

## SUMMARY

In my opinion, the review of the related information in the literature and the practical experiments helped to reach the goals of the thesis. First of all, the variety of contributions and applications of AM technologies in veterinarian medicine and in the whole healthcare industry were analysed and showed. They include the manufacturing of individual implants, prostheses, tools and other devices and the use of fabricated models for pre-surgical preparation and for education. These bring the solution closer for the limb amputation problem in animals, that suffer from the absence of one or more supports. 3D printed prostheses can be the viable solution. However, the prototype of the osseointegrated prosthetic implant has been developed to attach the implant to the body avoiding the disadvantages (pain, skin damages with risks of infections) related to the traditional method of fixation (the prosthetic socket).

In most cases, the amputation is done on the radius bone due to the high level of OSA cases particularly in this bone. The prototype of the implant was developed for this bone with the respect to the reviewed requirements and sequence. The requirements included: using of a biocompatible material Ti6Al4V; specific design of a rod which is mounted inside the bone; adding of the lattice structure for fast osseointegration process; aligning the implant with the anatomical axis of the bone. The sequences consist of preparation of a 3D model of a bone from a CT scan, modelling of an implant and surgical instruments, validation of design by simulating operation and 3D printing preparation to reduce the final costs.

The future step includes the development of a plastic prosthesis – an artificial paw. This will create the full solution for the patients that experienced amputation of a part of their limbs. In addition, the prosthesis will influence the part of the prototype of the osseointegrated prosthetic implant which is used for fixation. As a result, the implant will rise from the prototype stage to the ready product.

The practice work helped to measure the high impact and validate the theoretical information regarding possibilities of the AM in veterinarian medicine. Moreover, the new knowledge, that I have got during this project, will help me to work under future development mentioned above. Moreover, the topic of the thesis directed me to the idea of continuing my career as a bioengineer of 3D printed solutions for the healthcare industry.

To summarizing, in my opinion, AM technologies are making their highest contribution especially to the medical industry improving and even saving the lives of humans and animals.