

How to Choose the Best 3D Scanner for Small Objects?

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Quick answer

Scanning small objects is a unique challenge for many consumer-grade 3D scanners. While some devices excel at capturing large-scale items, they often struggle with fine details, detailed geometries, or reflective surfaces.

Scanning small objects is a unique challenge for many consumer-grade 3D scanners. While some devices excel at capturing large-scale items, they often struggle with fine details, detailed geometries, or reflective surfaces. Factors such as resolution and the ability to handle complex textures play an important role in determining whether a scanner can deliver professional-grade results. Suppose you are struggling to choose a 3D scanner for your daily projects, covering some requirements for scanning small objects.

Why Scanning Small Objects is Tough?

Below are the key challenges users face when scanning miniature objects:

1. Limited Resolution Due to Field of View (FOV) Constraints

Most general-purpose 3D scanners are optimized for medium to large objects, featuring a wide FOV to cover more area in a single pass. However, when scanning small objects, this wide FOV spreads the scanner's resolution too thin, resulting in a loss of fine details.

2. Stability and Fixturing Difficulties

Small objects are prone to movement during scanning, whether from handling vibrations, accidental bumps, or unstable mounting. Even minor shifts, often imperceptible to the naked eye, can distort scan data.

3. Shallow Depth of Field & Focus Limitations

To capture fine details, the scanner must be positioned close to the object. However, this reduces the depth of the field, meaning only a small portion of the object remains in sharp focus. If the scanner lacks dynamic focus adjustment, out-of-focus areas will appear blurry or distorted, requiring multiple rescans or manual corrections.

4. Problematic Surface Properties

Many small objects are made from reflective, transparent, or dark materials. These surfaces either scatter structured light (typical in optical scanners) or absorb too much laser light, leading to missing data points.

5. Poor Feature Recognition for Scan Alignment

Small objects often lack distinctive features, making it harder for software to align multiple scans or stitch them together accurately. Symmetrical or featureless objects are especially problematic.

Types of 3D Scanners

Not all 3D scanners are equally suited for small-object scanning. Each technology has its strengths and limitations, depending on factors like accuracy requirements, surface properties, and intended use. Below is a breakdown of the most common 3D scanning methods and their ideal applications:

Structured Light Scanner

It projects a pattern (usually white or blue light) onto the object; cameras record how the pattern deforms to calculate 3D shape. Structured light 3D scanners are generally the best choice for small objects requiring high accuracy and color detail, provided the surfaces are not too shiny or transparent.

Laser Triangulation Scanner

Project a laser line onto the object; a camera detects the line's position to build a 3D profile as the object or scanner moves. This type of 3D scanner excels in industrial settings or when scanning moving objects, but has limitations with certain surfaces and color capture.

Photogrammetry

Takes multiple photos from different angles; software reconstructs a 3D model by analyzing common points in the images. It is cost-effective and good for artistic or documentation purposes, but lacks the precision needed for technical or engineering applications.

Which 3D Scanner is Best for Small Objects?

If you want a budget-friendly consumer 3D scanner that can scan small object, focus on these key considerations to get the best value and results:

Object Size and Field of View

Confirm the size range of objects you want to scan. Most consumer scanners have a minimum scan size (often around 20-30 mm cubed). For small items (like jewelry or miniatures under 20 mm), even the best budget scanners may struggle to capture fine detail.

Surface Material Compatibility

Shiny, transparent, or dark surfaces are difficult for most budget scanners. You may need to use a matte spray, but this can affect results on tiny objects. Besides, check if the scanner's software or hardware offers any compensation for challenging surfaces.

Software Usability

Good software makes a big difference. Look for scanners that include easy-to-use software for aligning, merging, and exporting scans—essential for beginners.

Community and Support

Choose a scanner with active user communities, good documentation, and responsive support. This is especially helpful for troubleshooting and learning.

EINSTAR VEGA - Reliable 3D Scanner for Small Objects

The EINSTAR VEGA is a reliable entry-level to mid-range 3D scanner for scanning small objects. The handheld 3D scanner offers a strong balance of portability, ease of use, and scan quality for its price class. The Strengths of EINSTAR VEGA for Small Object Scanning:

- HD Mode for Small Objects: The VEGA's HD mode uses infrared MEMS technology, with a working distance of 100-350 mm (HD Mode) and a minimum point distance (resolution) of 0.05 mm, making it well-suited for capturing fine details on small, complex items.
- Texture and Color: The built-in 48MP color camera provides high-quality texture capture, which is valuable for applications needing both geometry and realistic color.
- User-Friendly & Portable: The scanner is wireless, with a built-in touchscreen and onboard processing, so you don't need a PC during scanning. This makes it beginner-friendly and highly portable.
- Software & Updates: The StarVision software is intuitive and regularly updated, with features like auto base plane detection and auto hole filling, making post-processing easier for non-experts.

EINSTAR VEGA Will Cater to Your Demands

Ultimately, the right scanner should fit your workflow, deliver the required detail, and stay within budget. For budget-conscious users who still demand reliable performance, the EINSTAR VEGA is highly recommended.

References

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