1 Introduction

MTU Aero Engines AG (MTU) provides its services to sectors with very stringent regulatory obligations. PFAS are used for maintenance, repair, and overhaul (MRO) in the aerospace industry (civil and military). 30% of all aircraft have MTU technology on board. On a global scale, MTU faces competition from GE Aerospace, which is based in the USA and is a subsidiary of General Electric. Further competitors based in the USA are Pratt & Whitney, StandardAero, Component Repair Technologies Inc., Ceral USA and Praxair USA. Other competitors are Pratt & Whitney Canada and Lufthansa Technik, based in Germany. Unlike other sectors some competitors are also OEMs. Importantly, for any modification, prior approval from the OEM is an absolute necessity. Indeed, their requirements are based on very strict industry standards for the aerospace industry to ensure passenger safety. The aerospace industry involves diverse fields such as navigation, engineering, development, and maintenance, serving both civil and military/defense sectors. The final products within this industry include aircraft, airships, helicopters, and other flying vehicles, along with related equipment, systems, and structures. Undoubtedly, it stands as a highly intricate and multifaceted sector, directly impacting the safety and well-being of EU citizens. The following sections explain the most important regulations in this sector. The lifecycles of an aircraft engine ranges from 25 to 50 years. More than 11,000 engine experts work at 17 locations. At the moment there are 300 technology projects, 2,675 patents and 700 inventors. The revenue is around € 5.3 billion the EBIT adj. € 655 million. In the past years and decades MTU was able to establish itself among other major competitors.

2 Supply chain and sectors involved

This comment revolves around the usage of gaskets in aircraft engines. The aim of the current section is to provide an overview of the supply chain. For conducting their production activities, the different MTU applying sites receive deliveries of different gaskets from upstream EEA and non-EEA suppliers. These materials are used at the MTU sites for the assembly of modules and engines as well as MRO activities. Notably, there are several interdependencies between the sites, as some components may be transferred from one site to another within the EEA. The gaskets are purchased directly from retailers. There is no rework of the products done by MTU. PFAS gaskets are only used during assembly and disassembly of the complete engine. Broken gaskets will be disposed an replaced. Only the complete assembled engine will be delivered to the OEM, MTU does not resell PFAS gaskets. Therefore the aviation industry will be primarily affected.

3 Employment and economic information

Currently only the employees who work in the assembly and disassembly line are in direct contact with those PFAS products. The products are in a closed loop and are therefore not in contact to the environment. No more useable products are collected and will be separately disposed. This means it will be incinerated in a hazardous waste incinerator.

4 PFAS use in aircraft engines

PFAS are used as gaskets in aircraft engines, because of their high temperature and chemical resistance and their durability. The application of these gaskets is e. g. in fuel, oil and air pipes. Without those durable gaskets the safety of the aircraft engines cannot be guaranteed. Therefore MTU is only purchasing products for final use and is not a manufacturer of those materials.

5 PFAS alternatives offered in the market, considering the technical suitability

The polymers in the market identified as a substitute are not suitable for the application in the aero engine market. Even if there is any product available it takes a lot of time of sorting it out. Various technology projects are currently running to substitute PFAS. Considering the average duration of comparable tests it will be impossible to substitute PFAS within 18 months. Nevertheless the final approval whether a substitute is useable or not is has to be given by the OEM manufacturer of the aircraft engine (e. g. GE, Pratt&Whitney) based in the Unites States. The decision making process takes a lot of time because carrying out admission tests and alternative testing in production under near-series conditions is necessary. Therefore it is not possible to estimate a timeline for transition to alternatives.

6 Potential impacts of the restriction

In the case of a PFAS restriction it would not be possible anymore to build up, repair and overhaul aircraft engines in Europe. Therefore the turnaround time of aircraft engines would increase massively and it won't be reasonable to repair, overhaul and build them up in Europe, which leads to do the build ups in third party countries. This means that aircrafts will be grounded way longer, which is not acceptable for most airlines given the increase in flights over the course of coming years. The restriction influences not only the civil but also the military business. Losing the ability to build up military aircraft engines in Europe or having a longer turnaround time would also weaken the defensive ability.