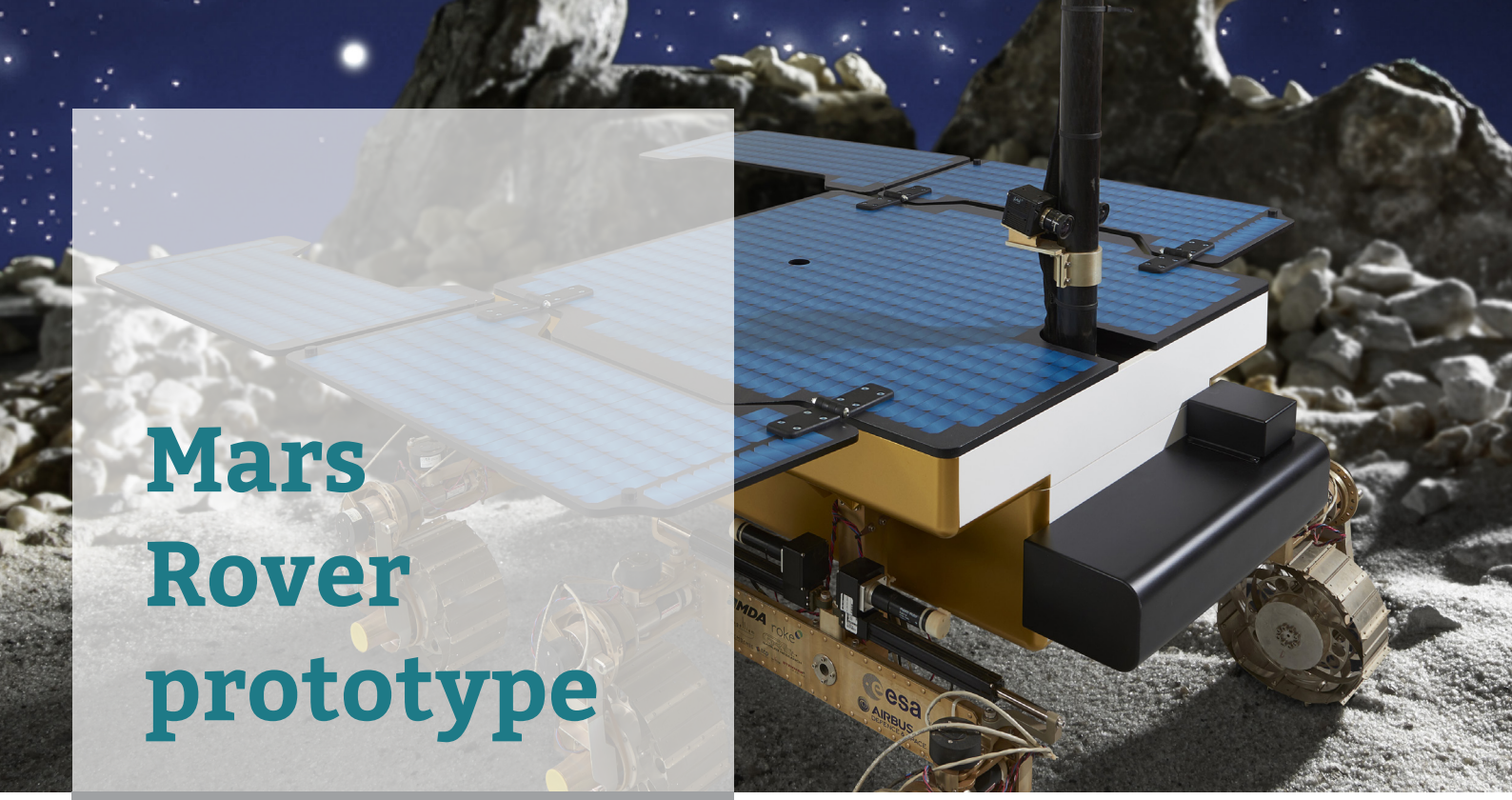

Mars Rover prototype

Case Study

As Europe pushes ahead with its plan to put a UK-assembled robotic rover on Mars in 2021, Ogle Models have worked closely with a world-leading player in the space industry to prototype the autonomous vehicle.

