Rare Earth Elements in the Air and Space Industry: a brief review

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The Air and Space Industry are highly strategic and there are several strategic planning documents that emphasize this aspect, in which the technological frontier is established as the big difference for the future. This aspect is addressed by different sectors of the Brazilian Government, as Minister of Defence (National Strategy for Defence), Ministry of Science, Technology and Innovation (National Strategy for Science, Technology and Innovation) and Brazilian Air Force (Strategic Design of the Air Force of the Future), demonstrating the common concern and the alignment of thought regarding this matter. Another important document of the Ministry of Defence, which expands a little this scope, is the National Defense Industry Policy, establishing as a mission within the national demands, the participation of armed forces in activities to stimulate the Defence Industry by fostering the development of cutting-edge technologies to strengthen National Industry and obtaining technological independence with the encouragement of research and the production of new materials and products, both for military and civilian uses. Some of the main materials, that impact on the vision of future mapped out by the Brazilian Government, are the Rare Earth Elements, as the use in the defense industry is highly strategic, because some materials are critical items in manufacturing military technologies, in particular by the permanent magnets containing Rare Earth Elements, since there are no other materials that can replace them, they are samarium cobalt (SmCo) and neodymium iron boron (NdFeB). NdFeB magnets are essential to many military weapons systems and SmCo is ideal for military technologies such as precision-guided missiles, smart bombs, and aircraft. Permanent magnets containing neodymium, gadolinium, dysprosium, and terbium are also used in numerous electrical and electronic components. This paper will discuss the strategic importance of Rare Earth Elements for the future of national defense industry and indicate the need for the Ministry of Defence to promote research and encourage the national industry, in order to achieve technological independence and the development of technologies, both for military and civilian uses.

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