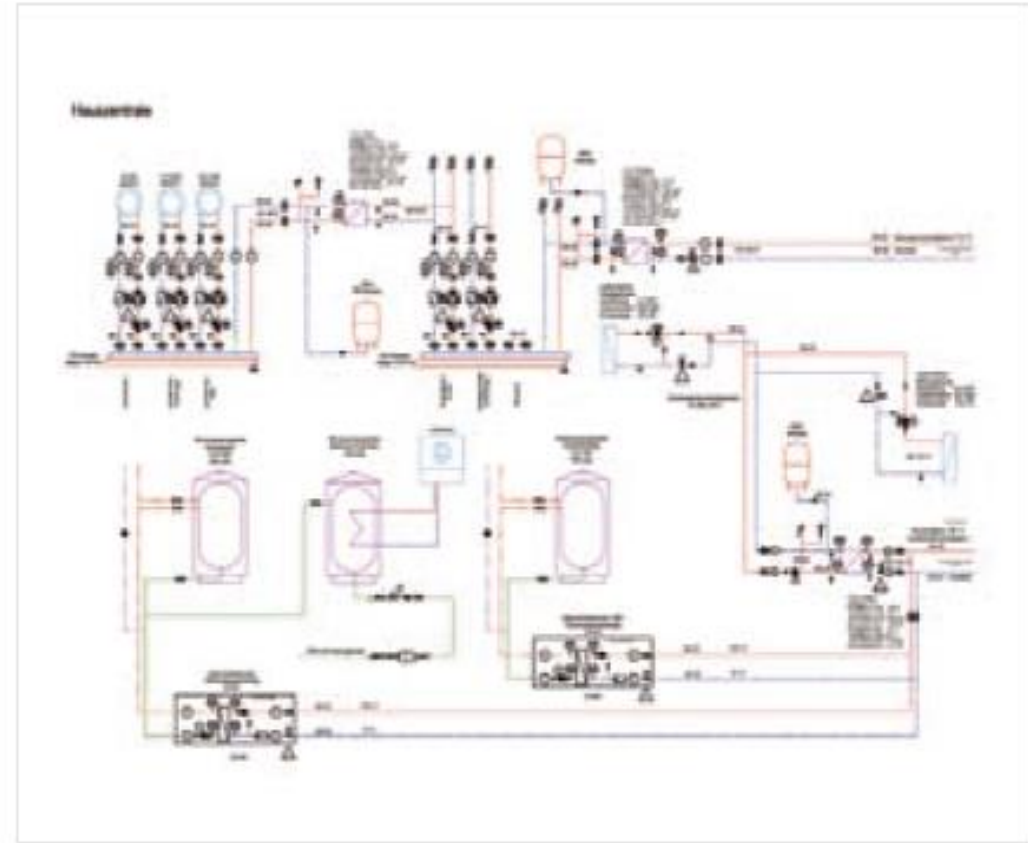
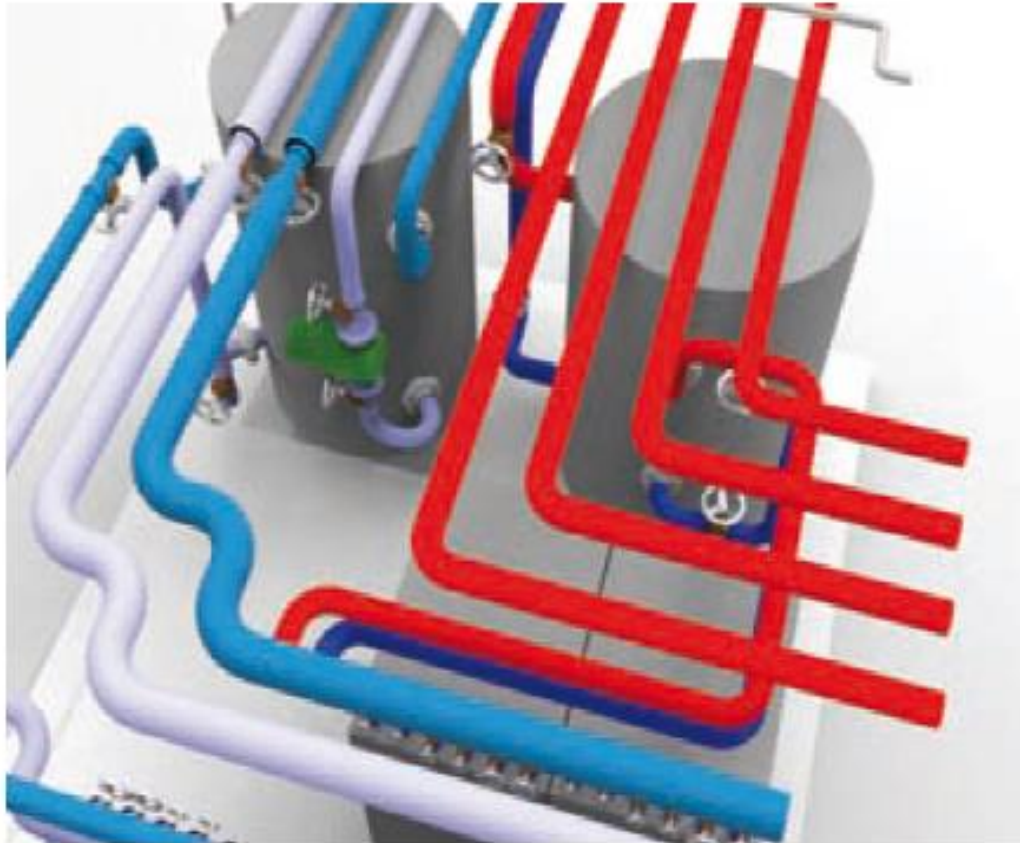
Product number	Product description	Quantity
<b>Duct and accessory</b>		
BE100090BoL	Rectangular duct bend 90°	26,00 pcs
BE8300125030	Folded spiral seamless circular bend 30° d=125 mm	7,00 pcs
BE8300125045	Folded spiral seamless circular bend 45° d=125 mm	6,00 pcs
BE8300125090	Folded spiral seamless circular bend 90° d=125 mm	12,00 pcs
BE83001250xx	Folded spiral seamless circular free d=125 mm	4,00 pcs
BE8300140090	Folded spiral seamless circular bend 90° d=140 mm	2,00 pcs
BE8300250030	Folded spiral seamless circular bend 30° d=250 mm	2,00 pcs
BE8300250090	Folded spiral seamless circular bend 90° d=250 mm	1,00 pcs
BE8300315015	Folded spiral seamless circular bend 15° d=315 mm	2,00 pcs
CH8300140125	Reducer folded spiral seamless circular d=140/125 mm symmetrical	2,00 pcs
CH8300160140	Reducer folded spiral seamless circular d=160/140 mm symmetrical	2,00 pcs
CH8300200160	Reducer folded spiral seamless circular d=200/160 mm symmetrical	1,00 pcs
CH8300250200	Reducer folded spiral seamless circular d=250/200 mm	1,00 pcs



→ *computo metrico* (estimativo)

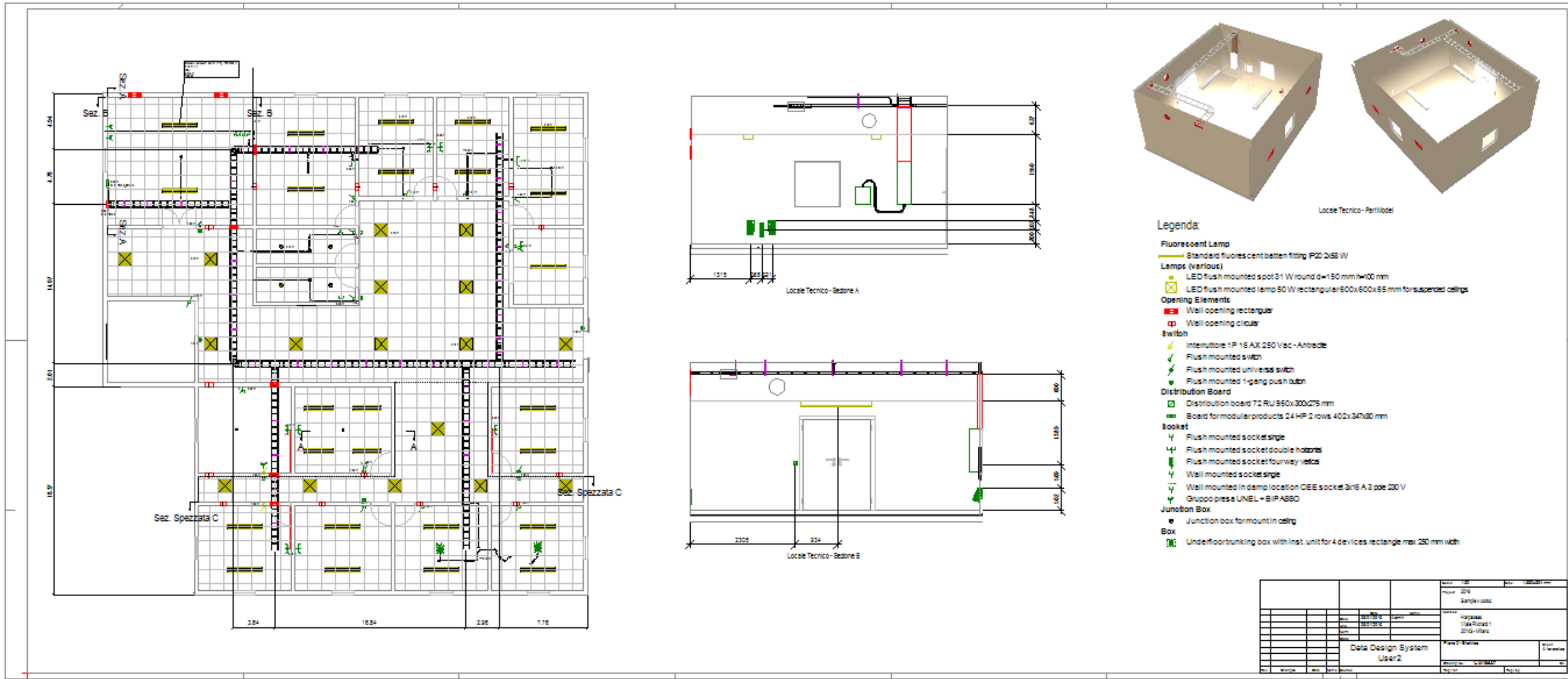


# MODELLO 3D BIM MEP



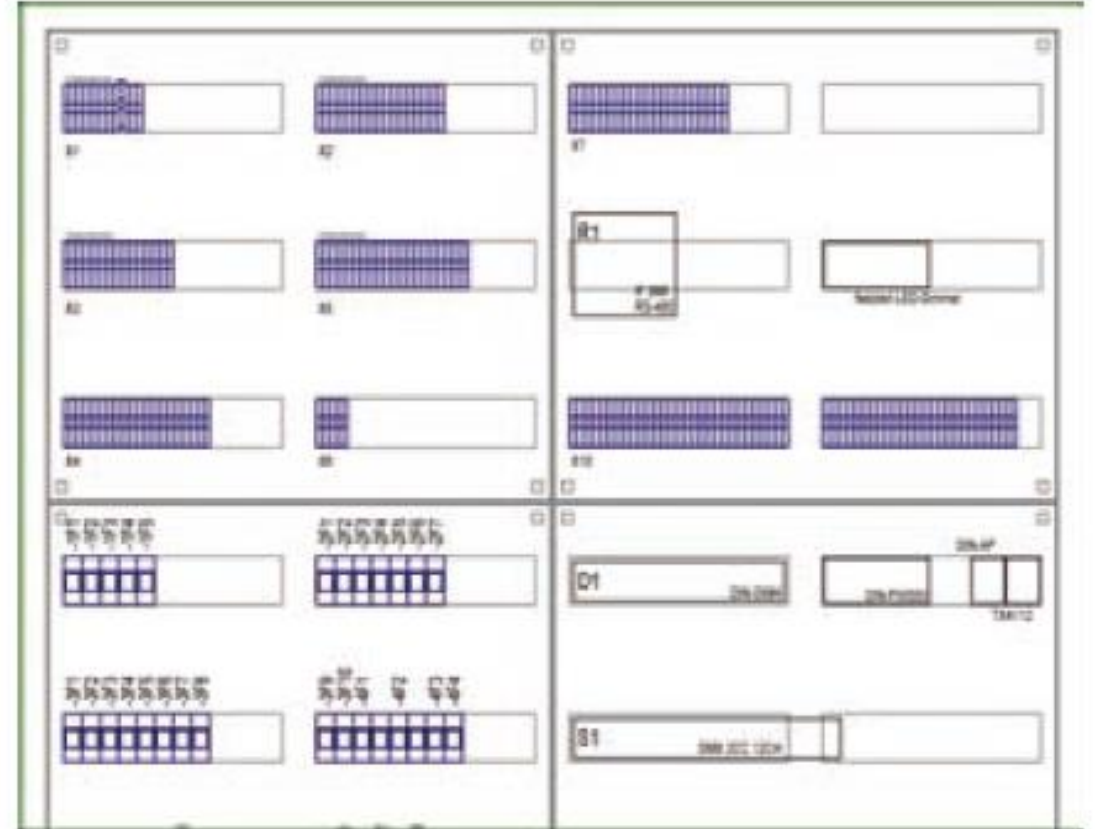
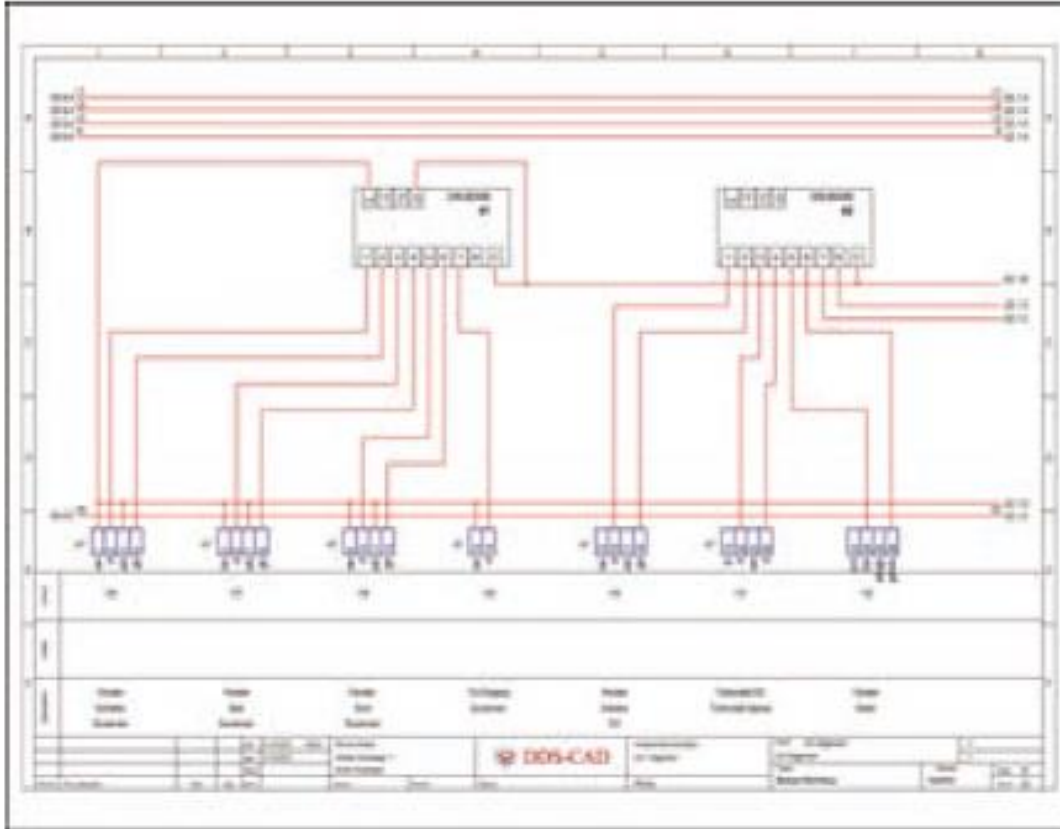
→ *schemi e disegni di impianti*

