

COPILOT FAQ

What is Copilot?

The Copilot feature in TurboCAD® introduces an AI-driven companion engineered to elevate your design journey. It serves three primary purposes:

1. Responding to inquiries regarding the software.
2. Delivering data-driven insights about your CAD projects.
3. Utilizing an extensive AI knowledge base for a wide range of questions.
4. Creating visual content from text descriptions.

This integrated AI tool streamlines navigation, expedites your project's progress, and enhances your design endeavors with insightful analysis. Copilot is adept at handling diverse requests, from guiding you through the initial steps of using TurboCAD® to sharing intriguing details about your file or providing insights on design trends and principles.

How do I interact with Copilot?

CAD: What elements are in my file and which lengths do they have?

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CAD File Elements and Their Lengths

The following table lists the elements in your CAD file along with their respective lengths:

Entity ID	Type
3	Line
4	Line
5	Polyline
6	Bezier
9	Double
12	Multiline

Enter Question: Can you explain what Copilot is and how it can help me as a CAD User?

Response:

FAQ

What is Copilot?

Copilot is your AI-powered assistant in TurboCAD Mac, crafted to enhance your design experience. It serves three key functions: answering questions about the software, providing insights into your CAD data, and leveraging a broad AI knowledge base for general queries. This integrated AI simplifies navigation, accelerates your project workflow, and enriches your design process with data-driven insights.

1- Open the Copilot Palette:

Windows: Navigate to the **Tools > Palettes** menu and select **Copilot Palette**.

Mac: Navigate to the **Tools > TurboCAD Explorer** menu. Within **TurboCAD Explorer**, click on the **Copilot** tab.

2- Ask your question:

Enter your query into the text field.

3- Submit your query:

Windows: Click on the **Submit** button or press **<Ctrl>+<Enter>**.

Mac: Click on the **Apply** button situated in the lower right corner.

Copilot Activation:

The first time you submit a request, you are asked to activate Copilot. Enter your registration information and Copilot key into the registration dialog to activate Copilot.

How does Copilot work?

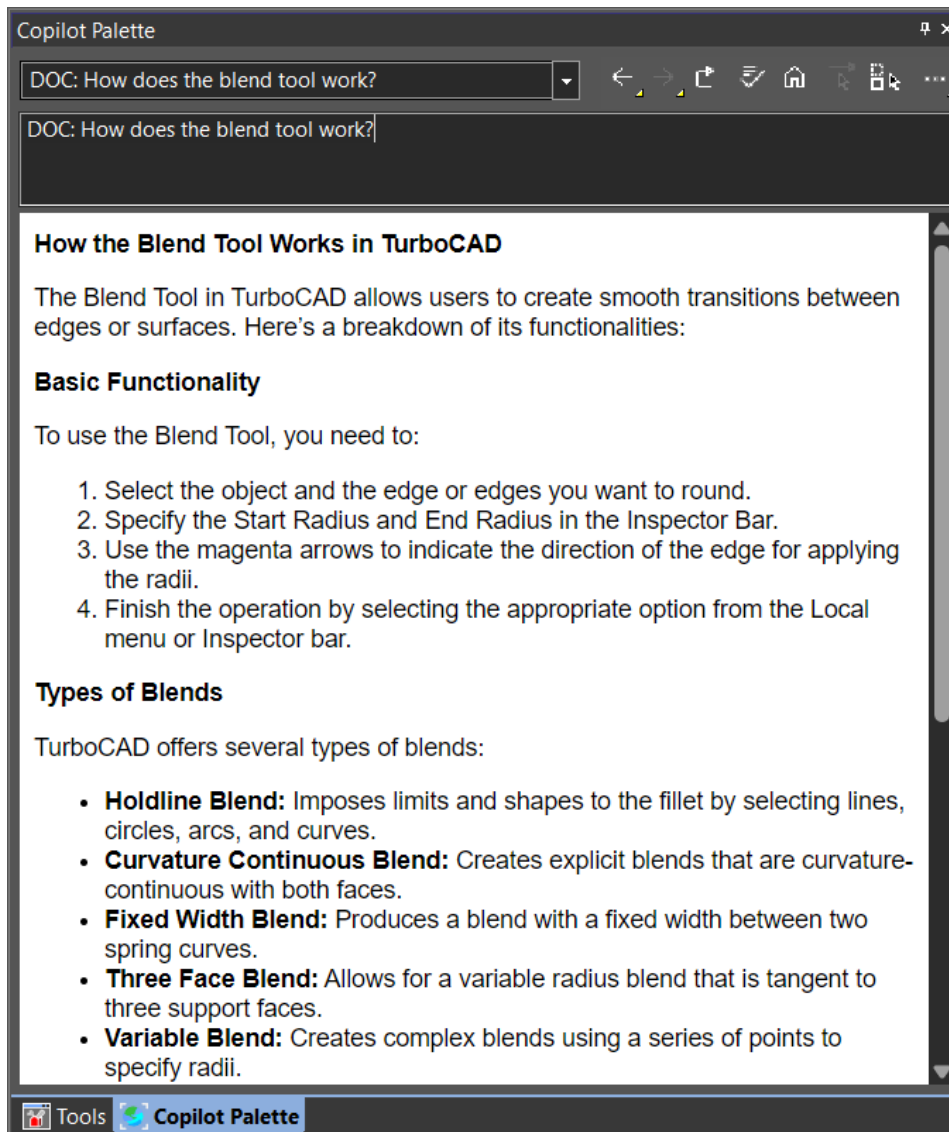
Copilot operates with different functions, each supported by a distinct set of AI Agents and Assistants. When you pose a question, the AI directs your query to the appropriate assistants, depending on the specific prefix to your question.