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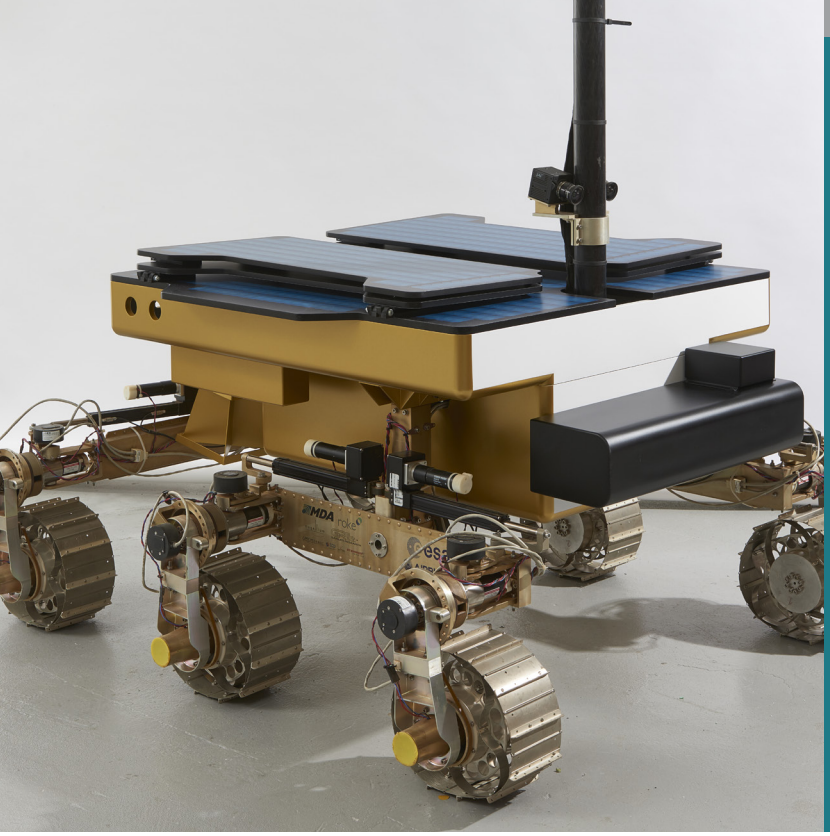
BACKGROUND

Airbus Defence and Space is a division of the Airbus Group and global pioneer. It is Europe's leading defence and interplanetary enterprise, and the second largest space business worldwide. Its activities include space, military aircraft and related systems and services. Technology and engineering requirements are at their most stringent and demanding within the defence, security and space exploitation industries. Airbus turned to Ogle Models to deliver the precision required for the Mars Rover prototype.

THE CHALLENGE

Mars Rover is the second part in a two-step programme known as ExoMars. This project is to explore the possibility of life on Mars. The first part has seen a satellite on the Red Planet investigating trace gases in the atmosphere. The second phase is to use the robotic rover to follow up studies by drilling below the surface to detect organisms directly.

The requirement was for a full-size body and solar array to mount on a Mars Lander rover chassis. The prototype is to be used for terrain handling and testing purposes at Airbus' Hertfordshire laboratory. The working prototype chassis was supplied to Ogle. Once completed, it will be fully operational and will be driven both via remote control and autonomously with the body and solar panels mounted in place. The prototype was required to be a drivable test vehicle; the weight of the body and solar panels had to be carefully managed as the chassis was designed to operate and move with a certain amount of weight on board.



THE SOLUTION

To keep the weight of the body and solar panels to a minimum, Ogle selected to build using composite Cellite panels. The sandwich panels are fibre faced aluminium, and it is the core honeycomb structure that give such a solid performance. This material is selected when high rigidity and low weight and important requirements.

To produce the panels, full-size jigs were CNC machined in 15mm MDF. A table router was used to cut out the Cellite panels from the jigs. This highlighted another challenge of working with the panels as the board is almost hollow, any exposed edges had to be filled and sanded back to seal them.

In this case, Ogle used an automotive filler. Also, anywhere where a fixing was required, the model makers had to bond a threaded metal insert to enable the bolts and fixings to move securely.

The completed panels were then bonded onto SLS printed extrusions which, when assembled, formed a three-dimensional skeleton with the Cellite panels spanning the flat surfaces. The tub went through the paint facility and was finished in metallic gold which was matched to represent the radiation shielding on the real Mars Rover. This finishing process was also used for the solar array. Ogle also designed and printed eight SLS hinges to allow the solar array to unfold. This section was finished with large vinyls that were printed with the image of photovoltaic cells, and applied to the upper surfaces.

CONCLUSION

Whilst an array of CNC and SLS capabilities were used on this project, it was largely completed with bench model making skills to ensure each precise component functioned fully and fitted within the specific design and weight restrictions. Having such wide spread technologies available on-site at Ogle allowed the team to react quickly in making last minute adjustments to parts before sending them to SLS or CNC. The combination of materials, machines and the highly-skilled team has resulted in a very rigid yet lightweight prototype. The Principal Systems Engineer at Airbus Defence and Space, said: "When the UK Space Agency requested Airbus Defence & Space Ltd. to provide a Ground Demonstration Model (GDM) of the ExoMars Rover, Ogle Models + Prototypes were the obvious choice to provide the representative 'bathtub' structure and solar panels. Both these elements were required to be mass-limited whilst still providing the necessary stiffness to ensure the GDM would remain rigid when driving over rocks.

In addition, since the GDM is required to represent both the company and the ExoMars mission at a wide variety of public events, the quality of the finish needed to be very high.

Ogle Models + Prototypes met all expectations in delivering an excellent product on a tight schedule, whilst suggesting useful improvements to the initial design as a result of the manufacturing process."

FOR MORE INFORMATION PLEASE CONTACT:
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