

Deep Impact Spacecraft Development Support



Image Courtesy NASA/JPL-Caltech

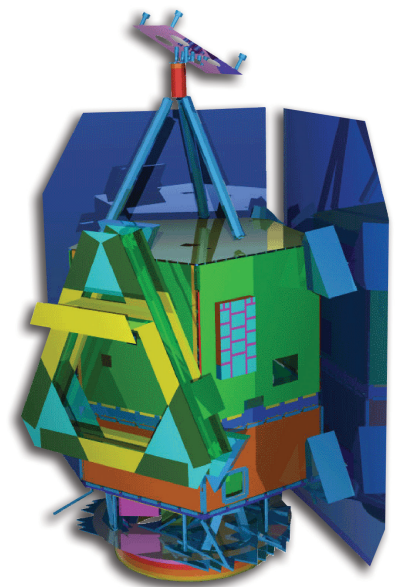
Case Study

OVERVIEW

Ball Aerospace & Technologies Corp. (BATC) developed the spacecraft for NASA's Deep Impact program. Deep Impact consisted of two spacecraft which flew into deep space to gather more information about the Tempel 1 comet. One spacecraft was designed to impact the comet while the other flyby spacecraft observed and recorded the impact, the ejected material blasted from the crater, and the structure and composition of the crater's interior. On July 4, 2005, the Deep Impact spacecraft successfully completed its mission. ATA Engineering, Inc., provided specialized test and analysis support to BATC over a period of 12 months.

TASKS PERFORMED & KEY OUTCOMES

- Developed detailed finite element models (FEMs) of components and subsystems.
- Verified designs through detailed stress analysis under static, thermal, and dynamic loads.
- Worked with designers to implement component and system modifications required to achieve positive margins for all design loads.
- Developed forcing functions and performed transient analyses on subsystems subjected to impact loading.
- Developed correlated, simplified subsystem FEMs for use in the system dynamic analysis.
- Designed and validated innovative shock attenuation flexures for a variety of components by applying shock data from test to detailed analytical models.
- Performed a modal test of the entire spacecraft at BATC's facility in only three days.
- Closely correlated system-level dynamic model to test data for fourteen target modes.



System finite element model