Lockheed Martin Awarded Patent For A Three-Axis Flap Control System For Reentry Vehicles

The United States Patent and Trademark Office (USPTO) has granted Lockheed Martin Corporation a patent for an innovative, three-axis flap control system that promises to revolutionize the steering of rocket-launched, hypersonic and supersonic reentry vehicles/projectiles.

The advanced design enables a single, simple, low-cost control system to steer the reentry vehicles in all three axes (pitch, yaw, and roll). The three-axis flap control system provides quick response and increased capability and controllability for difficult aerodynamic maneuvers, as well as increased accuracy and weapon effectiveness. The patent (Patent Number 6,502,785 B1) was issued on Jan. 7, 2003.

"This is a significant technological breakthrough," said Roger Teter, director of Fleet Ballistic Missile (FBM) Reentry Systems at Lockheed Martin Space & Strategic Missiles and one of the three principal inventors of the system. "The three-axis flap control system represents a major step toward achieving low-cost, highly maneuverable reentry vehicles for many different high priority precision strike military missions such as defeating hard and deeply buried targets."

The control system employs four aft flush mounted movable flaps (or control surfaces) of uniform design, which decreases machining and manufacturing costs. The flaps are positioned on the vehicle orthogonally, but offset from the vehicle centerline. By actuating various combinations of flaps into the airstream, any desired vehicle orientation may be achieved. The flaps, which are all independently controlled, may be extended (deployed) from the stowed, non-deployed, position to any desired deployed position, providing a variable control system for rocket-propelled projectiles and reentry vehicles.

A demonstration of the flap control system was conducted in October 2002. A prototype three-axis flap control system was fabricated and integrated into a full-scale, fully instrumented Navy Mk 4 reentry body and successfully flown from a Trident II D5 FBM during a routine operational test flight. The three-axis flap control system performed flawlessly during the mission and precisely navigated the reentry body to the intended target. Further tests of the three-axis flap control system are planned for the near future.

In addition, the U.S. Navy now intends to incorporate this new technology development into its Enhanced Effectiveness (E2) Demonstration Program, which will demonstrate a near-term capability to steer a Submarine Launched Ballistic Missile (SLBM) warhead from a Trident II D5 missile to Global Positioning Systems (GPS)-like accuracy. This program is scheduled to start in FY 2004.

In January 2003, Technology Review -- published by the Massachusetts Institute of Technology (MIT) -- for the third consecutive year ranked Lockheed Martin first in the aerospace industry for the technological strength and innovation of its patents. Last year, USPTO issued 199 patents to Lockheed Martin scientists and engineers.

Space & Strategic Missiles is a key element of Lockheed Martin Space Systems Company, headquartered in Denver, Colo., one of the major operating units of Lockheed Martin Corporation. Space Systems designs, develops, tests, manufactures and operates a variety of advanced technology systems for military, civil and commercial customers. Chief products include space launch and ground systems, remote sensing and communications satellites for commercial and government customers, advanced space observatories and interplanetary spacecraft, fleet ballistic missiles and missile defense systems.

Headquartered in Bethesda, Maryland, Lockheed Martin employs about 125,000 people worldwide and is a global enterprise principally engaged in the research, design, development, manufacture and integration of advanced technology systems, products, and services. The Corporation reported 2002 sales of $26.6 billion.

For more information about Lockheed Martin Space & Strategic Missiles, see our websites at: http://lmms.external.lmco.com/

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