



Press Release

3D Printing Technology Helps Cincinnati Zoo's Meerkats Mimic Wild Behaviors

Engineering meets zoology in a novel collaboration between the Zoo and GE Additive

CINCINNATI, OH, May 28, 2020 – [Cincinnati Zoo & Botanical Garden](#) is home to 2,000 animals, including world-famous hippo [Fiona](#), and is committed to providing each one with excellent care. Thanks to a novel partnership with GE Additive, known for pushing the boundaries of industrial 3D printing (often referred to additive manufacturing), some of the animals are getting meals from a fabricated feeder that encourages natural foraging behaviors.

“Something that we often think about is how to mimic natural feeding behaviors in the animals that we care for. In the wild, animals are adapted to find, acquire, and process food – and it’s not always easy! In human care though, food is always available and of good quality and balance, and in many cases, it’s consumed quite quickly,” said David Orban, Cincinnati Zoo’s animal excellence manager.

“For example, one challenge that we often see when we offer live insects to some of our birds or small mammals is that they are captured and consumed in a matter of five to ten minutes. We’ve had the idea to create a more complex feeder that will extend foraging duration, in turn, extending animals’ physical activity and mental stimulation, leading to more naturally behaving wildlife,” added Orban.

Orban heads up a team that observes and documents how animals are spending their days and how they interact with their environments and with each other. This data is used to better understand animals’ experiences at the Cincinnati Zoo and can be used to inform facets of animal care, including husbandry, diet, habitat design, and innovative enrichment solutions.

Engineers from [GE Additive’s AddWorks](#) consulting team in Cincinnati used data collected by the Zoo’s animal researchers and keepers to imagine how metal 3D printing technology could help give animals the opportunity to find their food as they would in the wild.

“To kick things off, the Zoo team showed us around and explained their goal to keep animals engaged and enriched. We were thrilled to be working with such an atypical customer and challenge that would allow us to demonstrate that, with additive technology, the sky really is the limit”, said Shannon Jagodinski, lead engineer at GE Additive in Cincinnati.

One of the challenges in this pro bono project was learning how to communicate with each other – engineer to zoologist and vice versa. Another was helping the Cincinnati Zoo team understand the possibilities that 3D printing creates.

“Additive technology allows a design to incorporate any shape, angle, structure or texture that is needed, with metal or plastic. The first thing that we considered was safety for the animals, keepers, and visitors and then the Zoo’s request that the animal enrichment device look natural within the environment,” added Jagodinski.

After their initial meetings, the engineers at GE Additive and the enrichment team and keepers at the Zoo began exchanging their design thoughts for a new feeder. The Zoo collected as many ideas as possible from the animal care staff for new enrichment experiences for the animals.

The GE engineers assessed these concepts for design feasibility, bearing in mind the specific considerations that go into designing an additive part - everything from part orientation on the additive machine build plate to powder removal. They presented two ideas to the Zoo team, who then selected the design they thought would provide the biggest benefit to the broadest group of animals. The first part was printed, using recycled Titanium powder, in February this year.

The final product is a device that disconnects the keepers from feeding the animals, disbursing food into habitats at random times, which is more like an experience that the animals would have in the wild. The exterior of the device replicates a tree trunk with a bark-like texture, and the inside of the feeder has a central enclosure to house crickets, which is connected to varying length tubes that exit the device at different points along the exterior.

Depending on which tube the cricket selects, it takes a different amount of time to leave the device, which therefore provides crickets to the animals at varying times.

“After this feeder concept was selected, my initial questions were ‘how big is a cricket and what size tube do they need to crawl through?’ We got some feedback from the Zoo’s insect team and tried three different tube sizes. We printed prototype tubes with three different diameters and tested them in a cricket enclosure at the zoo to see which size worked best,” said Jagodinski.

Despite Zoos all over the world being temporarily closed due to the COVID-19 pandemic, the GE Additive team in Cincinnati was able to deliver one finished device before lockdown. Zookeepers have been able to use this time to experiment with, and test, the efficacy of the feeder first with birds, then with smaller insectivorous mammals such as meerkats.

“We have seen that foraging time and the animals’ investigation and interaction last for up to a few hours in our tests compared to a few minutes, which is really exciting for us because that means we can utilize it multiple times a day and in different habitats. We have really seen that a lot of animals have been interested in it and continue to stay interested in it, which is exactly what we wanted,” said David Orban.

GE Additive will be delivering several more of the feeding devices to the Cincinnati Zoo, including one for education around animal enrichment and 3D printing capability. This demo piece will remove a portion of the bark textured exterior to expose the complex and intricate internal passageways made possible with metal 3D printing to teach school groups and other visitors.

“If there’s one thing I continue to learn with additive is that every customer has their own unique challenges. It is amazing to see the positive impact that this unique partnership has had for the animals,” said Dave Chapin, leader of the AddWorks consulting team at GE Additive.

As for Jagodinski, she’s looking forward to the day the famous Cincinnati landmark re-opens its gates, post Coronavirus, “I’m excited to be able to go to the zoo with my family and friends and to point into a habitat and say hey I worked on that, that’s a titanium additive part, and that was created using 3D printing technology.”

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Video

4K video of the 3D printing collaboration: youtu.be/AhUeGSvGPOE

Images

High resolution images can be downloaded at www.pressreleasefinder.com/GE_Additive/GEADPR037

About GE Additive

[GE Additive](#) – part of GE (NYSE: GE) is a world leader in additive design and manufacturing, a pioneering process that has the power and potential to transform businesses. Through our integrated offering of additive experts, advanced machines and quality materials, we empower our customers to build innovative new products. Products that solve manufacturing challenges, improve business outcomes and help change the world for the better. GE Additive includes additive machine providers Concept Laser and Arcam EBM; along with additive material provider AP&C.

About Cincinnati Zoo

The world-famous Cincinnati Zoo & Botanical Garden is committed to inspiring visitors to care about wildlife and wild places. It was voted the #1 Best Zoo in a USA TODAY reader poll and has also received rave reviews from Child Magazine, Parents Magazine, USA Today and TripAdvisor. Over 1.8 million people visit the Zoo's award-winning habitats, and more than 500 animal and 3000 plant species annually. The Zoo, an accredited member of the Association of Zoos & Aquariums (AZA) for almost 30 years, is internationally known for its success in the [protection and propagation of endangered animals and plants and engages in research and conservation projects](#) worldwide. Known as the #GreenestZooInAmerica, the Zoo is doing its part to conserve natural resources that are critical to saving wildlife and its habitats and is committed to greening its daily operations and reducing its impact on the environment with rain gardens, recycled building materials, solar panels and more. The Cincinnati Zoo is a 501(c)(3) nonprofit organization.

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Animals at Cincinnati Zoo engaging with the metal 3D printed cricket feeders.
(Photo: Cincinnati Zoo)



CAD models of metal 3D Printed cricket feeder for Cincinnati Zoo.
(Photo: GE Additive, GEADPR037)



Inside the metal 3D printed cricket feeder. Device installed at the Discovery Rainforest at Cincinnati Zoo.
(Photo: GE Additive, GEADPR037)



David Orban - animal excellence manager at Cincinnati Zoo.
(Photo: Cincinnati Zoo)

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