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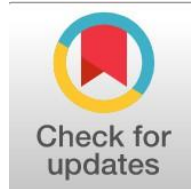
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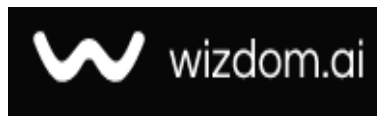
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Implementation of Building Information Modelling (BIM) Using the Quantity Take-Off Method to Determine the Volume of a Two-Story Residential Building in Wonoayu District, Sidoarjo Regency:
Implementasi Building Information Modelling (BIM) menggunakan Metode Quantity Take Off untuk menentukan Volume pada Bangunan Rumah 2 lantai di Kecamatan Wonoayu, Kabupaten Sidoarjo

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Abstract

General Background Technological advancements in the construction industry have promoted digital transformation through Building Information Modeling systems. **Specific Background** For residential projects, accurate estimation of material quantities is essential to establish reliable budgets and reduce calculation errors. **Knowledge Gap** Although 3D digital modeling platforms are increasingly used, limited research evaluates the automated volume extraction process specifically applied to two-story residential structures. **Aims** This study evaluates automated Quantity Take-Off procedures using Autodesk Revit for a two-story residential building located in Sidoarjo Regency. **Results** Automated digital extraction produced precise volumetric data across architectural, structural, and foundational elements, including red brick walls, concrete floors, footings, and framing components, thereby reducing manual effort and processing time. **Novelty** The integration demonstrates a practical workflow connecting 3D spatial modeling directly with structured quantity schedules for localized residential construction. **Implications** Adopting automated digital volume schedules supports budget analysis accuracy, minimizes manual calculation mistakes, and streamlines cost estimation workflows for future engineering projects.

Key Findings Highlights

Automated digital modeling generates precise material quantity schedules for structural and architectural elements in residential buildings.

Quantity extraction from 3D models eliminates manual measurement errors while significantly improving estimation time efficiency.

Direct digital data extraction facilitates seamless budget analysis and enhances cost estimation workflows.

Keywords Building Information Modeling, Autodesk Revit, Quantity Take-Off, Bill Of Quantities, Cost Estimation

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Pendahuluan

Dalam dunia konstruksi perkembangan waktu dan kemajuan teknologi yang semakin pesat, terdapat banyak dampak positif yang dirasakan, salah satunya adalah kemunculan berbagai aplikasi inovatif seperti *Building Information Modeling* (BIM) [1]. Salah satu perangkat lunak unggulan dalam BIM adalah Autodesk Revit. Autodesk Revit merupakan perangkat lunak Building Information Modeling (BIM) yang memungkinkan pengguna untuk merancang bangunan konstruksi, baik dalam aspek arsitektur, struktur, maupun MEP (Mechanical, Electrical, and Plumbing), dalam bentuk 3D [2]. Selain itu, Autodesk Revit juga dapat digunakan untuk melakukan Quantity Take-Off dan menyusun Rencana Anggaran Biaya (RAB) secara efisien [3]. Oleh di dunia konstruksi sangat disarankan untuk mendalami dan memanfaatkan teknologi *Building Information Modeling* (BIM) guna meningkatkan produktivitas dan akurasi dalam perencanaan proyek [4].

Building Information Modeling (BIM) merupakan sebuah konsep atau sistem dalam bentuk digital yang memanfaatkan perangkat lunak untuk membuat model 3D dengan informasi terintegrasi [5]. BIM digunakan untuk mendukung koordinasi, simulasi, dan visualisasi yang lebih efektif di antara para pemangku kepentingan (stakeholders) dalam sebuah proyek [6]. Selain itu, pengguna BIM perlu memiliki pengetahuan dan keterampilan yang memadai, terutama dalam memasukkan data informasi secara detail dan teliti, guna memastikan kualitas serta akurasi model yang dihasilkan [7].

Dalam pekerjaan pemodelan menggunakan Autodesk Revit, data yang dihasilkan dari proses perancangan berbasis Building Information Modeling (BIM) mencakup berbagai elemen, seperti gambar arsitektur, gambar struktur, gambar utilitas, gambar lanskap, rincian volume pekerjaan, dan rancangan anggaran biaya (RAB) [8]. Pada pemodelan konvensional, gambar-gambar tersebut biasanya dibuat secara terpisah oleh masing-masing ahli. Namun, dengan Revit, model sudah berbentuk 3D sehingga secara otomatis dapat menghasilkan Quantity Take-Off (QTO) serta gambar 2D atau gambar teknis tanpa perlu dibuat ulang secara manual [9].



