

ONE-STOP SHOP

For precision
stainless steel
components

3DEO is a high-volume production supplier of precision stainless steel components, made with our patented metal 3D printing technology. With no molds, tooling, or lengthy setup times, 3DEO delivers production parts in weeks, not months.

ISO Certified



Based in Los Angeles, 3DEO supplies small, complex stainless steel components to customers in the medical, defense, aerospace, and industrial equipment markets. 3DEO is an employee-owned company.

Parallel to its production business, 3DEO also operates an R&D center which is continually striving to improve and advance its manufacturing technology.

Reimagine Manufacturing® with the power of 3D printing—design freedom, flexible production, immediate turnaround, and no up-front costs.

INTRODUCTION

There is a problem in metal 3D printing today. The 3D printing industry doesn't hold itself to the same standards as traditional manufacturers. When you order a part from traditional manufacturing, you expect the parts to be exactly as you ordered them. For 3DEO, quality means that whether it's the 10th part or the 10,000th part, they're all the same. The parts are the same dimensionally, with the same surface finish and ultimately when you put that part into your machinery, it functions exactly the same.



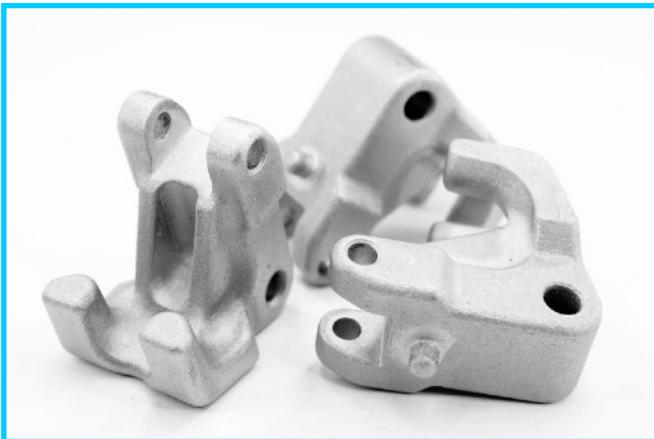
Production *means* quality. We take quality very seriously, from implementing the most up-to-date ISO certification to creating proprietary technologies and closed feedback systems specifically to measure and enhance quality.

This guide will give you a glimpse into 3DEO's philosophy on quality production, and how we're achieving it.

3D printing is a relatively new technology in a rapidly developing industry. While the industry undoubtedly has a promising future, the new manufacturing technology has lacked a standardized quality control system that traditional manufacturing industries have.

OUR QUALITY PHILOSOPHY

Our goal is to be the highest quality manufacturer in the world for the high precision metal components we fabricate. Predictability of performance monitored through effective process controls for all key variables enable us to understand when changes in process occur and take immediate corrective actions. This type of control ensures that our customers will receive the same quality of parts from qualification throughout their full requirement over time.



OUR QUALITY STANDARDS

Our quality standards involve building in as much automatic optimization and monitoring into our processes and machines with the intent of eliminating the potential for defects and limiting as much variation as possible.

We monitor quality in 3 different ways:

-  We monitor critical variables throughout our process to achieve predictability of performance, which means we know in each step of the process if anything has changed.
-  As part of our formal process, we review finished product distribution data to ensure 100% of the product that is shipping out is within customer specifications.
-  We follow a methodology of continuous improvement throughout our facility to keep us on a path to improving our processes over time. Tools that we use include process value mapping, root cause failure analysis, PDCA, DMAIC, and others.

With 3DEO, the first articles are the production parts. The machine printing the first article is the same used in production. With engineering drawings and models, we work with you to establish a mutual understanding of our ability to produce your part to your standards.

OUR **CURRENT & FUTURE** QUALITY **CERTIFICATIONS**



3DEO has successfully completed ISO 9001:2015 certification. This was a great exercise for us, as it gave us an opportunity to stand back and review our processes with a critical eye. The result from this analysis ensured that our processes were appropriately documented with a defined improvement plan.

Currently, we are continuing to press forward with our improvement plans and focusing on multiple medical and aerospace qualifications. The goal right now is meet all the specific requirements for customer qualification and optimize our generic controls internally to exceed customer expectations through implementation of capable processes.

With that said, if customers require us to complete additional certifications in the future, we can do that. The good news is that we place best of class business and quality practices higher than any certification, so when we need to go into a certification process, we know we will be well positioned for success.

For example, the ISO certification process typically takes 6-12 months, but 3DEO completed it in just three months because we had already implemented processes that were compliant with the requirements.

3DEO stands behind our quality and we know your business is dependent on our parts.

OUR DATA-DRIVEN PRODUCTION PROCESS

3DEO takes pride in having a fully traceable manufacturing process. But why is traceability important? Because traceability means accountability. To 3DEO, traceability is data driven.



We use closed-loop feedback systems to confirm that our processes are repeatable and in control. We collect data on critical variables during the process and monitor them in real time. If the data shows that the variable is not in control, we can take immediate corrective action.

We also have reaction plans if we see out of control conditions occurring, and we review data distributions to understand capability against each customer specification. This helps us to understand our best opportunities for improvement.

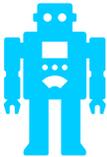
We can pick up any part and identify what machine and powder lot it came from, what the humidity levels were, who cleaned the part and more. We can catch anything that happens and ensure that no part leaves 3DEO without meeting our customer's specifications.

OUR STATISTICAL PROCESS CONTROL & SCALABILITY WITH OUR HYPER-GROWTH

3DEO accomplishes this in a few ways:



First, we qualify each printer before running any production product.



Second, we build in as much machine optimization as possible into our machine design. The intent is to eliminate as much human error as possible.



