DESIGN BUILDINGS USING NATURAL LANGUAGE

Connecting Claude Code AI to Autodesk Revit 2026 via MCP

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What is Autodesk Revit?

The Industry Standard BIM Software

Autodesk Revit is the world's leading BIM (Building Information Modeling) software used by architects, structural engineers, MEP engineers, and contractors to design, visualize, and deliver building projects.

Architecture

Design building layouts, walls, roofs, floors, doors, and windows

Create 3D visualizations and construction documents

Structure

Design foundations, beams, columns, and steel framing systems

Perform structural analysis and detailing

MEP Engineering

Mechanical, Electrical, and Plumbing systems design

HVAC ductwork, wiring, and pipe routing

Revit is the **#1 tool** in the construction industry — used on projects from residential homes to skyscrapers worldwide

BIM vs CAD

Why BIM Revolutionized the Construction Industry

Traditional CAD (2D/3D Drawings)

Just lines and shapes — no intelligence behind the geometry

Each drawing is independent — change one, manually update all others

No material data, cost info, or scheduling built in

Teams work in silos — architects, engineers use separate files

Errors found late during construction — expensive fixes

BIM (Intelligent 3D Model)

Smart objects — a wall knows its height, material, cost, fire rating

Single source of truth — change once, updates everywhere automatically

Rich data: quantities, costs (5D), scheduling (4D), sustainability (6D)

All teams collaborate on ONE shared model in real-time

Clash detection catches conflicts BEFORE construction begins

Why BIM Changed Everything:

BIM reduced construction errors by up to **40%**, cut project timelines by **20-30%**, and enabled teams across the world to collaborate on a single intelligent model instead of exchanging disconnected drawings.

4D — Time
Construction scheduling linked to model

5D — Cost
Real-time cost estimation from quantities

6D — Sustainability
Energy analysis and green building design

7D — Operations
Facility management and maintenance

What is BIM?

Building Information Model, Modelling, and Management

BIM is a 3D model-based process that connects **ALL stakeholders** — architects, engineers, contractors, and clients — through a **single intelligent digital model**

Model (the 3D Model)

Digital representation of a building's physical and functional characteristics

Contains geometry, spatial data, materials, quantities, and properties

Modelling (the Process)

Collaborative process of creating the intelligent model across all project phases

Design → Construction → Operations lifecycle

Management

Using the shared model to coordinate teams and manage the entire building lifecycle

Clash detection, cost tracking, scheduling, facility management

Connected Stakeholders

Architects	**Engineers**	**Contractors**	**Clients**
Design intent	Structural and MEP	Quantities and scheduling	Visualization and cost

Parametric Modeling

Why It Powers BIM Software Like Revit

What is Parametric Modeling?

Instead of drawing fixed geometry, you define **rules and relationships** between elements. Parameters and constraints drive the geometry. Change one thing and related elements update automatically.

Why It's Critical for BIM:

Automatic Coordination — Move a wall, doors, windows, and dimensions update instantly

Rapid Iteration — Explore design options without manual redrafting

Data-Driven Accuracy — Quantities, costs, schedules always correct

Example in Revit:

Change a wall's **Height** from 3000mm to 3500mm:

→ **All windows** on that wall adjust position

→ **All dimensions** update to show 3500mm

→ **All schedules** recalculate automatically

→ **Room areas** and volumes update in all views

Why This Matters:

Parametric modeling makes BIM **intelligent** — every element knows its relationship to others, enabling accurate coordination across the entire project.

The Problem

Why This Matters

#1 Industry

Construction and design is Pakistan's biggest industry

#1 Tool

Autodesk Revit is the most used BIM tool by architects worldwide

2-5 Years

Traditional training time to master Revit

What if anyone could design buildings just by describing them in plain English?

The Solution

Natural Language Building Design

1
Talk to Claude Code in plain English

→

2
Claude sends commands to Revit via MCP

→

3
Walls, floors, grids, beams created in seconds

Query
Model data instantly

Analyze
Statistics automatically

Export
Reports on demand

What is MCP?

