J∆S Engineering Suite

Guide 00: Getting Started with

Version 1.2 — April 2026
JS Engineering Solutions

Complete New User Guide

Version: 1.2 **Last Updated:** February 2026 **Product:** JΔS Engineering Suite (Design Suite) **Company:** JS Engineering Solutions **Support:** james@jsengineeringsolutions.com

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1. System Requirements and Installation

1.1 Minimum System Requirements

Before downloading JΔS Engineering Suite, verify your computer meets the following minimum requirements:

Component	Minimum	Recommended
Operating System	Windows 10 (64-bit), version 1903 or later	Windows 11 (64-bit), latest update
Processor	Intel Core i5 (8th Gen) or AMD Ryzen 5	Intel Core i7 (10th Gen+) or AMD Ryzen 7
RAM	8 GB	16 GB or more
Disk Space	2 GB free for installation	5 GB+ (including project files and weather data)
Screen Resolution	1366 x 768	1920 x 1080 or higher
Display Scaling	100% or 125%	100% for best layout accuracy

Component	Minimum	Recommended
Graphics	Any GPU with DirectX 11 support	Dedicated GPU for 3D visualization
Internet	Required for initial login, cloud sync, and AI features	Broadband connection
.NET Runtime	Not required (standalone Python executable)	N/A

Important Notes on Requirements:

- The application is built as a self-contained executable. You do not need to install Python, PyQt6, or any other runtime. Everything is bundled inside the single EXE file.
- If you plan to use the Revit or AutoCAD integration add-ins, you will need Autodesk Revit 2022-2025 or AutoCAD 2022-2025 installed separately.
- The AI Design Assistant and Proactive AI Engineer features require an internet connection and a cloud API key (Google Gemini free tier recommended, Claude and OpenAI also supported). On first launch, the AI Setup Wizard will guide you through obtaining a free API key.
- For 8760-hour annual energy simulations on large buildings (100+ zones), 16 GB RAM is strongly recommended.

1.2 Downloading the Application

The JΔS Engineering Suite installer is a single portable executable file. There is no traditional MSI or setup wizard -- the EXE itself is the application.

Step-by-step download:

1. Open your web browser (Chrome, Edge, Firefox, or any modern browser).
2. Navigate to the download URL:

```
https://jas-engineering-downloads.s3.us-west-1.amazonaws.com/Design_Suite.exe
```

3. Your browser will begin downloading the file `Design_Suite.exe`. The file is approximately 150-250 MB depending on the version.
4. Wait for the download to complete. Do not interrupt the download.
5. The file will appear in your default Downloads folder, typically:

```
C:\Users\<YourUsername>\Downloads\Design_Suite.exe
```

Alternative download method:

You can also download from the official website:

1. Go to `https://jsengineeringsolutions.com`
2. Click the "Download" button on the homepage or navigate to the Downloads page.
3. Click "Download Design Suite" to begin the download.

1.3 Windows Defender SmartScreen Warning

Because JΔS Engineering Suite is an independently published application, Windows Defender SmartScreen may show a warning when you first run the EXE. This is a standard Windows behavior for applications that have not yet accumulated a large number of downloads to build a reputation with Microsoft.

How to proceed past the SmartScreen warning:

1. Double-click `Design_Suite.exe` to launch it.

2. A blue Windows Defender SmartScreen window will appear, stating: **"Windows protected your PC"** with the message "Microsoft Defender SmartScreen prevented an unrecognized app from starting."

3. Click the text link that says **"More info"** (this is a clickable link, not a button -- it appears below the warning text in small blue text).

4. After clicking "More info," two buttons will appear at the bottom of the window: **"Don't run"** and **"Run anyway"**.

5. Click **"Run anyway"** to launch the application.

6. You will only need to do this once. After the first successful launch, Windows will remember your choice and will not show the warning again for this file.

If the SmartScreen dialog does not appear but the application does not launch:

• Right-click the `Design_Suite.exe` file.

• Select **"Properties"** from the context menu.

• At the bottom of the General tab, look for a message: "This file came from another computer and might be blocked to help protect this computer."

• Check the **"Unblock"** checkbox next to this message.

• Click **"Apply"**, then **"OK"**.

• Now double-click the EXE to launch it.

1.4 Installation Directory and File Placement

JΔS Engineering Suite is a portable application. There is no formal installation step. You can run it from any location on your computer.

Recommended placement:

1. Create a folder for the application:

```
C:\Program Files\JΔS Engineering Suite\
```

or

```
C:\JAS\
```

2. Move or copy `Design_Suite.exe` into this folder.

3. Optionally, right-click the EXE and select **"Create shortcut"**, then drag the shortcut to your Desktop or pin it to the Taskbar for quick access.

Application data location:

The application stores its settings, user database, and cached data in:

```
%LOCALAPPDATA%\MEP-Design-Suite\
```

Which typically resolves to:

```
C:\Users\<YourUsername>\AppData\Local\MEP-Design-Suite\
```

This directory contains:

- `settings.json` -- Your application preferences (theme, window mode, recent projects, code standard selections)
- `users.db` -- Local SQLite database for user authentication, license keys, and 2FA secrets
- Cached license validation data

Project files location:

By default, project files (.mep format) are stored in:

```
%USERPROFILE%\Documents\JAS Projects\
```

You can save projects to any location you choose.

1.5 First Launch: What You Will See

When you launch JΔS Engineering Suite for the first time, the following sequence occurs:

1. Splash Screen (3-8 seconds): A dark, animated splash screen appears with the JΔS Engineering Suite logo, a progress bar showing loading status, animated loading dots, and the text "Professional MEP Design & Analysis Tools" below the title. The progress bar fills from 0% to 100% as modules are loaded. Status messages cycle through items like "Initializing...", "Loading modules...", "Preparing workspace..." etc. The splash screen features a pulsing cyan glow effect and an animated accent line that sweeps across the top.

2. Login Dialog (fullscreen): After the splash screen finishes, a fullscreen login dialog appears. This is a glassmorphism-styled dialog with a background image (your selected logo theme), a semi-transparent login panel in the center, and a theme selector dropdown in the upper right corner. Since this is your first launch, you will need to register an account. See Section 2 for complete details.

3. Main Application Window: After successful login, the main application window appears with the left sidebar, top menu bar, central dashboard, and bottom status bar. The window opens maximized by default.

1.6 Updating the Application

To update JΔS Engineering Suite to a newer version:

1. Download the latest `Design_Suite.exe` from the same S3 URL listed above (it always points to the latest version).

2. Close any running instance of the application.

3. Replace your existing `Design_Suite.exe` file with the newly downloaded one.

4. Launch the updated EXE. Your settings, projects, and user account are preserved because they are stored separately in `%LOCALAPPDATA%\MEP-Design-Suite\`.

You can check for updates from within the application by going to **Help > Check for Code Updates...** in the menu bar.

2. Account Registration and Login

JΔS Engineering Suite requires a user account to operate. Accounts are stored locally in an SQLite database on your machine, with optional cloud synchronization for collaboration features.

2.1 The Login Dialog in Detail

When the application starts, you see the Login Dialog. Here is every element on this screen:

Top Right Corner -- Theme Selector:

- A "Theme:" label and a dropdown combobox appear in the upper right.
- The dropdown lists all 40+ available themes organized by category (Dark themes, Light themes, Lightsaber themes, Lightning themes, Special Edition themes, Color themes).
- Selecting a different theme instantly changes the entire application appearance, including this login dialog.
- The selected theme is saved to your settings file and persists across sessions.

Center -- Login Panel:

- The login panel is a rounded rectangle with a semi-transparent dark background (`rgba(12, 12, 20, 0.8)`) and a subtle border glow in the primary theme color.
- The panel is 420 pixels wide minimum and vertically centered on the screen.

Panel Contents (top to bottom):

1. **"Login" Title** -- Large bold text in cyan (#00d4ff), centered at the top of the panel.

2. **Email Field:**

- Label: "Email:" (light gray text, 13px)
- Input: A text field with placeholder text "Enter email address"
- Minimum height: 44 pixels
- Dark background with a subtle border that turns cyan when focused
- This field accepts the email address you used during registration

3. **Password Field:**

- Label: "Password:" (light gray text, 13px)
- Input: A text field with placeholder text "Enter password"
- Characters are masked (shown as dots) for security
- Minimum height: 44 pixels
- Pressing Enter in this field triggers the login action

4. **"Remember me" Checkbox:**

- A small checkbox with gray label text
- When checked, the application saves a session token so you do not need to re-enter credentials on the next launch
- The checkbox state is persisted in the Windows registry under `HKCU\Software\JSEngineering\JSEngineeringSuite`

5. **Error Label (hidden by default):**

- When a login attempt fails, a red (#ff6b6b) error message appears here
- Common messages: "Please enter email and password", "Please enter a valid email address", "Invalid email or password"

6. **"Login" Button:**

- A large cyan button (minimum height 46px)
- Text: "Login" in bold white

- Clicking this button or pressing Enter in the password field attempts authentication
- The button changes to a lighter cyan on hover and a darker shade when pressed

7. Register Link:

- Text: "Don't have an account?" followed by a clickable "Register" button in cyan
- Clicking "Register" switches the view to the Registration Dialog

8. 2FA Badge:

- At the bottom of the panel, a small green shield icon with text "Two-Factor Authentication Supported"
- This is informational only and indicates the application supports TOTP-based 2FA

Bottom -- Footer:

- "JΔS Engineering Suite v1.2 | (c) JΔS Engineering Solutions" in semi-transparent white text

Keyboard Navigation:

- Tab: Move between Email field, Password field, Remember Me checkbox, and Login button
- Enter: If focus is in the Password field, triggers login. If focus is on the Login button, triggers login.
- Escape: Closes the login dialog and exits the application

2.2 Login Process Step by Step

1. Type your registered email address in the "Email" field.

2. Type your password in the "Password" field.

3. Optionally check "Remember me" to skip login on future launches.

4. Click the "Login" button or press Enter.

5. If login succeeds and 2FA is NOT enabled: You proceed directly to the main application.

6. If login succeeds and 2FA IS enabled: A Two-Factor Authentication dialog appears (see Section 2.5).

7. If login succeeds and 2FA is NOT enabled but you have not set it up: A "Secure Your Account with 2FA" dialog appears prompting you to set up 2FA. You can set it up, skip for now ("Set Up Later"), or choose "Don't Ask Again."