# MODELLO 3D BIM MEP



→ Layout di stampa

# MODELLO 3D BIM MEP

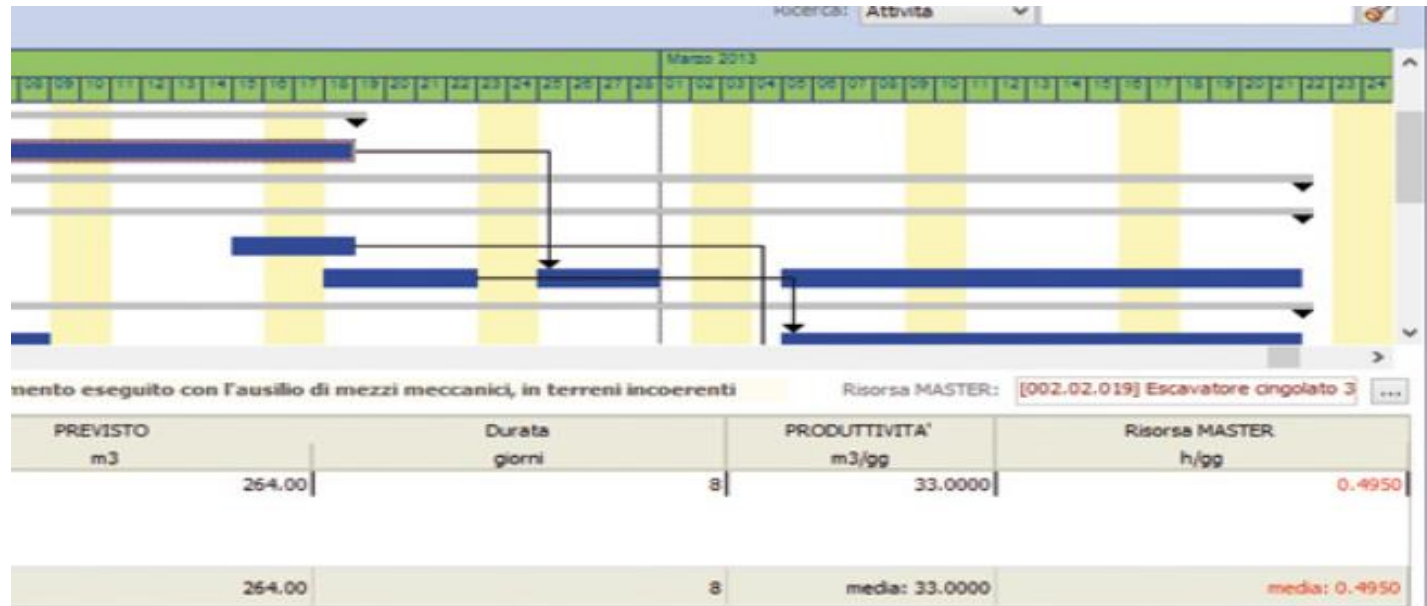


→ *schemi e disegni di impianti*



# MODELLO 3D BIM MEP

- *Controllo parametrico degli oggetti* durante la progettazione ci garantisce un perfetto allineamento tra i diversi componenti. Il modello 3D è allora costruito realmente
- Possibilità di modificare il progetto in qualsiasi momento con *aggiornamento automatico di calcoli ed estrazioni*
- Il BIM fornisce *informazioni accurate ed estremamente affidabili* per la costruzione, la struttura, i materiali utilizzati, etc compresi gli aspetti più “green” o sostenibili, come l'efficienza energetica e parametri d'illuminazione.
- *Stime economiche/cronoprogramma preventivi* e più affidabili rispetto al passato (approvvigionamento materiali, installazione, etc.)
- *Vantaggio* notevole già *in fase precostruttiva*: la Committenza valuta la fattibilità economica dell'opera; possibilità di variare il design del modello in base a tempi – costi preventivati; inoltre il BIM offre anche informazioni adeguate per la costruzione di analisi delle prestazioni e valutazioni, di vitale importanza per la progettazione di edifici sostenibili



# MODELLO 3D BIM MEP

→ Progettazione 3D, con i relativi benefici nell'attività di analisi, dimensionamento e controllo

Pressure Loss Calculation:

Config Calculation Tree view

Select Calculation Type

Current status

D	Str.	Dimension	Vol Nom	Vol Bal	Vel	Pa los
02	1.001	ø 200	1273.8	1273.8	11.3	
02	1.002	ø 200	1273.8	1273.8	11.3	
02	1.003	ø 200	0.0	0.0	0.0	
02	1.004	ø 200	1273.8	1273.8	11.3	
02	1.005	ø 200	1186.3	1186.3	10.5	
02	1.006	ø 200	1098.8	1098.8	9.7	
02	1.007	ø 200	1035.8	1035.8	9.2	
02	1.008	ø 200	972.8	972.8	8.6	
02	1.009	ø 200	832.8	832.8	7.4	
02	1.009	ø 200	552.8	552.8	4.9	
02	1.010	ø 200	412.8	412.8	3.6	
02	1.011	ø 200	210.0	210.0	1.9	
02	1.011	ø 200	0.0	0.0	0.0	

Default (MaxVel 6m/s) Pen...

Velocity limits

Tolerated velocity max 6 m/s

Tolerated velocity min 2 m/s

Min dimensions

Dimension ø 160 mm

Width 150 mm

Flow limits

Critical difference 6 %

Tolerated difference 4 %

Max dimensions

Dimension ø 1200 mm

Width 2000 mm

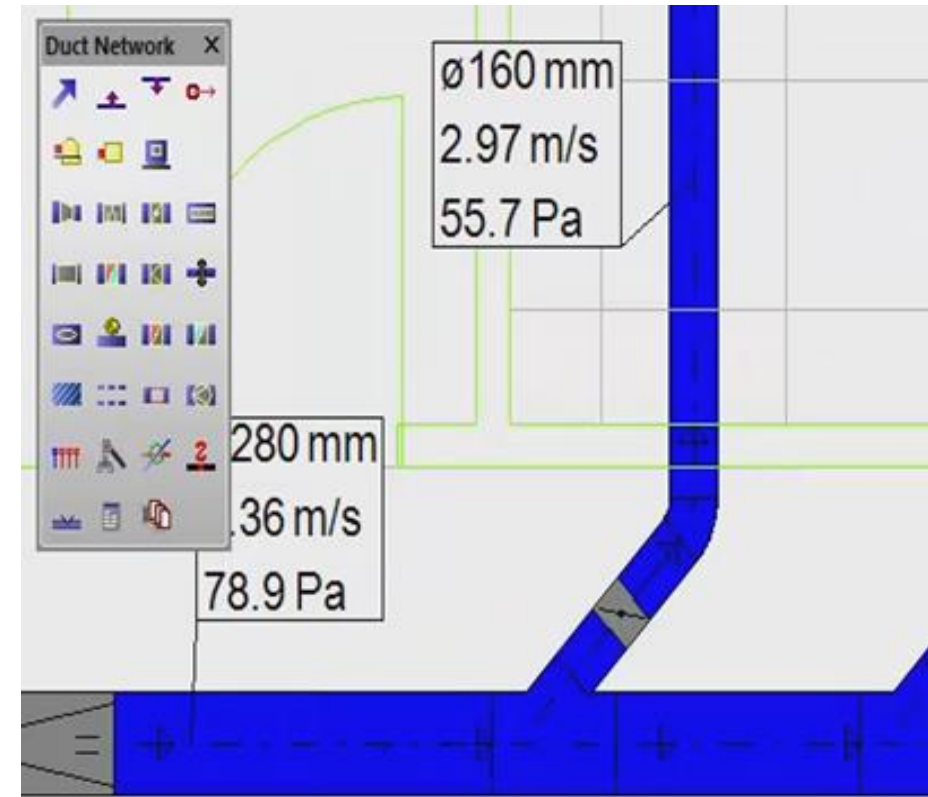
Balancing loop

Max iterations 30

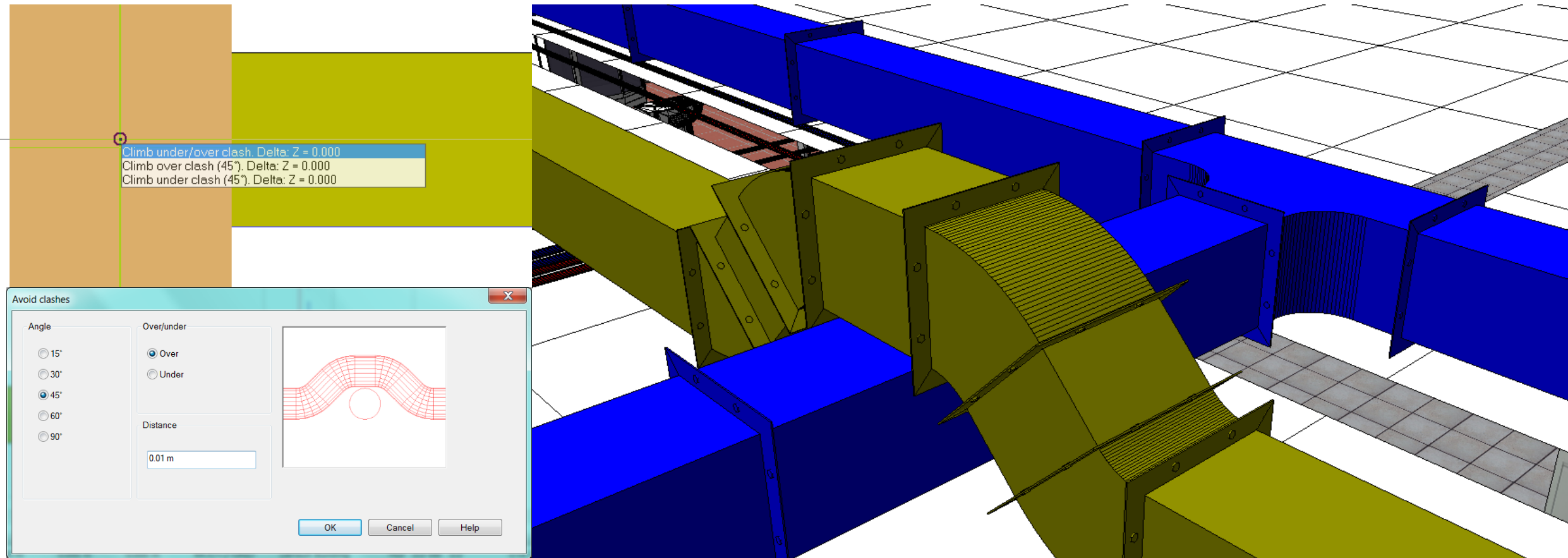
Round off value for rect. ducts

Dimension: 100 mm

Open model  Summary view



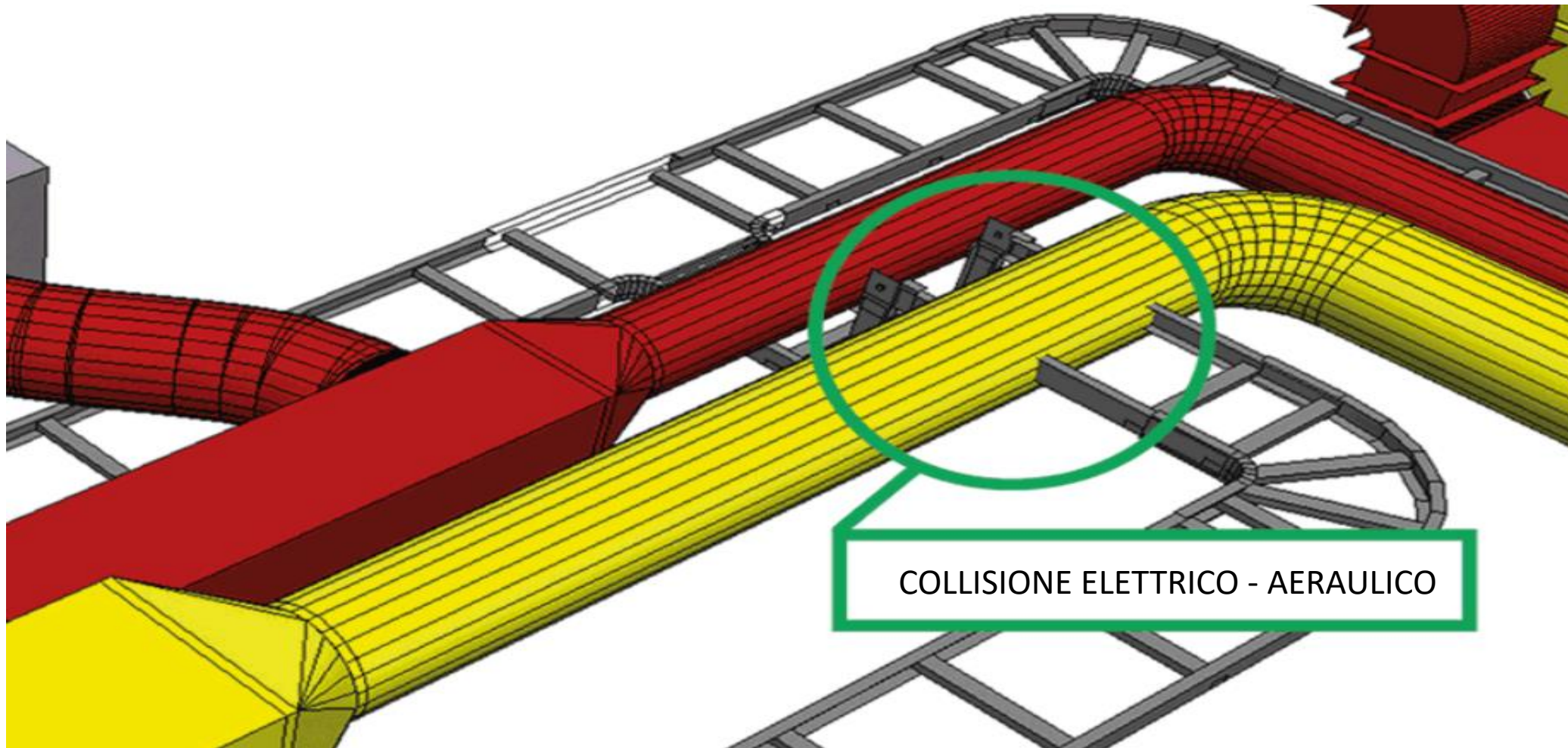
→ *Prevenzione collisioni* progettuali e coordinamento virtuale interdisciplinare durante la modellazione (**Clash prevention**)





