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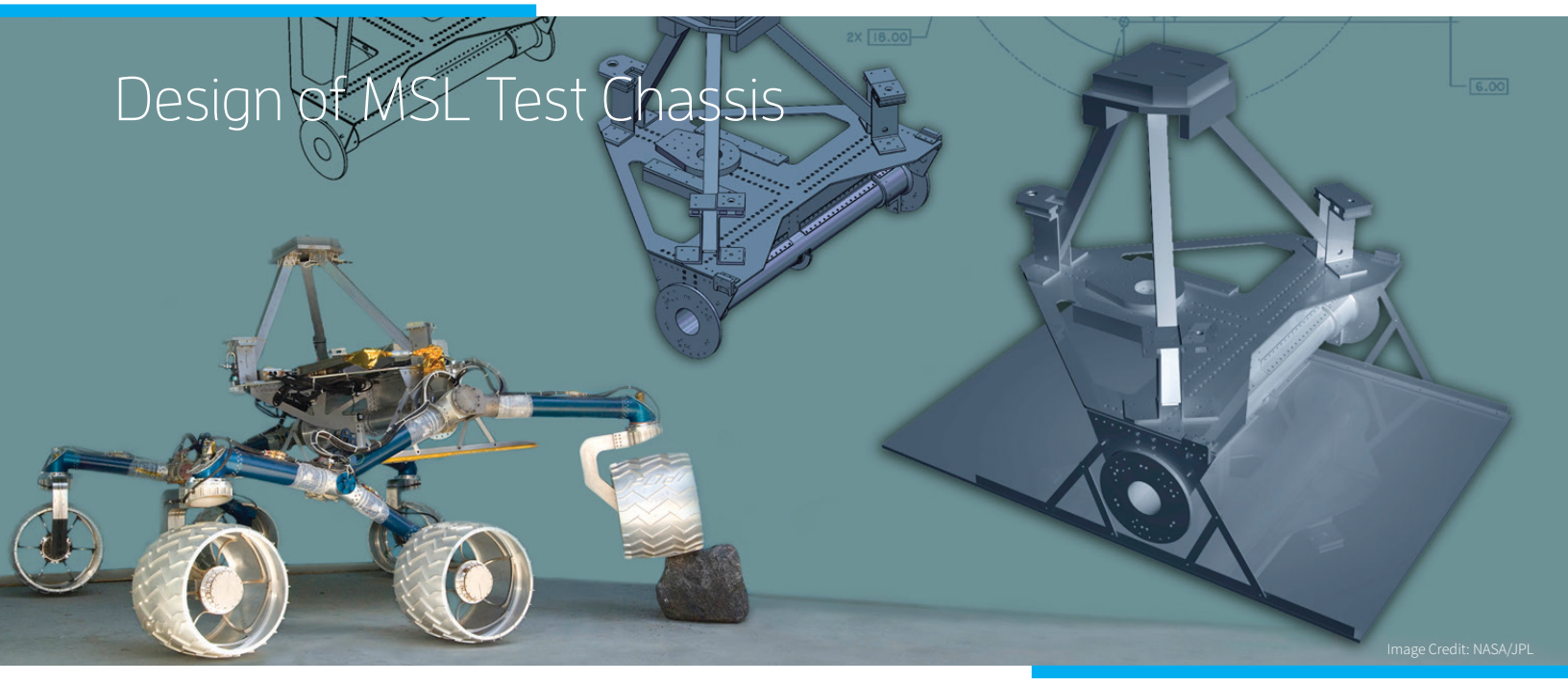


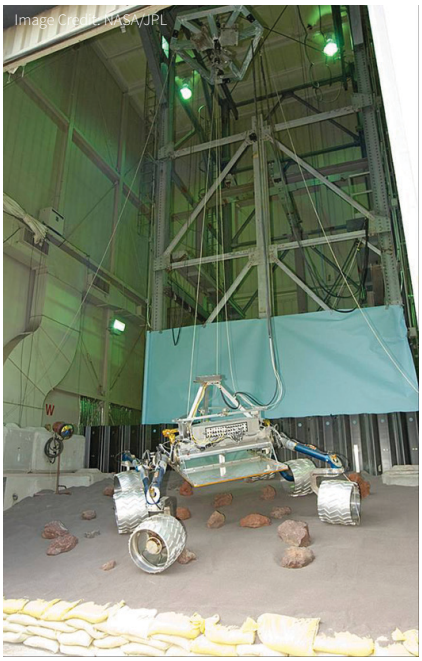
Design of MSL Test Chassis

Image Credit: NASA/JPL

Case Study

OVERVIEW

As part of NASA's unmanned planetary exploration program, the Jet Propulsion Laboratory built a next-generation rover, called the Mars Science Laboratory (MSL). The largest rover yet to be sent to Mars, it was designed to search for evidence of microbial life, past or present. With a first-of-its-kind landing system, the rover was lowered from a slowly descending rocket-controlled stage via tethers and touched down using the same mobility system that it uses to traverse the planet. Advanced testing methodologies were called for to understand this sequence. ATA Engineering supported this work with the design and manufacture of a representative rover chassis for full-scale touchdown testing.



MSL test rig

TASKS PERFORMED & KEY OUTCOMES

- Created a conceptual design that fulfilled requirements such as mobility system interface locations, total mass, center of mass location/adjustability, bridle keep-out zones, and hard-stop locations.
- Used an analysis-driven design approach to develop a conceptual system representation that met all performance criteria.
- Developed a detailed design of the chassis.
- Performed detailed analysis of the system to ensure that it met performance requirements: stress analysis, structural dynamics, and determination of mass properties.
- Finalized structural details and fastener selection, including addressing issues related to manufacturability and tolerancing.
- Generated engineering/manufacturing drawings of all parts.