DOC (Document Assistant):

The DOC model extracts information from documents using Retrieval Augmented Generation (RAG). It leverages a vast collection of TurboCAD® documentation, including the User Guide, FAQ, YouTube Channel videos, New Features docs, press releases, blogs, and selected categories from the user forum.

To use DOC, simply ask your question, and Copilot will consult relevant documentation to provide an effective response.

Example: *DOC: How does the blend tool work?*



CAD (Computer-Aided Design Assistant):

The CAD model processes mathematical properties and attributes from your CAD data. It allows Copilot to analyze data, identify problems, and perform new calculations related to your designs.

To activate CAD, prefix your question with "CAD:" and ask about CAD-related topics.

Example: CAD: What is the largest blend I can use on the selected part?

The screenshot shows the Copilot Palette interface. At the top, there is a search bar with the text "CAD: What is the largest blend I can use on the selected part?". Below the search bar, the same text is repeated. The main content area is titled "CAD Analysis: Largest Blend for Selected Part". It contains a paragraph explaining that to determine the largest blend, the bounding extents of the part and the available space for blending must be considered. Below this, a table titled "Bounding Extents of the Part" provides the minimum and maximum dimensions for X, Y, and Z. The table has three columns: Dimension, Minimum, and Maximum. The rows are X, Y, and Z. The values are: X (Minimum: -0.388 mm, Maximum: -0.209 mm), Y (Minimum: -0.204 mm, Maximum: 0.754 mm), and Z (Minimum: -0.329 mm, Maximum: -0.121 mm). Below the table, a section titled "Calculation of Largest Blend" explains that the largest blend radius is typically limited by the smallest dimension of the bounding box. In this case, the dimensions are listed as $DX = 0.179 \text{ mm}$, $DY = 0.958 \text{ mm}$, and $DZ = 0.208 \text{ mm}$. It concludes that the largest blend radius that can be applied without exceeding the part's extents is 0.179 mm , which is the smallest dimension (DX). Finally, a "Conclusion" section states that based on the bounding extents and dimensions of the selected part, the largest blend radius that can be used is 0.179 mm . At the bottom of the interface, there are three tabs: "Tools", "Advanced Rendering Styles", and "Copilot Palette".

Copilot Palette

CAD: What is the largest blend I can use on the selected part

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CAD Analysis: Largest Blend for Selected Part

To determine the largest blend that can be applied to the selected part, we need to consider the bounding extents of the part and the available space for blending.