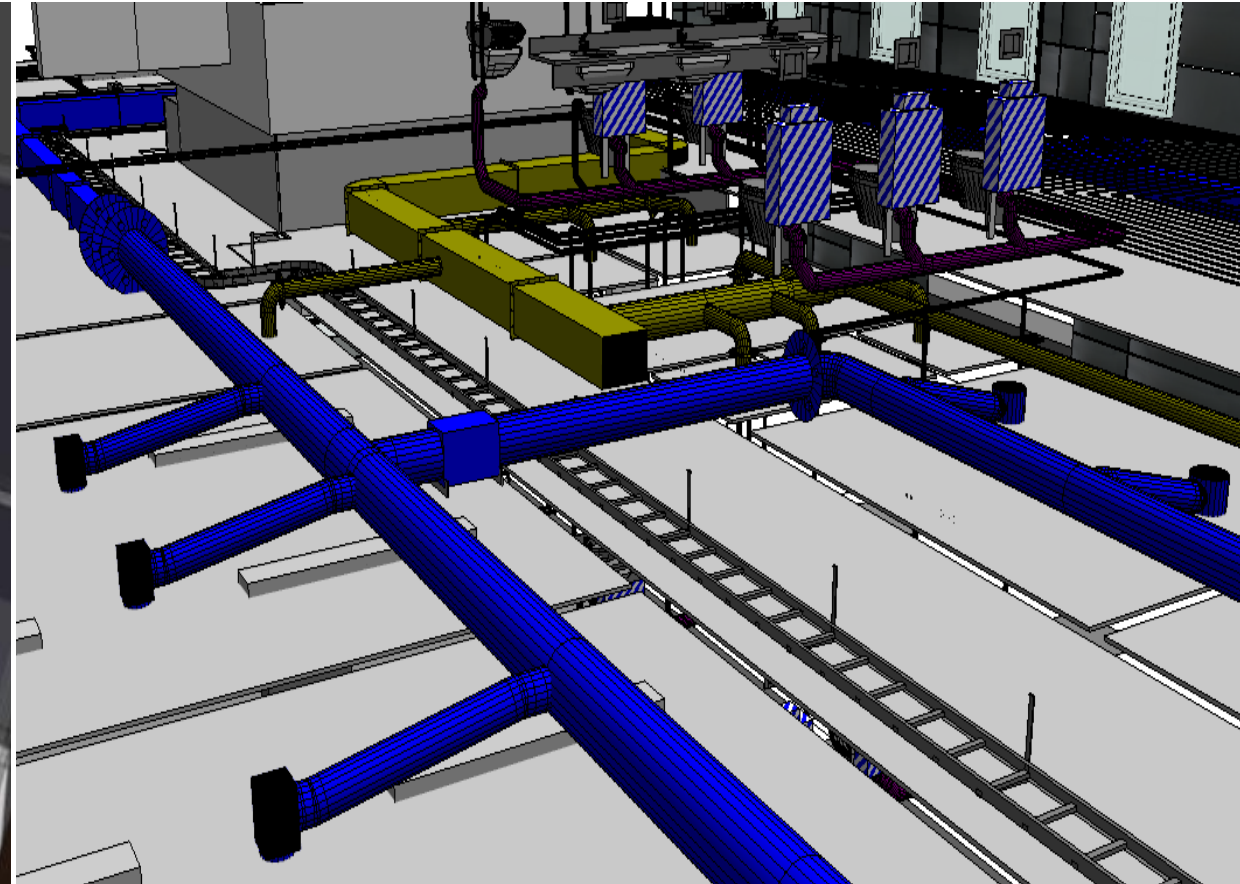
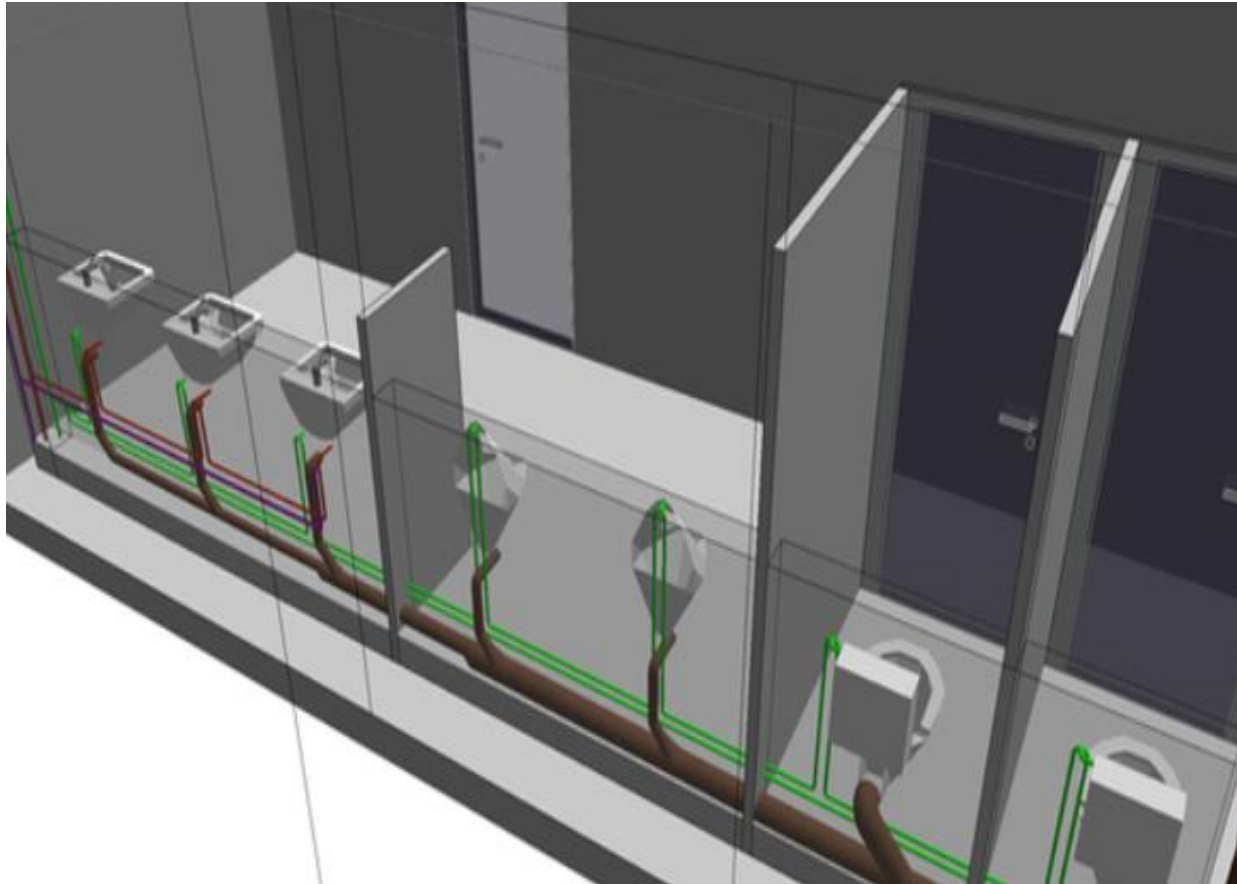
# MODELLO 3D BIM MEP

→ *Individuazione collisioni progettuali* (controllo a posteriori) e coordinamento virtuale interdisciplinare (**Clash detection**)



# MODELLO 3D BIM MEP

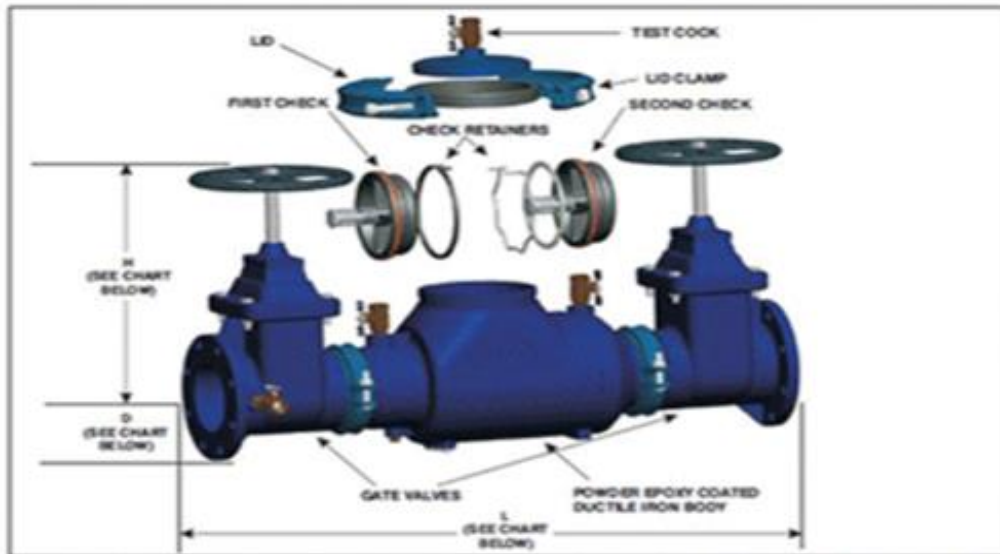
→ *Connessioni automatiche ai terminali (Automatic connection)*



# PERSONALIZZAZIONE LIBRERIE

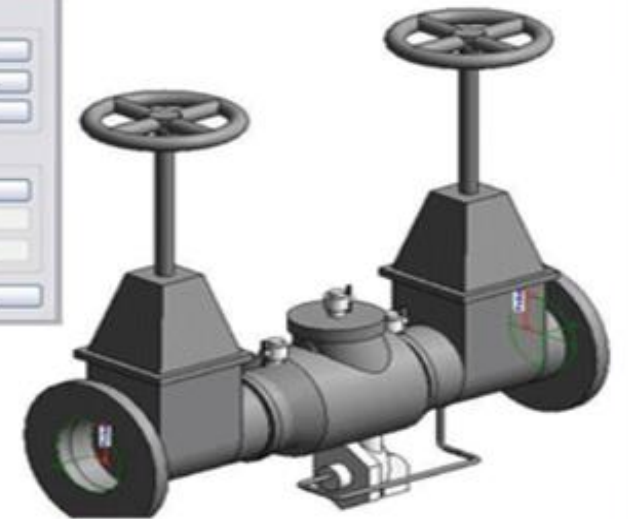
→ Catalogo dei prodotti *customizzabile*

## INPUT



Model No.	Size	L	H OSY OPEN	H NRS	D	OPTIONAL VARIATIONS:	SUFFIX
FDC2.50	2 1/2"	33.5	18.88	16.38	7	<input type="checkbox"/> Non Rising Stem Gate Valve	-NRS
FDC3.00	3"	34.5	21.88	18.88	7.5	<input type="checkbox"/> Outside Stem and Yoke Gate Valve	-OSY
FDC4.00	4"	40.8	25.63	21.63	9	<input type="checkbox"/> Meets Buy America and Pennsylvania Steel Act	-BA
FDC6.00	6"	43.8	35.13	29.13	11	<input type="checkbox"/> Strainer attached	-S
FDC8.00	8"	56.5	44.63	36.63	13.5	<input type="checkbox"/> Double Check Detector Assembly	-DCCA
FDC10.00	10"	59.5	54.5	44.5	16	<input type="checkbox"/> Grooved Flange Connection	-G
						<input type="checkbox"/> No Gate Valves	-LF

## OUTPUT





# PERSONALIZZAZIONE LIBRERIE

→ *Catalogo dei prodotti personalizzabile*

Product Database

Socket

- ... Flush mounted sockets
- ... Wall mounted sockets
- ... Floorbox trunking mounted sockets
- ... FP (Fast planning)
- ... User defined


Product number  Manufacturer

Description

Description

Description

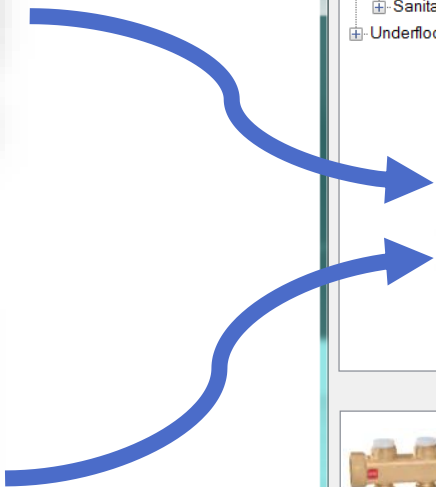
Product number	Manufacturer	Description
AM5440/16	BTicino	Presse standard tedesco e bipasso 16 A - 250 V ac
AM5440/16/2	BTicino	Presse duplex standard tedesco e bipasso 10/16 A - 250 V ac
A5180R	BTicino	presse bipasso 2P+T 10/16A - con alveoli schermati - interasse 19 e 26
AM5180	BTicino	presse bipasso standard Italia 2P+T 10/16A con alveoli schermati - int
A5180V	BTicino	presse bipasso standard Italia 2P+T 10/16A con alveoli schermati - int
AM5100	BTicino	presse di sicurezza irreversibile 2P+T per spina art. 2200NA o 2200NN
AM5180/2	BTicino	presse duplex bipasso 2P+T 10/16A - alveoli schermati - interasse 19 e
AM5113	BTicino	presse standard Italia 2P+T 10A 250v ac - interasse 19 mm - alveoli pr
AM5180/3	BTicino	presse triplex bipasso 2P+T 10/16A - alveoli schermati - interasse 19
AM5115D	BTicino	presse americana 2P - 15A - 127/250V ac - duplex - alveoli schermati -
A5115T	BTicino	presse americana 2P+T - 16A - 127/250V ac - alveoli schermati - colore
A5115S	BTicino	Presse UL 2P 15A 127/250V ac - colore bianco
AM5025	BTicino	presse euroamericana 2P - 16A - 127/250V ac - alveoli schermati - col
SK-131015142630	BTicino	Presse standard tedesco e bipasso 10/16 A - 250 V ac
AM5025T	BTicino	presse euroamericana 2P+T - 16A - 127/250V ac - alveoli schermati - co
AM5025D	BTicino	presse euroamericana 2P+T - 16A - 127/250V ac - duplex - alveoli scher
AM5085C2	BTicino	caricatore con 2 prese USB con tensione 5V dc per dispositivi elettric
AM5285C	BTicino	caricatore USB con tensione 5V dc per dispositivi elettronici tipo ce



Picture preview  Show only used products  Flat mode

OK Cancel Help Show more

# PERSONALIZZAZIONE LIBRERIE



Product Database

Manifold

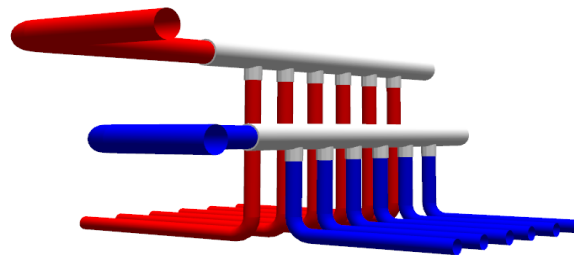
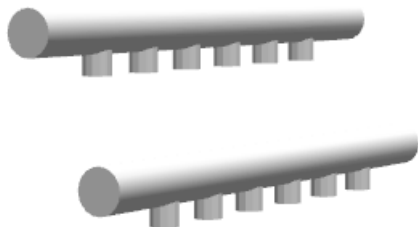
- Generic
  - Radiator
    - Direct connection
    - With heat exchanger
  - Underfloor heating
  - Sanitary
  - Underfloor heating

Product number: [dropdown]  
 Description: [dropdown]  
 Description: [dropdown]  
 Manufacturer: [dropdown]

PDF [icon] X [icon] OK Cancel Help Show more

Product number	Description
354052	:Collettore semplice, componibile, con valvole di intercettazione 3/4" x 2
354053	:Collettore semplice, componibile, con valvole di intercettazione 3/4" x 3
354055	:Collettore semplice, componibile, con valvole di intercettazione 3/4" x 4
354056	:Collettore semplice, componibile, con valvole di intercettazione 3/4" x 5
360210	:Coppia supporti per il fissaggio di collettori serie 354 e cassette serie 360 ...
364150	:Tappo 3/4" M
364160	:Tappo 1" M
364254	:Raccordo di testa per collettori serie 360 3/4" M x 1/2" F
356502	:Collettore complanare fuso monoblocco 3/4" 2+2
356504	:Collettore complanare fuso monoblocco 3/4" 4+4
356506	:Collettore complanare fuso monoblocco 3/4" 6+6
356508	:Collettore complanare fuso monoblocco 3/4" 8+8
356510	:Collettore complanare fuso monoblocco 3/4" 10+10
356604	:Collettore complanare fuso monoblocco 1" 4+4
356606	:Collettore complanare fuso monoblocco 1" 6+6
356608	:Collettore complanare fuso monoblocco 1" 8+8
356610	:Collettore complanare fuso monoblocco 1" 10+10
662665	:Coppia collettori attacco 1" x 6 derivazioni 3/4"

Picture preview  Show only used products  Flat mode



# PERSONALIZZAZIONE LIBRERIE

bellung Tools Window Help

Ground Floor - Ductwork model 2D ...

scheda tecnica 1.pdf

### Valvole di ventilazione circolari regolabili

SR 143 - SR 149 acciaio o plastica

SR 143 SR 149

**CAMPO DI APPLICAZIONE**

- Ripresa per tutte le applicazioni di ventilazione in locali di piccole dimensioni dal sistema tecnico.
- Posizionamento a muro o a soffitto.

**DESCRIZIONE**

- Manico regolabile.
- SR 143: acciaio inossidabile spazzolato bianco RAL 9010.
- SR 149: polipropilene bianco.
- Flangia ad innesto all'interno del canale.

**ACCESSORIO**

- Manichette di secondo fondo.

**GAMMA COMPLEMENTARE**

- Ventole: laminare, fessure variabili, secondo scheda SR4 (normalizzata).

**INGOMBRO**

Manichetta SR 143  
Scatoleta SR 149


Manichetta SR 143 con manichetta

Modello		Punti di controllo per le SR 143 SR 149					
SR 143		SR 149					
Dimensioni (mm)	SR 143	SR 143	SR 143	SR 143	SR 143	SR 143	SR 149
Dimensioni (mm)	SR 143	SR 143	SR 143	SR 143	SR 143	SR 143	SR 149
Ø 100	1100324	1100324	1100324	1100324	1100324	1100324	1100324
Ø 125	1100327	1100327	1100327	1100327	1100327	1100327	1100327
Ø 150	1100328	1100328	1100328	1100328	1100328	1100328	1100328
Ø 200	1100329	1100329	1100329	1100329	1100329	1100329	1100329

Catalogo 02/14 75



# CAPITOLO ITALIANO BUILDING SMART



International home of openBIM

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only in current section





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## About buildingSMART

BuildingSMART is a world-wide alliance driving the development of open internationally-recognised standards, tools and training to support the wider use of Building Information Modelling (BIM) across the architecture, engineering and construction (AEC) and facilities management (FM) industries.



