

Jet engines to become cleaner in future

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Aircraft engines emit soot. Credit: Charlie Atterbury, Seattle

Thanks to a close collaboration between the Swiss Federal Laboratories for Materials Science and Technology (Empa), SR Technics and the Federal Office of Civil Aviation (FOCA), Switzerland is setting an international benchmark by developing a method for measuring emissions of fine particulate matter from aircraft engines. The Committee on Aviation Environmental Protection of the International Civil Aviation Organization (ICAO) recently approved a preliminary

standard governing the emission of particulates by aircraft engines.

Since the 1980s, large aircraft engines have been required to meet emission limits that have been gradually tightened over time. Air traffic, therefore, contributes relatively little to Switzerland's pollution levels, and visible smoke trails in the sky from jet engines are a thing of the past. However, no-one has yet found a solution to the emission of ultra-fine particles from [jet engines](#). These microscopically small particles can penetrate deep into the lungs and thus adversely affect health. As a precautionary measure, these emissions from [air traffic](#) will now also be measured, regulated and reduced, even though air traffic produces less than 1 percent of Switzerland's fine particulate emissions.

From a technical standpoint, measuring ultra-fine combustion particles is extremely complex. As part of a close collaboration between Empa, SR Technics and FOCA experts have spent years developing a standard test setup and method that can be used to measure fine particulate emissions from [aircraft engines](#). Both the measuring system and the corresponding instruments were tested by way of international campaigns until they were considered ready for deployment. The measuring system gives the mass of the particulate matter as well as the number of particles emitted per liter of fuel. It even captures the smallest particles with diameters of less than a hundred-thousandth of a millimeter.

The work on this new global standard was led by FOCA in partnership with the US aviation authority. On 2 February in Montreal, the ICAO's Committee on Aviation Environmental Protection approved the new standard, which relies heavily on contributions by FOCA, SR Technics and Empa. Final approval of the standard is expected by the ICAO Council in one year.

All engine types for passenger aircraft that are in production as of 1 January 2020 must be certified in accordance with the new standard.

Most engine manufacturers have already developed their own measuring systems that comply with the standard and have started re-measuring their engines. Technologies are also emerging that will further reduce the emission of fine particulates.

Provided by Swiss Federal Laboratories for Materials Science and Technology

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