Continuous Processing Demonstrated for Propellant Manufacturing

S0663 - Continuous Processing of Composite Propellants (CPOCP)

OBJECTIVE

The CPOCP project developed and demonstrated the capability to continuously process composite propellants using the twin screw extruder. It was part of an international cooperative research and development agreement to develop the processing technology necessary for continuous manufacture of composite propellants which are characterized by the incorporation of energetic chemicals into a plastic matrix. The process improvement activities in France and the US were combined as the two countries worked jointly to improve ingredient feed systems, develop on-line quality control technologies, and advance the understanding of the process, quality, safety, and relationships in the twin screw mixer/extruder. This project has bridged the gap between previously existing research facilities and future production facilities by providing the necessary information to design a prototype production facility.

PAY OFF

This capability can enable the energetics manufacturing industry to reduce the cost of products containing composite propellants and other energetics. Lower costs result from compact systems requiring less real estate and fewer buildings; flexible processes replacing multiple batch mixers and extrusion presses; combination and automation of functions to reduce manpower; and product quality improvements that reduce wastes and costs. Additional benefits include improvements in operational safety and environmental impact. The continuous process is applicable to a wide variety of cast and extruded motors that include small unguided rockets, tactical missile motors, space motors and strategic booster motors.

IMPLEMENTATION

Continuous processing using the twin screw extruder has been demonstrated at the Indian Head Division of the Naval Surface Warfare Center by producing a composite 2.75 inch rocket motor. The manufacture of new products using raw materials which result in improved material characteristics can be processed on the twin screw mixer/extruder which cannot be made by conventional batch methods. The thermoplastic elastomer poly (BAMO/AMMO), an energetic binder, is an example of a new raw material that cannot be processed in larger scale batch mixers due to heat transfer problems. Results of this project were published and made available to US industry. Additionally, the technology was made available through an industry-wide symposia hosted by the joint Army, Navy, NASA, Air Force, Interagency Propulsion Committee. Industry was also invited to participate in the project tests and experiments.

Period of Performance
SEP 1994 to Mar 1999

Stakeholder
ONR Generic

Performing Activity
EMTC

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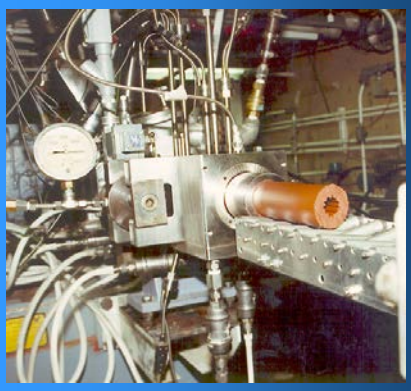

2.75” Inert Rocket Motor Grain

Total ManTech Investment
$2,518,000

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