8. If login fails: A red error message appears below the password field. Check your email and password and try again.

Behind the scenes during login:

- The application authenticates against the local SQLite database using PBKDF2-SHA256 hashing (100,000 iterations).
- Simultaneously, it attempts to fetch a JWT (JSON Web Token) from the cloud API at `https://api.jsengineeringsolutions.com/api/auth/login` for collaboration features. This is non-blocking -- if the cloud API is unreachable, local login still succeeds.
- If the cloud account has 2FA enabled and the local account does not, the cloud TOTP secret is automatically synced to the local database so both accounts use the same authenticator code.

2.3 Registration Dialog in Detail

If you click "Register" from the Login Dialog, or if this is your very first time using the application, you will see the Registration Dialog.

Window Properties:

- Title: "J∆S Engineering Suite - Register"
- Minimum size: 420 x 560 pixels
- Modal dialog (you cannot interact with other windows while it is open)

Form Fields (top to bottom):

1. "Create Account" Title -- Large bold text in the primary theme color, centered.

2. Email Field:

- Label: "Email:"
- Placeholder: "Your email address (used for login)"
- Minimum height: 36 pixels
- This email becomes your unique login identifier. It must contain an "@" symbol and at least one "." in the domain.
- Example: `john.smith@acmehvac.com`

3. Name Field:

- Label: "Name:"
- Placeholder: "Your full name"
- Minimum height: 36 pixels
- This is your display name. If left blank, the portion of your email before "@" is used.
- Example: `John Smith`

4. Password Field:

- Label: "Password:"
- Placeholder: "Choose a password (min 6 chars)"
- Minimum height: 36 pixels
- Characters are masked (dots)
- Minimum length: 6 characters (enforced during registration)

5. Confirm Password Field:

- Label: "Confirm:"
- Placeholder: "Confirm your password"
- Minimum height: 36 pixels
- Characters are masked
- Must exactly match the Password field
- Pressing Enter in this field triggers the registration action

6. License Key Group Box:

- Titled "License Key (Required)" with a bordered group box

- Input field with placeholder: "MEP-XXXX-XXXX-XXXX or TRIAL-2026-EVAL-FREE"
- Minimum height: 36 pixels
- Below the input: "For 30-day trial, enter: TRIAL-2026-EVAL-FREE" in muted gray text
- Below that: "Purchase license: Contact xmanjames@gmail.com" with the email as a clickable mailto link

License Key Formats Accepted:

- Trial key: `TRIAL-2026-EVAL-FREE` (provides 14-day evaluation period)
- Standard key: `MEP-XXXX-XXXX-XXXX` (format: 3-6 character prefix, dash, then three groups of 4 uppercase alphanumeric characters)
- Any key matching the pattern `XXXX-XXXX-XXXX-XXXX` (four groups of 3-6 uppercase alphanumeric characters)

7. Error Label (hidden by default):

- Red text appears here if registration fails
- Common messages: "Please fill in email and password", "Please enter a valid email address", "License key is required...", "Passwords do not match", "Email already registered"

8. "Create Account" Button:

- Green (#10b981) button with bold white text
- Minimum height: 40 pixels
- Clicking this triggers the registration process

9. Back to Login Link:

- "Already have an account?" followed by a clickable "Login" link in the primary theme color
- Clicking this returns to the Login Dialog

2.4 Registration Process Step by Step

1. Enter your email address in the Email field.

2. Enter your full name in the Name field (optional but recommended).

3. Choose a password (minimum 6 characters) and type it in the Password field.

4. Re-type the same password in the Confirm field.

5. Enter a license key in the License Key field. For evaluation, type: `TRIAL-2026-EVAL-FREE`

6. Click "Create Account".

7. If registration succeeds:

- A local account is created in the SQLite database.
- Simultaneously (in a background thread), a cloud account is automatically created at `https://api.jsengineeringsolutions.com/api/auth/register`. This is silent and non-blocking -- if it fails, your local account still works.
- The application attempts to automatically log you in and activate the license key (first trying online activation, then falling back to local activation).
- If the license activation fails, a warning dialog appears saying "Account created but license activation failed" -- you can add a license later from Settings > User Account > License Management.

• If everything succeeds, an "Account created!" success dialog appears.

• You are then automatically logged in and the main application window opens.

8. If registration fails:

• A red error message appears in the error label area.

• Common reasons: email already registered, invalid email format, passwords do not match, license key format invalid.

2.5 Two-Factor Authentication (2FA)

JΔS Engineering Suite supports TOTP (Time-based One-Time Password) two-factor authentication, compatible with Google Authenticator, Authy, Microsoft Authenticator, and any other TOTP-compatible app.

2.5.1 Setting Up 2FA

After your first login (if 2FA is not yet configured), a "Secure Your Account with 2FA" dialog appears automatically:

Dialog Contents:

1. Title: Shield icon with "Secure Your Account with 2FA" in bold primary color, centered.

2. Description: "Two-Factor Authentication adds an extra layer of security to your account. Even if someone gets your password, they won't be able to access your account without your phone."

3. QR Code: A 220x220 pixel white-bordered frame containing a QR code. This QR code encodes an `otpauth://totp/` URI with the application name "JΔS Engineering Suite" as the issuer and your username as the account name.

4. Instructions:

• "1. Install an authenticator app (Google Authenticator, Authy, etc.)"

• "2. Scan this QR code with the app"

• "3. Enter the 6-digit code below"

5. Code Input Field:

• A large centered input field (font-size 24px, letter-spacing 8px) for entering the 6-digit code

• Placeholder: "Enter 6-digit code"

• Maximum length: 6 characters

• Pressing Enter triggers verification

6. "Enable Two-Factor Authentication" Button:

• Green success-colored button

• After successful verification, changes to "2FA Enabled!" and becomes disabled

7. Skip Options:

• "Set Up Later" -- closes the dialog without enabling 2FA; you will be prompted again on your next login

• "Don't Ask Again" -- closes the dialog and saves a preference to never show the 2FA setup prompt again (you can still enable 2FA later from Settings > User Account > Two-Factor Authentication)

Step-by-step setup process:

1. When the QR code dialog appears, open your authenticator app on your phone.
2. In the authenticator app, tap the "+" or "Add Account" button.
3. Choose "Scan QR Code" (or "Scan Barcode").
4. Point your phone's camera at the QR code displayed in the dialog.
5. The authenticator app will create a new entry labeled "J∆S Engineering Suite" with your username.
6. The app will now display a 6-digit code that changes every 30 seconds.
7. Type the current 6-digit code from your authenticator app into the code input field.
8. Click "Enable Two-Factor Authentication".
9. If the code is valid, a success message appears and a **Backup Codes** dialog is shown.
10. **Critical: Save your backup codes.** The Backup Codes dialog displays 10 recovery codes in the format `XXXX-XXXX`. Write these down or save them in a secure location. Each backup code can only be used once. If you lose access to your authenticator app, these codes are the only way to log in.
11. Click "OK" to close the backup codes dialog. 2FA is now active on your account.

If the QR code fails to generate:

- The dialog will display the TOTP secret as plain text (e.g., `JBSWY3DPEHPK3PXP`).
- In your authenticator app, choose "Enter a setup key" (or "Manual entry") instead of scanning a QR code.
- Type the secret key displayed in the dialog.
- Set the account name to your username and the issuer to "J∆S Engineering Suite".

2.5.2 Logging In with 2FA

When 2FA is enabled, the login process adds an extra step:

1. Enter your email and password as usual and click Login.
2. If credentials are correct, a "Two-Factor Authentication" verification dialog appears.
3. The dialog title says "Enter Verification Code".
4. Instructions: "Enter the 6-digit code from your authenticator app or use a backup code."
5. A large centered input field (font-size 24px) with placeholder "000000".
6. Open your authenticator app and find the current 6-digit code for J∆S Engineering Suite.
7. Type the 6-digit code into the field.
8. Click "Verify" or press Enter.
9. If the code is valid, you are logged in.
10. If the code is invalid, an error message "Invalid verification code. Please try again." appears, the field is cleared, and you can try again.
11. To cancel, click "Cancel" -- this returns you to the login dialog.

Using a backup code instead:

- In the verification code field, you can enter one of your backup codes instead of the TOTP code.
- Backup codes are 8-character alphanumeric strings in the format `XXXX-XXXX`.

- Enter the backup code (with or without the dash) and click Verify.
- The backup code is consumed (removed from your list of valid codes) after successful use.
- You can regenerate backup codes from Settings > User Account > Two-Factor Authentication.

2.5.3 Unified 2FA Between Desktop and Cloud

JΔS Engineering Suite uses a unified 2FA system. When you log in:

- If the cloud API has 2FA enabled for your account and your local installation does not, the cloud's TOTP secret is automatically synced to your local database. This means your authenticator app entry works for both the desktop application and the web portal.
- If the cloud requires a 2FA code during JWT fetch, the code you enter locally is also forwarded to the cloud API.

2.6 Password Requirements

- Minimum length: 6 characters
- No maximum length enforced
- No special character requirements (however, using a mix of uppercase, lowercase, numbers, and symbols is recommended)
- Passwords are hashed using PBKDF2-HMAC-SHA256 with 100,000 iterations and a random 32-byte salt
- Legacy accounts (from older versions) using SHA-256 hashing are automatically verified with the legacy method

2.7 Password Reset

Currently, password reset is handled locally:

1. If you have forgotten your password and cannot log in, you will need to contact support at `james@jsengineeringsolutions.com`.

2. For the cloud web portal, password reset via email is available at `https://jsengineeringsolutions.com/auth.html`.

3. As a local workaround (not recommended for production), an administrator can reset passwords through the Settings > User Account > User Management dialog if they have admin role access.