Model Context Protocol — The USB Port for AI

Open Standard by Anthropic

MCP standardizes how AI applications connect to external systems. It enables secure, two-way connections between AI models like Claude and external tools.

The USB Analogy

Just as **USB** lets you plug any device into your computer, **MCP** lets Claude plug in to any software tool.

Universal — One protocol for all tools

Hot-Pluggable — Add/remove tools dynamically

Standardized — No custom integrations needed

How It Works for Revit

Our MCP server sits between Claude Code and Revit, translating natural language into actual Revit API commands.

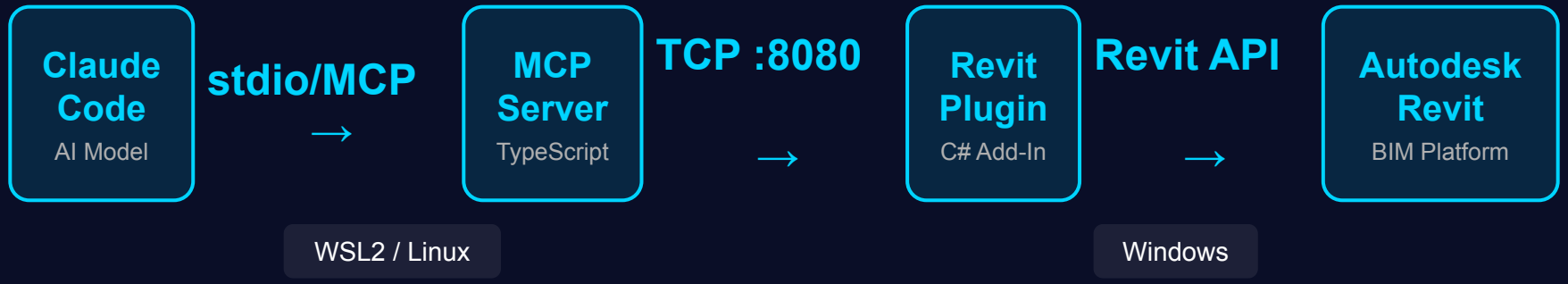
Tool Discovery — Claude finds available Revit operations

Bidirectional — Query data AND create elements

Real-Time — Commands execute instantly in Revit

System Architecture

How Claude Code Talks to Revit



1. User Input
You describe what you want in natural language to Claude Code in your terminal

2. MCP Translation
The MCP server converts your request into structured Revit commands via Model Context Protocol

3. TCP Bridge
Commands travel from WSL2/Linux to Windows over TCP port 8080 using the gateway IP

4. BIM Execution
The C# plugin marshals commands to Revit's UI thread via ExternalEvent and creates BIM elements

Available Tools

19 Commands for Complete BIM Control

CREATE — 6 Commands

CREATE ELEMENTS

Walls — Straight and curved walls

Floors — Floor slabs and finishes

Grids — Column grids and levels

Beams — Structural framing

Dimensions — Automatic dimensioning

Point Elements — Columns, fixtures

QUERY — 13 Commands

ANALYZE AND EXPORT

View Info — Active viewport data

Family Types — Available components

Selected Elements — Current selection

Room Data — Areas and volumes

Material Quantities — Takeoff data

Model Statistics — Element counts

Natural Language in Action

What You Say to Claude Code vs What Revit Does

YOU SAY:
"Create a 10m x 8m rectangular room with 3 meter high walls"

→ **Revit creates:** 4 walls forming a 10x8m enclosure at 3m height

YOU SAY:
"Add a grid system with 6 meter spacing, 3 bays in each direction"

→ **Revit creates:** 4x4 grid lines with 6m spacing and labels

YOU SAY:
"What are the total floor areas and wall quantities in this model?"

