

TECHNOLOGY OFFER

MATERIALS AND MATERIAL ENGINEERING

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SOUND ABSORBENT CERAMICS

Porous ceramic structure produces more stable combustion and reduces aircraft noise (UN551)

BACKGROUND

Combustion-induced instabilities constitute a general problem in all aircraft gas turbines. They are produced by resonant processes inside the combustion chamber. Helmholtz resonators have hitherto been used as a passive measure to dissipate sound energy from the resonance circuit. However, they require much more cooling which reduces their efficiency. Besides, the reduction of aircraft noise has been a research topic for years and is gaining more and more importance. Aircraft noise is generated in numerous places on an aircraft. For example, the high-lift systems and the engines produce significant noise emissions whenever an airplane lifts off or lands. In particular, the thruster is a source of noise and has been difficult to improve on account of the comparably high jet temperature.

SOLUTION

The "Combustion Engineering" research group of ZARM – Center of Applied Space Technology and Microgravity – at the University of Bremen has developed and patented a porous, sound-absorbent ceramic material which limits the noise produced inside combustion chambers to specific frequencies and thus achieves a more stable combustion. Ceramics are resistant to high temperatures. The required internal structure of ceramics is calculated mathematically for each specific application. The invention comprises both the exact composition of the ceramic material and the selection of the process parameters needed to build a ceramic material possessing the desired properties.

A successful sound absorption during combustion processes based on this porous ceramic material has already been proven for stationary gas turbines. In addition, thermal shock resistance has also been evidenced for this application, i.e. the ceramic material is resistant to high temperature variations.

ADVANCES AND APPLICATIONS

The new-developed sound-absorbing ceramic material produces a desired sound absorption inside the combustion chamber. Compared to Helmholtz resonators, which only cover a very narrow frequency range and require a huge amount of cooling air, the ceramic material can be applied in broad frequency bands. In addition, they are very heat resistant and must not be flushed separately with cooling air. Moreover, this ceramic material can contribute to low-emission combustion and thus to a more efficient use of fuel.

The patent is supposed to be further developed or licensed in collaboration with private enterprises



FIELD OF APPLICATION

Aircraft turbines,
combustion chambers

KEYWORDS

Porous ceramics, sound absorbers

PROPERTY RIGHTS

Patent registered
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OFFER

Licensing, cooperation

AN INVENTION OF

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