

## **e-DEAL ENGINE FOR A MACH 0-MACH 5 CRUISER**

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### **Abstract**

MBDA France developed a large scale engine dedicated at demonstrating the ability of a Continuous Detonation Wave Chamber (CDWC) to be integrated to a turbofan to provide up to 15% more fuel efficiency. Nevertheless, harnessing mechanical power from supersonic flows exiting CDWC without substantial aerodynamic losses is very challenging. In that view, MBDA developed with Von Karman Institute and Purdue University a Wavy Bladeless Turbine concept allowing reducing speed of supersonic flow while extracting substantial mechanical energy from it. By another way, MBDA, in cooperation with the French SME France Col, has prepared a first demonstration of a turbineless propulsion system using electrical air compression. Taking benefit of this background, the concept of an electrically assisted DEtonation wave Airbreathing Liquid fuel engine (e-DEAL) able to power a Mach 5 cruiser is proposed. After a detailed description of e-DEAL concept operation, a possible flight demonstration using a small dedicated vehicle is proposed.

**Keywords:** Detonation Wave Engine, Hybrid Propulsion, Hypersonic Airbreathing Propulsion