


SPACE 2020 – WINNING STRATEGIES IN INNOVATIVE LIGHTWEIGHT DESIGN



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Vertical Lifting Device for EXOMARS,
delivered to OHB Systems,
realized by GRADEL

Source: ESA_EXOMARS_Baikonur

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Year of Publication: 2020

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**PROLOGUE TO THE MARKET /
TECHNOLOGY STUDY**

SPACE 2020 – WINNING STRATEGIES IN INNOVATIVE LIGHTWEIGHT DESIGN

The present market and technology study „SPACE 2020 – Winning Strategies in Innovative Lightweight Design“ was conceived, developed and implemented by AUTOMOTIVE MANAGEMENT CONSULTING GmbH and GRADEL SÀRL in the period from 01 January to 31 December 2019. The study involved 43 highly qualified space experts from 9 nations, who made well-founded and valuable statements on the current market situation and the future challenges in the multi-material lightweight construction of space travel in the course of exploratory interviews and comprehensive in-depth surveys. Our thanks go to all these specialists.

The results report „SPACE 2020 – Winning Strategies in Innovative Lightweight Design“ thus provides a substantial overview of essential future core tasks in lightweight construction in space sector in order to specifically meet the specific needs of (end) customers.

This market and technology study, which was prepared by five authors, involved space component and system manufacturers, strategic suppliers, the European and Luxembourg Space Agencies, universities and scientific institutes as well as consulting firms and end customers from nine nations. In this way, the present market and technology study can be used to derive strategic directions for all space companies working to strengthen and optimise their international competitive position.

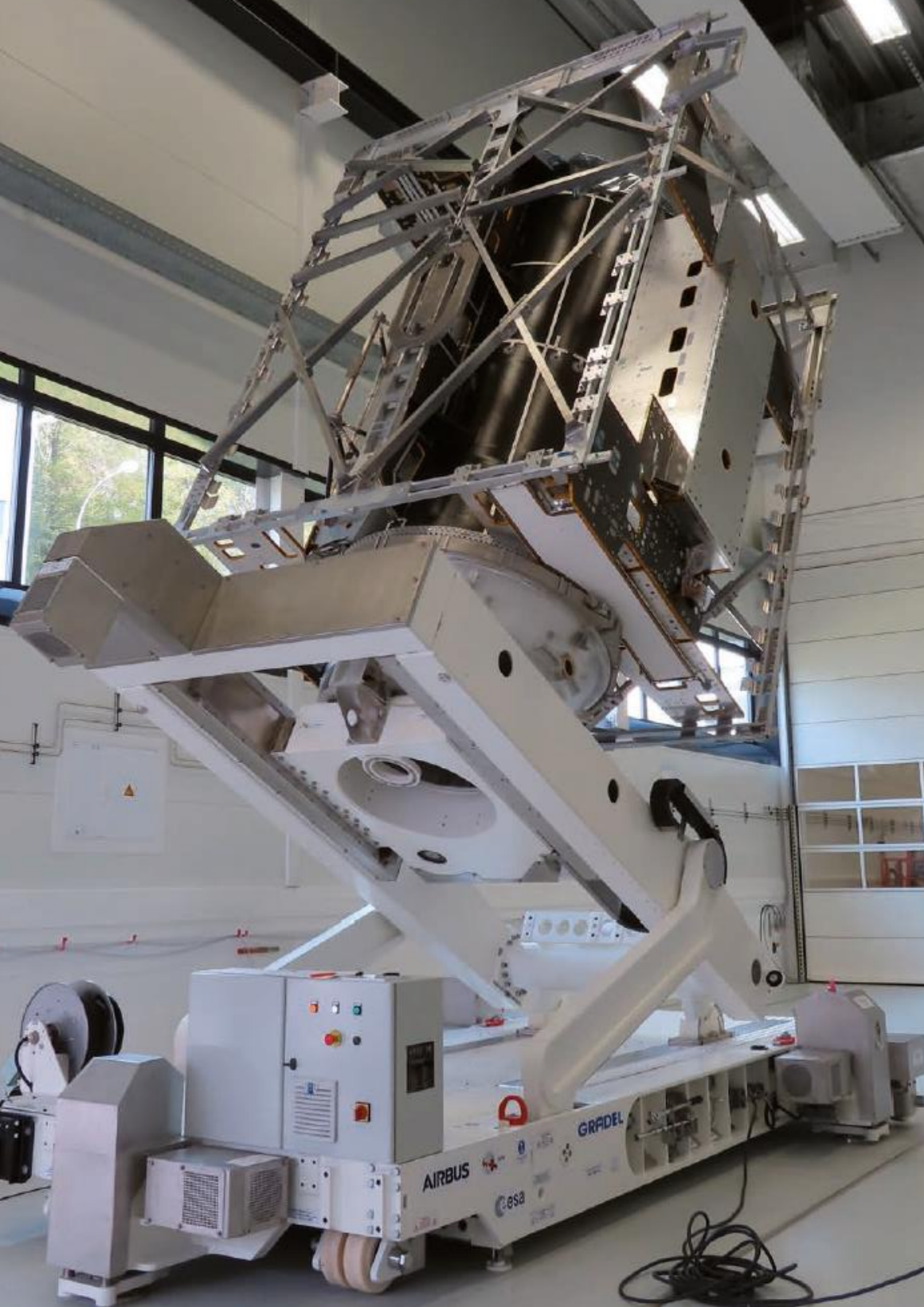
Against the background of increasing sensitivity for energy and resource efficiency, environmental and climate protection as well as various aspects of effective sustainability, „SPACE 2020 – Winning Strategies in Innovative Lightweight Design“ provides a measurable and assessable contribution to enable weight reduction for future space applications while maintaining or improving functionality.

