

# From Freezing Cold to Red Hot Glowing – An Introduction to Aerospace Applications of Porous Structures

Dr. Nicolas Fries

Ariane Group, Bremen

Aerospace is one of the technically most demanding engineering areas in terms of material selection. This originates from the need for low component weight in combination with very harsh load environments and high safety and quality standards. This demands for state of the art performance, however to be combined with industrialized (i.e. reliable and reproducible) production processes. The talk will give an overview of the different areas where porous materials (metallic, polymeric and ceramic) are applied and it will show some surprising cases. The range spans from mechanical impact attenuator systems to fluidic functional elements like woven filters or screen elements for propellant management, but also catalyst beds or thermal protection tiles for atmospheric re-entry.

Despite providing the described overview typical requirements of relevance to the individual applications will be discussed. In addition to the obvious need to sustain the respective mechanical and thermal load environment there can also be specific demands as low thermal conductivity, or a low pressure drop combined with as high as possible bubble point. To conclude the talk a presentation of a typical development cycle of an aerospace product will be given, involving also the technology readiness level (TRL) maturation if required. The presentation closes with an outlook on the recent “hot topics” in the space community and the technical challenges associated with them.