Figure 1.

Gambar 1: Model Dimensi dalam BIM

Sumber: PUPRR, 2018

Metode

Penelitian ini menggunakan metode Kuantitatif untuk mendukung hasil penelitian sebelumnya yang relevan, terutama yang menggunakan proses Software Building Information Modeling (BIM). Pendekatan penelitian ini mencakup studi kasus, studi literatur, serta analisis kuantitatif dalam memperkirakan jumlah material yang diperlukan dan mengevaluasi efektivitas waktu dalam pengambilan material. Berikut adalah flowchart yang menggambarkan tahap penelitian:

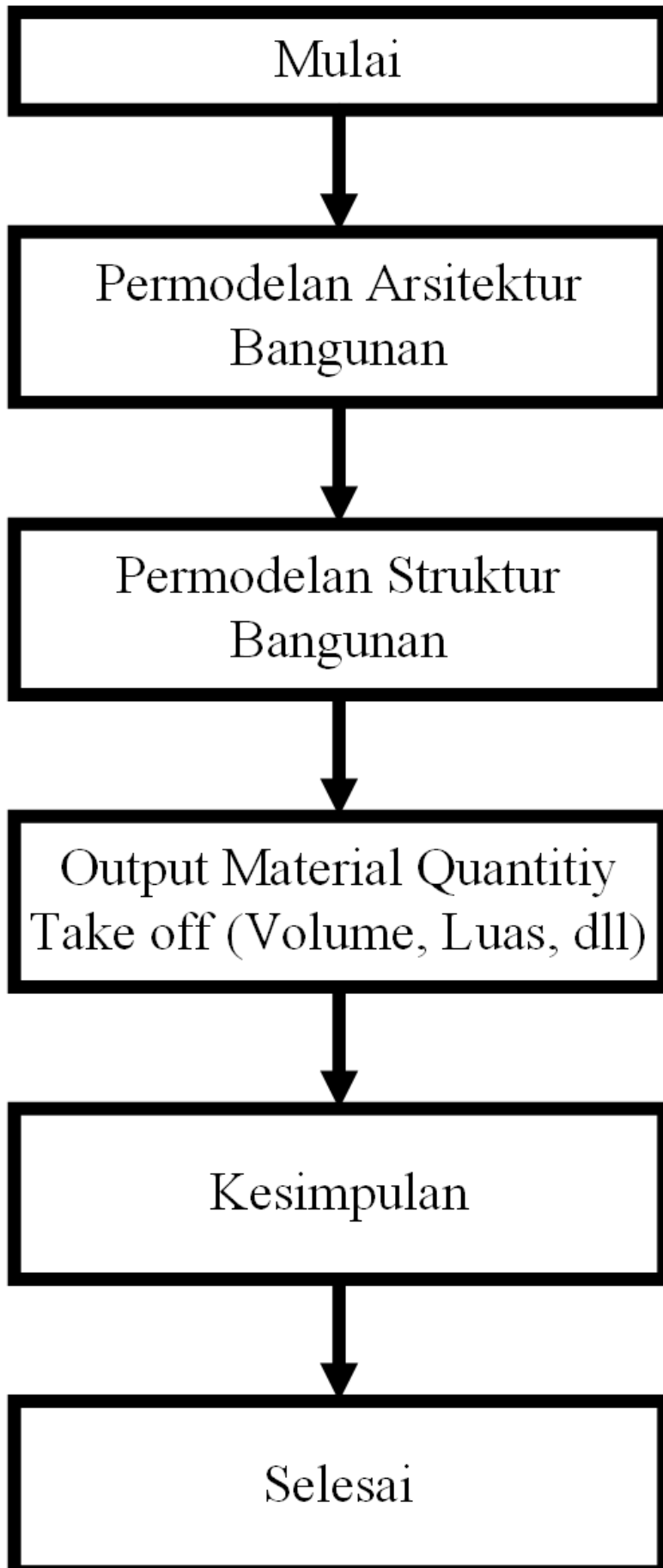
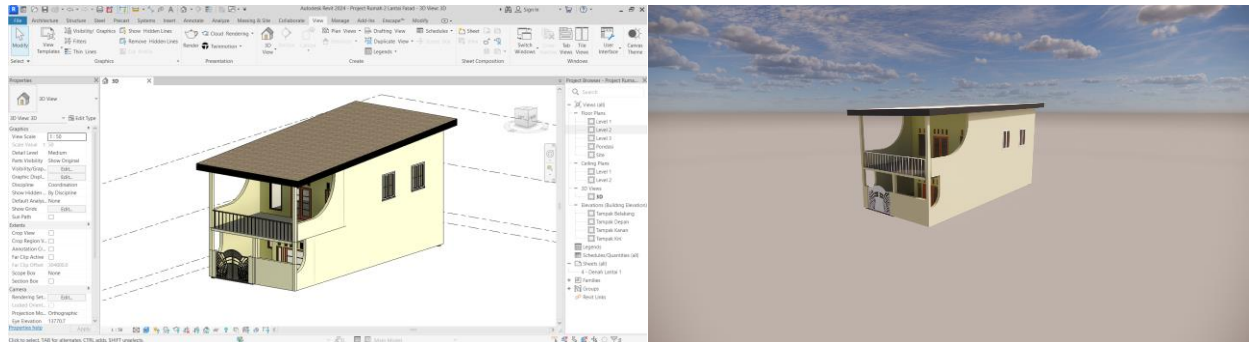


