# Article information:

Material extrusion additive manufacturing of multifunctional sandwich panels with load-bearing and acoustic capabilities for aerospace applications - ScienceDirect  
<https://www.sciencedirect.com/science/article/pii/S2214860422007333?via%3Dihub>

# Article summary:

1. Material extrusion additive manufacturing (MEAM) was used to create multifunctional sandwich panels with load-bearing and acoustic capabilities for aerospace applications.

2. The developed sandwich panel, based on the combination of five Helmholtz resonators, demonstrated an absorption spectrum over 517 Hz with more than 90% of absorption between 643 Hz and 1160 Hz.

3. Three-point bending tests revealed that the stiffness of the sandwich panels with the TC geometry is up to ∼10% higher than those of the panels with a standard hexagonal honeycomb structure, additively manufactured with the same mass and wall thickness.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article titled "Material extrusion additive manufacturing of multifunctional sandwich panels with load-bearing and acoustic capabilities for aerospace applications" discusses the design and fabrication of an acoustic sandwich panel using material extrusion additive manufacturing (MEAM) for reducing noise pollution in airplane engines. The article highlights the use of MEAM to create panels in one manufacturing step with complex geometry, which enables the integration of five Helmholtz resonators directly into the core of the sandwich panel. The developed multifunctional sandwich panel demonstrates an absorption spectrum over 517 Hz when measured with an impedance tube, and its acoustic spectrum has more than 90% absorption between 643 Hz and 1160 Hz.

The article provides a detailed description of the geometrical design of the acoustic sandwich panel, including its dimensions, thickness, and hole sizes. It also describes the printing process used to create the acoustic specimens and sandwich panels, along with their inspection and testing procedures. However, there are some potential biases in this article that need to be considered.

One-sided reporting is evident in this article as it only focuses on the benefits of using MEAM for creating multifunctional sandwich panels without discussing any limitations or drawbacks associated with this technology. Additionally, while the article mentions that different types of structures have already been studied to decrease noise pollution from airplane engines, it does not provide any evidence or references to support this claim.

Furthermore, some points of consideration are missing from this article. For instance, it does not discuss how these new designs will impact aircraft weight or fuel efficiency. Also, there is no mention of any potential risks associated with using these new materials or designs in aerospace applications.

The article also lacks evidence for some claims made. For example, it states that "the developed acoustic design...has an acoustic spectrum with more than 90% absorption," but there is no data provided to support this claim other than a single frequency range mentioned earlier in the article.

Unexplored counterarguments are another issue with this article. While it discusses how combining different HRs can widen the absorption peak up to a few hundred Hertz, it does not explore any potential counterarguments against using multiple HRs or other sound-absorbing technologies.

Finally, promotional content is evident in this article as it promotes MEAM as an alternative method for creating multifunctional structures for aerospace applications without discussing any competing technologies or methods.

In conclusion, while this article provides valuable insights into designing and fabricating multifunctional sandwich panels using MEAM for reducing noise pollution from airplane engines, it has some potential biases that need to be considered. These biases include one-sided reporting, missing points of consideration and evidence for claims made, unexplored counterarguments against using multiple HRs or other sound-absorbing technologies; promotional content promoting MEAM as an alternative method without discussing competing technologies or methods; possible risks not noted; partiality by not presenting both sides equally; among others.

# Topics for further research:

* Impact of multifunctional sandwich panels on aircraft weight and fuel efficiency
* Risks associated with using new materials or designs in aerospace applications
* Limitations or drawbacks of material extrusion additive manufacturing (MEAM) technology
* Comparison of different types of structures used to decrease noise pollution from airplane engines
* Counterarguments against using multiple Helmholtz resonators or other sound-absorbing technologies
* Other competing technologies or methods for creating multifunctional structures for aerospace applications.

# Report location:

<https://www.fullpicture.app/item/15bc7896d0fe79d233082b6dab21549a>