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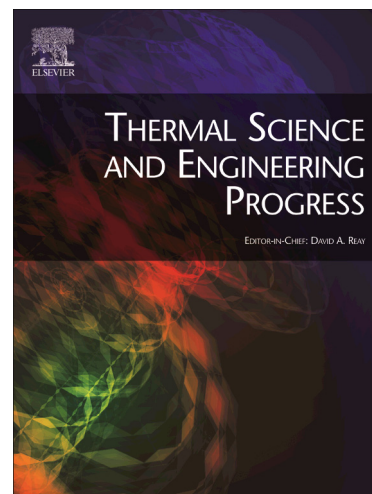
Aircraft air conditioning heat exchangers and atmospheric fouling

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Aircraft air conditioning heat exchangers and atmospheric fouling

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Abstract

This paper describes how the aircraft's air-conditioning system functions, such as those on the A320 including the components within the system. The need for an air-conditioning system requirement is explained, including the use of external air flow from outside to act as a cooling source (known in technical aviation terms as "ram" air). The A320 electronic controls are included in addition to the flight deck selections under normal operations and when the needs for higher levels of ventilation are required. The published literature identified indicates that the fouling and environmental pollution can affect the aircraft Environmental Control Systems is very limited, as there are few published or known materials about the particulate matter fouling / deposited on aircraft systems.

Fouling collected from large commercial aircraft is analysed using different techniques to identify the potential source emission and composition. This paper addresses the failures of the ECS due to fouling, identifies the potential sources of fouling and operational measures that may effect this safety critical systems operation.

Keywords:

Aircraft, Heat Exchangers, Fouling, Lubrication Oil Contamination, Environmental Control System

Note: Aircraft altitudes are quoted both in feet and meters to ensure SI compliance.

1 Introduction

The air-conditioning systems (Environmental Control System – ECS) that are fitted to modern large commercial aircraft are units that allow both the provision of cold and warm air on both the ground and whilst the aircraft is in-flight. The ECS bleeds hot 'clean' air from the high pressure customer manifold (high temperature, high pressure) on the gas turbine engine, which is ducted to the air conditioning pack. The pack can provide cool air to the aircraft by a simple mechanical device, namely compressing the air and passing it through wavy fin Plate

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