Bounding Extents of the Part

Dimension	Minimum	Maximum
X	-0.388 mm	-0.209 mm
Y	-0.204 mm	0.754 mm
Z	-0.329 mm	-0.121 mm

Calculation of Largest Blend

The largest blend radius is typically limited by the smallest dimension of the bounding box. In this case, the dimensions are:

- $DX = 0.179 \text{ mm}$
- $DY = 0.958 \text{ mm}$
- $DZ = 0.208 \text{ mm}$

Therefore, the largest blend radius that can be applied without exceeding the part's extents is 0.179 mm , which is the smallest dimension (DX).

Conclusion

Based on the bounding extents and dimensions of the selected part, the largest blend radius that can be used is 0.179 mm .

Tools Advanced Rendering Styles Copilot Palette

GKB (General Knowledge Base Assistant):

The GKB model processes your question independently of documentation and CAD data. It relies on a general knowledge base.

To engage GKB, prefix your question with “GKB:” and ask about general topics or concepts.

Example: *GKB: What CAD modeling kernels supporting blending?*

Copilot Palette

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CAD Modeling Kernels Supporting Blending

Blending is a crucial feature in CAD modeling, allowing for smooth transitions between surfaces. Here are some popular CAD modeling kernels that support blending:

Kernel	Description
ACIS	ACIS is a geometric modeling kernel developed by Spatial Corporation. It supports advanced blending operations and is widely used in various CAD applications.
Parasolid	Parasolid, developed by Siemens PLM Software, is another leading geometric modeling kernel known for its robust blending capabilities.
CGM (Convergence Geometric Modeler)	Developed by Dassault Systèmes, CGM is used in CATIA and SOLIDWORKS and offers comprehensive blending features.
Granite	PTC's Granite is a modeling kernel that provides powerful blending tools, used in products like Creo.
Open CASCADE	An open-source modeling kernel that supports blending and is used in various free and commercial CAD applications.

These kernels are integral to many CAD systems, providing the underlying technology for complex modeling tasks, including blending.