Quality and cost criteria are equally taken into account in the present results report, so that „customer value“ is the focus of all analyses. Modern functional, joining technology and lightweight manufacturing is also oriented towards materials that must be used in accordance with their strength. In this respect, the present market and technology study „SPACE 2020 – Winning Strategies in Innovative Lightweight Design“ serves as a guide to the lightweight construction of the future.

Dr.-Ing. Claus Bayreuther, AUTOMOTIVE MANAGEMENT CONSULTING
and
Claude Maack, GRADEL SÀRL

Multi Purpose Trolley for JUICE, delivered to AIRBUS, realized by GRADEL

Source: AIRBUS_JUICE in LAM Airlock



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1. INTRODUCTION AND STUDY CONCEPT

The study project is motivated in view of current and future challenges in the lightweight construction of the space industry and its industrial, scientific-technological and social significance. Subsequently, the basic procedure and the study concept are presented and explained.

1.1 Starting Point and Motivation

Lightweight construction has become an essential key technology that contributes significantly to the international competitiveness of all European countries. It has established itself as an independent discipline of product development and realisation and includes various technical disciplines and fields such as materials, concepts, design, structure, joining and manufacturing technology and many more.

The portfolio of activities that already exists for the lightweight construction of the future is very comprehensive, multi-dimensional and constantly expanding in the aerospace, automotive, mechanical and plant engineering, sporting goods and many other fields.

Very sensible, analytically founded and targeted perspectives on lightweight construction for the international space industry are presented in the present market and technology study. The market and technology study thus makes a concrete, measurable and assessable contribution to the technical, economic, ecological and social lightweight construction of the future.

1.2 Lightweight Construction in Space Industry

The current market situation in the space industry is characterised by the predominant use of aluminium and titanium alloys. Fibre composite technologies are already being used successfully on panels, some structural components and fuel tanks, and have so far made relatively little progress due to different qualitative and price criteria, although they have already had very positive experiences with them in aerospace, motorsports and other sectors and market segments and have gained extensive insights.

Regarding possible future multi-material, functionally integrated, systemic and bionically inspired lightweight construction solutions, the present market and technology study assesses leading material technologies and future solutions for the targeted mass reduction of components, modules and aerospace systems. To this end, more than 30 highly qualified companies and scientific institutions in the space industry were questioned in order to obtain the clearest, most analytically founded, substantially engineering-science-oriented and objective picture of future lightweight construction in the space industry through exploratory interviews and personal depth surveys.