### Developing open standards & specifications for BIM

#### Open standards

Our open standards for information sharing are covered by the Industry Foundation Classes (IFC) data model, the Information Delivery Manual (IDM) data exchange protocols, and the buildingSMART Data Dictionary (bSDD).

- [IFC data model](#)
- [IDM data exchange](#)
- [bSDD data dictionary](#)

### Practical support for BIM implementation

#### Software

Our ISO-endorsed software certification process allows vendors to demonstrate that their building information modelling (BIM) applications conform to the latest open standards.

- [Software certification scheme](#)
- [Currently certified software](#)

### News


#### bSI International Council meeting in Beijing - May 2014

Details of the bSI International Council meeting in Beijing on 19th - 21st May 2014 are now available

[Read More...](#)

#### IHA signs Statement of Intent

The International Housing Association (IHA) has pledged its support for Building Information






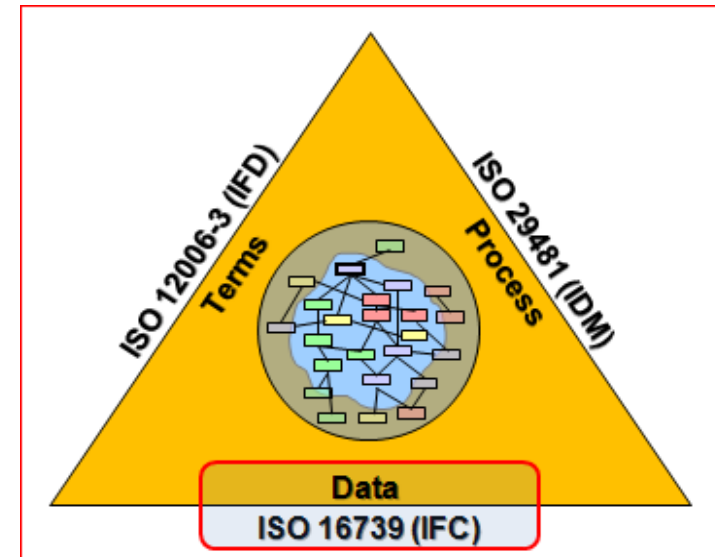
# CAPITOLO ITALIANO BUILDING SMART

BuildingSMART develops and maintains international standards for [openBIM](#), combining:



- buildingSMART Processes – (IDM) Information delivery manuals
- buildingSMART Data Dictionary - (bsDD, former IFD) Library
- buildingSMART Data model - [Industry Foundation Classes](#) (IFC) data model

IFC Data File Formats and Icons		
IFC data files are exchanged between applications using the following formats and should be indicated by the published icons:		
.ifc	IFC data file using the STEP physical file structure according to ISO10303-21. The *.ifc file shall validate according to the IFC-EXPRESS specification.  This is the default IFC exchange format.	
.ifcXML	IFC data file using the XML document structure. It can be generated directly by the sending application, or from an IFC data file using the conversion following ISO10303-28, the XML representation of EXPRESS schemas and data.  Note: an .ifcXML file is normally 300-400% larger than an .ifc file.	
.ifcZIP	IFC data file using the PKzip 2.04g compression algorithm (compatible with e.g. Windows compressed folders, winzip, zlib, info-zip, etc.). It requires to have a single .ifc or *.ifcXML data file in the main directory of the zip archive.  Note: an .ifcZIP files usually compress an .ifc down by 60-80% and an .ifcXML file by 90-95%.	





# GESTIONE MODELLI 3D – FILE IFC

## Lightweight Capture of As-Built Construction Information

E. East  
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N. Nisbet, J. Wix  
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**ABSTRACT:** Discussions of Building Information Modeling (BIM) often center on commercial software and building geometry. Such discussions typically ignore the need for information capture and exchange during construction. This paper identifies several patterns of information exchange needed for the capture and delivery of construction handover data. A prototype tool set, bimServices, has been developed to support of these information exchange patterns. The paper also includes specific examples of how the prototype tool would be used to capture and transmit as-built construction information.

### 1 INTRODUCTION

The use of BIM during construction has focused, for the most part, on the visualization and manipulation of the geometric model elements. Anecdotes of large commercial contractors indicate that they often create a BIM for complex areas within a given project to resolve design discipline conflicts and to identify items prior to construction. Many contractors use BIM to create 3D objects in three dimensions. This visualization reduces on-site conflicts during construction. A leading U.S. trade publication, *ENR*, reports that the use of BIM during construction activities results in less re-work [Post 2009]. The use of BIM allows the creation of so-called 4D models. The objective of 4D models is to reduce on-site conflicts due to timing and or movement of products in manufacturing. The practical use of 4D models is visible on time-constrained projects such as China's Olympic stadium, where the technology links building construction in sequence [Tekin 2009].

The use of commercial software for geometry in static and time-dependent models is the most easily adopted approach. Commercial software firms and users create these models. These models are typically created by the "jockey" at the prime contractor's computer to present the model and identify problems resolved to update the design. Design changes are fed back into the BIM model and used in the production of improved construction documents. Today's efforts require a single party, typically the architect, to be responsible for the creation and publication of a model. Such "point applications" of BIM are far from the vision of models that capture the entire transformation of owner functional requirements throughout the project life-cycle. The life-cycle perspective is a key tenet of buildingSMART and large public owners such as the Corps of Engineers who are adopting open standards approaches for BIM exchange.

The American Institute of Architects recently released its document describing the expected evolution of design practice called the Integrated Design Practice [AIA 2009]. In that document, AIA acknowledges that while the design executive maintains overall project leadership, there are parts of the design that are led by appropriate consultancies. This document illustrates that there will not be a single design executive during the design process. The use of BIM during construction activities results in less re-work [Post 2009]. The use of BIM allows the creation of so-called 4D models. The objective of 4D models is to reduce on-site conflicts due to timing and or movement of products in manufacturing. The practical use of 4D models is visible on time-constrained projects such as China's Olympic stadium, where the technology links building construction in sequence [Tekin 2009].

For many practitioners today, the correlation between the question of proprietary technology and the definition of information exchange is assumed that a single proprietary software stack will provide a seamless transmittal of information through the entire set of project stakeholders. This assumption is incorrect.

Regardless of the technology used, if information is to be shared, the precise definition of the content of that deliverable is critical to the success of the information by others. Thus the correlation between the question of proprietary technology and the definition of information exchange with BIM is not really one of technology but of defining the specific requirements of the information exchange.

For many public owners, as well as owners interested in maintaining control of their facilities information, the use of proprietary data formats and media is problematic. Over time, proprietary data formats are superseded by later non-compatible versions and storage media becomes obsolete. Owners interested in ensuring competitive markets and maintaining control of their facilities' information require open standards. The commonly acknowledged open standard for building information is the Industry Foundation Class (IFC) model. IFC, however, only provides a starting framework for the

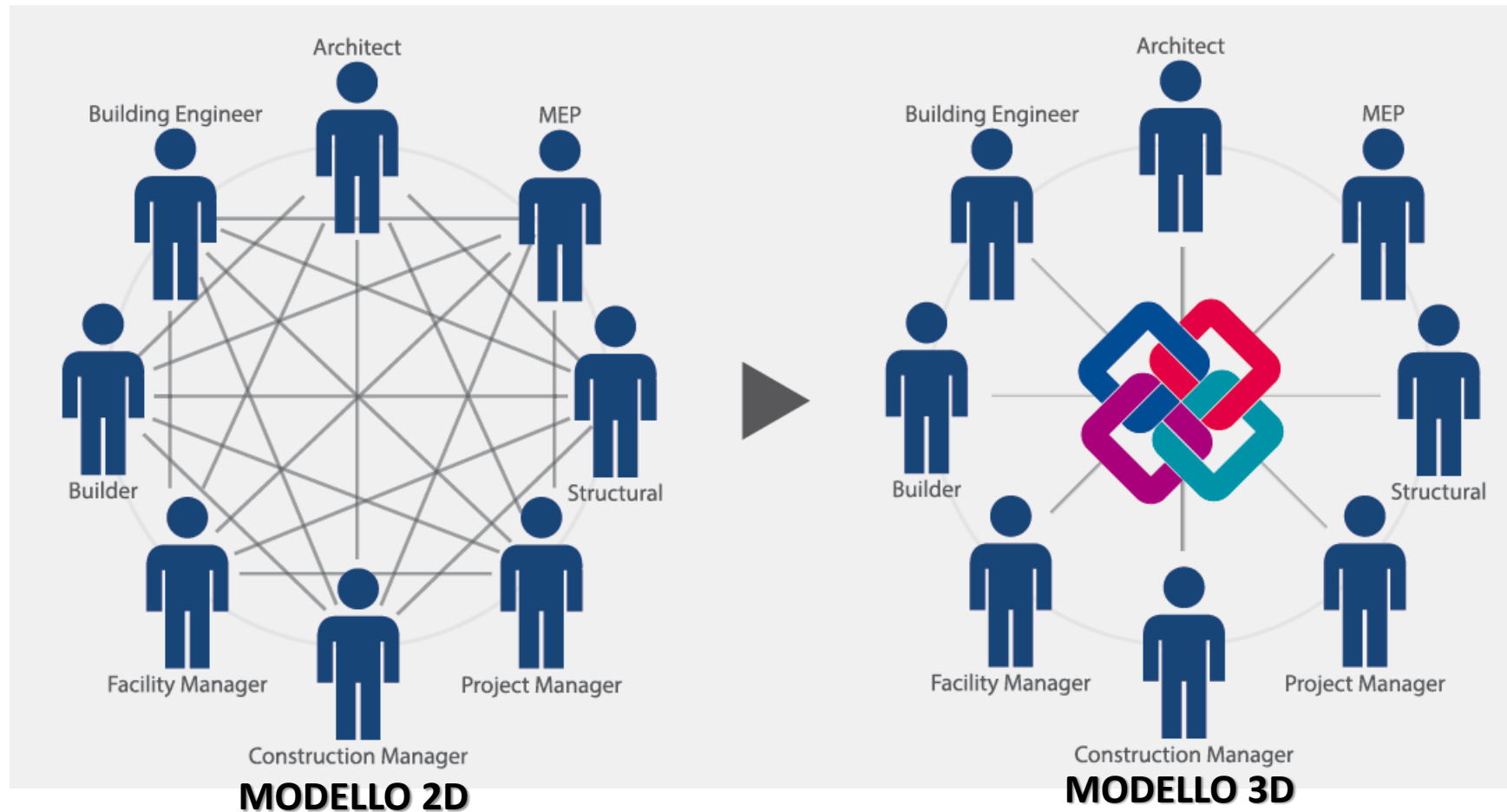


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# GESTIONE MODELLI 3D – FILE IFC

## INTEROPERABILITA'



*Tutti i partecipanti alla realizzazione dell'opera lavorano sullo stesso modello dialogando tramite un medesimo linguaggio digitale*

# STRUTTURA DELLA SINTASSI IFC



```
1 ISO-10303-21;
2 HEADER;
3 FILE_DESCRIPTION('IFC2x3 Coordination View'),'2;1');
4 FILE_NAME('C:\\Users\\alli.HARPA\\Desktop\\Ifc da Allplan2013.ifc',
5 '2013-04-30T17:02:38',('alli'),('','')),
6 'EXPRESS Data Manager stand alone and
7 ,'Allplan 2013.0 10.04.2013 - 22:06:1
8 FILE_SCHEMA('IFC2X3');
9 ENDSEC;
10
11 DATA;
12 #1= IFCAXIS2PLACEMENT3D(#30,$,$);
13 #4= IFCOWNERHISTORY(#20,#21,$,.ADDED.
14 #5= IFCPROJECT('1n6ZBIgo0Huf62029a6JR
15 $,$,$,(#11,#43),#50);
16
17 DATA;
18 #1= IFCPERSON('HARPA\\delorenzi','Undefined',$,$,$,$,$);
19 #2= IFCORGANIZATION($,'Tekla Corporation',$,$,$);
20 #3= IFCPERSONANDORGANIZATION(#1,#2,$);
21 #4= IFCAPPLICATION(#2,'19.0','Tekla Structures','Multi material modeling');
22 #5= IFCOWNERHISTORY(#3,#4,$,.NOCHANGE.,$,$,$,1368519794);
23 #6= IFCCARTESIANPOINT((0.,0.,0.));
24 #7= IFCDIRECTION((1.,0.,0.));
25 #8= IFCDIRECTION((0.,1.,0.));
26 #9= IFCDIRECTION((0.,0.,1.));
27 #10= IFCAXIS2PLACEMENT3D(#6,#9,#7);
28 #11= IFCGEOMETRICREPRESENTATIONCONTEXT($,'Model',3,1.E-005,#10,$);
29 #12= IFCGEOMETRICREPRESENTATIONSUBCONTEXT('Body','Model',*,*,*,*,#11,$,.MODEL_VIEW.,$);
30 #13= IFCGEOMETRICREPRESENTATIONSUBCONTEXT('Axis','Model',*,*,*,*,#11,$,.GRAPH_VIEW.,$);
31 #14= IFCGEOMETRICREPRESENTATIONSUBCONTEXT('FootPrint','Model',*,*,*,*,#11,$,.MODEL_VIEW.,$);
32 #15= IFCSIUNIT(*,.LENGTHUNIT.,$.MILLI.,$.METRE.);
33 #16= IFCSIUNIT(*,.AREAUNIT.,$.SQUARE_METRE.);
34 #17= IFCSIUNIT(*,.VOLUMEUNIT.,$.CUBIC_METRE.);
35 #18= IFCSIUNIT(*,.MASSUNIT.,$.KILO.,$.GRAM.);
36 #19= IFCSIUNIT(*,.TIMEUNIT.,$.SECOND.);
37 #20= IFCSIUNIT(*,.PLANEANGLEUNIT.,$.RADIAN.);
38 #21= IFCSIUNIT(*,.SOLIDANGLEUNIT.,$.STERADIAN.);
39 #22= IFCSIUNIT(*,.THERMODYNAMICTEMPERATUREUNIT.,$.DEGREE_CELSIUS.);
40 #23= IFCSIUNIT(*,.LUMINOUSINTENSITYUNIT.,$.LUMEN.);
41 #24= IFCUNITASSIGNMENT((#15,#16,#17,#18,#19,#20,#21,#22,#23));
42 #25= IFCPROJECT('1ISovrIdzDfv10iSFH2d1s',#5,'Nome Progetto',$,$,$,(#11),#24);
43 #26= IFCLOCALPLACEMENT($,#10);
44 #27= IFCSITE('21jh6ExJr56uUI_9MH0Q_Z',#5,'Undefined',$,$,#26,$,$,.ELEMENT.,$,$,0.,$,$);
45 #28= IFCPOSTALADDRESS($,$,$,$('Indirizzo'),$,$,$,$);
46 #29= IFCLOCALPLACEMENT(#26,#10);
47 #30= IFCBUILDING('1jHaJe_W17ie28EslTNXNB',#5,'Undefined',$,$,#29,$,$,.ELEMENT.,$,$,#28);
```