2.8 Offline Mode

JΔS Engineering Suite works fully offline after initial login:

What works without internet:

- All calculation modules (load calculations, duct sizing, pipe sizing, equipment selection, etc.)
- All 523+ weather data locations (weather data is bundled in the application)
- Project file save/load (.mep files)
- Report generation (PDF, Excel, TXT)
- Login (credentials are verified against local SQLite database)
- 2FA verification (TOTP is computed locally)

- All compliance checking (ASHRAE 90.1, Title 24, etc.)
- All code references and standards databases

What requires internet:

- Cloud collaboration (Share Project, Open Shared Project, Team Online)
- AI Design Assistant (requires cloud API key -- Gemini free tier, Claude, or OpenAI)
- Proactive AI Engineer (cloud-based analysis)
- License activation via the online portal
- Cloud account registration
- Checking for application updates
- CEC Registry submission

2.9 User Roles

The application supports three user roles:

Role	Capabilities
Admin	Full access to all features, user management, license management, can create/delete user accounts
User	Full access to all engineering tools, project management, and reporting (default role for new accounts)
Viewer	Read-only access to projects and reports; cannot modify calculations or save projects

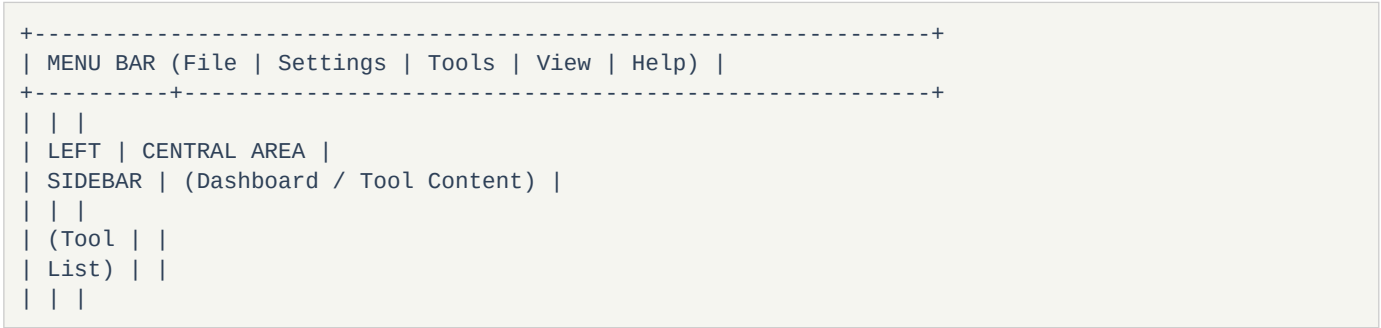
New accounts are created with the **User** role by default.

3. Dashboard Navigation

After successful login, the main application window appears. This section describes every element of the interface in detail.

3.1 Application Window Layout

The main window is divided into four regions:



```
+----------+-------------------------------------------------------+
| STATUS BAR |
+-------------------------------------------------------------------+
```

3.2 The Dashboard (Central Area)

When no tool is active, the central area displays the Dashboard. The dashboard has the following sections from top to bottom:

3.2.1 Header Row

- **Left:** "JΔS Engineering Suite" in large bold primary-colored text (22px font).
- **Right:** Today's date in the format "Wednesday, February 20, 2026" in secondary gray text.

3.2.2 KPI Stat Cards Row

Four stat cards are displayed in a horizontal row, each with a colored top border accent:

1. **Active Project** (cyan top border)
- Shows the name of the currently loaded project
- If no project is loaded: "No project loaded"
- If a project is loaded: displays the project name
2. **Recent Activity** (green top border)
- Shows the number of tools used during the current session
- Example: "3 tools used today"
3. **Available Modules** (orange top border)
- Shows the total count of available engineering tools
- Typically displays: "150+ tools"
4. **System Status** (blue top border)
- Shows the application readiness state
- Normal state: "Ready"
- During calculations: "Calculating..."

Each card has a dark card background (#12121a) with a subtle border and rounded corners.

3.2.3 Quick Actions Row

Below the stat cards, a "Quick Actions" section provides one-click access to the most common tasks:

Button	Color Accent	Action
New Project	Cyan	Creates a new empty project
Open Project	Blue	Opens the file dialog to load an existing .mep file
Energy Calcs	Orange	Launches the Energy Calculations module

Button	Color Accent	Action
Duct Sizer	Cyan	Launches the Duct Sizer tool
Pipe Sizer	Green	Launches the Pipe Sizer tool
Reports	Purple	Launches the Reports and Diagrams module

Each button is 52 pixels tall with a left-side color accent bar, dark background, and hover effect.

3.2.4 Two-Column Layout: Recent Projects and Recently Used Tools

Below the Quick Actions, the dashboard splits into two columns:

Left Column -- Recent Projects:

- Header: "Recent Projects" in bold secondary text
- A list widget (maximum 200px tall) showing the file paths of your most recently opened projects
- Each entry is clickable -- double-click to open the project
- If no projects have been opened: the list is empty
- Projects are listed in reverse chronological order (most recent first)
- Hover highlights the entry; selected entry highlights in the primary theme color

Right Column -- Recently Used Tools:

- Header: "Recently Used Tools" in bold secondary text
- A flow layout showing chip/tag buttons for tools you have recently launched
- Each chip shows the tool name and is clickable to relaunch
- If no tools have been used in the current session: this area is empty

3.3 Left Sidebar: Tool Categories

The left sidebar is the primary navigation element. It occupies approximately 280 pixels wide and contains a vertically scrollable list of all engineering tools organized by category.

3.3.1 Sidebar Header

At the top of the sidebar:

- **"TOOLS" label** in uppercase bold primary-colored text
- **"Collapse All" / "Expand All" button** -- a small button in the top-right of the header that toggles all categories between collapsed and expanded states

3.3.2 Search Box

Directly below the header is a search filter:

- A magnifying glass icon ("search") followed by a text input field
- Placeholder text: "Search tools..."
- The field has a clear button (X) on the right side that appears when you type

- **How it works:** As you type, the sidebar dynamically filters to show only tool buttons whose names contain your search text. Category headers for empty categories are hidden. Categories with matching tools are automatically expanded.
- Example: Typing "duct" will show "Duct Sizer", "Duct Insulation", and their parent categories, hiding everything else.
- Clearing the search box restores all categories and tools to their original state.

3.3.3 Special Sections

Before the main tool categories, two special sections appear:

FAVORITES (orange accent):

- Click the "FAVORITES" header to expand/collapse
- Contains tools you have marked as favorites
- To add a favorite: right-click any tool button and select "Add to Favorites"

RECENTLY USED (cyan accent):

- Click the "RECENTLY USED" header to expand/collapse
- Automatically populated with tools you have recently launched
- Limited to the most recent 5-8 tools

A thin horizontal separator line divides these special sections from the main categories.

3.3.4 Tool Category List (Complete Reference)

Below the separator, every tool category and its tools are listed. Each category has:

- A colored header bar with a left-side accent line
- An expand/collapse arrow (down-arrow = expanded, right-arrow = collapsed)
- A tool count badge in parentheses showing how many tools the category contains
- Click the category header to toggle expand/collapse

The expand/collapse state is persisted in settings, so your collapsed/expanded preferences are remembered between sessions.

Here is the complete list of all categories and their tools:

1. HVAC LOAD CALCULATIONS (Orange accent)

Tool	Description
Energy Calculations	Whole-building heating and cooling load calculations per ASHRAE methodology
Envelope Editor	Define and edit wall, roof, floor, and fenestration assemblies with U-factor calculations
Building Analysis	Analyze building performance metrics including energy use intensity and peak loads
Reports & Diagrams	Professional load calculation reports, system diagrams, and compliance forms

Tool	Description
Project Report (PDF)	Generate comprehensive project report in PDF format
Data Visualizer (8760)	Visualize 8,760-hour annual energy simulation data with interactive charts
Parametric System Sweep	Compare HVAC system alternatives side-by-side with automated parametric analysis

2. SIZING TOOLS (Cyan accent)

Tool	Description
Duct Sizer	Calculate duct sizes per SMACNA for round, rectangular, and flat oval ducts
Pipe Sizer	Size hydronic and plumbing piping based on flow rate, velocity, and pressure drop
Pump Calculator	Select and size pumps using system curve analysis and manufacturer performance data
Ventilation (62.1)	Calculate outdoor air ventilation rates per ASHRAE Standard 62.1
ESP Calculator	Calculate external static pressure for air handling units and fan selection
Louver Sizing	Size intake and exhaust louvers for required free area and weather protection
Door Undercut	Calculate door undercut dimensions for transfer air between pressure zones

3. PLUMBING TOOLS (Blue accent)

Tool	Description
Fixture Calculator	Calculate plumbing fixture unit counts and pipe sizing per IPC/UPC codes
Water Pressure Calc	Analyze domestic water pressure from source to highest fixture with friction losses
Gas Pipe Sizer	Size natural gas and propane piping per IFGC using longest-length method
Hot Water Sizing	Size hot water distribution piping and calculate recirculation loop heat loss
Domestic Hot Water	Design domestic hot water systems including heater sizing and storage tank selection
Waste Pipe Invert	Calculate waste pipe invert elevations and slopes for gravity drainage systems

4. PLANT EQUIPMENT (Green accent)

Tool	Description
Chiller Plant	Design chiller plants with equipment selection, piping layout, and sequence of operation
Boiler Plant	Design boiler plants with equipment selection, piping layout, and sequence of operation
Equipment Schedule	Create and manage HVAC equipment schedules with manufacturer catalog data
Equipment Wizard	Step-by-step wizard for selecting and configuring HVAC equipment

5. ADDITIONAL TOOLS (Purple accent)

Tool	Description
Psychrometrics	Interactive psychrometric chart with air process plotting and state-point calculations
Unit Converter	Convert between IP and SI units for all common HVAC and plumbing engineering values
Noise Calculator	Calculate sound power levels, transmission loss, and duct attenuation for HVAC noise
Mixed Air Calculator	Determine mixed air temperature and enthalpy from outdoor and return air streams
Expansion Tank Sizing	Size expansion tanks for closed hydronic systems per ASHRAE guidelines
Refrigerant Pipe Sizing	Size refrigerant suction, liquid, and discharge lines with oil return verification

6. SPECIALTY HVAC (Red accent)

Tool	Description
Kitchen Hood	Design commercial kitchen exhaust hoods per IMC/NFPA 96 with makeup air calculations
Parking Garage Vent	Calculate parking garage ventilation rates per IMC for CO and NO2 dilution
Lab / Fume Hood	Design laboratory HVAC with fume hood exhaust, air change rates, and pressure cascades
Pool / Natatorium	Design natatorium HVAC systems with dehumidification and corrosion-resistant materials
Stairwell Pressurization	Calculate stairwell pressurization fan sizing per IBC for smoke control compliance
Data Center Cooling	Design data center cooling with rack-level analysis and PUE optimization

