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Press release

## New PHOEBUS contract paves the way for development of future lightweight composite rocket stages

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- **ArianeGroup signs a new contract with ESA as lead contractor for the PHOEBUS project. This European Space Agency program aims to further the development of composite technologies, notably for the future upper stage of Ariane 6**
- **The future “black” carbon composite upper stage, called ICARUS (Innovative Carbon ARiane Upper Stage), will be lighter than the current metal upper stage and will further enhance the versatility and competitiveness of Ariane 6 in the next few years**
- **This contract, worth 14,6 M€, follows on from the first contracts signed in May 2019 and will confirm the technological maturity of the PHOEBUS demonstrator**

The European Space Agency (ESA) and ArianeGroup, lead contractor and design authority for Ariane 6, have signed a new technological development contract in the field of carbon composites. The PHOEBUS (Prototype of a Highly OptimizEd Black UpperStage) program will increase the maturity of the technologies needed to lower both the manufacturing cost and the weight of the Ariane 6 upper stage. The goal is thus to improve its performance (in particular, an increased payload capacity of about two metric tons to geostationary transfer orbit), and to validate a new stage architecture.

Continued improvements to the competitiveness of the Ariane 6 launcher were designed-in from the outset and are proceeding incrementally throughout its development. The exploration and use of composite technologies are key aspects, for which MT Aerospace and ArianeGroup are combining the expertise of their teams in Augsburg and Bremen in order to design and test the PHOEBUS upper stage cryogenic composite technology prototype. This collaboration, which began in May 2019 with an initial phase A/B1 design contract, continues under the ESA contract signed today.

*“One of the main challenges is to ensure that the composites are just as-tight and robust as metal parts for the extremely cold and penetrating liquid hydrogen,” explained Pierre Godart, CEO of ArianeGroup in Germany. “This new contract demonstrates the confidence of the ESA and DLR space agencies in our team and in our partner MT Aerospace, with whom we have been working for a long time, notably on metal parts for Ariane 6. We will continue our collaboration to position Germany and Europe at the forefront of cryogenic composite technologies for the storage of liquid hydrogen and oxygen. It is thanks to the institutional support of our agencies, ESA, and DLR, that we can innovate under the best conditions and at the best cost for the benefit of all citizens of Europe.*



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To demonstrate the maturity of all the necessary technologies, ArianeGroup will contribute its know-how in launcher stage technology and systems integration, while MT Aerospace will be responsible for the materials and technologies intended for composite tanks and structures in cryogenic conditions.

The technologies developed under this contract will be integrated into an upper stage demonstrator beginning in 2023, in order to demonstrate that the system is compatible on a large scale (scale 1 for the LOX tank and scale 2/3 for the LH2 tank) with the liquid oxygen-hydrogen mixture

PHOEBUS paves the way not only for the further development of a new stage for Ariane 6 or other future launchers, but also for the introduction of cryogenic composite technologies for the aeronautics sector, by creating synergies between the two industries.

### **About ArianeGroup**

ArianeGroup develops and supplies innovative and competitive solutions for civil and military space launchers, with expertise in all aspects of state-of-the-art propulsion technologies. ArianeGroup is lead contractor for Europe's Ariane 5 and Ariane 6 launcher families, responsible for both design and the entire production chain, up to and including marketing by its Arianespace subsidiary, as well as for the missiles of the French oceanic deterrent force. ArianeGroup and its subsidiaries enjoy a global reputation as specialists in the field of equipment and propulsion for space applications, while their expertise also benefits other industrial sectors. The group is a joint venture equally owned by Airbus and Safran, and employs approximately 7,600 highly qualified staff in France and Germany. Its 2020 revenues amounted to 2.7 billion euros.

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