# INTEROPERABILITA' TRA SETTORI – INTEROPERABILITA' TRA SW





# INTEROPERABILITA' IN AMBITO BIM

BIM Architettonico



BIM Strutturale



BIM Impiantistico



BIM Infrastrutturale



Facility Management



Model & CodeChecking



Project Collaboration



Business Intelligence



Analisi Strutturale

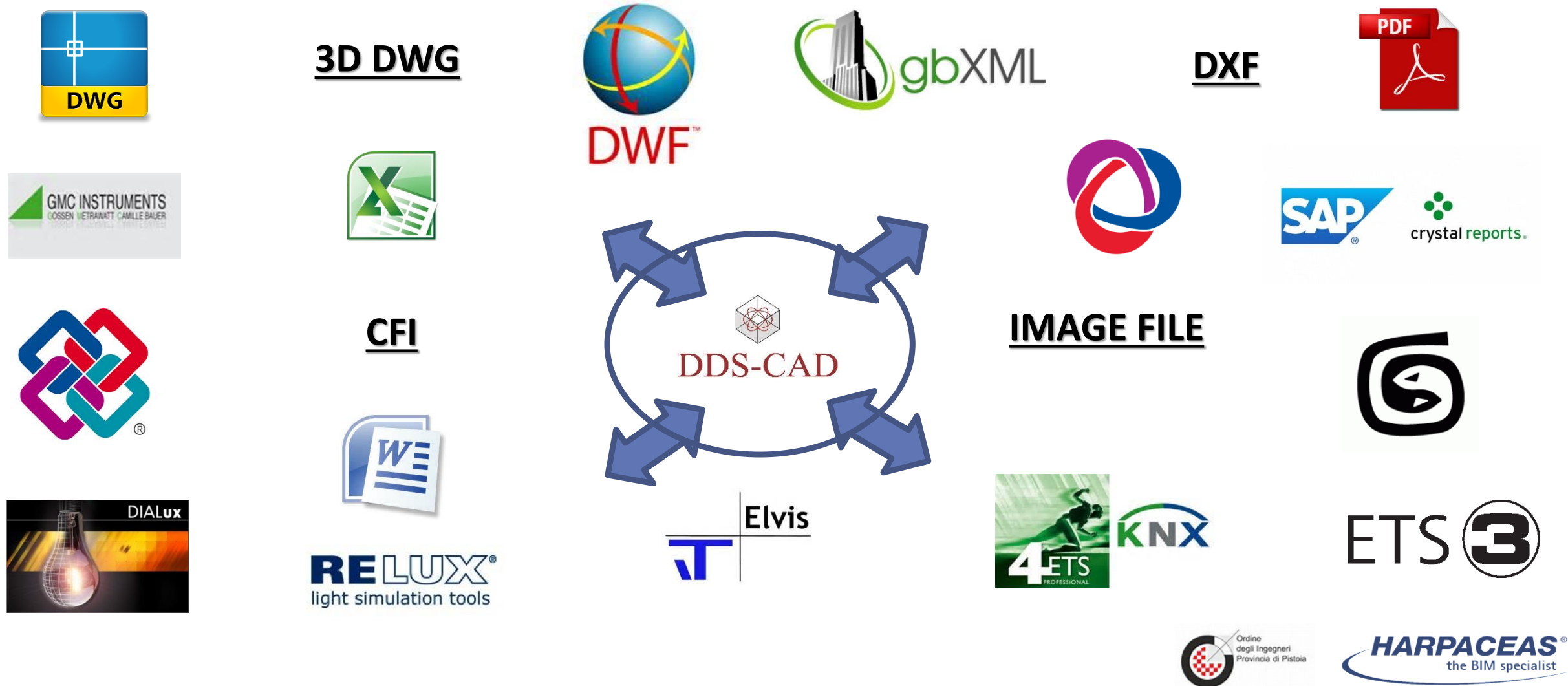


Analisi Geotecnica



# INTEROPERABILITA' IN AMBITO BIM

**INTEROPERABILITA'** - **Import/Export** da/verso altri formati (DWG, 3D DWG, DXF, DWF, CFI, IFC, Image File, 3DS, gb XML, PDF, RELux, DIALux, ETS, Elvis, BCF, Word, Excel, Crystal reports, GMC-I Profitest, etc.)



# INTEROPERABILITA' IN AMBITO BIM

Verso i programmi di calcoli di Fluidodinamica è disponibile un import-export diretto dei file **GBXML**

The image is a collage illustrating BIM interoperability. It features several key elements:

- Software Menu:** A screenshot of a software application's menu, with the 'Export' option highlighted. The 'Export' submenu is open, showing various file formats including 'gbXML'.
- File Explorer:** A screenshot of a file explorer window showing a folder named 'gbXML.xml' and another named 'green building XM'.
- 3D Airflow Model:** A 3D rendering of a room interior with numerous colored arrows (green, yellow, orange, red) representing airflow patterns, likely from a fluid dynamics simulation.
- Line Graph:** A line graph titled 'Hourly Temperature and Heat Gain - Single zone 1' showing data over time.
- 3D Room Model:** A 3D rendering of a room interior with furniture (tables and chairs) and a color gradient overlay, possibly representing temperature or energy distribution.
- DesignBuilder Software:** A screenshot of the DesignBuilder software interface, showing a 3D model of a building and a list of components and templates.



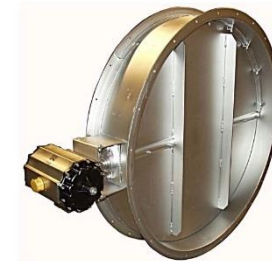
# MEP (Mechanical, Electrical, Plumbing)

Svariate tipologie di *impianto tecnico realizzabili*:

→ *Elettrico*



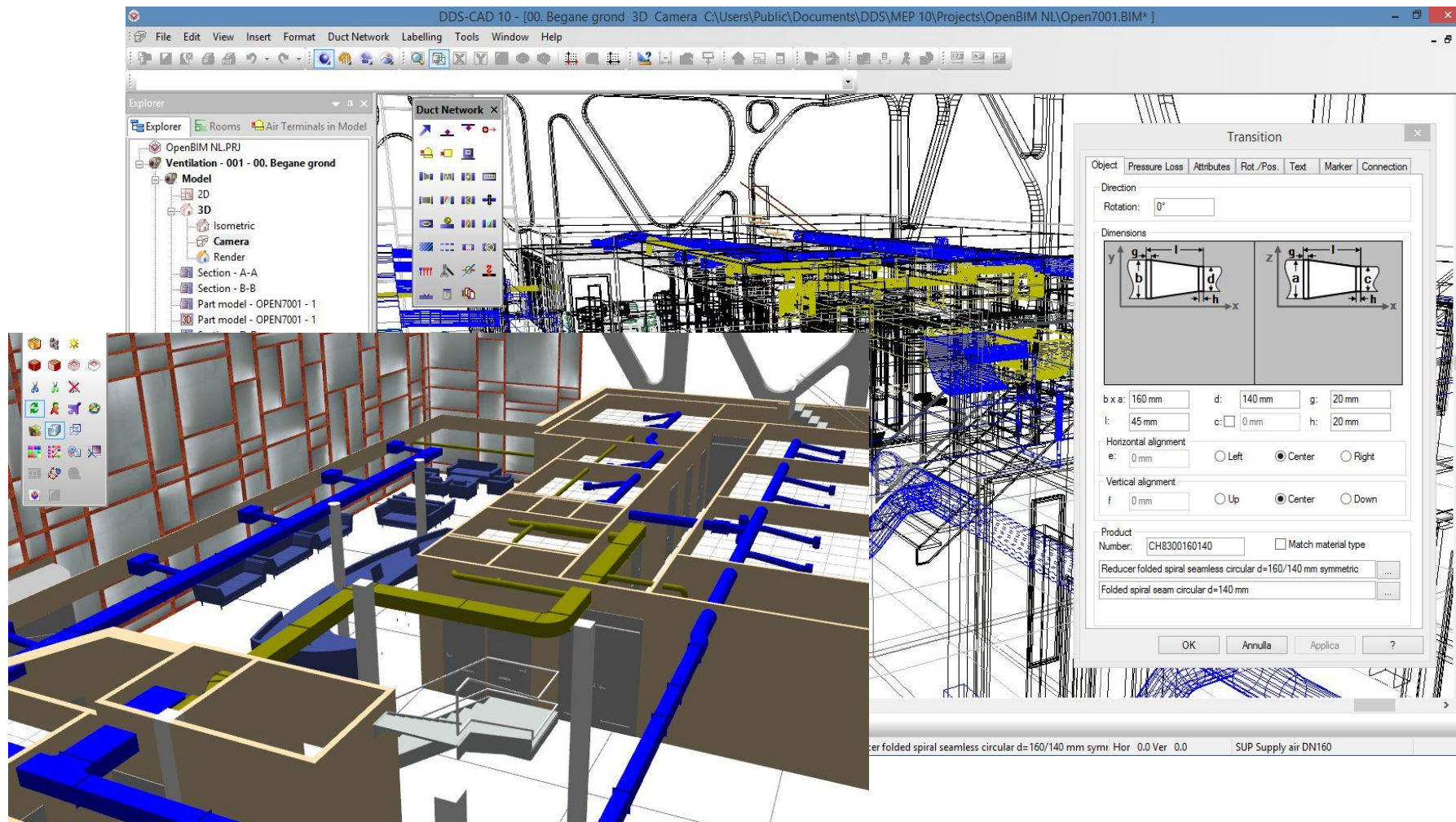
→ *HVAC (Heating, Ventilation, Air conditioning and Cooling)*



