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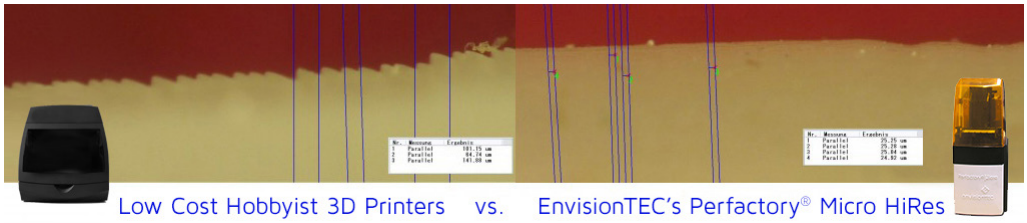
Look to EnvisionTEC and our line of 3D printers for your business when you need a Professional Grade 3D Printer!

Case Study

The Difference in 3D Printed Jewelry

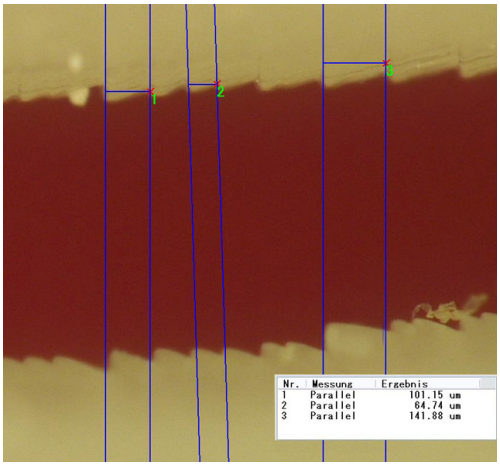


Low Cost Hobbyist 3D Printers vs. EnvisionTEC's Perfactory® Micro HiRes

On average, it seems there's a new 3D printer coming out every month. Most of these machines cost around $5,000 and each company swears they will deliver quality prints fit for the jewelry industry. However, not all 3D printers marketed for the jewelry market are created equally. The patented PSA with reference glass is one of the many reasons EnvisionTEC printers outperform the competitors in delivering an accurate and usable part. The following set of examples demonstrates the difference between a professional-grade EnvisionTEC Perfactory® Micro HiRes 3D printer and a low-cost hobbyist version. This study illustrates the difference in quality between EnvisionTEC and the competitor through photographs of parts magnified 200x under a microscope.

Non-EnvisionTEC Example Ring 1

In this example, the competitor's build was grown at a layer thickness of 75 microns. We drew the blue lines which indicate layers built by the competitor's machine. We then used a microscope to measure the thickness of each layer (the picture below labels the layers as Parallels 1-3).



As you can see in the emphasized layers above, there's a huge variation in the layer thickness of almost 2x what the designated required thickness.

• Layer 1 measures 100 microns, 25 microns larger than desired thickness

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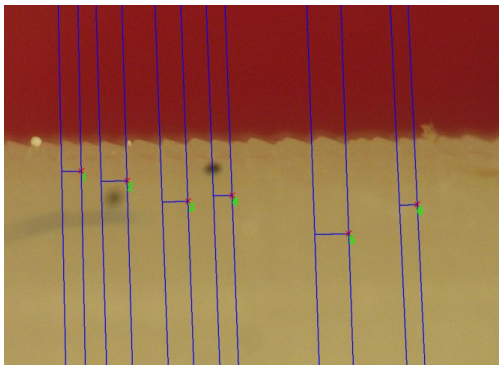
• Layer 2 measures 65 microns, 10 microns smaller than desired thickness

• Layer 3 measures 140 microns, 65 microns larger the desired thickness which is almost double desired value

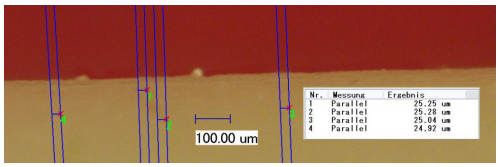
The variation of almost 100% is due in part to the lower accuracy of the Z axis motor assembly of cheap machines, and the fact that they build jewelry without a solid reference surface. Think about trying to build a structure on a trampoline. Any sagging during the build will lead to huge errors. Resulting in increased cost of precious metals when you cast, higher labor costs, errors in the overall accuracy and fidelity of the detail in the ring, and finally, it also means more time for stone setting.

