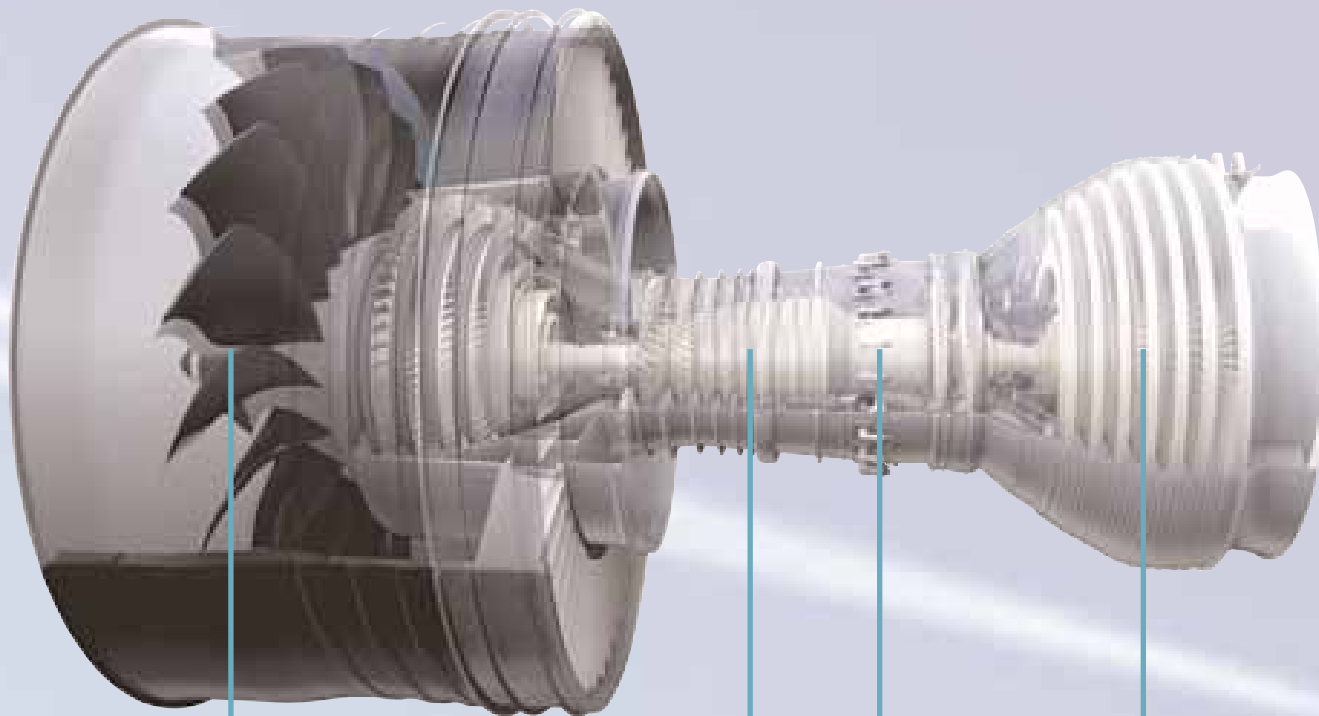


HOW A JET ENGINE WORKS

The jet engine can be simply compared to a balloon. If you inflate and let go of a balloon you see how the air, or jet stream, makes it fly away. The fan, compressor, combustion chamber and turbine are the main components of a jet engine.

ILLUSTRATION: GENERAL ELECTRIC



Fan

The fan sucks in huge amounts of air into the engine.

Compressor

The compressor compresses the air that is then channelled into the combustion chamber.

Combustion chamber

The combustion chamber's job is to heat the combustion gases before they go to the turbine. Combustion occurs when the aviation fuel is finely mixed in the front section of the combustion chamber, the primary zone. The remaining fuel is combusted in the remaining zones until it reaches the turbine intake. The heated gases expand in the turbine.

Turbine

The turbine drives the compressor and the fan. The air stream emitted by the turbine and the fan propels the aircraft forward.

THE FUEL FORMS CARBON DIOXIDE and water upon complete combustion in air. But combustion isn't always complete and that causes the build up of unwanted emissions of carbon monoxide (CO) and uncombusted hydrocarbons (UHC). Upon combustion at extreme temperatures, nitrogen reacts with oxygen in the air to form nitrous oxide (NOx), which is another unwanted emission.

When new jet engines are developed engineers want to optimise the combustion process to minimise unwanted exhaust emissions. The emission of carbon monoxide and uncombusted hydrocarbons is reduced mainly by improving the mixture of fuel and air in the combustion process.

However, NOx emissions require the development of new combustion concepts. The main

focus today is to create conditions in the combustion chamber so that combustion can occur under homogenous fuel and air conditions. This means that the absolute highest temperatures can be avoided (NOx forms at high temperatures). Another way to reduce NOx emissions is to allow combustion to develop slowly, i.e. with the excess air, which lowers the combustion temperature. ◀