→ *Impianti idrosanitari ed impianti antincendio*

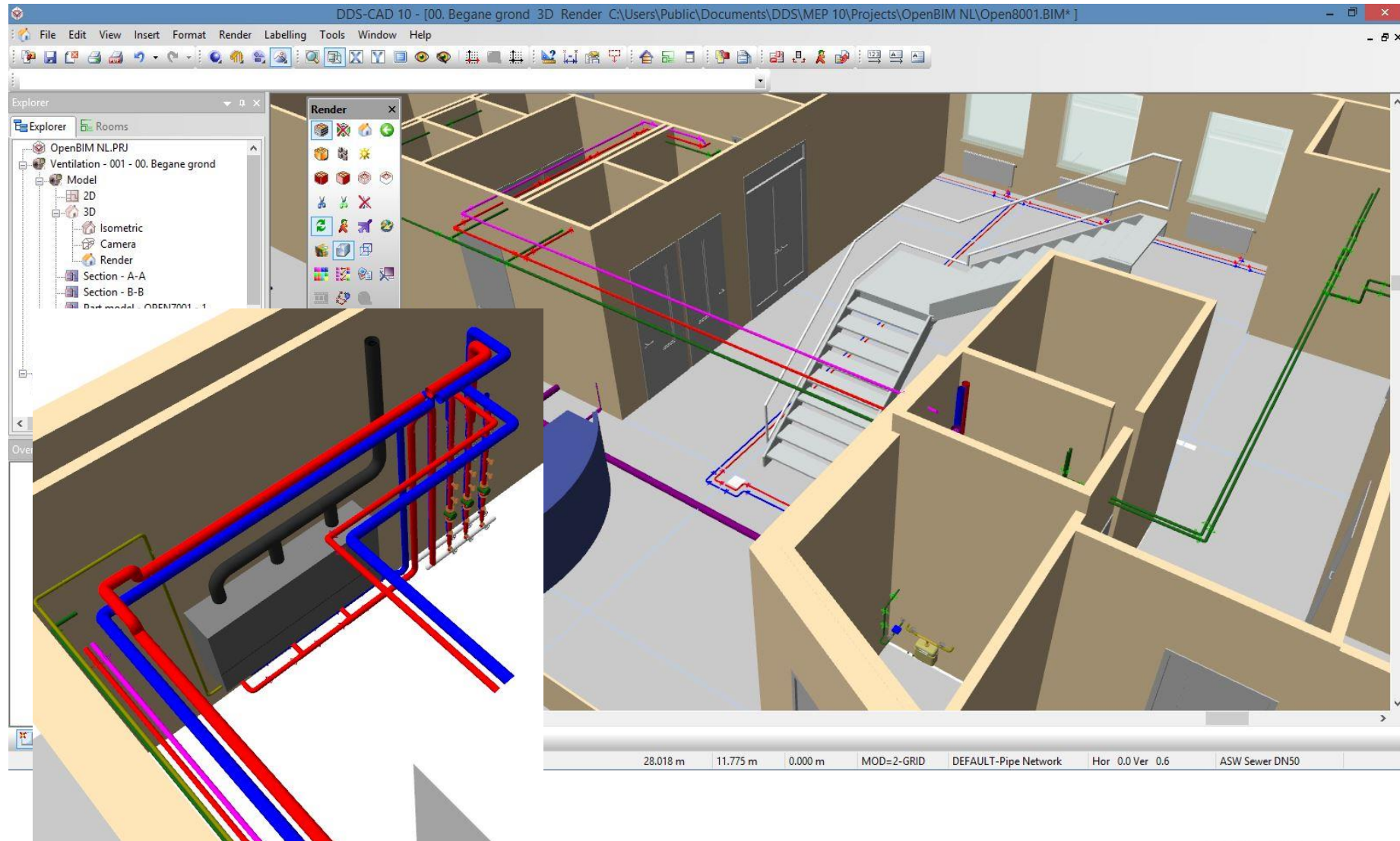


# VENTILAZIONE



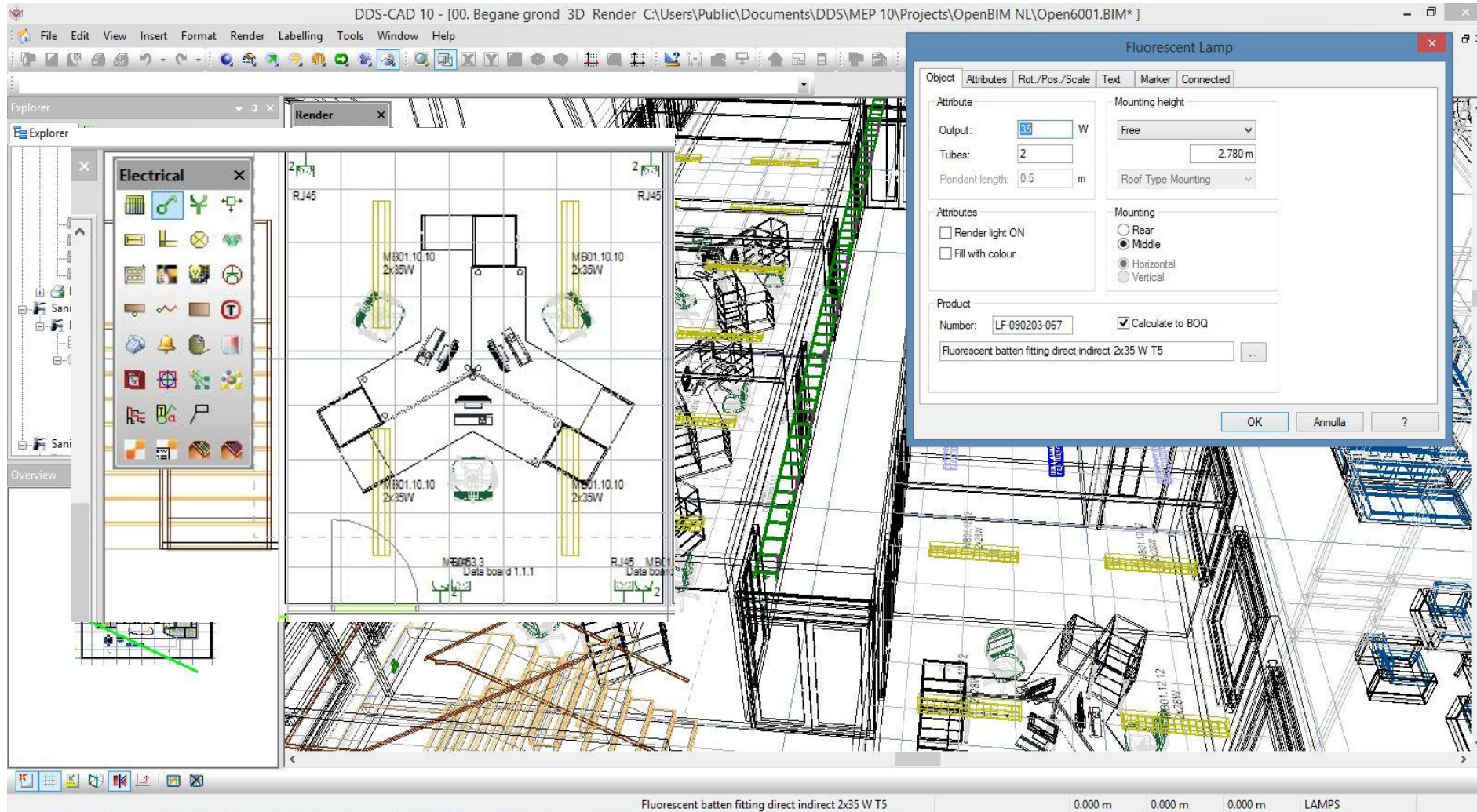


# IDRICO SANITARIO - CLIMATIZZAZIONE



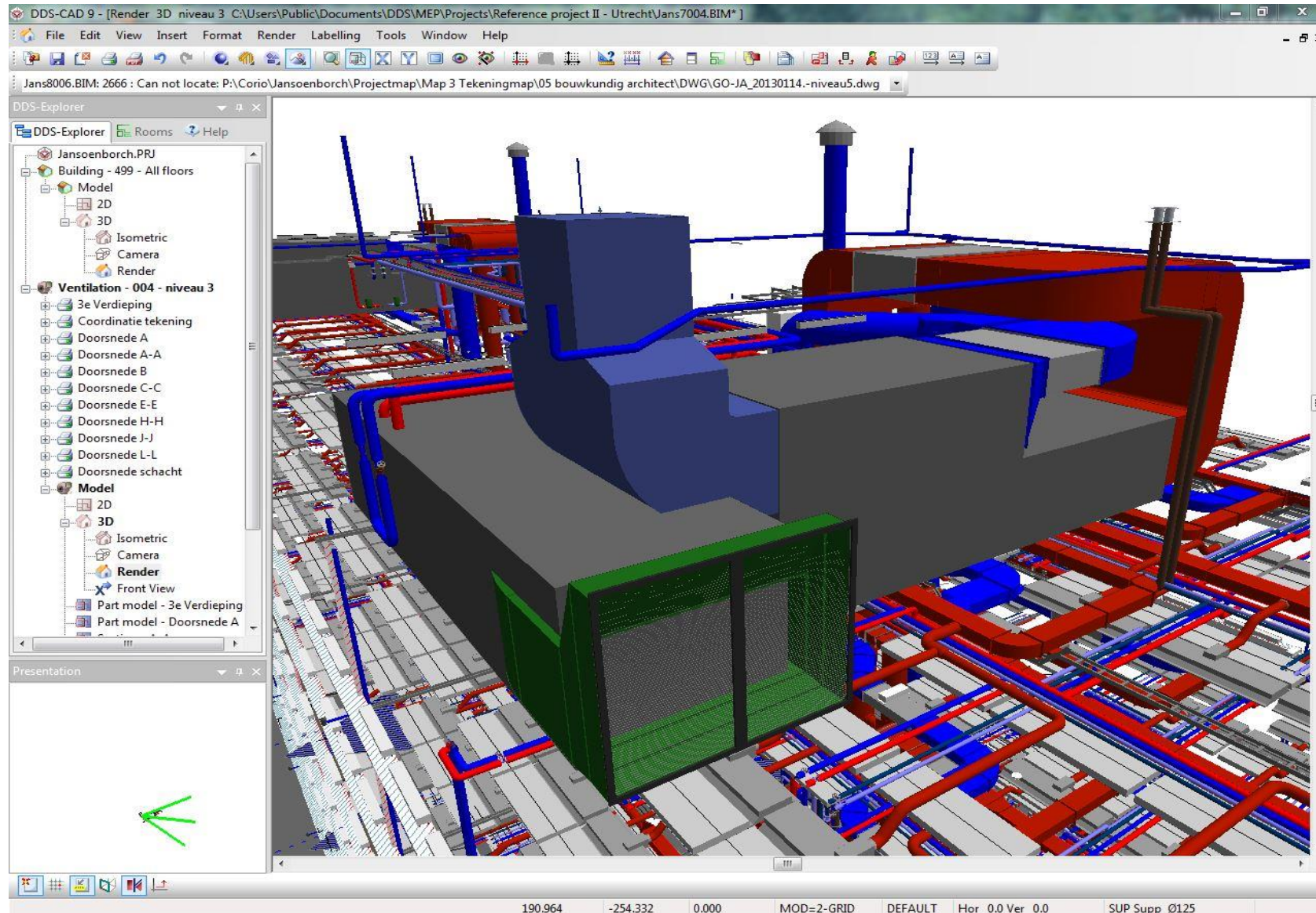


# ELETTRICO



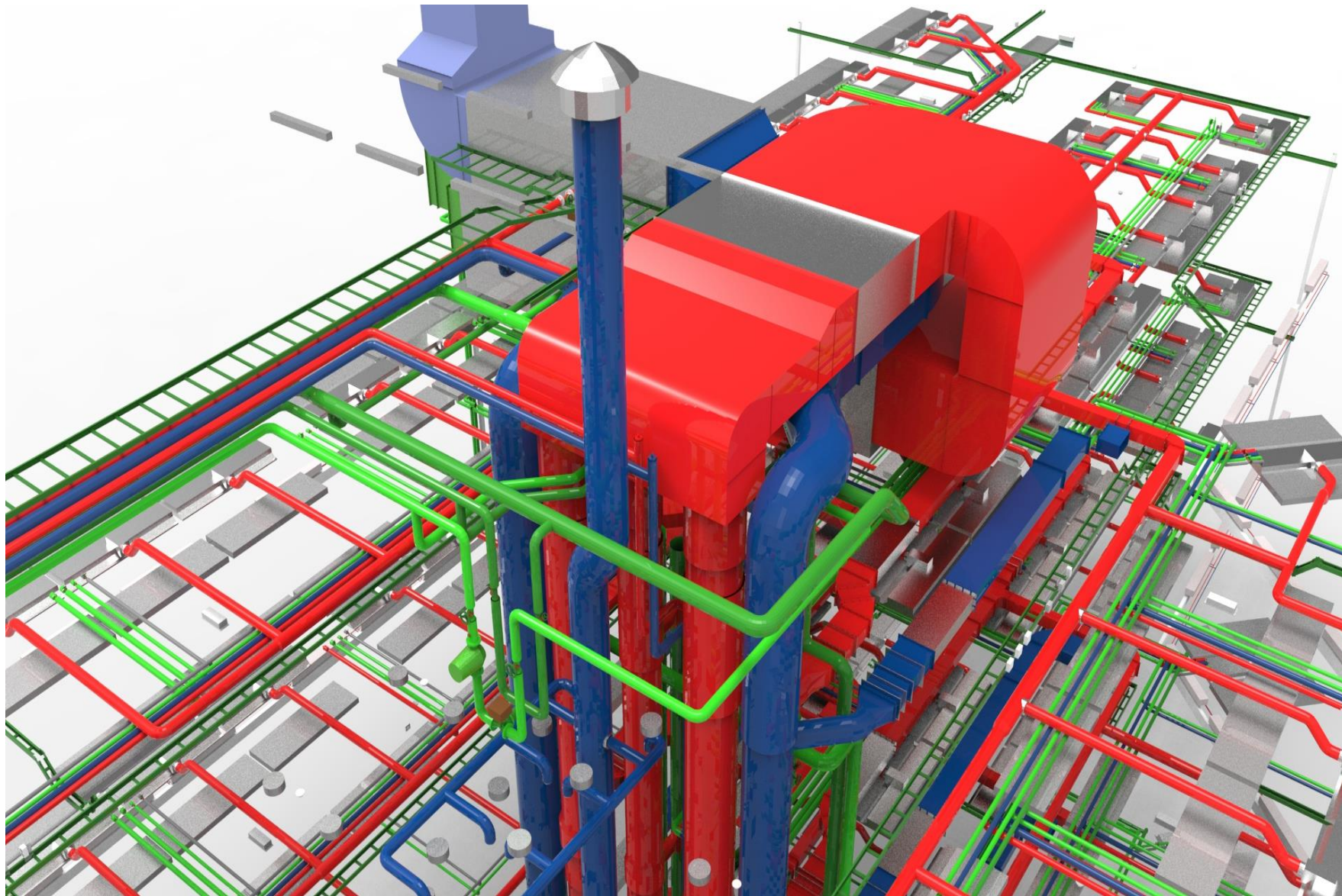


# MODELLO 3D BIM MEP



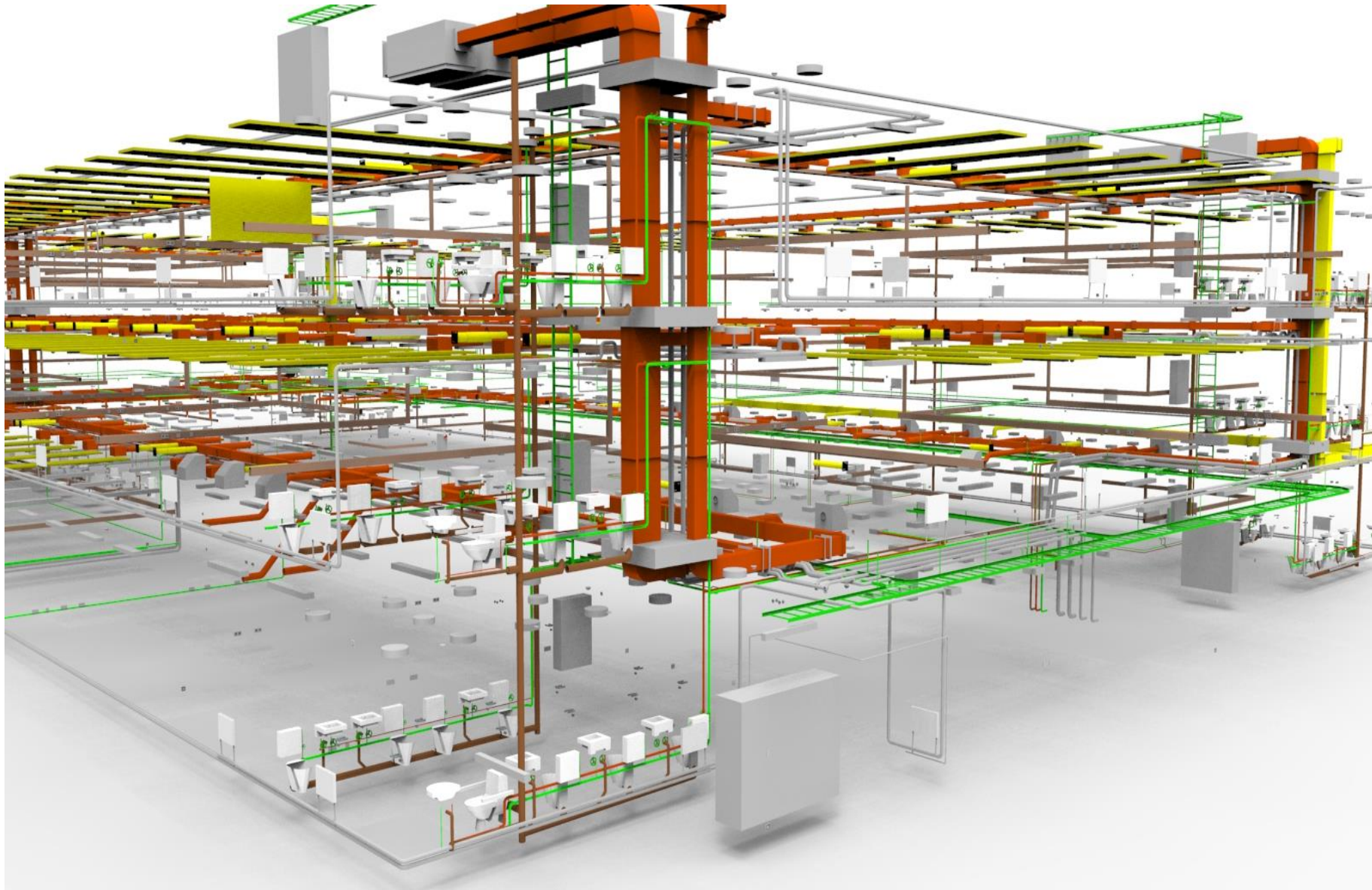


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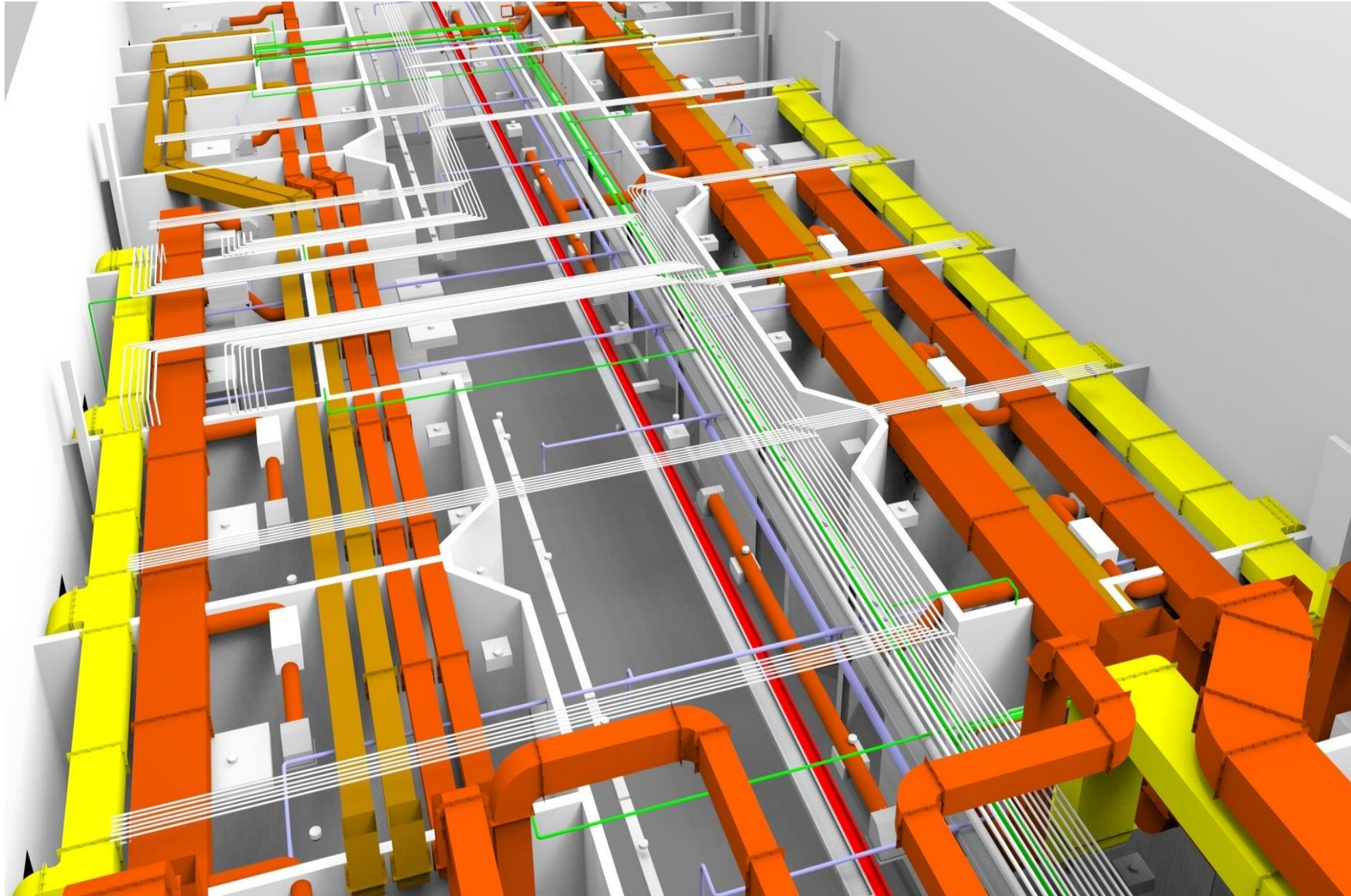