7. ELECTRICAL TOOLS (Orange accent)

Tool	Description
Voltage Drop	Calculate conductor voltage drop for branch circuits and feeders per NEC
Conduit Fill	Determine conduit fill percentages per NEC Chapter 9
Motor Circuit	Size motor branch circuits including overload protection, wire, and conduit per NEC Article 430
Transformer Sizing	Size dry-type and liquid-filled transformers based on connected and demand loads
Lighting Calculator	Calculate lighting power density and illumination levels per IES and energy codes
Short Circuit	Perform short circuit analysis to verify equipment AIC ratings
One-Line Diagram	Generate single-line electrical diagrams showing power distribution

8. PLANT / SYSTEM TOOLS (Cyan accent)

Tool	Description
Air Balance	Create air balance reports with supply, return, exhaust, and outdoor air flow measurements
Pump Curves	Plot and analyze pump performance curves with system curve overlay
Grease Interceptor	Size grease interceptors per PDI G101 and local plumbing code requirements
Heat Exchanger	Design and rate shell-and-tube and plate heat exchangers
Cooling Tower	Select and rate cooling towers based on approach, range, and wet-bulb conditions
Control Diagrams	Generate HVAC control system diagrams with points lists and sequences
VAV Box Sizing	Size variable air volume terminal units
Diffuser Selection	Select supply air diffusers and grilles based on throw, NC, and pressure drop
Acoustics NC/RC	Calculate NC and RC noise criteria ratings for occupied spaces
Glycol Properties	Look up thermophysical properties of ethylene and propylene glycol solutions
Steam Pipe Sizing	Size steam supply and condensate return piping
Fan Laws	Apply fan laws to predict performance changes from speed, diameter, and density variations
Duct Insulation	Calculate duct insulation thickness for condensation prevention and energy code compliance

9. SPECIALTY ENGINEERING (Purple accent)

Tool	Description
Fire Protection	Design fire protection systems including sprinkler hydraulic calculations per NFPA 13
Smoke Control	Design smoke control systems per IBC Chapter 9
Vibration Analysis	Analyze equipment vibration isolation requirements
Cleanroom Design	Design cleanroom HVAC with ISO classification, HEPA filtration, and pressurization
Pipe Network	Analyze complex pipe networks with multiple loops using Hardy Cross iteration
Pool/Natatorium	Design pool and natatorium HVAC systems with humidity control
CFD Integration	Interface with computational fluid dynamics tools for airflow visualization

10. COMPLIANCE & SUSTAINABILITY (Green accent)

Tool	Description
PHIUS Passive House	Verify compliance with PHIUS passive house certification
WELL Building	Check project compliance with WELL Building Standard
Title 24-2022	California Title 24-2022 energy code compliance analysis with NRCC/LMCC forms
ASHRAE 90.1-2022	ASHRAE Standard 90.1-2022 energy code compliance
CEC Registry Submission	Prepare and submit Title 24 compliance documents to the California Energy Commission
Carbon Footprint	Calculate embodied and operational carbon emissions
Grid-Interactive (GEB)	Design grid-interactive efficient buildings with demand response

11. REFERENCES & STANDARDS (Blue accent)

Tool	Description
Code Reference (AI)	AI-powered building code lookup across ASHRAE, IBC, IMC, NFPA, and local amendments
ASHRAE Standards	Browse and reference ASHRAE standards (90.1, 62.1, 55, 189.1)
ASHRAE Weather Data	Access ASHRAE design weather data for 523+ US and international locations
NFPA Codes	Browse NFPA fire codes (13, 72, 90A, 101)
IPC/CPC Plumbing	Reference International and California Plumbing Code requirements
AI Design Assistant	Chat with an AI assistant trained on HVAC engineering standards
Proactive AI Engineer	AI that proactively generates equipment schedules, sequences, and design validation

12. INTERNATIONAL CODES (Cyan accent)

Tool	Description
Eurocode (EN Standards)	European EN standards compliance for HVAC and energy performance
British Standards (CIBSE)	CIBSE guides and British Standards for UK building services design
Australian Standards (NCC)	Australian NCC and AS/NZS standards
Canadian Codes (NBCC/NECB)	Canadian NBCC, NECB, and CSA standards
Middle East Codes (Gulf)	Gulf region codes including Estidama, DEWA, and Ashghal standards

13. ENGINEERING SERVICES (Blue accent)

Tool	Description
Generator/UPS	Size emergency generators and UPS systems
Seismic Restraints	Calculate seismic bracing and restraint requirements per ASCE 7
TAB Reports	Testing, adjusting, and balancing reports per AABC/NEBB/TABB standards
TAB Contractor	Manage TAB contractor workflows
Pressurization Plan	Create building pressurization plans
Commissioning	Manage building commissioning process
LEED Credits	Track and document LEED credit compliance
Life Cycle Cost	25-year life cycle cost analysis comparing HVAC alternatives
Specification Writer	Generate HVAC specifications using UFGS and MasterSpec templates

14. FIELD SERVICES (Orange accent)

Tool	Description
Field Survey	Conduct field surveys with mobile data collection
Equipment Inventory	Catalog existing HVAC equipment with nameplate data and condition ratings
Space Assessment	Document space conditions (dimensions, ceiling heights, existing systems)
TAB Data Collection	Collect field TAB measurements
Deficiency Tracking	Track and manage field deficiency observations with photos and corrective actions

15. HVAC SYSTEM DESIGN (Cyan accent)

Tool	Description
Central Plant	Design central heating and cooling plants with primary/secondary piping

Tool	Description
VRF Design	Design variable refrigerant flow systems with indoor/outdoor unit selection
DOAS Systems	Design dedicated outdoor air systems with energy recovery and dehumidification
Heat Recovery	Design heat recovery systems (run-around loops, enthalpy wheels, heat pipes)
Chilled Beams	Design active and passive chilled beam systems
Ground Source HP	Design ground-source heat pump systems with bore field sizing

16. CONTROLS & BAS (Orange accent)

Tool	Description
Controls Wizard	Step-by-step wizard for designing HVAC control systems
Control Sequences	Write and manage HVAC control sequences per ASHRAE Guideline 36
BACnet Design	Design BACnet building automation networks
DDC Programming	Develop direct digital control programs with logic diagrams
Sensors & Actuators	Select and specify sensors, actuators, and control valves

17. CONSTRUCTION ADMIN (Red accent)

Tool	Description
RFI/Submittal	Manage requests for information and submittals with KPI dashboard
Daily Log	Record daily construction activities, weather, workforce, and equipment
Change Orders	Track change orders with cost and schedule impact analysis
Pay Applications	Prepare pay applications with schedule of values and retainage
Meeting Minutes	Record and distribute meeting minutes with action item tracking
Transmittals	Create and track document transmittals
Permit Tracker	Track building permit status and inspections
Punch List	Create and manage construction punch lists
Closeout Docs	Manage project closeout documents (O&M manuals, warranties, as-builts)
Cost Tracking	Track project costs against budget
As-Built Manager	Manage as-built drawing markups
OSHA Compliance	Track OSHA safety compliance requirements
Warranty Tracker	Track equipment and system warranties with expiration alerts

18. ENTERPRISE TOOLS (Purple accent)

Tool	Description
Project Templates	Create and manage reusable project templates
Batch Processing	Run calculations across multiple zones or projects simultaneously
Workflow Manager	Define and manage engineering workflow stages
Report Engine	Generate professional PDF reports for load calculations, equipment, and compliance
Proposal Generator	Create engineering service proposals with scope, schedule, and fee estimates
Collaboration	Share projects and collaborate in real-time
Audit Log	View detailed audit trail of all project changes
Project Schedule	Create and manage project schedules with Gantt charts

19. EMERGING TECHNOLOGIES (Green accent)

Tool	Description
Hydrogen Systems	Design hydrogen fuel cell and distribution systems
Smart Grid	Design smart grid integration with demand response
EV Infrastructure	Design electric vehicle charging infrastructure
Microgrids	Design building or campus microgrid systems
Thermal Storage	Design ice and chilled water thermal energy storage
Carbon Capture	Evaluate building-scale carbon capture technologies

20. RENEWABLE ENERGY (Orange accent)

Tool	Description
Advanced Solar	Photovoltaic and solar thermal systems with production and financial analysis
Wind Systems	Small wind turbine installations with wind resource analysis
Geothermal Systems	Geothermal heating and cooling with ground heat exchanger sizing
DER Integration	Distributed energy resources (solar, storage, generators)
Waste Heat Recovery	Capture and reuse process and exhaust heat
Trigeneration	Combined cooling, heating, and power trigeneration systems

21. ADVANCED TECHNOLOGIES (Cyan accent)

Tool	Description
Advanced Refrigerants	Low-GWP and natural refrigerant options

Tool	Description
District Energy	District heating and cooling with central plant and distribution network
Energy Recovery Adv	Advanced energy recovery (enthalpy wheels, run-around coils)
Thermal Comfort	ASHRAE Standard 55 with PMV/PPD and adaptive models
IAQ Advanced	Advanced indoor air quality analysis
Acoustics Advanced	Detailed acoustical analysis with sound path modeling
Lighting Advanced	Advanced lighting design with daylight integration
Controls Advanced	Model predictive control and fault detection

22. VENTILATION & AIR SYSTEMS (Blue accent)

Tool	Description
Exhaust Fan Sizing	Size roof and wall exhaust fans
Air Change Calculator	Calculate room air changes per hour
Makeup Air Unit	Size makeup air units
Energy Recovery Wheel	Size energy recovery wheels with effectiveness calculations

23. HELP & DOCUMENTATION (Purple accent)

Tool	Description
Interactive Help	Context-sensitive help with search, glossary, and FAQ
User Guides	Open comprehensive step-by-step user guides

3.4 Top Menu Bar

The menu bar runs across the top of the window and contains five menus.