→ **Claude returns:** Floor areas, wall counts, material quantities

YOU SAY:
"Place steel beams along all grid intersections at level 2"

→ **Revit creates:** Structural steel beams at every grid crossing

No Revit training needed — describe what you want in plain English, Claude handles the rest

Live Demo Results

What We Built: The Prism

THE PRISM

A 3-Story Neo-Futuristic Building

Glass Curtain Wall — Full facade glazing

Cantilevered 2nd Floor — Dramatic overhang

Sky Terrace — 3rd floor outdoor space

Steel Beam Framing — Structural systems

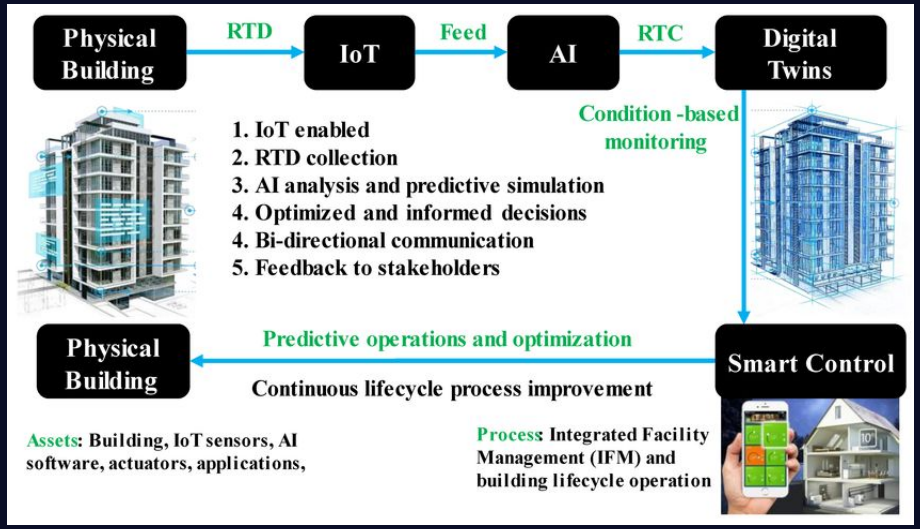
Grid System — 6x6m column layout

Floor Slabs — 150mm concrete

All created through natural language in under 5 minutes

Digital Twins and IoT

The Future of Smart Building Management



What is a Digital Twin?

A **real-time virtual replica** of a physical building that mirrors its actual state, behavior, and performance using live sensor data.

How It Works:

Physical Building has IoT sensors installed

Sensors collect real-time data (temperature, humidity, occupancy, energy use)

AI analyzes the data for predictive simulation and optimization

Smart Control feeds decisions back to the building systems

IoT Sensors

Small devices embedded in buildings that collect data 24/7: temperature, motion, air quality, energy consumption, structural stress

AI + Predictive Analysis

AI processes sensor data to predict failures, optimize energy usage, and recommend maintenance before problems occur

BIM + Digital Twin

The BIM model becomes a living digital twin — from design tool to lifetime building management system

Our Vision

Design buildings with natural language, then manage them as digital twins — full lifecycle from concept to operations

Setup Guide

Everything You Need to Get Started

Prerequisites

Windows 10/11 — Revit only runs on Windows
Autodesk Revit 2026 — Free trial at autodesk.com/revit
Node.js 18+ — For the MCP server
Claude Code — Anthropic's AI CLI (needs API key)
WSL2 — Windows Subsystem for Linux (for Claude Code)

```
$ git clone https://github.com/Demolinator/Revit-MCP-CS.git
$ cd Revit-MCP-CS
$ chmod +x setup.sh && ./setup.sh
```

Then Start Using:

1. Open Revit 2026 and create/open a project
2. Go to **Add-Ins** tab, click **MCP Switch**
3. Start Claude Code in WSL2 — ready to design!

Try It Yourself!

github.com/Demolinator/Revit-MCP-CS

Complete setup guide with troubleshooting
19 pre-configured Revit commands
Works out of the box with Revit 2026
Auto-detects WSL2 gateway IP

Important Notes

A Revit **project must be open** for commands to work

Click MCP Switch **once** to toggle ON (not double-click)
Setup script handles all config automatically

THANK YOU

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