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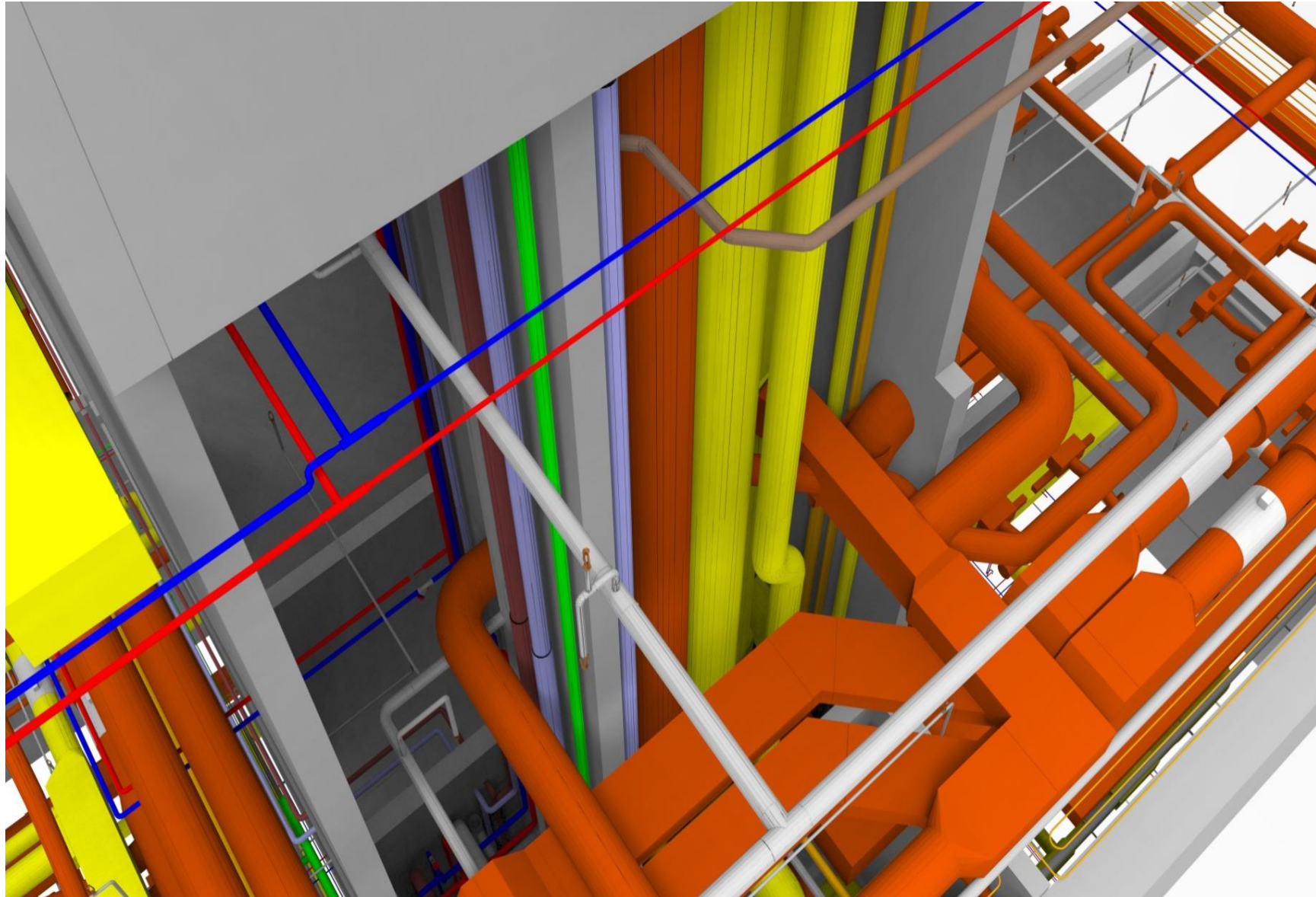


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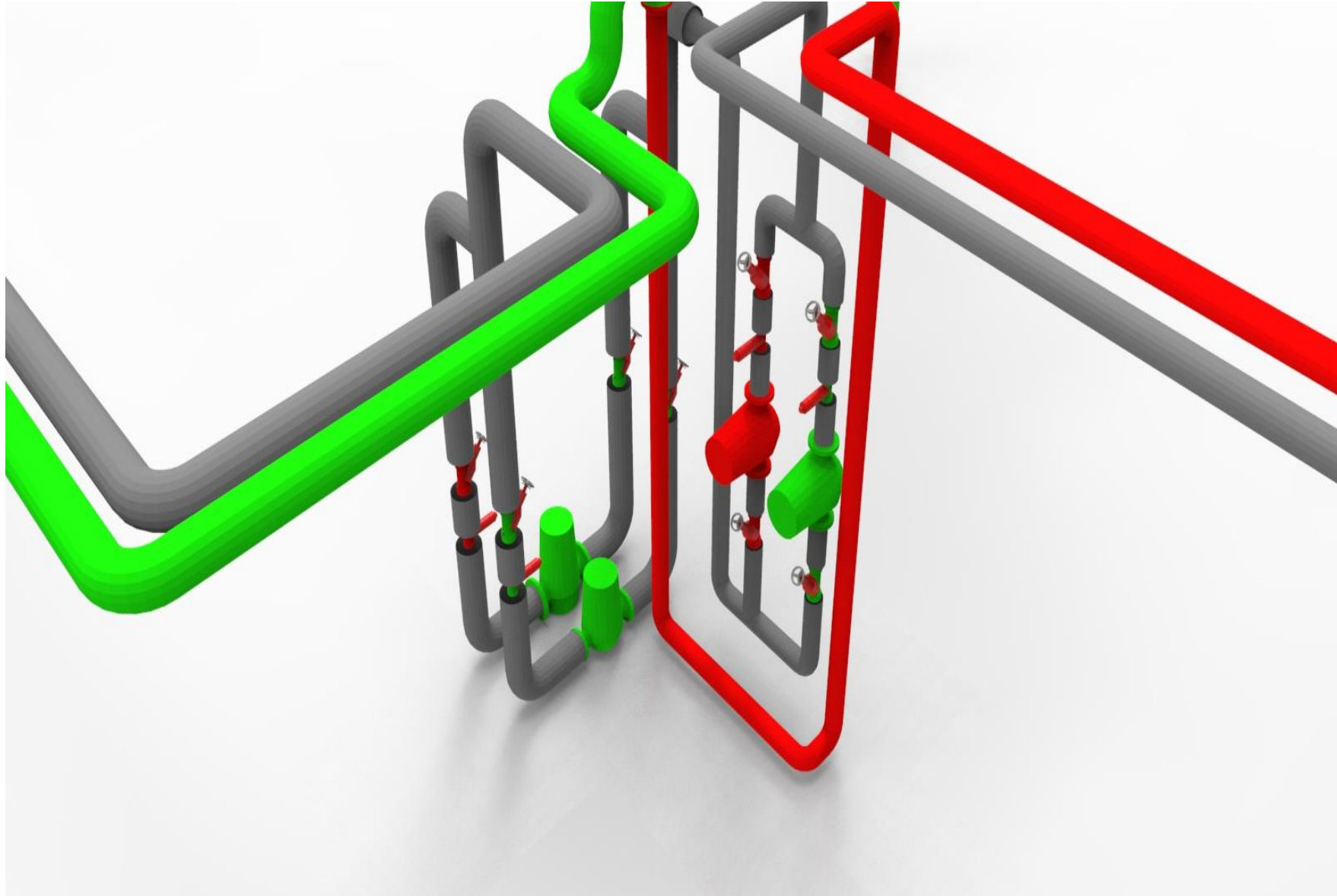


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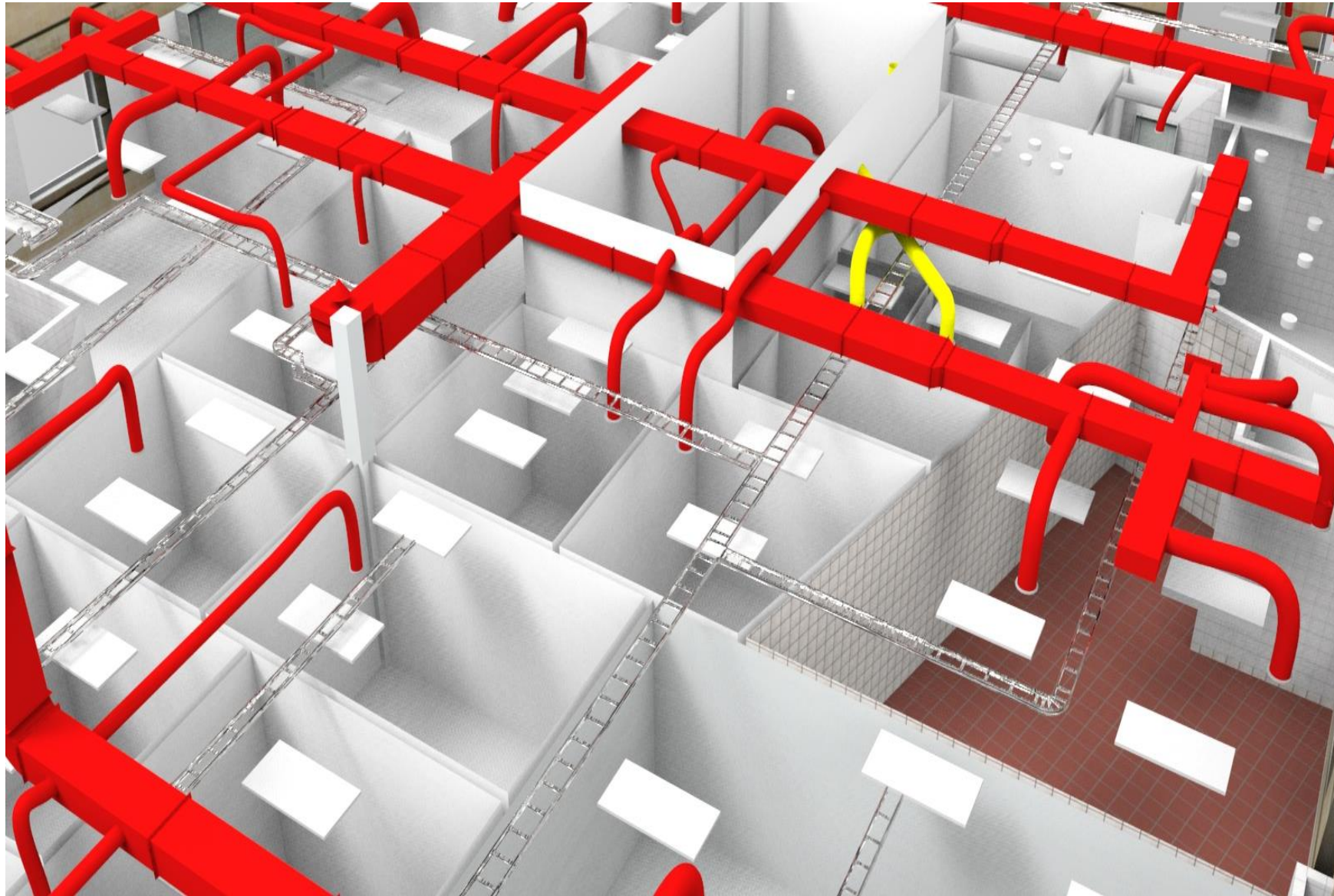




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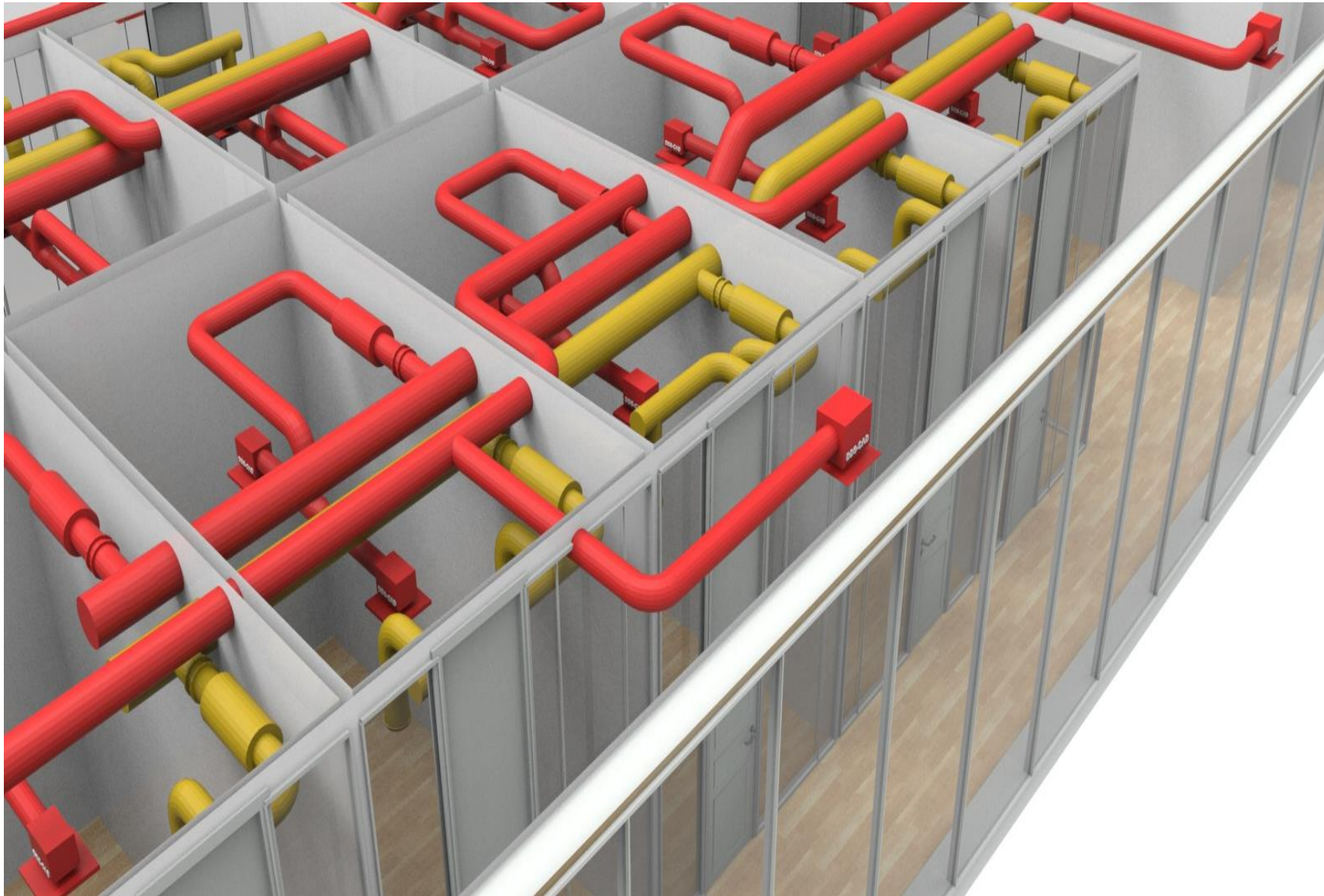


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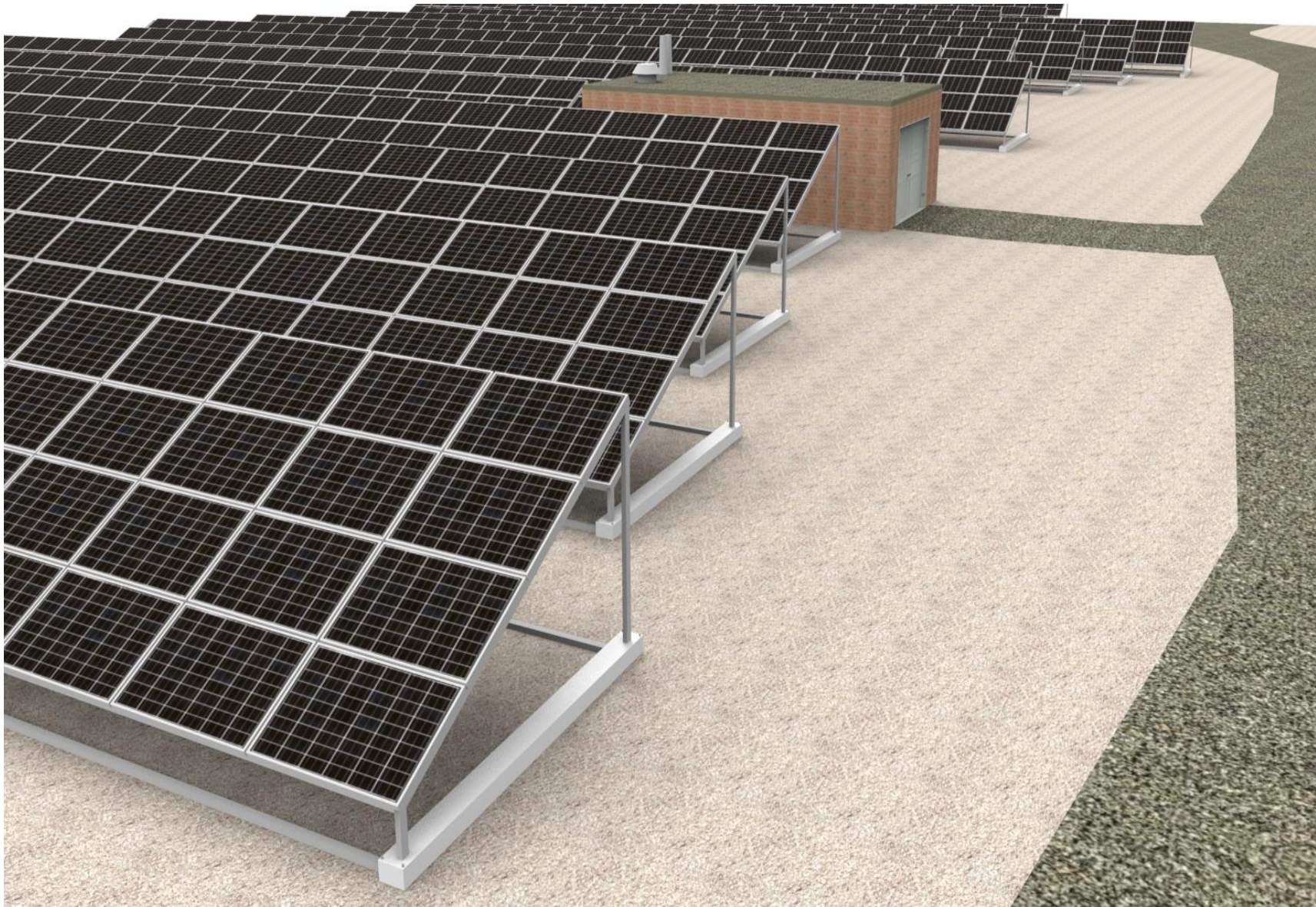