3.4.1 File Menu

Menu Item	Shortcut	Description
New Project	Ctrl+N	Creates a new empty project. If you have unsaved changes, prompts to save first.
New Project Wizard...	Ctrl+Shift+N	Opens the multi-step Project Setup Wizard (see Section 4.2)
Open Project...	Ctrl+O	Opens a file dialog to select and load an existing .mep or legacy .edsp project file
---	---	*(separator)*
Save Project	Ctrl+S	Saves the current project to its existing .mep file. If no file path exists, behaves like Save As.

Menu Item	Shortcut	Description
Save Project As...	Ctrl+Shift+S	Opens a file dialog to save the project to a new .mep file location
---	---	*(separator)*
Sync to Revit...	Ctrl+R	Pushes project data back to Revit. Only enabled when launched from the Revit add-in.
---	---	*(separator)*
Share Project...	(none)	Opens the cloud collaboration dialog to share the current project with team members. Requires cloud authentication.
Open Shared Project...	(none)	Opens a dialog listing projects shared with you by other team members.
Team Online...	(none)	Shows which team members are currently online and their active projects.
---	---	*(separator)*
Generate PDF Report...	Ctrl+P	Opens the Report Engine to generate a professional PDF report of the current project
---	---	*(separator)*
Clear All Data	(none)	Resets all project data to defaults. Prompts for confirmation.
---	---	*(separator)*
Exit	Ctrl+Q	Closes the application. If you have unsaved changes, prompts to save first.

3.4.2 Settings Menu

Menu Item	Description
Theme >	Submenu listing all 40+ themes. Selecting a theme instantly changes the application appearance. A checkmark indicates the currently active theme.
---	*(separator)*
Code Standards >	Submenu with sub-menus for each code family. Select which version of each code standard to use in calculations:
-- IPC >	2024, 2021, 2018, 2015
-- CPC >	2025, 2022, 2019, 2016
-- UPC >	2024, 2021, 2018
-- ASHRAE 90.1 >	2025, 2022, 2019, 2016, 2013
-- Title 24 >	2025, 2022, 2019, 2016
-- IECC >	2024, 2021, 2018, 2015
---	*(separator)*

Menu Item	Description
Company Information...	Opens a dialog to enter your company name, address, phone, email, and logo for use in reports and compliance documents
---	*(separator)*
User Account >	Submenu with account management options:
-- Login...	Opens the login dialog (if not currently logged in)
-- Logout	Logs out the current user
-- Change Password...	Opens a dialog to change your password (requires current password)
-- Two-Factor Authentication...	Opens the 2FA settings dialog to enable, disable, or manage 2FA
-- License Management...	Opens the License Management dialog (see Section 2.3 for license details)
-- User Management...	Opens the user administration panel (admin role only)

3.4.3 Tools Menu

Menu Item	Shortcut	Description
Energy Model Wizard...	Ctrl+Shift+W	Opens a detailed building energy model setup wizard
---	---	*(separator)*
Cost Estimation...	Ctrl+E	Opens the HVAC cost estimation tool
---	---	*(separator)*
3D Visualization >		Submenu:
-- View Building Model...		Launches the 3D building model viewer
-- CFD - Airflow Analysis...		CFD analysis for airflow patterns
-- CFD - Temperature Distribution...		CFD analysis for temperature mapping
-- CFD - Thermal Comfort (PMV)...		CFD analysis for PMV/PPD thermal comfort
---	---	*(separator)*
Import Building Data >		Submenu:
-- Import IFC File (Revit/AutoCAD)...		Import an IFC file from BIM software
-- Import gbXML File...		Import a gbXML file for energy modeling
---	---	*(separator)*
Envelope Editor...	Ctrl+Shift+E	Opens the wall/roof/floor assembly editor

3.4.4 View Menu

Menu Item	Shortcut	Description
Dashboard	Ctrl+D	Returns to the main dashboard view

Menu Item	Shortcut	Description
---	---	*(separator)*
Window Mode >		Submenu:
-- Separate Windows		Each tool opens in its own independent window (default)
-- Tabbed (MDI)		Tools open as tabs within the main window using Multiple Document Interface
---	---	*(separator)*
Close All Tool Windows	Ctrl+Shift+Q	Closes all currently open tool windows
---	---	*(separator)*
Tile Windows		Arranges all open tool windows in a tiled layout (MDI mode only)
Cascade Windows		Arranges all open tool windows in a cascading layout (MDI mode only)

3.4.5 Help Menu

Menu Item	Description
About	Shows the application version, copyright, and system information
---	*(separator)*
Contact Support...	Opens a dialog with support contact information
Submit Feedback...	Opens a feedback submission form
Report a Bug...	Opens a bug report form (same as feedback but pre-configured for bug reports)
---	*(separator)*
Help Contents...	Opens the searchable Help Browser with 48 help entries covering all major tools (v1.2)
Check for App Updates...	Manually checks GitHub Releases for a newer version (v1.2)
Check for Code Updates...	Checks the server for any updated code standard data
---	*(separator)*
Documentation >	Submenu:
-- Generate User Guide PDF...	Generates a comprehensive user guide in PDF format
-- Generate Packaging Guide PDF...	Generates a guide for packaging and distribution

3.5 Status Bar

The status bar runs along the bottom of the window. It displays:

- **Left side:** Current status messages (e.g., "Ready", "Calculating...", "Project saved", module loading status)

- **Center:** Current project file path (if a project is loaded)
- **Right side:** User name and role indicator (e.g., "john@acme.com [User]")

3.6 Window Modes

JΔS Engineering Suite supports two window modes, selectable from View > Window Mode:

Separate Windows (Default):

- Each tool opens in its own independent OS window.
- You can arrange windows side-by-side, drag them to different monitors, minimize/maximize independently.
- The main launcher window stays open as the sidebar/menu hub.
- Best for multi-monitor setups.

Tabbed (MDI):

- Tools open as tabbed sub-windows within the main application window.
- The central area becomes an MDI workspace where you can tile or cascade sub-windows.
- Use View > Tile Windows or View > Cascade Windows to arrange.
- Best for single-monitor setups where you want everything contained in one window.

4. Project Setup and Management

4.1 File > New Project (Ctrl+N)

Creating a new project resets all data to defaults:

1. Click **File > New Project** or press **Ctrl+N**.
2. If you have unsaved changes in the current project, a dialog appears:
   - Title: "Unsaved Changes"
   - Message: "You have unsaved changes. Do you want to save before creating a new project?"
   - Buttons: **Save** | **Discard** | **Cancel**
   - Click **Save** to save first (opens Save dialog if needed), then creates the new project.
   - Click **Discard** to abandon changes and create a new project.
   - Click **Cancel** to abort and return to your current work.
3. Once confirmed, all project data is cleared to defaults.
4. A confirmation dialog appears: "New project created."
5. The window title updates to: "JΔS Engineering Suite - Untitled"
6. You are returned to the dashboard, ready to begin a new project.

4.2 File > New Project Wizard (Ctrl+Shift+N)

The Project Setup Wizard guides you through creating a project with pre-configured settings in four steps.

Step 1: Project Info

Field	Description	Example
Project Name	A descriptive name for your project	"Main Street Office Building"
Project Number	Your firm's project tracking number	"2026-0145"
Client Name	The client or building owner	"Acme Properties LLC"
Location	City and state of the building	"Sacramento, CA"
Engineer	The engineer of record	"John Smith, PE"

Step 2: Building

Field	Description	Options
Building Type	Primary use classification	Office Building, Retail/Shopping, Healthcare/Medical, Educational (K-12), Educational (Higher Ed), Hotel/Hospitality, Residential Multifamily, Industrial/Warehouse, Restaurant/Food Service, Laboratory, Data Center, Assembly/Theater, Religious, Parking Garage, Mixed Use, Other
Gross Area (ft2)	Total building gross floor area	Numeric input (e.g., 50000)
Number of Floors	Total number of above-grade floors	Numeric input (e.g., 3)

Step 3: Climate & Codes

Field	Description
Climate Zone Type	Choose "ASHRAE 90.1" or "California Title 24"
Climate Zone	Select from a dropdown of all zones (see full list below)
Energy Code	Selected code standard (ASHRAE 90.1-2022, Title 24-2022, etc.)
Plumbing Code	Selected plumbing code (IPC 2024, CPC 2022, UPC 2024, etc.)

ASHRAE Climate Zones:

- 1A - Very Hot, Humid (Miami)
- 2A - Hot, Humid (Houston)
- 2B - Hot, Dry (Phoenix)
- 3A - Warm, Humid (Atlanta)
- 3B - Warm, Dry (Los Angeles)
- 3C - Warm, Marine (San Francisco)
- 4A - Mixed, Humid (New York)
- 4B - Mixed, Dry (Albuquerque)

- 4C - Mixed, Marine (Seattle)
- 5A - Cool, Humid (Chicago)
- 5B - Cool, Dry (Denver)
- 5C - Cool, Marine (Vancouver)
- 6A - Cold, Humid (Minneapolis)
- 6B - Cold, Dry (Helena)
- 7 - Very Cold (Duluth)
- 8 - Subarctic (Fairbanks)

California Title 24 Climate Zones:

- CZ1 - Arcata through CZ16 - Mt. Shasta (16 zones)

Step 4: Systems

Select one or more HVAC system types for your project:

System	Description
VAV with Reheat	Variable air volume with hot water reheat coils
Packaged Rooftop	Direct expansion packaged units
Chilled Water AHU	Central plant with air handling units
VRF/VRV	Variable refrigerant flow multi-split
WSHP	Water source heat pumps
GSHP	Ground source heat pumps
Radiant	Radiant heating/cooling with DOAS
Fan Coil Units	4-pipe fan coil with central plant
PTAC/PTHP	Packaged terminal units
Split Systems	Ductless mini-split systems

Navigation:

- **Back** button: Returns to the previous step
- **Next** button: Advances to the next step (validates current step data first)
- **Cancel** button: Aborts the wizard and returns to the previous project state
- On the final step, the **Next** button changes to **Finish**

The step indicator at the top shows your current progress with four labeled steps: "1. Project Info", "2. Building", "3. Climate & Codes", "4. Systems". The current step is highlighted.

4.3 File > Open Project (Ctrl+O)

1. Click **File > Open Project** or press **Ctrl+O**.
2. If you have unsaved changes, the "Unsaved Changes" dialog appears (same as described in Section 4.1).