Tools

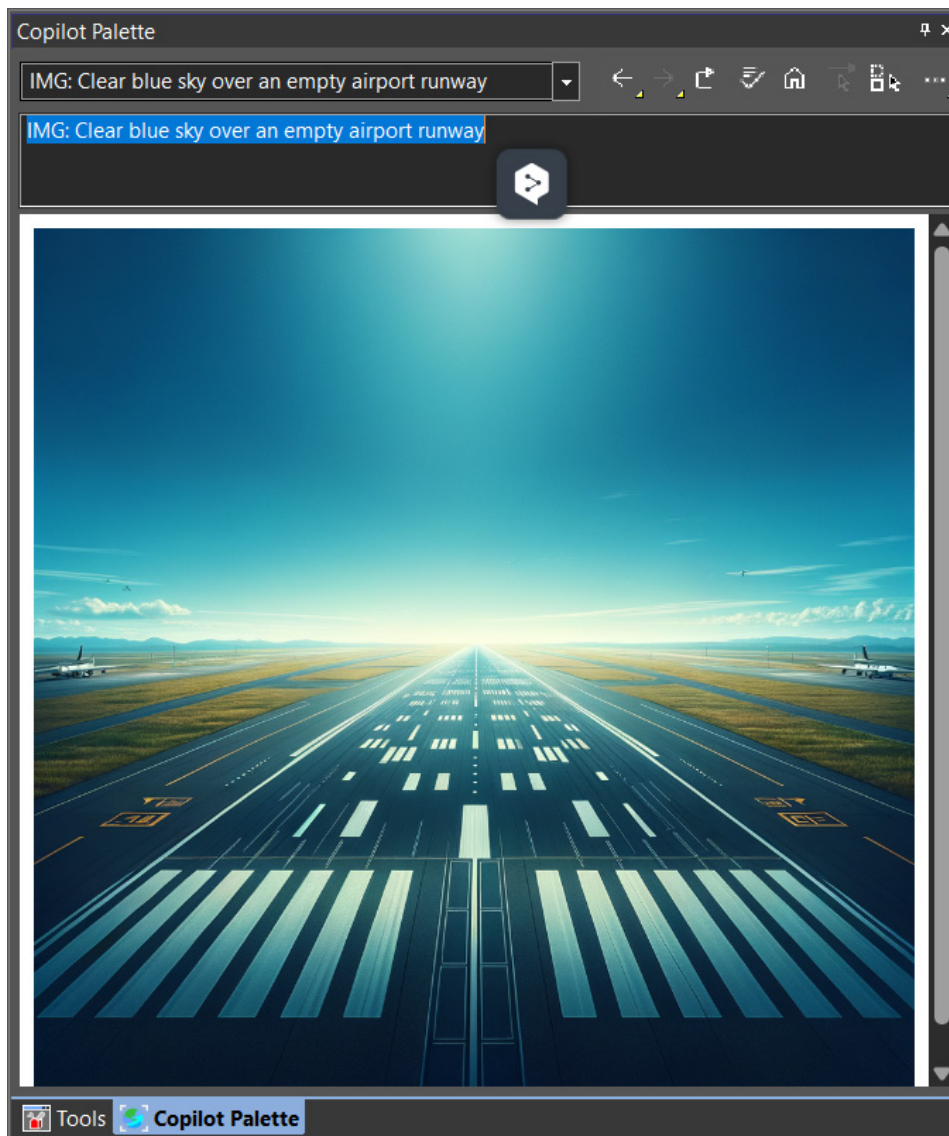
Copilot Palette

IMG (Image Assistant):

The IMG model creates 1024x1024 images that you can use for textures, backgrounds, or prototype inspirations.

To generate an image, prefix your request with "IMG:" and describe what you need.