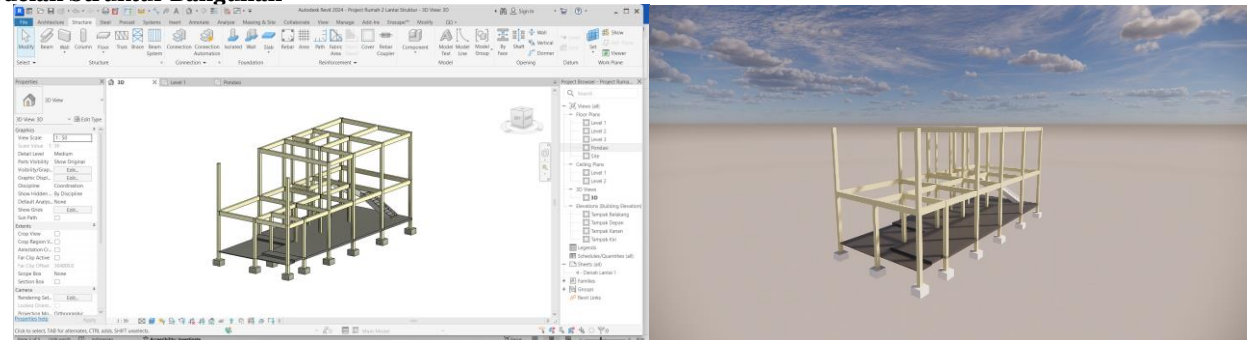
Figure 2.

Hasil dan Pembahasan Permodelan Arsitektur Bangunan



Gambar 2: Permodelan Arsitektur Bangunan

Permodelan Struktur Bangunan



Gambar 3: Permodelan Struktur Bangunan

Hasil Output Quantity Take off

Item Dinding

Wall Material Takeoff				
Base Constraint	Material: Name	Material: Area	Length	Material: Volume
Lantai 1	Bata Merah	5 m ²	3000	0.952 m ³
Lantai 1	Bata Merah	5 m ²	3000	0.000 m ³
Lantai 1	Bata Merah	5 m ²	3000	0.000 m ³
Lantai 1	Bata Merah	40 m ²	13000	7.933 m ³
Lantai 1	Bata Merah	40 m ²	13000	0.000 m ³
Lantai 1	Bata Merah	40 m ²	13000	0.000 m ³
Lantai 1	Bata Merah	9 m ²	3000	1.708 m ³
Lantai 1	Bata Merah	17 m ²	3000	0.000 m ³
Lantai 1	Bata Merah	9 m ²	3000	1.830 m ³
Lantai 1	Bata Merah	18 m ²	3000	0.000 m ³
Lantai 1	Bata Merah	20 m ²	6300	3.904 m ³
Lantai 1	Bata Merah	20 m ²	6300	0.000 m ³
Lantai 1	Bata Merah	20 m ²	6300	0.000 m ³
Lantai 1	Bata Merah	32 m ²	10000	6.400 m ³
Lantai 1	Bata Merah	32 m ²	10000	0.000 m ³
Lantai 1	Bata Merah	32 m ²	10000	0.000 m ³