3. A standard Windows file dialog opens.

4. Default directory: `%USERPROFILE%\Documents\JAS Projects\`

5. File filter: "JΔS Engineering Project (*.mep)" is selected by default. You can also choose "Legacy Project (*.edsp)" or "All Files (*)".

6. Navigate to and select your project file.

7. Click **Open**.

8. The project data loads. A confirmation dialog appears showing:

• "Project loaded from: [filepath]"

9. The window title updates to: "JΔS Engineering Suite - [Project Name]"

10. All project data (zones, loads, equipment, weather, calculations) is restored.

Legacy .edsp files: If you open a legacy `.edsp` file (from an older version), the application imports it and displays a message: "Legacy .edsp file imported successfully. Please use 'Save As' to save in the new unified .mep format." The project is marked as having unsaved changes to encourage saving in the modern format.

4.4 File > Save / Save As

Save (Ctrl+S):

• If the project has been previously saved to a `.mep` file, it is saved to the same location.

• If this is a new project that has never been saved, the Save As dialog opens instead.

Save As (Ctrl+Shift+S):

1. A standard Windows file dialog opens.

2. Default filename: The project name with underscores replacing spaces, plus `.mep` extension.

3. Default directory: `%USERPROFILE%\Documents\JAS Projects\`

4. File filter: "JΔS Engineering Project (*.mep)"

5. Choose a location and filename and click **Save**.

6. If you omit the `.mep` extension, it is automatically appended.

7. A confirmation dialog appears: "Project saved to: [filepath]"

8. The window title updates with the new file name.

4.5 Project File Format (.mep)

JΔS Engineering Suite project files use the `.mep` extension. The file is a JSON document containing:

• **Project metadata:** name, number, client, engineer, creation date

• **Building information:** type, area, floors, location, climate zone, latitude/longitude, elevation

• **Zone definitions:** rooms with dimensions, constructions, occupancy, lighting, equipment loads

• **Calculation results:** heating/cooling loads, airflow, equipment selections

• **Tool settings:** saved inputs for duct sizer, pipe sizer, pump calculator, etc.

• **Energy simulation results:** 8760-hour data, site EUI, annual cost

- **Equipment selections:** manufacturer data, model numbers, capacities
- **Control sequences:** written sequences of operation
- **Company information:** for report headers
- **Compliance check results:** pass/fail status for applicable codes

The `.mep` file is human-readable JSON text and can be opened in any text editor for inspection, though direct editing is not recommended.

4.6 Recent Projects

The application maintains a list of your 10 most recently opened project files. These appear in:

1. The Dashboard's "Recent Projects" list (left column)
2. Recent project buttons in the Standalone Dashboard's Recent Projects card

Double-clicking a recent project entry in the dashboard opens it immediately.

4.7 Auto-Save Behavior

J∆S Engineering Suite does not currently implement automatic periodic saving. You must manually save your project using Ctrl+S or File > Save.

However, the application protects against data loss by:

- Prompting to save unsaved changes when you create a new project, open another project, or exit the application
- Tracking an `unsaved_changes` flag that is set whenever you modify any project data

5. Setting Location and Weather Data

5.1 How to Select City/State

Weather data selection is done through the Energy Calculations module:

1. Open **Energy Calculations** from the sidebar or Quick Actions.
2. In the project/building setup area, find the **Location** section.
3. Use the **State** dropdown to select a US state (all 50 states plus territories).
4. Use the **City** dropdown to select from available cities in that state.
5. The application includes ASHRAE design weather data for 523+ US locations.

Alternatively, in the **Project Setup Wizard** (Step 3), you select a climate zone which determines the representative weather location.

5.2 ASHRAE Design Conditions

When you select a location, the following ASHRAE design conditions are automatically populated:

Cooling Design Temperatures:

Percentile	Meaning
0.4% Cooling DB/MCWB	Dry-bulb temperature exceeded only 0.4% of annual hours (about 35 hours). Used for most commercial HVAC design. This is the most conservative (highest temperature) design condition.
1% Cooling DB/MCWB	Dry-bulb temperature exceeded only 1% of annual hours (about 88 hours). Used for some residential and light commercial design.
2% Cooling DB/MCWB	Dry-bulb temperature exceeded only 2% of annual hours (about 175 hours). Used for economy/budget designs with some risk of not meeting load on extreme days.

MCWB = Mean Coincident Wet Bulb temperature (the average wet-bulb temperature that occurs when the dry-bulb is at the design value).

Heating Design Temperature:

Condition	Meaning
99.6% Heating DB	Dry-bulb temperature that is exceeded 99.6% of annual hours (i.e., it is colder than this only 0.4% of the time, about 35 hours per year). This is the standard heating design temperature for commercial buildings.
99% Heating DB	Temperature exceeded 99% of hours (colder only 1% of the time). Less conservative.

Additional Data Available:

- Daily range (difference between daily high and low temperatures)
- Wind speed and direction (for infiltration calculations)
- Solar radiation data (for 8760-hour simulations)
- Atmospheric pressure (affects air density calculations)
- Humidity ratio at design conditions

5.3 Climate Zone Auto-Detection

When you select a city/state location, the application automatically determines:

1. **ASHRAE climate zone** (1A through 8) based on ASHRAE Standard 169
2. **California Title 24 climate zone** (CZ1 through CZ16) if the location is in California
3. **Elevation** above sea level for the selected location

The climate zone drives:

- Default insulation requirements for envelope compliance
- Default HVAC system efficiency requirements
- Default fenestration U-factor and SHGC limits
- Building envelope prescriptive requirements

5.4 Manual Override of Design Conditions

You can manually override any auto-populated design condition:

1. In the Energy Calculations module, locate the weather data section.
2. Individual fields for cooling design DB, WB, heating design DB, and other parameters can be edited directly.
3. A "Reset to Default" or similar option restores the ASHRAE values for the selected location.

This is useful for:

- Custom microclimate corrections (urban heat island, coastal effects)
- Altitude corrections for mountain sites not in the database
- Client-specified design conditions that differ from ASHRAE
- Future-proofing designs for anticipated climate changes

5.5 Altitude and Its Effect on Calculations

Altitude (elevation above sea level) affects HVAC calculations in several critical ways:

Affected Calculation	How Altitude Changes It
Sensible Heat Factor	The standard factor 1.08 (= 60 min/hr x 0.075 lb/ft3 x 0.24 BTU/lb-F) is for sea level. At altitude, air density decreases. The factor must be multiplied by the pressure ratio (local pressure / 14.696 psi).
Latent Heat Factor	The standard factor 4840 (= 60 min/hr x 0.075 lb/ft3 x 1076 BTU/lb) is also sea-level only and must be corrected for altitude.
Fan Performance	Fans deliver the same volumetric flow (CFM) at altitude but move less mass of air. Motor power requirements may change.
Boiling Point	Water boils at lower temperatures at altitude, affecting steam and hot water systems.
Combustion Air	Gas-fired equipment must be derated at altitude (typically 4% per 1,000 ft above sea level).

The application automatically applies altitude corrections when a location's elevation is known. You can see and modify the elevation in the building setup section of the Energy Calculations module.

6. Common Workflows

6.1 Load Calculation Workflow

A complete load calculation workflow follows these steps:

1. **Create or open a project**

- Click **File > New Project Wizard** (Ctrl+Shift+N)
- Complete all four wizard steps with your building information.

2. Select weather location

• Open **Energy Calculations** from the sidebar.

• Select your State and City from the dropdowns.

• Verify the design conditions are appropriate.

3. Define building envelope

• Open **Envelope Editor** from the sidebar or Tools > Envelope Editor (Ctrl+Shift+E).

• Define wall assemblies with layers and U-factors.

• Define roof assemblies.

• Define floor assemblies.

• Define window/glazing types with U-factor and SHGC.

4. Add zones/rooms

• In the Energy Calculations module, add zones to your building.

• For each zone, define:

• Room name and number

• Area (ft2) and ceiling height (ft)

• Orientation (N, S, E, W)

• Wall/roof/floor construction assignments

• Window areas per orientation

• Occupancy (number of people, activity level)

• Lighting load (W/ft2)

• Equipment/plug load (W/ft2)

• Ventilation requirements (CFM/person and CFM/ft2)

5. Run calculations

• Click "Calculate" or the equivalent button in the Energy Calculations module.

• The engine computes peak heating and cooling loads for each zone using ASHRAE methodology.

• Results include: sensible cooling (BTU/hr), latent cooling (BTU/hr), total cooling (BTU/hr), heating load (BTU/hr), supply CFM, outdoor air CFM.

6. Review results

• Examine zone-by-zone load summaries.

• Check building-level totals (total cooling tons, total heating MBH).

• Use the **Building Analysis** tool for performance metrics.

• Use the **Data Visualizer (8760)** for annual hourly profiles.

7. Generate reports

• Open **Reports & Diagrams** from the sidebar.

• Select report type (Load Summary, Zone Detail, System Summary, etc.).

• Click "Generate" to create a PDF report.

• Or use **File > Generate PDF Report** (Ctrl+P) for the full project report.

6.2 Equipment Sizing Workflow

1. **Complete load calculations** (Section 6.1 above).
2. Open **Equipment Schedule** or **Equipment Wizard** from the sidebar.
3. The wizard reads your calculated loads and recommends equipment:

• AHU sizing based on total CFM and cooling/heating coil loads

• Chiller sizing based on total building cooling load

• Boiler sizing based on total building heating load

• Pump sizing based on flow rates and head requirements

4. Select specific manufacturer equipment from the catalog database (Trane, Carrier, Greenheck, etc.).
5. Verify equipment meets load requirements with appropriate safety factors.
6. Generate equipment schedules for inclusion in construction documents.

6.3 Duct/Pipe Sizing Workflow

Duct Sizing:

1. Open **Duct Sizer** from the sidebar.
2. Enter the required airflow (CFM) for the duct section.
3. Select the duct type: Round, Rectangular, or Flat Oval.
4. Choose the sizing method:

• Equal Friction: Specify a friction rate (e.g., 0.08 in.wg/100ft)

• Velocity: Specify a maximum velocity (e.g., 1200 FPM for main ducts)

5. The tool calculates the required duct dimensions, actual velocity, friction rate, and equivalent diameter.
6. For rectangular ducts, multiple aspect ratio options are shown.

