

Master of Science – Biomedical Engineering
Thesis Proposal

Development of a laser source to cut bones:

Laser osteotomy is a contactless and potentially minimally invasive technology for bone surgery, providing freedom along with cutting geometry and high precision. To ensure minimal invasiveness in surgery, the laser source should be adapted in a way to initiate less tissue damage. This is possible by using fiber-based laser sources or fiber-coupled laser sources which can be led to the point of interest by having a small incision.

This master thesis aims to develop a fiber amplifier for bone cutting applications. The following steps describe the thesis:

- Conducting a literature review on the existing laser amplifiers at the wavelength of interest
- Preparing a computer code based on existing models to estimate the amount of amplification in the fiber gain medium
- Taking a part in the experiments to set up the amplifier system

Realizing bone cutting experiments

Nature of the Thesis

Experimental: 40%

Programming: 45%

Documentation: 15%

Specific Requirements

Background in Physics, Optics. Experience in working with optical systems.
Experience in working with MATLAB or Mathematica.

Supervisor

Prof. Dr. -Ing. Azhar Zam (Head of BLOG)

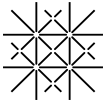
Dr. Ferda Canbaz (Technical Supervisor)

Biomedical Laser and Optics Group (BLOG)

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Contact

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Plan—24 weeks—6 months

- Literature search, papers from me and you, conceptual studies (4 weeks)
- Amplification simulation (6 weeks)
- Optimization of the main oscillator (4 weeks)
- How to build a laser
- How you estimate gain