Lantai 1	Bata Merah	3 m ²	1500	0.605 m ³
Lantai 1	Bata Merah	6 m ²	1500	0.000 m ³
Lantai 1	Bata Merah	8 m ²	2500	1.525 m ³
Lantai 1	Bata Merah	15 m ²	2500	0.000 m ³
Lantai 1	Bata Merah	4 m ²	1500	0.793 m ³
Lantai 1	Bata Merah	8 m ²	1500	0.000 m ³
Lantai 1	Bata Merah	8 m ²	3300	1.627 m ³
Lantai 1	Bata Merah	8 m ²	3300	0.000 m ³
Lantai 1	Bata Merah	8 m ²	3300	0.000 m ³
Lantai 1	Bata Merah	15 m ²	6500	3.062 m ³
Lantai 1	Bata Merah	31 m ²	6500	0.000 m ³
Lantai 1	Bata Merah	14 m ²	5000	2.730 m ³
Lantai 1	Bata Merah	28 m ²	5000	0.000 m ³
Lantai 1	Bata Merah	5 m ²	3000	1.023 m ³
Lantai 1	Bata Merah	11 m ²	3000	0.000 m ³
Lantai 1	Bata Merah	4 m ²	2000	0.786 m ³
Lantai 1	Bata Merah	8 m ²	2000	0.000 m ³
Lantai 1	Bata Merah	9 m ²	3000	1.708 m ³
Lantai 1	Bata Merah	9 m ²	3000	0.000 m ³
Lantai 1	Bata Merah	9 m ²	3000	0.000 m ³
Lantai 1	Bata Merah	1 m ²	440	0.145 m ³
Lantai 1	Bata Merah	2 m ²	440	0.000 m ³
Lantai 1	Bata Merah	1 m ²	385	0.160 m ³
Lantai 1	Bata Merah	2 m ²	385	0.000 m ³
Lantai 2	Bata Merah	11 m ²	3000	2.160 m ³
Lantai 2	Bata Merah'	22 m ²	3000	0.000 m ³
Lantai 2	Bata Merah	10 m ²	3000	2.016 m ³
Lantai 2	Bata Merah	20 m ²	3000	0.000 m ³
Lantai 2	Bata Merah	42 m ²	10000	8.306 m ³
Lantai 2	Bata Merah	42 m ²	10000	0.000 m ³
Lantai 2	Bata Merah	42 m ²	10000	0.000 m ³
Lantai 2	Bata Merah	5 m ²	1400	1.008 m ³
Lantai 2	Bata Merah	10 m ²	1400	0.000 m ³
Lantai 2	Bata Merah	8 m ²	2532	1.513 m ³
Lantai 2	Bata Merah	15 m ²	2532	0.000 m ³
Lantai 2	Bata Merah	4 m ²	1400	0.864 m ³
Lantai 2	Bata Merah	9 m ²	1400	0.000 m ³
Lantai 2	Bata Merah	19 m ²	6032	3.724 m ³
Lantai 2	Bata Merah	37 m ²	6032	0.000 m ³
Lantai 2	Bata Merah	37 m ²	10000	7.432 m ³
Lantai 2	Bata Merah	37 m ²	10000	0.000 m ³
Lantai 2	Bata Merah	37 m ²	10000	0.000 m ³
Lantai 2	Bata Merah	17 m ²	6300	3.424 m ³
Lantai 2	Bata Merah	1 m ²	6300	0.000 m ³
Lantai 2	Bata Merah	17 m ²	6300	0.000 m ³
Lantai 2	Bata Merah	17 m ²	6300	0.000 m ³
Lantai 2	Bata Merah	26 m ²	6300	5.239 m ³