Pipe Sizing:

1. Open **Pipe Sizer** from the sidebar.
2. Enter the required flow rate (GPM for hydronic, or fixture units for plumbing).
3. Select the pipe material (copper, steel, PVC, CPVC, etc.).
4. Choose the sizing criteria:

• Maximum velocity (e.g., 4 ft/s for copper)

• Maximum friction loss (e.g., 4 ft/100ft)

5. The tool calculates the required pipe diameter, actual velocity, friction loss, and Reynolds number.

6.4 Report Generation Workflow

1. Ensure your project has completed calculations (loads, equipment, etc.).

2. Open the **Report Engine** from the Enterprise Tools category, or use **File > Generate PDF Report** (Ctrl+P).
3. Select the report sections to include:

• Project Information and Cover Sheet

• Building Summary

• Load Calculation Summary

• Zone-by-Zone Detail

• Equipment Schedules

• Compliance Summary

• Energy Simulation Results

• Cost Estimate

• Narrative Report

4. Configure report options (company logo, header/footer text, page numbering).
5. Click "Generate Report".
6. A PDF file is created. Choose the save location.
7. The PDF is opened in your default PDF viewer.

6.5 Cloud Collaboration Workflow

Cloud collaboration allows team members to share and synchronize project files through the Railway-hosted REST API.

Sharing a project:

1. Save your project locally (Ctrl+S).
2. Click **File > Share Project...**
3. The Share dialog appears. Enter the email addresses of team members you want to share with.
4. Set access level: "Edit" (full read/write) or "View" (read-only).
5. Click "Share". The project is uploaded to the cloud server.
6. Team members receive access and can open the shared project.

Opening a shared project:

1. Click **File > Open Shared Project...**
2. A list of projects shared with you appears.
3. Select a project and click "Open".
4. The project is downloaded and opened locally.

Synchronization:

• When you save a project that has been shared, changes are automatically synced to the cloud.

• The collaboration system uses a REST-only architecture (no WebSocket/SocketIO). Syncing occurs on save, not in real-time.

• Project locking prevents simultaneous edits. When you open a shared project, it is locked to your session. Other users see it as "locked" until you close or save.

Requirements:

• You must be logged in with a cloud-authenticated account (JWT token).

• Internet connection required.

• The Share Project, Open Shared Project, and Team Online menu items are enabled only after successful cloud authentication.

7. Keyboard Shortcuts and Tips

7.1 Complete Keyboard Shortcuts Reference

File Operations:

Shortcut	Action
Ctrl+N	New Project
Ctrl+Shift+N	New Project Wizard
Ctrl+O	Open Project
Ctrl+S	Save Project
Ctrl+Shift+S	Save Project As
Ctrl+P	Generate PDF Report
Ctrl+R	Sync to Revit (when connected)
Ctrl+Q	Exit Application

View Operations:

Shortcut	Action
Ctrl+D	Show Dashboard
Ctrl+Shift+Q	Close All Tool Windows

Tool Shortcuts:

Shortcut	Action
Ctrl+Shift+W	Energy Model Wizard
Ctrl+E	Cost Estimation
Ctrl+Shift+E	Envelope Editor

Help:

Shortcut	Action
F1	Context-sensitive help for the active tool window (v1.2)

Within Dialogs:

Shortcut	Action
Enter	Confirm/Submit (Login, Register, Verify 2FA, etc.)
Escape	Cancel/Close dialog
Tab	Move to next field
Shift+Tab	Move to previous field

7.2 Right-Click Context Menus

- **Sidebar Tool Buttons:** Right-click to see "Add to Favorites" or "Remove from Favorites" options.
- **Recent Projects List:** Right-click for "Open", "Open in File Explorer", or "Remove from Recent" options.
- **Table Cells (in calculation tools):** Right-click for "Copy", "Copy Row", "Export Table" options.
- **Text Fields:** Standard Windows context menu (Cut, Copy, Paste, Select All).

7.3 Theme Switching

You can change the application theme at any time. The theme affects all visual elements including the sidebar, menus, dialogs, and tool windows.

Method 1: Settings Menu

1. Click **Settings > Theme**.
2. Browse the list of 40+ themes organized by category.
3. Click any theme to apply it instantly.

Method 2: Login Dialog

1. The theme dropdown in the upper-right corner of the login dialog lets you preview themes before even logging in.

Available Theme Categories:

Category	Count	Examples
Dark Themes	8	Dark Professional, Dark Emerald, Dark Purple, Dark Classic, Midnight Blue, Dark Crimson, Charcoal, Nord Dark
Light Themes	8	Clean Professional, Warm Professional, Modern Minimal, Classic Engineering, Ocean Blue, Soft Rose, Forest Green, Slate Gray
Lightsaber Themes	8	Saber: Cyan (JΔS) [default], Blade: Blue, Blade: Green, Blade: Crimson, Blade: Violet, Blade: Amber, Blade: Frost, Blade: Flame

Category	Count	Examples
Lightning Themes	5	Lightning: Thunder, Lightning: Storm, Lightning: Tempest, Lightning: Plasma, Lightning: Ion
Special Edition	10	Special: Crystal, Special: Steel Alloy, Special: Graphite, Special: Hologram, Special: Ethereal, Special: Shadow, Special: Radiant, Special: Titanium, Special: Empire, Special: Alliance, Special: Cityscape
Color Themes	12	Color: Royal Blue, Color: Frost White, Color: Flame Orange, Color: Crimson, Color: Dark Red, Color: Lime Green, Color: Orchid Purple, Color: Lemon Yellow, Color: Maroon, Color: Amber Gold, Color: Crimson Red, Color: Dark Steel

The default theme is **Saber: Cyan (JΔS)**, a dark theme with electric cyan accents.

Custom Themes: You can create custom themes through the Theme Manager. Custom themes appear in the theme list with a "Custom:" prefix.

7.4 Export Options

Most calculation tools support exporting results in multiple formats:

Format	Extension	Use Case
PDF	.pdf	Professional reports for clients and submittal packages
Excel	.xlsx	Data analysis, further calculations, and custom formatting
Text	.txt	Simple plain-text export for records or quick reference
CSV	.csv	Data import into other software or databases

Export buttons are typically found in the toolbar or bottom-right area of each tool's interface.

7.5 Logo Customization

JΔS Engineering Suite features 39 logo variations that you can select to personalize the splash screen and login background:

Standard Logos: Blue, Anakin, AT, Bronze, BZ, Cal, Dark Side, Electric Blue, Gold, Industrial, Kylo, Luke, Magenta, Orange, Pink, Purple, Senate Blue, Silver Blue, Sith, White, Windu

Force Lightning Logos: Blue FL, Blue Saber FL, Bronze FL, Dark Magenta FL, Dark Saber FL, Dark Side FL, Green FL, Green Saber FL, Kylo FL, Orange FL, Pink FL, Purple FL, Purple Saber FL, Red FL, Teal FL, Teal Saber FL, Yellow FL, Yellow Saber FL

To change the logo:

1. Go to the application settings (stored in the Windows registry under `HKCU\Software\JSEngineering\JSEngineeringSuite`).
2. Change the `appearance/logo_style` value to one of the logo names listed above.
3. Restart the application to see the new logo on the splash screen and login dialog.

8. Troubleshooting

8.1 Common Errors and Fixes

"Module not found" or "Failed to load module" at Startup

Symptom: Warning messages appear in the console during startup, such as `[WARNING] Module 'xxx' not available: No module named 'xxx'`.

Cause: Some optional modules may not be available in your build.

Fix:

- These warnings are typically non-critical. Core functionality works regardless.
- If a specific tool fails to launch, it is likely because its optional dependency is missing from the build.
- Contact support if a critical module is unavailable.

Application Window Appears Very Small or UI Elements Overlap

Symptom: The window opens but buttons, text, and layouts appear cramped or overlapping.

Cause: Display scaling is set above 125% in Windows Settings.

Fix:

1. Right-click the `Design_Suite.exe` file.
2. Select **Properties > Compatibility** tab.
3. Click **"Change high DPI settings"**.
4. Check **"Override high DPI scaling behavior"**.
5. Set "Scaling performed by:" to **"Application"**.
6. Click OK and relaunch.

Login Fails with "Invalid email or password"

Symptom: You are certain your credentials are correct but login fails.

Possible Causes and Fixes:

1. **Case sensitivity:** Email addresses are converted to lowercase automatically. Ensure you are typing the correct email.
2. **Database corruption:** If the local database is corrupted:

- Navigate to `%LOCALAPPDATA%\MEP-Design-Suite\`
- Rename or delete `users.db` (this will require you to register again)
- Relaunch the application and create a new account

3. Multiple installations: If you have the application installed in multiple locations, each has its own database. Ensure you are using the same EXE location where you registered.

2FA Code Rejected

Symptom: The authenticator app shows a code, but the application says "Invalid verification code."

Fixes:

1. Clock sync: TOTP codes are time-based. If your phone's clock is out of sync, codes will be rejected. On your phone:

- Android: Settings > System > Date & Time > enable "Set time automatically"
- iOS: Settings > General > Date & Time > enable "Set Automatically"

2. Code expiry: TOTP codes change every 30 seconds. If you enter a code just as it is about to expire, it may fail. Wait for a fresh code.

3. Wrong account: Ensure you are reading the code from the correct authenticator entry (labeled "J∆S Engineering Suite").

4. Use a backup code: If TOTP codes continue to fail, use one of your saved backup codes.

Application Crashes or Freezes

Symptom: The application becomes unresponsive or closes unexpectedly.

Fixes:

1. Check available RAM: Close other applications. 8760-hour simulations on large buildings can consume 2-4 GB of RAM.

2. Check for crash dialog: The application has a global exception handler. If a crash is recoverable, a dialog will appear with the error message. Read the error and save your work.

3. Update graphics drivers: If the 3D visualization or splash screen causes issues, update your GPU drivers.

4. Run from console: For diagnostic purposes, open Command Prompt, navigate to the EXE directory, and run:

```
Design_Suite.exe
```

Any error messages will appear in the console window.

Project File Won't Open

Symptom: Opening a .mep file shows an error.

Fixes:

1. Corrupted file: Open the .mep file in a text editor (Notepad, VS Code). If the JSON is malformed (truncated, missing brackets), the file may have been corrupted by an incomplete save. Try restoring from a backup.