Example: *IMG: Clear blue sky over an empty airport runway*

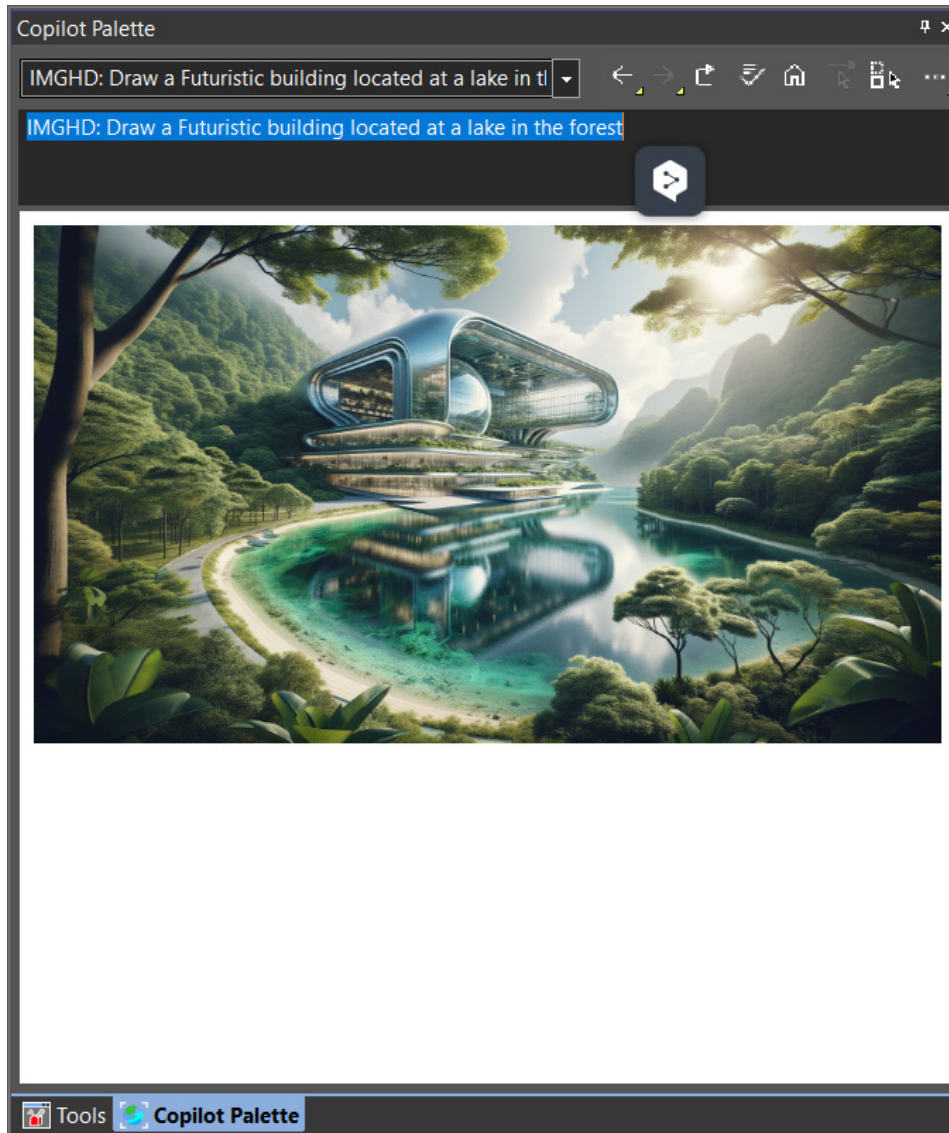


IMGHD (High-Definition Image Assistant):

The IMGHD model generates higher-resolution images, typically exceeding 1024x1024 pixels.

These images are ideal for detailed visualizations, printing, or any use where higher clarity is essential.

Example: *IMGHD: Draw a futuristic building located at a lake in the forest*



Batch mode for multiple queries

This feature lets you ask multiple questions at once. It breaks down questions, processes them individually, and combines answers into one document, bypassing character limits. A progress bar shows the current question, text, and total questions in the queue.

Example:

GKB: What material options are available for 3D printing? Can you provide cost estimates as well as strengths and weakness of the options?

CAD: Is my file suitable for 3D printing?

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CAD: Is my file suitable for 3D printing?

3D Printing Material Options

Below is a table listing various materials used in 3D printing, along with their estimated costs, strengths, and weaknesses.

Material	Cost Estimate	Strengths	Weaknesses
PLA (Polylactic Acid)	\$20-\$30 per kg	Biodegradable, easy to print, low warping	Brittle, low heat resistance
ABS (Acrylonitrile Butadiene Styrene)	\$25-\$35 per kg	Strong, durable, heat resistant	Emits fumes, prone to warping
PETG (Polyethylene Terephthalate Glycol)	\$25-\$40 per kg	Tough, good layer adhesion, food safe	Can be stringy, less rigid than PLA
Nylon	\$50-\$75 per kg	High strength, flexible, wear resistant	Absorbs moisture, difficult to print
TPU (Thermoplastic Polyurethane)	\$60-\$100 per kg	Flexible, impact resistant, durable	Slow printing, requires precise settings
Resin	\$50-\$100 per liter	High detail, smooth finish	Brittle, requires post-processing

3D Printing Suitability Analysis

The analysis of your CAD file for 3D printing suitability is summarized below:

Entity ID	Material	Volume (mm³)	Area (mm²)	Tests Passed	Tests Failed
4	TOP_SIDE_SPAR	0.001332	0.250199	No duplicate facets, No collapsed facets, Watertight body, No non-manifold edges	Improperly aligned normals
5	TOP_SIDE_SPAR	0.001332	0.250200	No duplicate facets, No collapsed facets, Watertight body, No non-manifold edges	Improperly aligned normals
6	TOP_CROSS_SPAR	0.001224	0.229907	No duplicate facets, No collapsed facets, Watertight body, No non-manifold edges, Proper normals	No serious issues

Overall Assessment

Most parts of your CAD file are suitable for 3D printing. However, several entities have improperly aligned normals, which could affect the print quality. It is recommended to address these issues before proceeding with printing.

Tools Copilot Palette

What is the difference between Copilot Help and Copilot Professional?

Copilot Help is limited to using "RAG" and documentation. RAG stands for Retrieval-Augmented Generation that searches for content for relevance to the question and adds this additional content as supplemental information to the AI along with the question. Our TurboCAD® documentation sources include: User Guide, FAQ, YouTube Channel videos, New Features docs, Press releases, Blogs, and some categories from the user forum.

Use Example Prompts to Get Started

The Copilot Palette has a pull-down menu of interesting prompts to query into your CAD file or get started using the application. Below are some example questions Copilot can respond to:

1. How should I get started learning TurboCAD? Can you provide some getting started videos?
2. Tell me something interesting and engaging about my file.
3. Provide a table of steel alloy densities in grams and pounds. Provide a color swatch for steel.