Third, we monitor each printer individually and as a group to ensure that critical variables stay in control. We also continually review part-to-part and machine to machine variation.

By watching these process controls, we can understand the predictability of performance and can take corrective action if necessary.



Predictability of performance is critical to our ability to scale our operation.

CERTIFICATES OF CONFORMANCE



3DEO offers Certificates of Conformance to our customers if they need them. Our C of C's indicate that the parts conform to specifications and that we're using certified raw materials. They also certify that all the parts shipping are within approved customer specifications.

Material specs are very important.

We hold ourselves to the highest standard so our customers can trust and rely on our products.

We have developed in-house characterization capabilities to test and measure our parts for different properties such as:

- Mechanical
- Environmental
- Metallurgical
- Chemical

We also collaborate with several accredited 3rd party testing labs, as well as academic research labs.

OUR QUALITY PROCESS VS. MIM & CNC

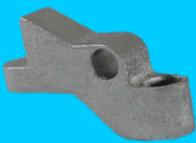
The most significant difference between 3DEO and MIM and CNC machining is that 3DEO doesn't have degrading processes as part of its production.



For example, in CNC machining, the tools that are cutting or shaping the metal wear, thus slightly changing each of the finished parts from a dimensional standpoint. The same is true for MIM, which has degrading mold quality.

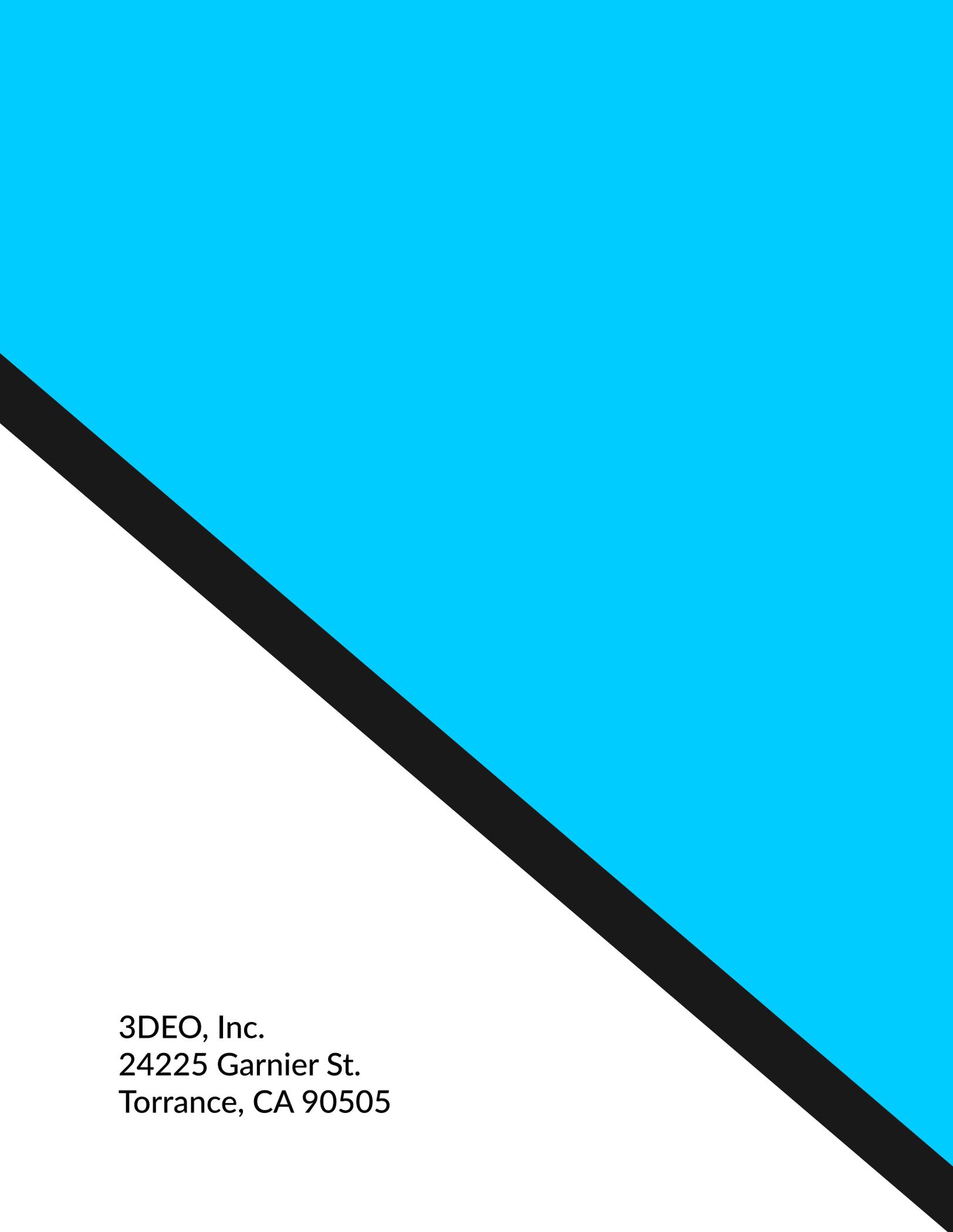
Because of the continuous dimensional change, there is built-in variation that cannot be eliminated. 3DEO differs because our additive process does not have continual dimensional variation inherent in CNC or MIM.

OUR CAPABILITIES VS. MIM & CNC



After just three years of development, our printers have reached world-class tolerances and material properties. Everything we're doing will improve our processes and capability going forward.

MIM and CNC can't offer the same level of continuous improvement that yields this level of improvement over time. Rather than needing to invest in maintenance tooling, we're investing in improving our own equipment and processes for more capability across the board.



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