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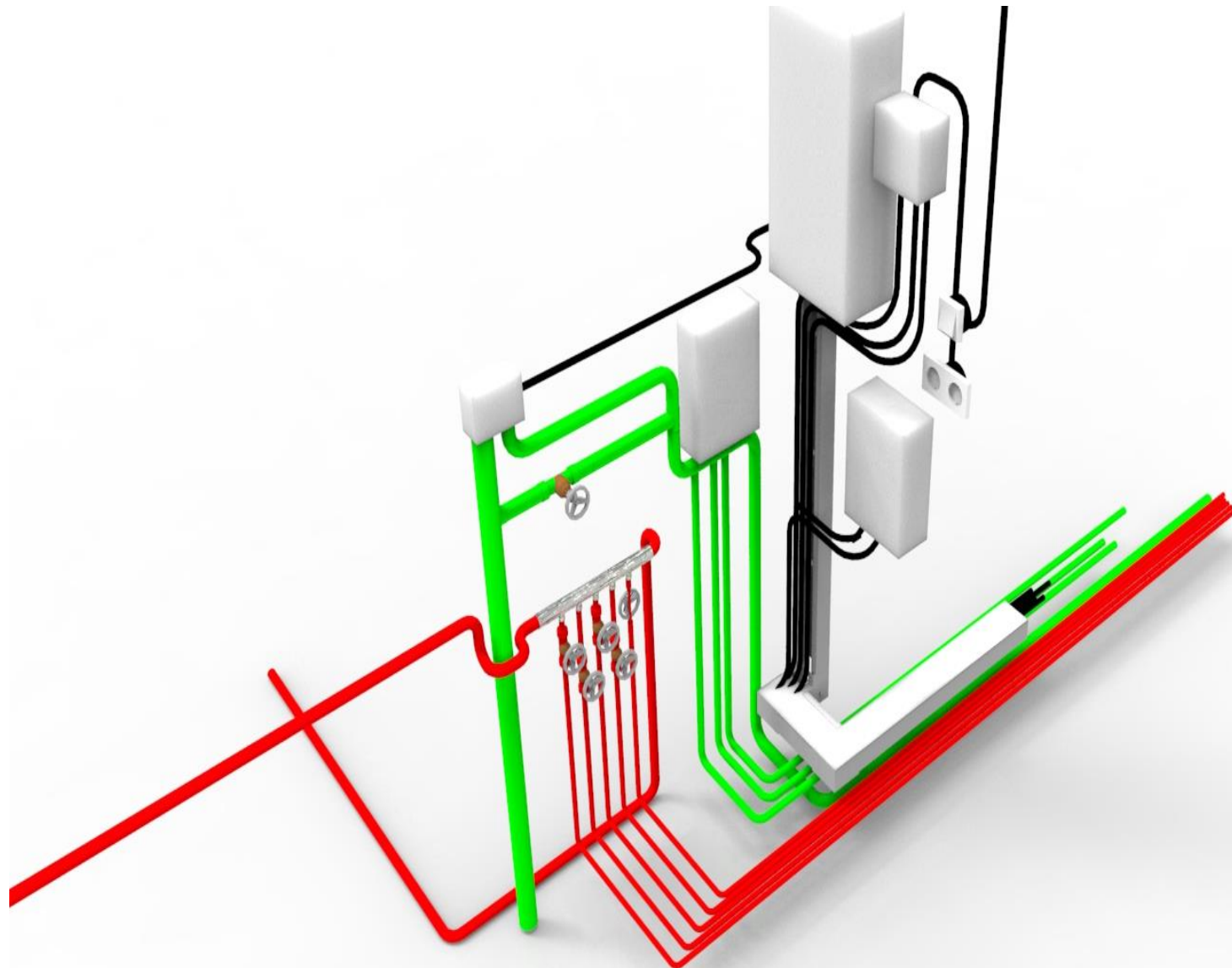




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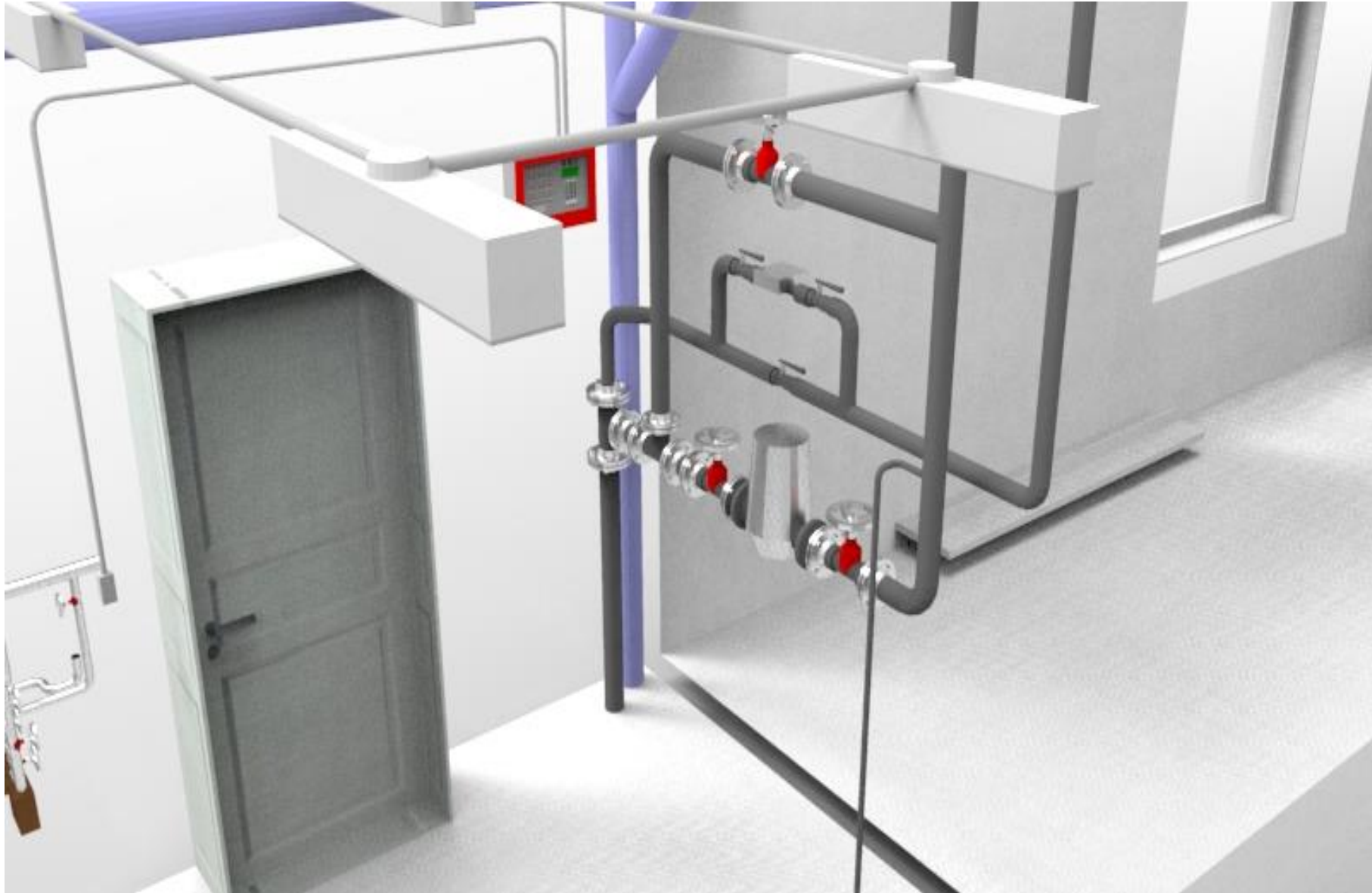


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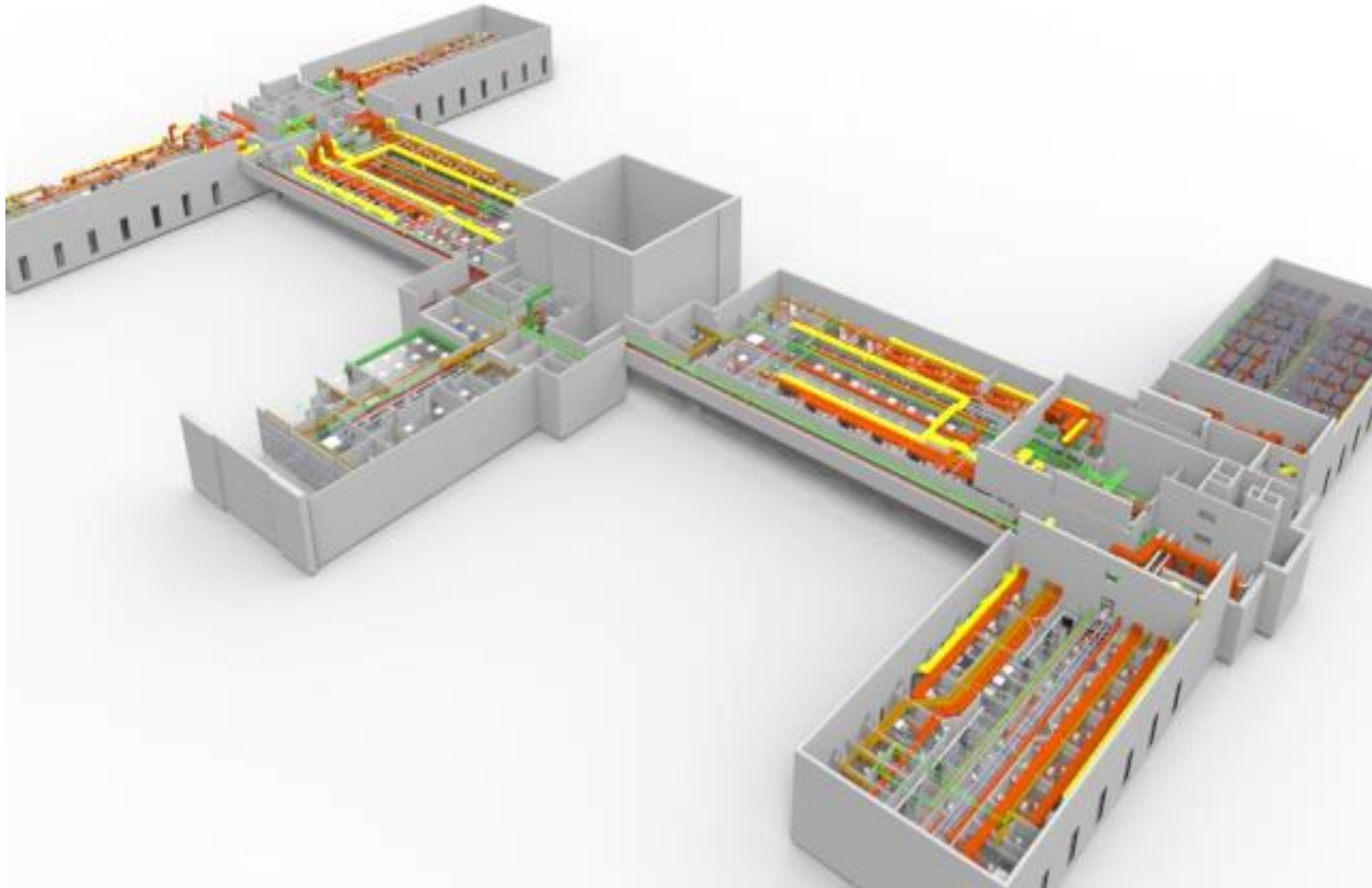


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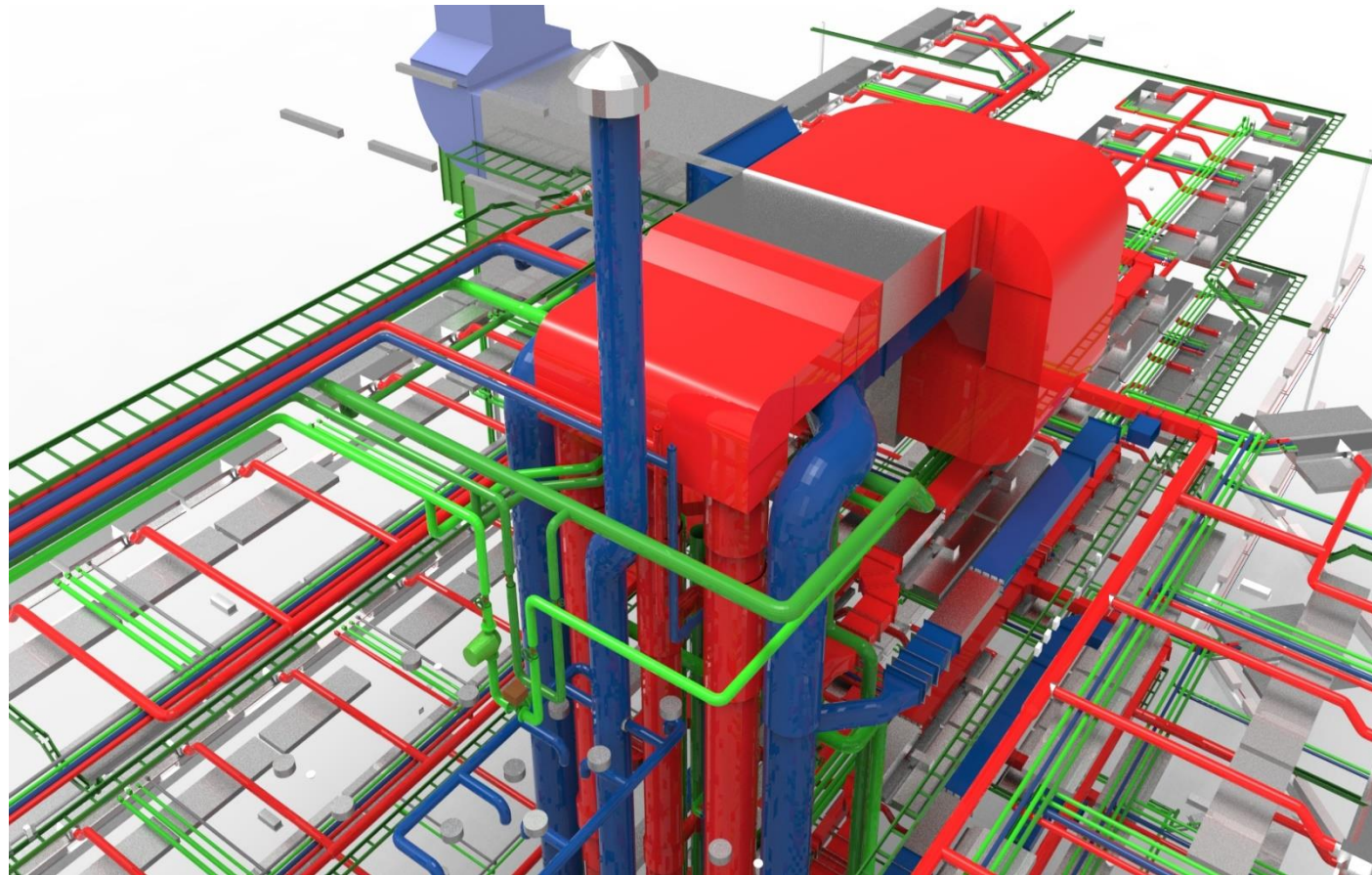




# MODELLO 3D BIM MEP



# MODELLO 3D BIM MEP







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