2. Legacy format: If the file is a .edsp (old format), the application should import it automatically. If it fails, try renaming the extension to .mep and attempting to open.

3. Version mismatch: If the project was created with a newer version of the application, some data fields may not be recognized by an older version. Update to the latest version.

8.2 Performance Tips for Large Projects

1. Close unused tool windows: Each open tool window consumes memory. Use View > Close All Tool Windows (Ctrl+Shift+Q) when you are done with tools.

2. Use Separate Windows mode instead of Tabbed MDI mode for better memory management.

3. Limit 8760-hour simulation zones: Running hourly simulations on buildings with 100+ zones can take several minutes and consume significant memory. Consider running zone groups separately.

4. Disable AI features when not needed: The AI Design Assistant and Proactive AI Engineer consume resources. Close them when not actively in use.

5. Save frequently: Use Ctrl+S to save regularly. If the application crashes, you will only lose work since your last save.

8.3 Settings Reset

If the application behaves unexpectedly due to corrupted settings:

1. Close the application completely.

2. Navigate to `%LOCALAPPDATA%\MEP-Design-Suite\`

3. Delete or rename the `settings.json` file.

4. Relaunch the application. Default settings will be recreated.

Your user account and projects are NOT affected by deleting settings.json. Only your theme choice, window mode preference, recent projects list, and sidebar collapse states are reset.

8.4 Getting Help

Within the application:

- **Help > About:** Shows version information and system details.
- **Help > Contact Support:** Opens a dialog with support contact information.
- **Help > Submit Feedback / Report a Bug:** Sends feedback or bug reports.
- **Interactive Help** (sidebar): Browse a searchable help system with glossary and FAQ.

External support:

- **Email:** james@jsengineeringsolutions.com
- **Website:** https://jsengineeringsolutions.com

8.5 Uninstalling

Since JΔS Engineering Suite is a portable application:

1. Close the application.

2. Delete the `Design_Suite.exe` file.
3. Optionally, delete the settings and user database folder:

```
%LOCALAPPDATA%\MEP-Design-Suite\
```

4. Optionally, delete the Windows registry entries:

```
HKCU\Software\JSEngineering\JSEngineeringSuite
```

Appendix A: License Management

The License Management dialog (accessible from Settings > User Account > License Management) shows:

Current License Status section:

- **Status:** ACTIVE (green), ACTIVE (Offline) (orange), or EXPIRED/INVALID (red)
- **Type:** Standard, Trial, Admin, etc.
- **Key:** The license key with middle segments masked for security (e.g., MEP-XXXX-XXXX-ABCD)
- **Expires:** The expiration date and number of days remaining, or "Never (Perpetual)" for permanent licenses
- **Licensed To:** Your name and email
- **Machine ID:** A unique identifier for your computer (used for single-machine license enforcement)

Activate New License section:

- A text input field to enter a new license key
- An "Activate" button to attempt activation
- Info text: "Enter a license key from the J∆S Engineering web portal."
- Activation is attempted first against the online portal, then falls back to local validation

Refresh License Status: A button to re-check the license status against the server.

Appendix B: Revit and AutoCAD Integration

Launching from Revit

When JΔS Engineering Suite is launched via the Revit add-in:

1. In Revit, click the JΔS Engineering Suite button in the Add-Ins ribbon tab.

2. The application launches with the `--revit-project` argument.

3. Building data is automatically imported from the active Revit model:

• Project name, number, client

• Building location (city, state, latitude, longitude, elevation)

• All spaces/rooms with areas, volumes, and space types

• Wall assemblies with U-factors (from Revit analytical properties)

• Windows with U-factor, SHGC, and VT values

• Roofs with thermal properties and cool roof data

• Plumbing fixtures with IPC fixture unit counts

• Piping with system types, diameters, and lengths

• HVAC equipment with capacities and served spaces

4. The **Sync to Revit** menu item (File > Sync to Revit, Ctrl+R) becomes enabled.

5. After performing calculations in JΔS Engineering Suite, click Sync to Revit to push results back to the Revit model.

AutoCAD Plugin

The AutoCAD plugin provides similar bidirectional communication for importing space data and exporting calculation results.

Appendix C: AI Features

AI Setup Wizard

On first launch, JΔS Engineering Suite displays an AI Setup Wizard to help you configure cloud AI. Three providers are supported:

Provider	Cost	Best For
Google Gemini (Recommended)	Free tier available	General design assistance, code compliance questions
Anthropic Claude	Paid API	Detailed engineering narratives, report generation
OpenAI	Paid API	Equipment selection reasoning, sequence writing

To set up: go to **Settings > AI Assistant > AI Setup Wizard**, paste your API key, and click **Test Connection**. You can change providers anytime via **Settings > AI Assistant > AI Settings**.

AI Design Assistant

The AI Design Assistant (found in the **AI & AUTOMATION** sidebar category) provides a chat interface for engineering questions:

- Code requirements: "What is the minimum ventilation rate for an office per ASHRAE 62.1?"
- Design guidance: "What chiller type is best for a 200-ton healthcare facility?"
- Debug calculations: "Why is my cooling load so high for Zone 3?"
- Report narratives: "Write an executive summary for my energy model"

The AI Assist button (robot icon) also appears in the status bar of every tool window. Click it for context-aware AI help specific to the tool you're using — it automatically includes your current project data and calculation results.

Proactive AI Engineer

The Proactive AI Engineer automatically monitors your design and provides real-time feedback:

- **Load Validation**: After calculating loads, AI checks SF/ton, CFM/SF, and ventilation rates against ASHRAE benchmarks
- **Equipment Scheduling**: Auto-generates equipment schedules when loads are finalized
- **Sequence Writing**: Creates sequences of operation for common HVAC systems (per ASHRAE GL36)
- **Compliance Checking**: Cross-references design parameters against applicable codes
- **Toast Notifications**: AI insights appear as non-intrusive toast popups

Toggle proactive mode on/off via **Settings > AI Assistant > Proactive Mode**.

Appendix D: New in v1.2 (February 2026)

Parametric Sweep & System Comparison

Side-by-side comparison of up to 5 HVAC system types (VAV, RTU, VRF, WSHP, DOAS+Radiant) with automated energy cost, first cost, maintenance cost, and CO2 emissions analysis. Found in the **Analysis & Optimization** sidebar category.

Medical Gas Piping Design

NFPA 99 compliant medical gas system design including oxygen, medical air, vacuum, nitrogen, and nitrous oxide. Automatic pipe sizing, source equipment sizing, and zone valve box layout. Found in the **Plumbing & Piping** sidebar category.

Plumbing Utilities

Compressed air system sizing, emergency eyewash/shower compliance (ANSI Z358.1), thermal expansion tank sizing, and domestic water flush-out calculations. Found in the **Plumbing & Piping** sidebar category.

Refrigerant Compliance

ASHRAE Standard 15 refrigerant safety analysis with AIM Act GWP phase-down tracking, room volume calculations, detector placement, and ventilation requirements. Found in the **HVAC Systems** sidebar category.

Revit Live Sync

Real-time bidirectional synchronization with Autodesk Revit via WebSocket connection. Rooms and zones auto-populate when the Revit model updates, and calculation results push back to Revit parameters automatically.

Theme System

40+ built-in themes with custom theme editor. All tool windows inherit the active theme — no more hardcoded dark stylesheets.

7-Step Workflow Navigation

Visual workflow bar at the top of the main window guides you through: Project Setup → Load Calculations → System Selection → Equipment Sizing → Energy Simulation → Code Compliance → Reports. Green checkmarks show completed steps.

Appendix E: New in v1.2 (February 2026)

CLI / Batch Runner

A new command-line interface (`cli_runner.py`) allows you to run load calculations, energy simulations, and compliance checks without launching the GUI. Five subcommands are available:

Command	Description
`load-calc`	Run room-by-room heating/cooling load calculations
`energy-sim`	Run 8760-hour annual energy simulation
`compliance`	Check compliance against ASHRAE 90.1, Title 24, or UFC
`info`	Print project summary to terminal
`batch`	Run parametric sweeps from a JSON configuration file

All commands support JSON, CSV, and summary output formats. Example usage:

```
python cli_runner.py load-calc project.mep --output results.json
python cli_runner.py compliance project.mep --standard title24 -f csv -o check.csv
python cli_runner.py batch wall_study.json
```

The batch command is particularly powerful for parametric studies -- sweep wall R-value, window SHGC, setpoints, or supply air temperature across multiple values and compare the results in a spreadsheet.

See **Guide 10: New Features in v1.2** for detailed documentation of each subcommand and batch configuration format.

Auto-Update System

JΔS Engineering Suite now checks for new versions automatically once per day on startup. When a newer version is found, an update notification dialog appears with three options:

- **Download Update** -- Opens the download URL in your web browser
- **Remind Me Later** -- Dismisses the dialog; check runs again next launch
- **Skip This Version** -- Permanently ignores this specific version

To check manually at any time: **Help > Check for App Updates...**

The update check runs silently in a background thread and never blocks the UI. If you are offline, no error is shown.

Offline Help System

Press **F1** in any tool window for instant context-sensitive help. The help system includes:

- **48 help entries** covering all major tools (load calculations, HVAC sizing, equipment selection, plumbing, fire protection, energy analysis, compliance, controls, reports, and specialty tools)
- **Searchable Help Browser** (Help > Help Contents) with category tree, full-text search, and bookmarks
- **Embedded content** -- no internet connection or external files required

- **Engineering formulas** with variable definitions
- **Input field descriptions** with units and valid ranges
- **ASHRAE/SMACNA/NFPA references** for each tool
- **Practical tips** and common engineering pitfalls

Web Dashboard

A new web-based dashboard at `https://jsengineeringsolutions.com` provides project management and team collaboration from any web browser:

- **Project list** with create, upload (.mep), view, share, and delete actions
- **Project detail view** with Rooms, Systems, Results, and Compliance tabs
- **Team sharing** with Viewer/Editor/Admin permission levels
- **Activity feed** showing recent project changes
- **Account settings** for password, 2FA, API keys, and license management

Login with the same credentials you use in the desktop application. Two-factor authentication uses the same TOTP secret for both web and desktop.

This guide covers JΔS Engineering Suite v1.2. For the latest information, visit https://jsengineeringsolutions.com or contact support.