

Utilization of Integrated High-End Analysis and Design Tools in Real-Time Concurrent Design Environments

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ABSTRACT

The Next Generation Project Development Teams (NPDTs) at the Jet Propulsion Laboratory provides customers with state-of-the-art Concurrent Analysis, Simulation, and Design environments for the early design stages that emphasizes a total Systems approach, and features Multi-Disciplinary design teams, and interconnected, high-end Analysis and Design tools. These tools share and utilize a common 3D geometry of payload and spacecraft for their analyses and design. As a result, teams utilizing the NPDT approach have shown improved analysis accuracy and higher design maturity in the early design phases, and have managed to shrink development time by factors of four and higher. The ability to bring a design from concept to engineering drawing level quality in very short time has also been demonstrated. In the case of a sub-sea probe, engineering level quality was achieved in 3 weeks. Currently, work is being done to introduce supercomputers and massive parallel computing systems to further improve the accuracy of the NPDT analysis, simulation, and design processes. The NPDTs have provided support for payloads, probes, rovers, and dedicated SC studies and proposals, covering orbital and in-situ types of payloads for volcanic vents off the ocean floor, bore-holes in Antarctica, planetary surface and sub surfaces, Earth and planetary orbits, and atmospheric insertions. The concurrent analysis and design method developed and implemented in the NPDT environment can with slight modifications be applied for developing full spacecraft, automobiles, oil & gas platforms, and other types of large and complex systems.