



# European Project Semester

## PROJECT OUTLINE

**Project dates:** March 2017 - June 2017

**Title:** Design of atmospheric plasma based on Dielectric-barrier discharge (DBD)

**Project activity areas**

*Mechanical engineering*

**Key words**

Design on Catia

Realization of prototypes

**Tutor's name and coordinates**

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Client – End-user: ENIT

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**Project origin**

Research (Internal equipment)

**Project technical background:**

Plasma is often called the fourth state of the matter after solid, liquids and gases and constitutes more than 99% of the universe, it can be seen as an ionized gas. Cold Plasma treatment presents a great interest for a wide range of research areas (chemistry, physics, engineering, biology, microbiology and medicine) because of its potential applications: cleaning, surface activation, deposition, and etching. More and more conventional industrial pretreatment methods are being replaced by plasma technology in order to make processes more effective and environmentally friendly. Recently, Atmospheric-pressure plasma has attracted great interest by the possibility to overcome the disadvantages of vacuum operation.

The aim of this project is to design three different configurations for generated atmospheric plasma based on Dielectric-barrier discharge (DBD), a DBD device implied two metal electrodes and a dielectric layer. The three configurations considered are:

- Volume DBD: two parallel electrodes with a gap distance of several millimeters,
- Jet DBD: a dielectric tube with two metal ring electrodes on the outer side of the tube,
- Diffuse coplanar surface barrier discharge (DCSBD): two electrode systems embedded inside a dielectric with a fixed electrode distance.

These DBD devices will be connected to a power source and a gas system to generate a plasma.

**Study topics :**

To lead this project, the tasks to be done by the EPS students are:

- Literature review about DBD plasmas,
- Design under CATIA software of the different DBD configurations (the design should promote modularity and possibility of improvement in the future).
- To manufacture (or to order) the plasma reactor parts,
- To assemble all parts, to make electrical and gas connections.