Jet Engine Documentation

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Introduction

We are a group of bachelor students at the Technische Universität München. In this documentation, we will be noting down how we built our Jet Engine step-by-step. The jet engine we are building is a Turbofan Engine, the size and performance will be constrained by our limited budget and time.

Planning

The Engine is split into five parts: Fan, Compressor, Combustor, Turbine, and Nozzle. The start of each part is the research phase. Then comes the analysis and designing phase and finally, assembling and testing. The research phase simply consists of searching for the standard on building each part. Next, the analysis and designing phase will go in loop, since the designing phase determines the manufacturing cost. The following parts are going to be developed in order from first to last: Compressor, Fan, Turbine, Combustor, Nozzle. Besides that, we are also going to create our own pump for the fuel; and software for the sensors and automation tasks. The reason the compressor comes first is because of it being the most expensive part, and therefore every other part will be designed around it.

Compressor

Compressor Blades

This section will be dedicated to researching, analysing, and designing the fitting blade geometry, using NACA configuration.

The first phase would be determining the airfoil shape and the number of stages. Next is to model the entire geometry and run computational simulations.

Ideally three stages are present in the high-pressure compressor and two stages in the low-pressure compressor.

Pritchards Airfoil geometry design for turbine blade

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