Lantai 2	Bata Merah	26 m ²	6300	0.000 m ³
Lantai 2	Bata Merah	26 m ²	6300	0.000 m ³
Lantai 2	Bata Merah	9 m ²	4850	1.751 m ³
Lantai 2	Bata Merah	19 m ²	4850	0.000 m ³
Lantai 2	Bata Merah	9 m ²	4850	1.751 m ³
Lantai 2	Bata Merah	19 m ²	4850	0.000 m ³
Lantai 2	Bata Merah	10 m ²	3000	2.016 m ³
Lantai 2	Bata Merah	20 m ²	3000	0.000 m ³
Grand total: 71				

Sumber: Software Autodesk Revit

Item Lantai

Floor Material Takeoff				
Level	Material: Name	Material: Area	Material: Volume	Count
Level 1	Default Floor	76 m ²	11.39 m ³	1
Level 1	Default Floor	3 m ²	0.42 m ³	1
Level 1	Default Floor	3 m ²	0.41 m ³	1
Level 1	Default Floor	13 m ²	0.64 m ³	1
Level 1	Default Floor	3 m ²	0.14 m ³	1
Level 2	Default Floor	53 m ²	8.02 m ³	1
Level 2	Default Floor	33 m ²	4.92 m ³	1
Level 2	Default Floor	1 m ²	0.00 m ³	1
Grand total: 8				

Item Pondasi

Structural Foundation Material Takeoff		
Type	Material: Area	Material: Volume
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³
600 x 600 x 400mm	2 m ²	0.14 m ³

Item Struktur Kolom

Structural Column Material Takeoff			
Base Level	Type	Material: Volume	Count
Pondasi	200 x 200mm	0.03 m ³	1
Pondasi	200 x 200mm	0.00 m ³	1
Pondasi	200 x 200mm	0.00 m ³	1

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[illegible]

Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	200 x 200mm	0.12 m ³	1
Level 1	200 x 200mm	0.00 m ³	1
Level 1	150 x 150mm	0.07 m ³	1
Level 1	150 x 150mm	0.00 m ³	1
Level 1	150 x 150mm	0.07 m ³	1
Level 1	150 x 150mm	0.00 m ³	1
Level 1	150 x 150mm	0.07 m ³	1
Level 1	150 x 150mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1

Level 2	200 x 200mm	0.00 m ³	1
Level 2	200 x 200mm	0.14 m ³	1
Level 2	200 x 200mm	0.00 m ³	1
Level 2	150 x 150mm	0.08 m ³	1
Level 2	150 x 150mm	0.00 m ³	1
Level 2	150 x 150mm	0.08 m ³	1
Level 2	150 x 150mm	0.00 m ³	1
Level 2	150 x 150mm	0.08 m ³	1
Level 2	150 x 150mm	0.00 m ³	1

Item Struktur Balok

Structural Framing Material Takeoff				
Type	Material: Area	Material: Volume	Length	Count
150 x 300mm	1 m ²	0.14 m ³	3300	1
150 x 300mm	1 m ²	0.00 m ³	3300	1
150 x 300mm	1 m ²	0.13 m ³	3000	1
150 x 300mm	2 m ²	0.00 m ³	3000	1
150 x 300mm	1 m ²	0.14 m ³	3300	1
150 x 300mm	2 m ²	0.00 m ³	3300	1
150 x 300mm	1 m ²	0.13 m ³	3000	1
150 x 300mm	2 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.04 m ³	1000	1
150 x 300mm	1 m ²	0.00 m ³	1000	1
150 x 300mm	1 m ²	0.13 m ³	3000	1
150 x 300mm	2 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.13 m ³	3000	1
150 x 300mm	3 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.13 m ³	3000	1
150 x 300mm	3 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.15 m ³	3500	1
150 x 300mm	3 m ²	0.00 m ³	3500	1
150 x 300mm	0 m ²	0.13 m ³	3000	1
150 x 300mm	3 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.07 m ³	1800	1
150 x 300mm	1 m ²	0.00 m ³	1800	1
150 x 300mm	0 m ²	0.06 m ³	1500	1
150 x 300mm	1 m ²	0.00 m ³	1500	1
150 x 300mm	0 m ²	0.15 m ³	3500	1
150 x 300mm	3 m ²	0.00 m ³	3500	1
150 x 300mm	0 m ²	0.15 m ³	3500	1
150 x 300mm	3 m ²	0.00 m ³	3500	1
150 x 300mm	1 m ²	0.27 m ³	6300	1
150 x 300mm	5 m ²	0.00 m ³	6300	1
150 x 300mm	0 m ²	0.15 m ³	3500	1
150 x 300mm	3 m ²	0.00 m ³	3500	1
150 x 300mm	0 m ²	0.10 m ³	2500	1
150 x 300mm	2 m ²	0.00 m ³	2500	1

