Lucky Dog

FDM IMPLANT PUTS THE SPRING BACK INTO OREO'S STEP

"FDM is an ideal technology for implant manufacturing because it can produce strong, durable, biocompatible parts with the right physical properties."

– Martin Petrak, President,
Orthopaedic Innovation Centre

CASE STUDY

Oreo enjoying the use of his new implant.

A PAINFUL PROBLEM

In 2011, a six-year-old mixed breed dog named Oreo suffered a dislocated left hind patella. The patella was removed to relieve the pain, but he became lame after the surgery. The veterinary practitioner then consulted the Orthopaedic Innovation Centre (OIC), a research and testing facility that serves the medical device market, about the possibility of creating an artificial implant for Oreo. The OIC regularly uses 3D printing as a means of shortening the design and production cycles for its clients, as well as the creation of low volume or customized products, and saw this as an excellent solution for Oreo.

To help Oreo, OIC obtained a donated patella that was used to generate a scaled digitized copy. A biomedical engineer then converted the file into a computer-aided design (CAD) model. X-ray radiographs of Oreo's other patella were then used to modify the CAD design to match his femur.

"In Oreo's case, we were able to produce a custom-tailored implant in only four days including design, analysis, physical testing and manufacturing. As we move down the learning curve, it will probably be possible to produce similar implants in only a day or two."

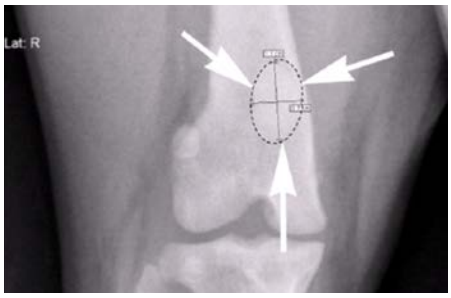
3D Printed Implant

OIC built an artificial patella using FDM® technology, an additive manufacturing process that builds plastic parts layer-by-layer from CAD files, on its Stratasys® 3D printer using PC-ISO™ bio-compatible polycarbonate (ISO 10993 USP Class VI). Physical testing was performed on the implant to validate its ability to provide the necessary mechanical strength. The implant was sterilized using ethylene oxide at 54°C (130°F) for one hour. During Oreo's surgery, the implant was attached to the tendon and quadriceps using polypropylene sutures.

Oreo recovered without incident, and eight weeks after his surgery, he had regained complete function of his leg with a full range of motion and weight-bearing capacity. His owner reported that he could once again go on long walks and jump using both of his limbs. Now, more than three years later, Oreo continues to enjoy an active lifestyle without complications thanks to his 3D printed implant.

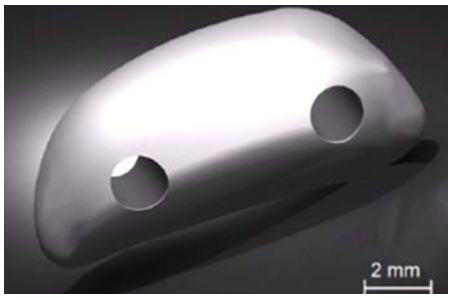
"FDM is an ideal technology for implant manufacturing because it is capable of producing strong, durable, biocompatible parts with the right physical properties," said Martin Petrak, president of Orthopaedic Innovation Centre.

"With FDM, we can tailor the implant to perfectly match the recipient's anatomy which has the potential to provide dramatic improvements in functionality and recovery time."

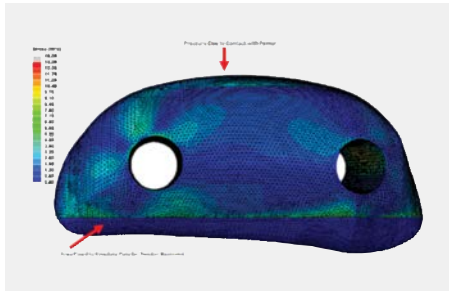


X-ray of original hind stifle joint and patella.


Point cloud data of the donated patella.



CAD model of patella.


Finite element analysis.

FDM printed patella pictured before implantation.

Operation during which Oreo's FDM patella was implanted.

stratasys

E info@stratasys.com / STRATASYS.COM

HEADQUARTERS
7665 Commerce Way, Eden Prairie, MN 55344
+1 888 480 3548 (US Toll Free)
+1 952 937 3000 (Intl)
+1 952 937 0070 (Fax)

2 Holtzman St., Science Park, PO Box 2496
Rehovot 76124, Israel
+972 74 745-4000
+972 74 745-5000 (Fax)

ISO 9001:2008 Certified