Non-EnvisionTEC Example Ring 2



The next image from a competitor's ring features the same inconsistent result. The 3D printed jewelry was set to grow at 50 microns layer thickness in the Z direction. From the smallest layer thickness of 51 microns to the largest measuring 93 microns. A discrepancy of over 40 microns is inaccurate and inconsistent. Poor quality printing is visibly inconsistent on the microscopic level, translating to surface finish that is jagged and uneven. Companies will have to devote extra manual labor for finishing.

EnvisionTEC's Ring



This example shows the distance between the different curing depth on a part built at 25 microns shows minimum variation in the thickness during the build process. The photo below shows an EnvisionTEC ring under 200X microscope at 25 microns curing depth:

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EnvisionTEC achieves accuracy in Z-axis with less than 1% error

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• Layer 1 measures at 25.25 microns

• Layer 2 measures at 25.28 microns

• Layer 3 measures at 25.04 microns

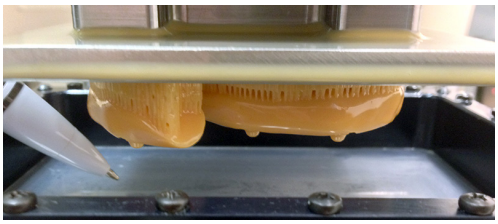
• Layer 4 measures at 24.92 microns

The maximum error in part build on the Perfactory® Micro is less than 1% compared to almost 100% error in layers with the cheaper competing printer.

EnvisionTEC achieves accuracy in Z-axis with less than 1% error

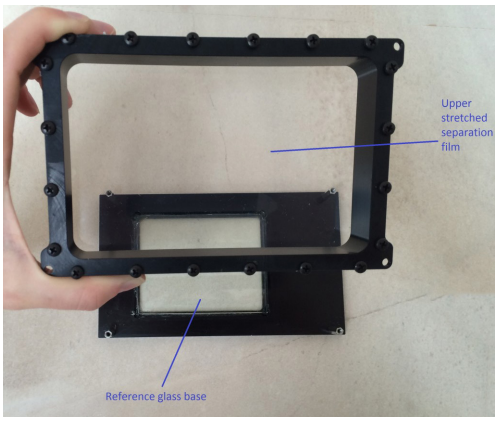
EnvisionTEC's Firm Build Plate Foundation

EnvisionTEC Perfactory® Micro and Perfactory® Standard 3D printers have a transparent sheet of optical glass sitting beneath the thin, Pre-Stretched Assembly (PSA). The glass guarantees uniform uncured material thickness before any curing takes place to achieve a print consistent to the original design at the micron level. The difference under a microscope clearly shows 3D printed jewelry by EnvisionTEC is smoother with higher quality surface finish than the competitor's.



Uniform curing in z-axis depth due to pre-stretched assembly with reference optical glass.

The glass plate serves as a stopping point for the PSA (in hand) in case the assembly sags or stretches during build time.



All this occurs with the support of the sheet of glass sitting beneath the PSA. This glass layer prevents the thinly-stretched assembly from sagging during build

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Uniform curing in z-axis depth due to pre-stretched assembly with reference optical glass.

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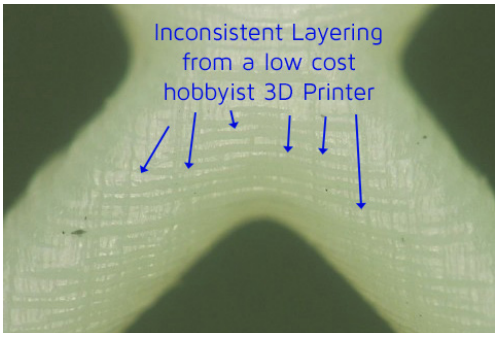
time, which would create inconsistent layers as seen in the competitor's 3D printed jewelry photo below. The competitor's printer doesn't have a second tray on the bottom of the build plate. Therefore, the build platform does not have a reference point as it builds.The build plate moves downward and grows the rings upside-down from a vat of resin sitting on a thin unsupported platform sagging in either direction, as if it were a trampoline. These equipment suppliers sell you a one-time-use plastic tray for their material, because of the floating film sags.

Photographic Comparisons

EnvisionTEC ring grown under an 85 mm lens at 25 microns in the Z vector with higher quality surface image.

A close-up of the Asiga ring showing layer inconsistency and bad surface finish.



The next time a company promises you a 3D printer for jewelry for $5,000-$10,000, remember that you get what you pay for.

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