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150 x 300mm	1 m ²	0.13 m ³	3000	1
150 x 300mm	2 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.08 m ³	2000	1
150 x 300mm	1 m ²	0.00 m ³	2000	1
150 x 300mm	0 m ²	0.13 m ³	3000	1
150 x 300mm	3 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.13 m ³	3000	1
150 x 300mm	3 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.06 m ³	1500	1
150 x 300mm	1 m ²	0.00 m ³	1500	1
150 x 300mm	0 m ²	0.11 m ³	2500	1
150 x 300mm	2 m ²	0.00 m ³	2500	1
150 x 300mm	0 m ²	0.13 m ³	3000	1
150 x 300mm	3 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.27 m ³	6300	1
150 x 300mm	5 m ²	0.00 m ³	6300	1
150 x 300mm	0 m ²	0.13 m ³	3000	1
150 x 300mm	3 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.14 m ³	3300	1
150 x 300mm	3 m ²	0.00 m ³	3300	1
150 x 300mm	0 m ²	0.13 m ³	3000	1
150 x 300mm	3 m ²	0.00 m ³	3000	1
150 x 300mm	0 m ²	0.15 m ³	3500	1
150 x 300mm	3 m ²	0.00 m ³	3500	1
150 x 300mm	0 m ²	0.15 m ³	3500	1
150 x 300mm	3 m ²	0.00 m ³	3500	1
150 x 300mm	0 m ²	0.04 m ³	1000	1
150 x 300mm	1 m ²	0.00 m ³	1000	1
150 x 300mm	0 m ²	0.10 m ³	2500	1
150 x 300mm	2 m ²	0.00 m ³	2500	1
150 x 300mm	0 m ²	0.15 m ³	3500	1
150 x 300mm	3 m ²	0.00 m ³	3500	1
150 x 300mm	0 m ²	0.27 m ³	6300	1
150 x 300mm	5 m ²	0.00 m ³	6300	1
150 x 300mm	0 m ²	0.13 m ³	3000	1
150 x 300mm	3 m ²	0.00 m ³	3000	1
150 x 300mm	1 m ²	0.08 m ³	1800	1
150 x 300mm	1 m ²	0.00 m ³	1800	1
150 x 300mm	1 m ²	0.06 m ³	1500	1
150 x 300mm	1 m ²	0.00 m ³	1500	1
150 x 300mm	1 m ²	0.11 m ³	2580	1
150 x 300mm	2 m ²	0.00 m ³	2580	1
150 x 300mm	1 m ²	0.06 m ³	1500	1
150 x 300mm	1 m ²	0.00 m ³	1500	1
150 x 300mm	0 m ²	0.15 m ³	3500	1
150 x 300mm	3 m ²	0.00 m ³	3500	1
150 x 300mm	1 m ²	0.13 m ³	3000	1

150 x 300mm	1 m ²	0.00 m ³	3000	1
150 x 300mm	1 m ²	0.14 m ³	3300	1
150 x 300mm	1 m ²	0.00 m ³	3300	1
150 x 300mm	0 m ²	0.22 m ³	5000	1
150 x 300mm	4 m ²	0.00 m ³	5000	1
150 x 300mm	0 m ²	0.08 m ³	5000	1
150 x 300mm	2 m ²	0.00 m ³	5000	1
150 x 300mm	0 m ²	0.15 m ³	3500	1
150 x 300mm	3 m ²	0.00 m ³	3500	1