What kind of keywords are recognized for CAD data extraction?

When your question contains certain keywords, Copilot is triggered to extract certain data or calculate certain data. Some example keywords Copilot recognizes include:

- Position, Length, Area, Volume, Distance, Extents, Perimeter
- Mass Properties, Weight, Center of Gravity, Clash, Clearance, Counts, Layers, BOM, Hidden
- Problems, Issues, Check Object, Topology
- Materials, Textures, Scene, Lights, Camera
- Curvature, Continuity, Inflections
- Pen Color, Pen Style, Font
- 3D Print

How can I improve my questions?

Great question! To improve response success, you can do the following:

1. Tell the AI that you want to analyze the selected object or the entire file by including "*selected*" or "*my file*" in your question.
2. Label your entities with a context-sensitive name.
3. Add custom attributes using Bill of Materials.
4. Set material properties.
5. If you need to specify styles of output, tell the AI to use a color theme.

Does Copilot support different languages?

Yes. Copilot when using an OpenAI engine is a multilingual application that supports multiple languages. Currently, it supports more than 50 languages, including English, Spanish, French, German, Chinese, Japanese, Arabic, and many more.

Are the answers 100% accurate?

No, the answers are not 100% accurate. Copilot uses OpenAI API to generate answers. While OpenAI is a powerful language model, it can sometimes make mistakes and may not always provide a comprehensive explanation, opting for brevity. Furthermore, Copilot employs semantic search to identify the most relevant chunks and does not process the entire document. This means it may not find all the relevant information and could struggle with summary-type questions or questions that require extensive context from the document.

However, for most use cases, Copilot is very helpful in responding to questions. **Always** verify the original sources to ensure the accuracy of the answers.

How does it know what entities or properties to use?

Copilot works best on “*selected*” entities. Select the entities in your file that you want to ask questions about and use the keyword “*selected*” in your question. Otherwise, use “*my file*” to perform an analysis on all the visible entities in the file.

What advice do you have for improving results?

To improve results when interacting with Copilot, consider the following advice:

1. **Be Specific About Your CAD Needs:** When asking questions, be as specific as possible about your CAD project or issue. For example, instead of asking, “*How do I create a 3D model?*” you might ask “*What are the steps to create a 3D architectural model of a four-bedroom house in TurboCAD?*” Specificity helps the AI understand the exact nature of your query and provide more targeted advice.
2. **Include Technical Details:** If your question is about a problem or error, include any relevant technical details. For instance, “*I encounter a rendering issue with CAD when I try to apply textures to curved surfaces. How can I resolve this?*” Providing error messages, software versions, or specific tools you're using can significantly enhance the accuracy of the response.
3. **Utilize Sequential Queries for Complex Tasks:** If you're working on a complex CAD task, break it down into smaller queries. For example, if designing a complex machine part, ask about specific components or stages of the design process. This approach can provide more manageable and detailed guidance for each step.
4. **Incorporate Feedback for Refinement:** If the initial response doesn't fully address your query, use the feedback to refine your question. Sometimes, rephrasing or providing additional context can lead to more precise answers. For example, if the guidance on using a particular tool in the product isn't clear, ask for a more detailed explanation or request an example.
5. **Leverage Examples and Scenarios:** When appropriate, ask for examples or hypothetical scenarios that are relevant to your CAD work. For instance, “*Can you provide an example of how to use the Smart Dimension tool in TurboCAD for mechanical engineering drawings?*”
6. **Stay Updated on TurboCAD® Features:** Ensure your queries consider the latest features and updates of TurboCAD. This helps in receiving current and relevant advice, especially for software-specific functionalities.

By following these strategies, you can enhance the effectiveness of the TurboCAD® Copilot in addressing your CAD-related questions, leading to more productive and efficient design work.

Open AI Guide

The [OpenAI Guide](#) offers various strategies and tactics to achieve better results. You can often combine these methods for enhanced effectiveness. We encourage you to experiment and discover the approaches that work best for you.

Why do responses change for the same question?

LLM AI models are non-deterministic, meaning that identical inputs can yield different outputs.