SCIENTIFIC TRANSLATION
4TH YEAR / EVENING STUDIES
2ND SEMESTER 2018-2019 / 1ST LECTURE

Students are requested to translate the following texts into Arabic:

ENGINES

An aircraft engine is a component of the propulsion system for an aircraft that generates mechanical power. Aircraft engines are almost always either lightweight piston engines or gas turbines, except for small multicopter UAVs which are almost always electric aircraft.

DIESEL ENGINE

Most aircraft engines use spark ignition, generally using gasoline as a fuel. Starting in the 1930s attempts were made to produce a compression ignition Diesel engine for aviation use. In general, Diesel engines are more reliable and much better suited to running for long periods of time at medium power settings, which is why they are widely used in, for example, trucks and ships.

The lightweight alloys of the 1930s were not up to the task of handling the much higher compression ratios of diesel engines, so they generally had poor power-to-weight ratios and were uncommon for that reason, although the Clerget 14F Diesel radial engine (1939) has the same power to weight ratio as a gasoline radial. Improvements in Diesel technology in automobiles (leading to much better power-weight ratios), the Diesel's much better fuel efficiency and the high relative taxation

of AVGAS compared to Jet A1 in Europe have all seen a revival of interest in the use of diesels for aircraft.

Thielert Aircraft Engines converted Mercedes Diesel automotive engines, certified them for aircraft use, and became an OEM provider to Diamond Aviation for their light twin. Financial problems have plagued Thielert, so Diamond's affiliate — Austro Engine — developed the new AE300 turbodiesel, also based on a Mercedes engine.[14] Competing new Diesel engines may bring fuel efficiency and lead-free emissions to small aircraft, representing the biggest change in light aircraft engines in decades.

TURBOJET

A turbojet is a type of gas turbine engine that was originally developed for military fighters during World War II. A turbojet is the simplest of all aircraft gas turbines. It consists of a compressor to draw air in and compress it, a combustion section where fuel is added and ignited, one or more turbines that extract power from the expanding exhaust gases to drive the compressor, and an exhaust nozzle that accelerates the exhaust gases out the back of the engine to create thrust. When turbojets were introduced, the top speed of fighter aircraft equipped with them was at least 100 miles per hour faster than competing piston-driven aircraft. In the years after the war, the drawbacks of the turbojet gradually became apparent.

Turbojets are very fuel inefficient and create tremendous amounts of noise. Early designs also respond very slowly to power changes, a fact that killed many experienced pilots when they attempted the transition to jets. These drawbacks

eventually led to the downfall of the pure turbojet, and only a handful of types are still in production. The last airliner that used turbojets was the Concorde, whose Mach 2 airspeed permitted the engine to be highly efficient.

AVGAS

Avgas (aviation gasoline, also known as aviation spirit in the UK) is an aviation fuel used in spark-ignited internal-combustion engines to propel aircraft. *Avgas* is distinguished from *mogas* (motor gasoline), which is the everyday gasoline used in motor vehiclesand some light aircraft. Unlike mogas, which has been formulated since the 1970s to allow the use of platinum-content catalytic converters for pollution reduction, the most commonly used grades of avgas still contain tetraethyllead (TEL), a toxic substance used to prevent engine knocking (detonation), with ongoing experiments aimed at eventually reducing or eliminating the use of TEL in aviation gasoline.

Turbine engines are designed to use kerosene-based jet fuel. Kerosene is also used by most diesel piston engines developed for aviation use, such as those by SMA Engines, Austro Engine, Thielert.

PROPELLING

A jet exhaust produces a net thrust from the energy obtained from combusting fuel which is added to the inducted air. This hot air passes through a high speed nozzle, a *propelling nozzle*, which enormously increases its kinetic energy.[2]

Increasing exhaust velocity increases thrust for a given mass flow, but matching the exhaust velocity to the air speed provides the best energy efficiency. However, momentum considerations prevent jet aircraft from maintaining velocity while exceeding their exhaust jet speed. The engines of supersonic jet aircraft, such as those of fighters and SST aircraft (e.g. Concorde) almost always achieve the high exhaust speeds necessary for supersonic flight by using a CD nozzle despite weight and cost penalties; conversely, subsonic jet engines employ relatively low, subsonic, exhaust velocities and therefore employ simple convergent nozzle, or even bypass nozzles at even lower speeds.

Rocket motors maximise thrust and exhaust velocity by using convergent-divergent nozzles with very large area ratios and therefore extremely high pressure ratios. Mass flow is at a premium because all the propulsive mass is carried with vehicle, and very high exhaust speeds are desirable.