Item Pintu

Door Material Takeoff				
Level	Material: Name	Material: Area	Material: Volume	Count
Lantai 1				
Lantai 1	Door - Panel	3 m ²	0.079 m ³	1
Lantai 1	Door - Frame	2 m ²	0.019 m ³	1
Lantai 1	Door - Panel	4 m ²	0.100 m ³	1
Lantai 1	Door - Frame	2 m ²	0.020 m ³	1
Lantai 1	Door - Panel	4 m ²	0.100 m ³	1
Lantai 1	Door - Frame	2 m ²	0.020 m ³	1
Lantai 1	Glass	3 m ²	0.012 m ³	1
Lantai 1	Cherry	8 m ²	0.092 m ³	1
Lantai 1	Aluminum	0 m ²	0.001 m ³	1
Lantai 1	Door - Panel	3 m ²	0.079 m ³	1
Lantai 1	Door - Frame	2 m ²	0.019 m ³	1
Lantai 2	Door - Panel	3 m ²	0.079 m ³	1
Lantai 2	Door - Frame	2 m ²	0.019 m ³	1
Lantai 2	Door - Panel	3 m ²	0.079 m ³	1
Lantai 2	Door - Frame	2 m ²	0.019 m ³	1
Lantai 2	Door - Panel	3 m ²	0.079 m ³	1
Lantai 2	Door - Frame	2 m ²	0.019 m ³	1
Lantai 2	Glass	3 m ²	0.012 m ³	1
Lantai 2	Cherry	8 m ²	0.092 m ³	1
Lantai 2	Aluminum	0 m ²	0.001 m ³	1

Sumber: Software Autodesk Revit

Item Jendela

Window Material Takeoff			
Level	Material: Name	Material: Area	Material: Volume
Lantai 1	Glass	2 m ²	0.010 m ³
Lantai 1	Sash	3 m ²	0.031 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	0 m ²	0.000 m ³

Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	1 m ²	0.003 m ³
Lantai 1	Sash	2 m ²	0.022 m ³
Lantai 1	Glass	1 m ²	0.003 m ³
Lantai 1	Sash	2 m ²	0.022 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 1	Glass	0 m ²	0.000 m ³
Lantai 1	Sash	1 m ²	0.008 m ³
Lantai 2	Glass	3 m ²	0.016 m ³
Lantai 2	Sash	4 m ²	0.040 m ³
Lantai 2	Glass	3 m ²	0.016 m ³
Lantai 2	Sash	4 m ²	0.040 m ³
Lantai 2	Glass	0 m ²	0.000 m ³
Lantai 2	Sash	1 m ²	0.008 m ³
Lantai 2	Glass	0 m ²	0.000 m ³
Lantai 2	Sash	1 m ²	0.008 m ³
Lantai 2	Glass	0 m ²	0.000 m ³
Lantai 2	Sash	1 m ²	0.008 m ³
Lantai 2	Glass	0 m ²	0.000 m ³
Lantai 2	Sash	1 m ²	0.008 m ³
Lantai 2	Glass	0 m ²	0.000 m ³
Lantai 2	Sash	1 m ²	0.008 m ³
Lantai 2	Glass	0 m ²	0.000 m ³
Lantai 2	Sash	1 m ²	0.008 m ³
Lantai 2	Glass	0 m ²	0.000 m ³
Lantai 2	Sash	1 m ²	0.008 m ³
Lantai 2	Glass	0 m ²	0.000 m ³
Lantai 2	Sash	1 m ²	0.008 m ³
Lantai 2	Glass	5 m ²	0.016 m ³
Lantai 2	Clad - White	1 m ²	0.000 m ³
Lantai 2	Wood - Stained	4 m ²	0.051 m ³
Lantai 2	Glass	5 m ²	0.016 m ³
Lantai 2	Clad - White	1 m ²	0.000 m ³
Lantai 2	Wood - Stained	4 m ²	0.051 m ³

Kesimpulan

Dalam Penggunaan Material Quantity Take Off (QTO) pada Building Information Modeling (BIM) sangat membantu dalam menentukan volume untuk rencana anggaran biaya (RAB) secara lebih efisien. Dengan memanfaatkan model 3D yang telah dibuat, Quantity Take Off dapat menghasilkan output data kuantitas material secara otomatis, guna mengurangi potensi kesalahan perhitungan manual, serta mempercepat waktu pada proses perhitungan dibandingkan metode konvensional dan memungkinkan integrasi data dengan perangkat lunak estimasi biaya untuk mempermudah analisis anggaran, memberikan gambaran yang lebih realistis terkait kebutuhan material dan biaya proyek.

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