Jet Engine Documentation

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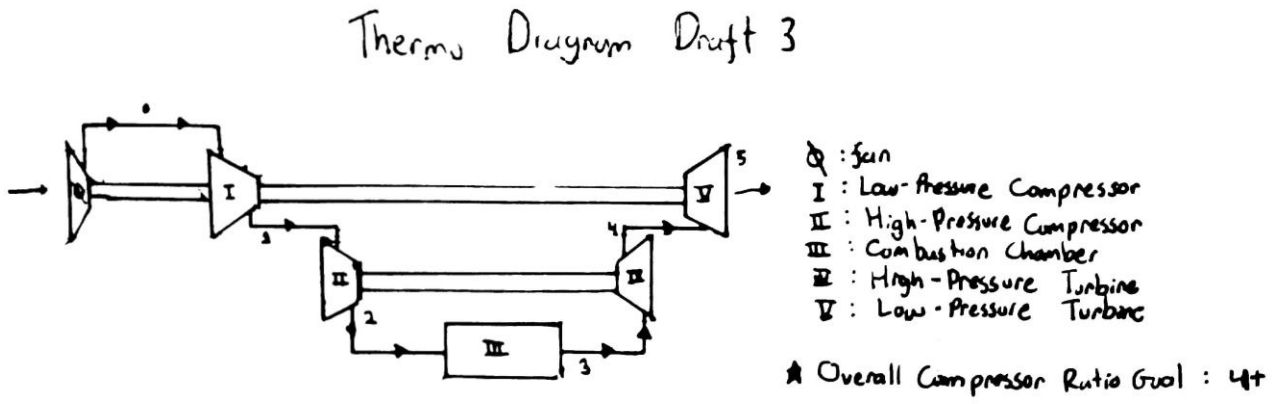
Introduction

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 they determine both the manufacturing cost, as well as the performance. 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.

Our current thermodynamic process diagram looks like the following :



Compressor

Six stage axial compressors were originally planned for the compressor part, however, due to the complexity; the compressor has been switched with one or two centrifugal compressors instead. Centrifugal compressors are much easier to design and analyse, hence saving time. Moreover, it requires less machining since there are only a few parts, compared to axial compressors.

Pritchards Airfoil geometry design for turbine blade

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